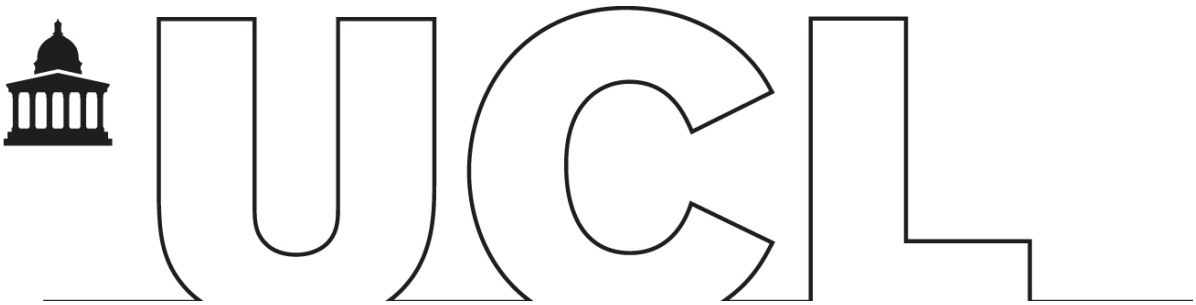

Generating and validating a global framework of Pharmaceutical Development Goals and corresponding indicators

Thesis submitted in accordance with the requirements of University College London for the degree of Doctor of Philosophy

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June 2023

Plagiarism Statement

This thesis describes research conducted at the UCL School of Pharmacy between 2019 and 2023 under the supervision of Professor Ian bates and Professor Felicity Smith. I herein certify that the research described is original and that any parts of the work that have been conducted by collaboration are clearly indicated. I also certify that I have written all the text and have clearly indicated by suitable citation any part of this thesis that has already been published.

Diala Koudmani — Signature

06/June/2023 — Date

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Abstract

Introduction: The imperative of meeting current global healthcare challenges requires advancing pharmacy practice in a global context. This research aimed to design and develop a valid and consented set of global goal-oriented pharmaceutical development frameworks and corresponding indicators to support and guide systematic practice transformation needed to meet the national and global pharmaceutical healthcare demands of changing population demographics.

Methods: Part 1 of the research project

This research used a mixed-methods approach. A series of international expert focus groups were conducted to evaluate the acceptance of a set of proposed global pharmaceutical development goals (PDGs). This was followed by recruiting global pharmacy leaders who participated in a modified nominal group technique to further develop the content of the initial PDGs framework. In a subsequent study, a qualitative modified Delphi approach was employed by a panel of international experts to ensure the credibility and content validity of the framework outputs and generate consensus on a final matrix of the proposed global PDGs.

Part 2 of the research project

A content analysis of the relevant collated data followed by a Delphi process of an international Expert Group was performed to identify and establish initial consensus on potential indicators aligned with the published PDGs framework. Delphi method's outcomes were used to conduct a global cross-sectional online questionnaire to assess and validate the relevancy and availability of the proposed indicators.

Results: Part 1 of the research project

A globally validated and consented set of systematic PDGs (systematic framework) for development comprising 21 PDGs along with their descriptions and mechanisms to shape and guide global pharmacy practice transformation.

Part 2 of the research project

A set of correlated and validated transnational evidence-based indicators that will monitor national-level progress and measure the advancement of the 21 PDGs worldwide across workforce/education, practice, and pharmaceutical science.

Conclusion: A systematic and globally consented set of PDGs, along with evidence-based progress indicators, was generated to monitor the sustainable advancement of pharmaceutical practice and support a needs-based roadmap for pharmacy practice transformation.

Impact Statement

Ways to meaningfully advance pharmacy practice and more effective pharmaceutical services has become imperative in the context of the current global health challenges, such as changing population demographics and increased medicines complexity. It is critical that we are able to articulate a clear vision to shift professional workforce development and national medicines policy to meet the goals of Universal Health Coverage.

For this to be achieved, a credible systematic framework, with transnational validity, is required to drive change. This work provides evidence for a validated development framework that will link the pharmaceutical workforce with pharmaceutical healthcare provision in order to support effective and sustainable national healthcare systems.

This research produced the first global consensus for a systematic, goals-oriented policy development framework that can be adopted and adapted to drive the pharmacy practice transformation, based on credible country-level metrics, to monitor global progress in the pharmacy context. Findings from this research fill a critical gap in the exiting literature regarding globally useful indicators to monitor the advancement of practice and services.

In addition, this work demonstrates innovation in research methodology, and is characterised as evidence-driven global development work focussed on outcomes. The research-driven methodology that was used to construct the global framework and indicators can now serve as a research tool to address other health policy questions.

The transformative framework described here acts as a mapping tool for needs assessment, identifying national priorities that can be aligned with the framework goals (nationally, regionally and globally). The framework facilitates the development of progress roadmaps and promotes the sharing of best practices across regions. The outcomes can be used to construct a data dashboard as a global measure of development of professional practice transformation over time.

The framework of Development Goals acts as a supportive, transformative tool to guide policymakers in the interest of practice-related national strategic planning, new policies and regulations. Hence, there is an intrinsic application to reinforce transnational cooperation and enhance the professional scope of practice across all settings and sectors.

The findings of this research have been published and disseminated through international congresses and digital events to the pharmaceutical workforce across education, practice, and science worldwide.

The international leadership community has started testing and implementing the framework in several countries. This is clear evidence that the framework and indicators are valid and based on a solid foundation of evidence, adaptable to each country's medicines healthcare needs, and reflect solutions to real-world problems.

This research highlights future opportunities for continued development and provides pragmatic solutions for advancing and transforming pharmacy practice and services delivery. The work will ensure that pharmaceutical practice and services will systematically meet global healthcare demands.

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List of Abbreviations

CVD(s): Cardiovascular Disease(s)

CV: Cardiovascular

DG(s): Development Goal(s)

DM: Diabetes Mellitus

IRG: Internal Reference Group

ISO: International Organization for Standardization

FIP: International Pharmaceutical Federation

MOs: member organisation(s)

NGT: Nominal Group technique

PC: Pharmaceutical Care

PCNE: Pharmaceutical Care Network Europe

PCSs: Pharmaceutical Care services

PDGs: Pharmaceutical Development Goals

PHC: Primary Health Care

PDGs: Pharmaceutical development goals

PWDGs: Pharmaceutical Workforce Development Goals

SIG: Special Interest Group

ToC: Theory of Change

UHC: Universal Health Coverage

UN: United Nation

WDGs: Workforce Development Goals

WHO: World Health Organisation

YPG: Young Pharmacists Group

Glossary

Development Framework: an evidence-based tool to support professional development by mapping against standards and practices[1].

Evidence-driven approach: utilizing obtained evidence/data to inform decisions based on data analysis and interpretation[2].

Needs assessment approach: is a process for determining the needs, or "gaps," between a current and desired outcome[3].

Quality indicators in healthcare: address measurable aspects of relevant systems, processes and outcomes. They provide insight into the performance of care providers and are used to stimulate continuous improvement of patient care[4].

Transformative framework: guide the design and implementation of countries, systems, agencies, or stakeholders needs assessment to lead to the intended transformation and inform decision-making and actions[5].

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List of publications

Publications

- International Pharmaceutical Federation (FIP). The FIP Development Goals: Transforming global pharmacy. The Hague: International Pharmaceutical Federation; 2020. https://www.fip.org/file/4793

- **Koudmani, D., Bates, I. The development and validation of a globally applicable pharmaceutical development framework** European Association of Faculties of Pharmacy (EAFP) Conference Proceedings 2022: Towards Pharmacy 5.0 Education. (2022). Pharmacy Education, 22(3), p. 1–35. https://doi.org/10.46542/pe.2022.223.135 (Abstract publication).

Oral presentations

- **"The development and validation of a globally applicable pharmaceutical development framework".** Oral presentation at the Annual European Association of Faculties of Pharmacy (EAFP), 11th - 13th, May 2022, Valetta, Malta.

- **"Creating development goal indicators – bridging data and outcomes (Southeast Asian Region)".** Six Oral presentations at a series of Digital events held by the International Pharmaceutical Federation (FIP), The Hague, Netherlands.

Creating development goal indicators – bridging data and outcomes (Americas Region)
Creating development goal indicators – bridging data and outcomes (European Region)
Creating development goal indicators – bridging data and outcomes (African Region)
Creating development goal indicators – bridging data and outcomes (Southeast Asian Region)
Creating development goal indicators – bridging data and outcomes (Eastern Mediterranean Region)
Creating development goal indicators – bridging data and outcomes (Western Pacific Region)

- **Koudmani, D.,** Bates, I. Generating and validating global indicators and a monitoring framework for the FIP Development Goals. Oral presentation at the PhD research day, 2023, UCL School of Pharmacy, UK. 21st April 2023.

Poster presentations

- **Koudmani, D.,** Bates, I. The development and validation of a globally applicable pharmaceutical development framework. Poster presentation at the PhD research day, UCL School of Pharmacy. 27th May 2022.

- **Koudmani, D.,** Bates, I. The development and validation of a globally applicable pharmaceutical development framework. Poster presentation at the ULLA Summer School, July 2022, Upsala, Sweden.

- **Koudmani, D.,** Bates, I, Generating and validating global indicators and a monitoring framework for the FIP Development Goals. Poster presentation at the Annual European Association of Faculties of Pharmacy (EAFP), 17th - 19th, May 2023, Valencia, Spain.

Certificates

Associate Fellow of the Higher Education Academy, United Kingdom, November 2022.

Introduction

Enhancing pharmacy practice and efficient pharmaceutical services has become essential in addressing the current global health challenges related to changing population demographics, ultimately leading to improved patient outcomes in a global context (K. Galbraith et al., 2017).

Nowadays, the pharmacy profession has shifted towards patient-centred care, necessitating the transformation and advancement of pharmacy practice and service delivery. This entails the need to focus on developing skilled and competent pharmacists throughout their careers and sectors, keeping up with global pharmaceutical innovations and technologies, and ensuring sustainable pharmacy practice and services. In line with this need, professional development frameworks are widely advocated to map and measure practice standards and demonstrated their effectiveness in driving improvement and making significant contributions at both national and global scales (Jackson et al., 2018; Udoh et al., 2021).

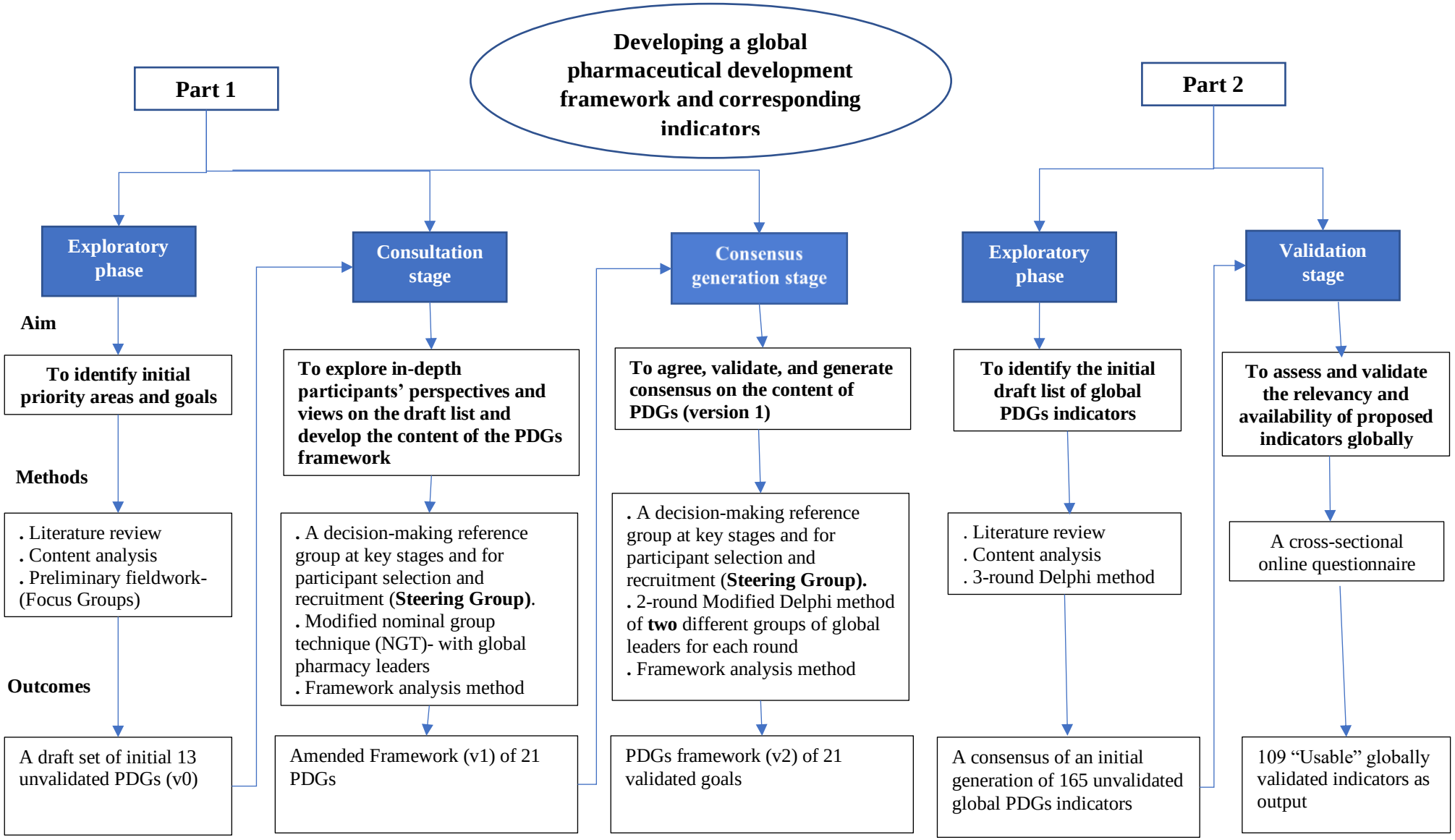
Several development frameworks have been created with the aim of advancing and transforming the pharmaceutical workforce at both national and global levels. For example, the global Pharmaceutical Workforce Development Goals (PWDGs) and the Global Advanced Development Framework (GADF) are validated flexible and effective frameworks supporting the systematic professional development and transformation of the pharmacy workforce and have been implemented and tested by different countries around the world (International Pharmaceutical Federation, 2017b, 2020b).

In the existing data, no single professional framework adequately fits all pharmacy practice contexts and stages to guide and support the global transformation of the pharmacy profession using needs assessments approach. Needs assessments approach is usually employed to determine what the current needs/gaps, assess and evaluate priorities to reach the desired outcomes (Jackson et al., 2018).

Therefore, there is an evident need to develop a universally applicable framework that can be adopted and adapted to facilitate and guide the transformation of pharmacy practice in alignment with the healthcare needs and based on countries' needs to fulfil the gap in the profession in this area. In addition, the lack and absence of globally validated quality indicators are also recognised in the profession.

Therefore, this research project sought to determine the feasibility of developing and validating a global development framework and progress indicators for a systematic pharmacy practice advancement, in order to identify the core set of principles "Goals", which could then be adapted to each country's needs.

Thesis structure



Chapter 1: Background

The role descriptions of pharmacists and pharmacy services have been clearly articulated after the definition introduced by Hepler and Strand regarding the concept of "pharmaceutical care" (Hepler & Strand, 1990). The concept has developed and re-shaped the pharmaceutical care services towards "patient-oriented care" and away from "product-oriented services". Also, it has helped keep up with the global trend of expanding and endorsing pharmacists' social and clinical roles. The importance and need for change, along with the challenges in building quality services, have also been declared across the global pharmacy society. Various models of pharmaceutical care services (PCSs) have been developed and implemented to meet with the current orientation of the pharmaceutical care concept, and the impact of the outcomes of these services have been reported on different aspects (clinical, economic, humanistic) across different countries (Lee et al., 2016).

1.1 What is Primary Health Care (PHC)?

The World Health Organization (WHO) has addressed Primary Health Care as "a whole-of-society approach to health and well-being centred on the needs and preferences of individuals, families and communities" (WHO, 2019b). In Almaty, Kazakhstan, in 1978, the International Conference on primary health care declared the importance of Primary Health Care, where leaders from 134 countries committed to "Health for all" (Duggan, 2020; Hone et al., 2018).

The Declaration of Alma-Ata reaffirmed some principles and values on health definition, which is a state of complete physical, mental and social wellbeing, and not only the absence of diseases. These principles and values are fundamental human rights, and the existing inequality in the health status amongst people across the world due to political, social, and economic factors is unacceptable. Furthermore, people have the right and responsibility to participate in the planning and implementation of their health care.

"Health a human right, equity an essential value, and community participation a necessary condition for a just society". (International Conference on Primary Health et al., 1978)

Primary health care has been set to ensure people receive whole-person health needs throughout the life course, which also includes the aspects of physical, mental, and social health and wellbeing, and not only to cover a set of specific diseases. It is manifested by providing people with different standard levels of health care ranging from promotion and prevention to treatment, rehabilitation and palliative care, as close as possible to people's daily life settings and environment (Duggan, 2020; WHO, 2019b).

Primary health care has been proven to show high efficiency in identifying the leading causes and risks of poor health and well-being at the present time. Also, it has shown a good response to the emerging challenges that threaten human health and well-being in the future, such as (economic growth, demographic and environment variations, epidemics, and antimicrobial resistance) through addressing such effective health measures which help improve and strengthen the health system (WHO, 2019b).

Moreover, evidence has shown that high-quality PHC reduces overall healthcare costs and improves patient safety by decreasing the number of hospitalisations. For example, PHC teams can enhance patient safety by improving the appropriate use of medicine, which may decrease the rate of hospital admission, thus not only achieving cost-efficiency but also preventing the possible risks related to hospital care (WHO, 2018b).

Primary health care plays a pivotal role in the sustainability of the health system in terms of delivering high-quality care and ensuring integration and coordination between different delivery levels all together to establish a high-quality care environment. Moreover, the prevalent culture and environment of the health system can greatly impact the quality of PHC. Accordingly, several quality factors can be considered in order to improve the quality of care at the system level to create an appropriate environment in many settings. Some of the health system factors that influence the quality of PHC are: the financing mechanism to support care; a well-qualified workforce to provide high-quality care; accountable national mechanisms and strategies to ensure primary care facilities are well-equipped and accessible; provision of good-quality medicines, medical devices and health product; health information system based on evidence to measure and guide quality of care across health systems; and national quality policies to help organise national efforts and achieve progress (WHO, 2018b).

1.1.1 Challenges to global primary health care

There are several barriers and challenges that hinder the appropriate delivery and equity of healthcare needs by PHC services across populations. “Barriers to access” is one of the identified barriers, which posits attributes of services and abilities of people as determinants of access. A recent conceptual framework has identified the attributes of services, which are approachability, acceptability, availability and accommodation, affordability, and appropriateness, as key elements of services contributing to access to services. Similarly, the abilities of people can be characterised by the ability to perceive, the ability to seek, the ability to reach, the ability to pay and the ability to engage. Consequently, any problem that can happen because of attributes of services or people’s abilities can cause a barrier to access, fig 2 (Corscadden et al., 2017).

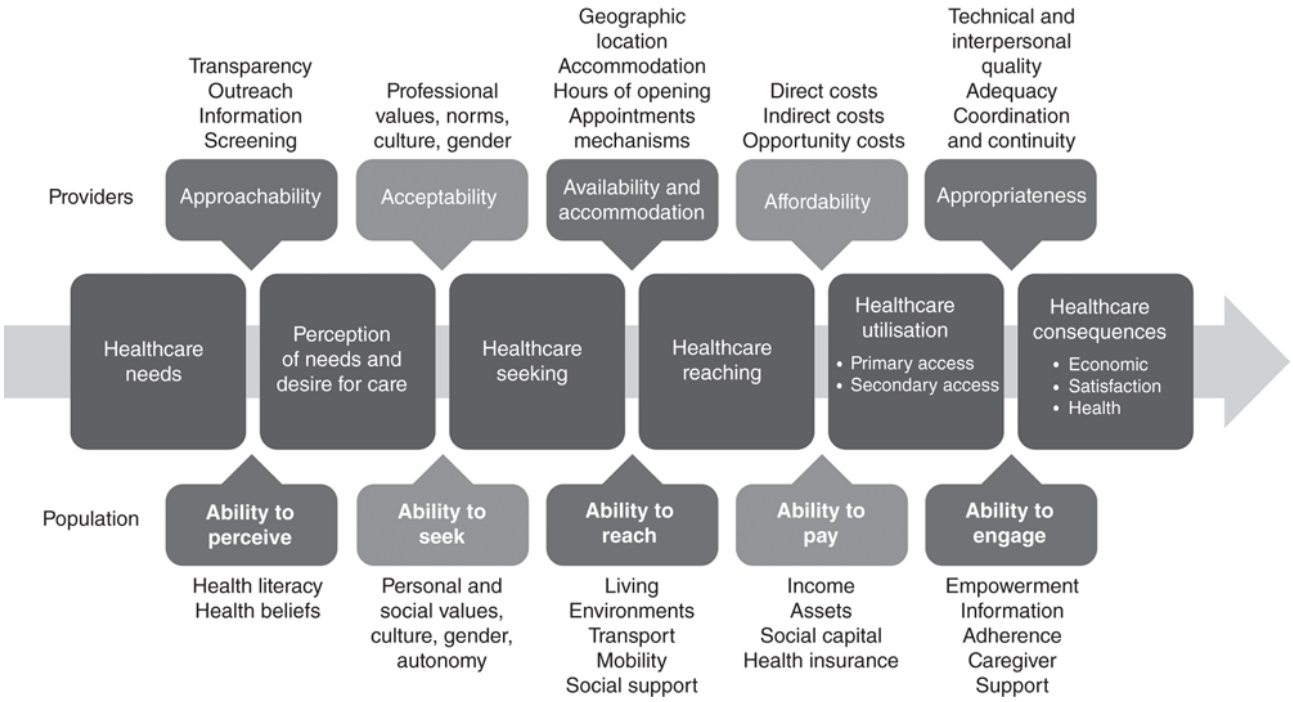


Fig. 1. Conceptual framework of access to health care (Adapted from (Levesque et al., 2013)).

Other barriers have been cited from the clinical practice, such as workload, motivation and attitudes of healthcare professionals, lack of skills and knowledge of healthcare professionals, problems related to the mutual relationship between the healthcare providers and patients, and lack of confidence in the efficiency of the clinical interventions (Rubio-Valera et al., 2014). Moreover, it is important to avoid barriers related to the dissemination and implementation of science to facilitate verifying the effectivity and efficiency of clinical guidance. Community factors should also be taken into consideration, including cultural and community context. Finally, public policy factors, including socioeconomic and political context, could affect the distribution of resources as well as people's social position within societies, where it can be noticed mainly amid the private and public systems (Rubio-Valera et al., 2014).

At present, despite the health benefits that have been proven from access to comprehensive PHC, there is a lack of research which detect other implied barriers that encounter the PHC, and further work should be done to tackle the PHC problems and to highlight them as a priority (Rao & Pilot, 2014).

1.1.2 Primary Health Care and Universal Health Coverage (UHC)

Referring to Alma-Ata Declaration, several broad principles were outlined, some of which drive to achieve the modern UHC agenda. The Declaration called for health care to be "made universally accessible for all". In 2018 the WHO sponsored Global Conference on Primary Health care in Astana renewed this universal commitment to achieve UHC by 2030. Besides, WHO considers a stronger

PHC central to delivering effective and sustainable UHC and achieving the health-related Sustainable Development Goals (SDG3) as promised (Duggan, 2020; Hone et al., 2018; WHO, 2018b, 2019b).

In an official collaboration with the WHO, the International Pharmaceutical Federation (FIP) is committed to supporting and delivering the Declaration of Astana to improve global health considering the pharmacy profession at the core. The FIP endorsed the delivery of PHC, across all WHO regions, through starting initiatives for transforming pharmacy to strengthen PHC. This commitment first showed during the first FIP regional conference for the Eastern Mediterranean Region focusing on "Transforming pharmacy for better primary health care" in Jordan in April 2019. The FIP has envisioned the improvement in PHC delivery by pointing out the necessity of the transformation of the pharmaceutical workforce and education, practice, and science to meet the national and global evolving health needs and achieve the UHC. Therefore, the FIP is currently working on developing several tools and transformation programmes aligned with the country's needs within the regions to support and facilitate the process of transformation (Duggan, 2020; International Pharmaceutical Federation, 2020a).

The goal of UHC is to ensure achieving equity in access to health services for all people and securing quality and financial protection. Achieving UHC requires healthcare systems geared towards PHC since PHC has been proven to be the best-value way in terms of equitability, efficiency and cost-effectiveness to improve the health of populations (Tao et al., 2020; WHO, 2018a).

1.1.3 The challenges of implementing Universal Health Coverage

Many challenges have faced countries that hindered their work to implement UHC for all. These include: national and global financial crises, changes in disease burden (especially non-communicable and long-term diseases), medicines supply and shortages, socioeconomic status, difficulty in delivering health services to remote areas, demographic shifts, ageing population, population displacement due to economic and political instability, pandemics, and others (Tao et al., 2020; WHO, 2018a). As a result, some countries have been forced to increase seeking help provided by private sectors, which in turn might restrict equitable access to health systems.

Most countries have "mixed health systems", meaning both public and private providers contribute to delivering health-related products and services. Generally, countries face challenges respecting the private sector and UHC due to the diversity and complexity of the private sector entities. In countries with well-developed private sector regulation, governments use a set of regulatory and financial policy tools to convey the delivery of health services in favour of public benefits. Conversely, in countries where the regulation over the private sector is limited, the healthcare system is not

comprehensively operating consistently to feed into the aim and objectives of a country' health system (WHO, 2018a).

In the global context, there is an urgent need to tackle this long-standing dilemma and bridge the policy gap to improve the capacity of all countries to manage private and mixed health systems effectively. Therefore, ensure that all providers (public and private sectors) work together to achieve a country's goals for UHC (WHO, 2018a).

1.1.4 The role of pharmacists and pharmacy in PHC and UHC

In many countries, pharmacy practice is going through a paradigm shift that focuses on new responsibilities and roles given by well-trained pharmacists to improve patient care. Since pharmacists are often the first point of contact for people in communities, they have become significantly engaged in PHC and provided access to primary health services (Bader et al., 2018; Duggan, 2020; Hughes et al., 2017)

Pharmacists' role has been widely expanded, and pharmacists are now involved in delivering public health through providing services and programmes ranging from people seeking advice concerning their treatments and diseases to include more complex services. For example, pharmacists provide medication adherence, disease management and treatment optimisation in people with chronic disease services; involve in referring at-risk patients for secondary care; contribute to PHC by providing health programmes such as smoking cessation, regular screening and monitoring of disease control, and immunisation programmes. Most importantly, pharmacists play a potential role in facilitating collaboration with other health care workers to improve patient outcomes and the quality of PC services (Duggan, 2020; Hughes et al., 2017).

Although pharmacists, particularly community pharmacists, have been seen as one of the most accessible health care providers (Duggan, 2020; Hughes et al., 2017), several barriers have been recognised that may limit utilising the capabilities of pharmacists more effectively and lead to underutilisation of pharmacists services. Lack of clinical autonomy and fair remuneration system are significant barriers to hinder the expansion of new services led by pharmacists. Fair remuneration strategies may contribute to advancing the profession and support expanding the role of community pharmacists to become more involved in primary care. Of note, poor collaboration with other health care providers and lack of a shared vision about the services provided may massively affect the aimed outcomes of services. Ensuring clear communication among healthcare team members, including the patient, is essential for optimal patient care and safety (Hughes et al., 2017).

As professional expertise and have capabilities to change from providing based on products services to more advanced services based on patients assessment, pharmacists' roles are in alignment with the aims of PHC to achieve equal access to services, safe and high-quality care, integration of services, ensure optimisation and rational use of medicines which in turn lead to achieving UHC (Bates et al., 2020; Hughes et al., 2017).

1.2 Understanding the Pharmaceutical Care concept

According to the definition given by Hepler and Strand in 1990, Pharmaceutical care (PC) is "the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life" (Al-Quteimat & Amer, 2016; Austrian Federal Ministry of Health, 2010; Hepler & Strand, 1990). These outcomes include treatment of a disease; elimination or reduction of patients' symptoms; stopping or slowing disease progression; or preventing diseases or symptoms (Austrian Federal Ministry of Health, 2010; Hepler & Strand, 1990).

In 2013, the board of the Pharmaceutical Care Network Europe (PCNE) organised a workshop to redefine and paraphrase the definition of PC to have a shorter and simpler definition and exclude any confusion that remains about the term used, and facilitate dissemination. Accordingly, the updated definition of PC is "Pharmaceutical care is the pharmacist's contribution to the care of individuals in order to optimise medicines use and improve health outcomes" (Allemann et al., 2014).

Pharmaceutical care is based on the mutual relationship between the patient and the healthcare providers who are in a position to deliver care to patients. This concept ensures involving patients' participation in their medical treatment decisions and enhances the collaboration of healthcare providers across various disciplines (Hepler & Strand, 1990). For example, a pharmacist collaborates with the patient and other healthcare professionals in developing, implementing, and monitoring a treatment plan designed to achieve specific therapeutic results for the benefit of the patient. Pharmaceutical care includes the following essential functions: assessment of the patient's medical problem; identifying potential and actual drug-related problems; resolving actual drug-related problems; preventing drug-related problems; and follow- up evaluation (Al-Quteimat & Amer, 2016; Austrian Federal Ministry of Health, 2010; Hepler & Strand, 1990; International Pharmaceutical Federation, 2019a).

Pharmaceutical care activities, although the extent of the engagement of pharmacists in patient care may vary according to the applied health system in countries in which they practice, include medication dispensing, providing drug information, patient counselling, drug monitoring, parenteral nutrition preparation, adverse drug reaction monitoring, medication reconciliation, drug

protocol/guideline development, medical rounding with the health care team, and performing admission drug histories (Al-Quteimat & Amer, 2016; International Pharmaceutical Federation, 2019a).

Allemann et al. (2014) have outlined the definition of PC in the figure below (fig. 2), with examples to illustrate each domain (provider, recipient, subject, outcome, and activity).

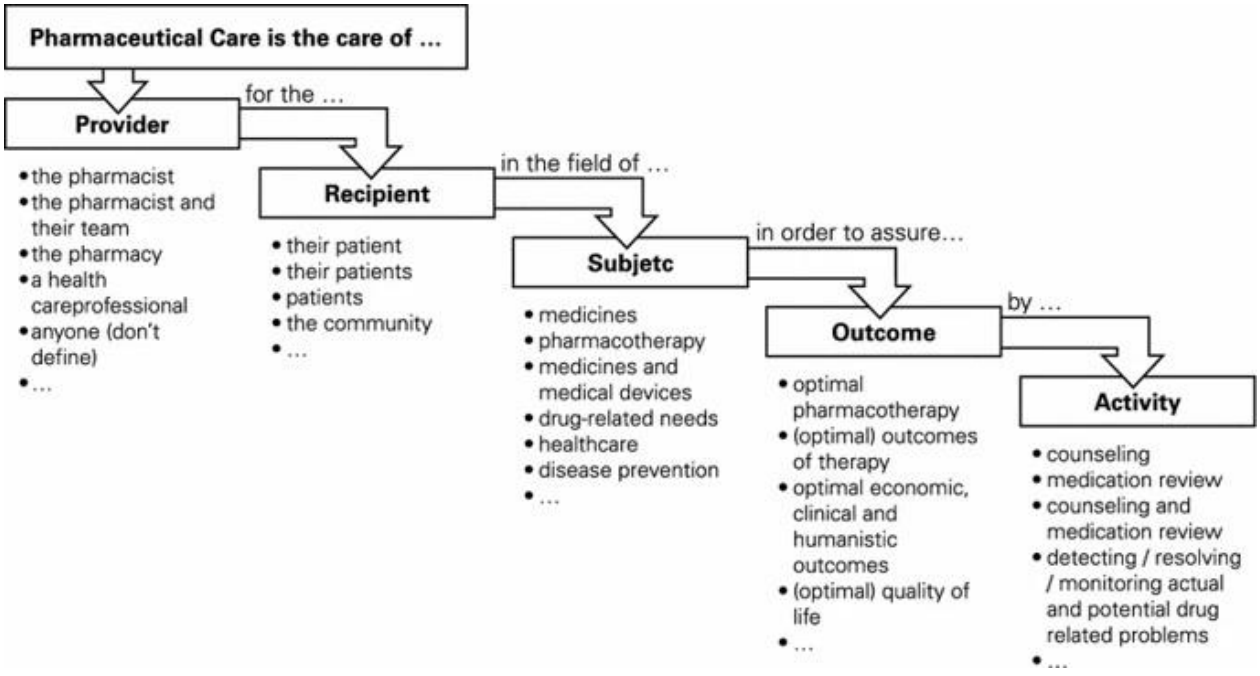


Fig. 2. Illustration of the pharmaceutical care definition

In summary, PC is an imperative component of health care and should be integrated with other components. The mutually beneficial relationship in which the patient gives authority to the health provider, and in turn, the provider commits and accepts responsibility constitutes the fundamental relationship in PC. These fundamental objectives, processes, and shared relationships of PC exist in order to fulfil the ultimate aim of PC to achieve the direct benefit of the patient regardless of the practice setting and professional background (Austrian Federal Ministry of Health, 2010).

1.2.1 Pharmaceutical Care in light of the evidence-based approach

Based on solid evidence, it was found that PC has shown improvement in health outcomes and cost-effective treatment. Practising the above-mentioned pharmaceutical activities with the evidence-based approach will improve the quality and efficiency of the provided services (Al-Quteimat & Amer, 2016). Evidence-based practice is essential for pharmaceutical care services to be more efficient, up-to-date, and relevant to patients. The need for healthcare providers to adopt an evidence-based approach to their daily practice has become imperative (Al-Quteimat & Amer, 2016).

Practising pharmacy in light of the evidence-based approach will improve the professional skills of the practitioner in favour of patient care. In order to apply the concept of evidence-based pharmaceutical care, pharmacists require training and continuous support to develop and advance their practical skills to provide high-quality PC. Pharmacy students should be educated and trained on how to apply their theoretical knowledge into practice and patient care, starting from the undergraduate level. For example, conducting training on research work, literature review, and evidence-based approaches would be more helpful in preparing pharmacists to practice the evidence-based PC proficiently (Al-Quteimat & Amer, 2016; Heidari K., 2014).

Several evidence-based studies and reviews have pointed out the effective role of PC in improving patient care with more cost-effective therapy in both inpatient and outpatient settings by implementing several care programmes. The conclusion of a comprehensive systematic review of inpatient pharmacy services shows that pharmacist-provided care has significantly decreased the number of hospitalisations and emergency visits within 30 days of discharge, reflecting positively on the cost-outcome therapy (Shekelle et al., 2013). Other comprehensive systematic reviews highlighted the pivotal role of pharmacist-provided direct patient care services in enhancing patients' knowledge, medication adherence and compliance, combined therapeutic outcomes (Blood pressure, INR, total cholesterol, etc.) and hence enhance the combined patients' safety endpoints (falls, adverse events, polypharmacy, etc.) and improve the quality of life (Al-Quteimat & Amer, 2016).

Embrace the evidence-based approach into a dynamic daily PC practice will help attain high quality and more efficient PC; however, more work and efforts are still needed to encourage this concept towards a more professional career in a global context. At the present time, health care interventions must be built upon scientific-based evidence resulting from valid and reliable quality research and could be adapted and used as a guide to fit each individual patient's circumstances. Evidence-based PC has proved to advance the quality of the pharmaceutical services PC and generate significant cost avoidance when assessed under well-defined criteria and conditions (Al-Quteimat & Amer, 2016; Gallagher et al., 2014).

1.2.2 Barriers limiting the implementation of the pharmaceutical care principles

Pharmaceutical care has increasingly grown and become an important goal but not yet comprehensively implemented in practice to fulfil the aim of a good PC practice due to several barriers that limit the advancement of the services provided (Austrian Federal Ministry of Health, 2010). The most frequently mentioned barriers are different awareness and education levels among healthcare professionals and a lack of adequate cooperation among healthcare providers. Additionally, the lack of appropriate systems for remuneration, unclear pharmacists' role description,

limited access to patient records by pharmacists, and absence of efficient exchange information among healthcare professionals to build a robust inter-professional network to ensure continuity of care provided (Austrian Federal Ministry of Health, 2010; Lee et al., 2016).

Other barriers that could hinder the implementation of the evidence-based PC approach which may be due to pharmacists themselves, such as professional and basic knowledge; motivation and attitude; clinical skills; and skills in research work. Some other potential barriers which could be classified as environmental factors are more related to the applied health system in terms of providing healthcare professionals with adequate support and reward systems, libraries, evidence-based resources, and specialised training courses (Al-Quteimat & Amer, 2016; Austrian Federal Ministry of Health, 2010).

1.2.3 Some initiatives and programmes of pharmaceutical care

There are some variations and different aspects amongst countries which provide pharmaceutical care and services; some of the following examples illustrate the extent of variations with different focuses and the extent of pharmacists' involvement in providing these services (Austrian Federal Ministry of Health, 2010).

In *Sweden*, researchers in pharmaceutical care put their efforts into developing a classification system for documenting drug-related problems and pharmacy interventions in addition to developing and implementing a specific counselling technique where patient medication profiles were introduced into several pharmacies. Similarly, in *Finland*, patients must be provided medication counselling by pharmacists by law, and since the year 2000, a noticeable improvement in medication counselling rates have been observed (Austrian Federal Ministry of Health, 2010).

In *Denmark*, PC and research work in pharmacy practice are well developed. In addition to medication counselling and other point-of-care measurements (blood pressure, blood glucose, cholesterol), they have developed several PC practice models to ensure the best PC practice. For instance, the "self-medication & self-care model" and "pharmaceutical care at-the-counter model" were designed to focus on the identification, solving and prevention of drug-related problems related to certain diagnoses (Austrian Federal Ministry of Health, 2010).

In 2005, the National Health Service (NHS) in *England* offered seven essential services to be implemented in all NHS pharmacies related to PC and agreed with the quality assurance framework. Some of these services include the controlled administration of methadone and smoking cessation programmes. In *Germany*, cognitive pharmaceutical services have been implemented since 2003, as most of the community pharmacies in Germany are engaged in this initiative now. Cognitive pharmaceutical services focus on community pharmacists' role in providing clinical and professional

assistance to patients and other health care providers to promote effective and safe medicine treatment (Austrian Federal Ministry of Health, 2010).

In general, pharmaceutical services are classified into "**Essential services**" (e.g., dispensing, point of care measures, waste collection, counselling, providing leaflets to the patients) and "**Advanced services**" (e.g., pharmaceutical care, methadone substitution) (Austrian Federal Ministry of Health, 2010). Advanced services usually need specific training and are provided in consultations with appointments. In respect of pharmaceutical care, also two types could be distinguished; 1) basic PC projects that are purposed towards many patients; or 2) a "deluxe approach" which relies on evidence-based data to apply in practice and the outcomes are measured and assessed based on well-defined indicators. The latter focuses on a small number of patients compared to the basic PC, which allows reaching many patients, but high-quality data are more likely difficult to obtain (Austrian Federal Ministry of Health, 2010).

Many projects and initiatives programmes are developed across Europe to ensure the delivery of a responsible provision of pharmaceutical therapy, which are structured differently across countries. Following the definition of Hepler & Strand, the overall pharmaceutical care approach is quite hard to fully implement due to the different healthcare and pharmaceutical systems across countries. Moreover, cultural and traditional differences may hinder the implementation of an identical PC approach. Therefore, each country has to prioritise its needs and adapt PC actions that fit into these needs (Austrian Federal Ministry of Health, 2010).

Establishing and maintaining efficient pharmaceutical care services needs a comprehensive and integrated health care system within different health settings. The primary healthcare system is an imperative component of the health system, and several PC services are implemented within it (Hawksworth & Chrystyn, 1998).

1.3 Pharmacy workforce development (unequivocal need)

A Universal Truth: No Health Care without Workforce –WHO

The global health workforce is the driving force for sustainable health systems, and the competency of health workers indicates the service delivery qualities and, eventually, population health outcomes (Bates et al., 2020). Therefore, the global health workforce needs to be adaptable, flexible, well-distributed, and capable of proving their competencies and practice skills to enhance patients' health and improve health systems (Bader et al., 2018; Duggan, 2020). Most importantly, equipping the health workforce with the needed competencies and capabilities is essential to attaining UHC and the

health-related United Nations Sustainable Development Goals (SDG3) (Bader et al., 2018; Bates et al., 2020).

The Pharmacy profession has currently evolved and shifted from traditional medicine-centred (dispensing and medication compounding) to focus on advanced patient-centred care (Uzman et al., 2019). Besides, health systems are continually changing and influenced by the ageing population and multi-morbidities, the epidemiological shift in patterns of disease, and the new scientific innovations in technology and medicines. These changes have put more pressure on the pharmacy team in order to fulfil the objectives of the new orientation of the profession and handle the responsibilities of their new role. Consequently, pharmacy-related workforce development has become an unequivocal need to ensure providing highly integrated and advanced pharmaceutical health services to patients through the responsible use of medicine and effective medicine optimization and utilization (Bader et al., 2018; Bates et al., 2020).

1.3.1 The International Pharmaceutical Federation (FIP)

The International Pharmaceutical Federation (FIP) has continuously worked towards advancing pharmacy education as well as pharmacy workforce development and transformation. In 2016, the FIP successfully held the Global Conference on Pharmacy and Pharmaceutical Science Education under the theme – "Creating a global vision for a global workforce". In this event, global health and pharmacy leaders from across the globe gathered to approve the milestones for the global transformation in the context of pharmaceutical education and workforce development of pharmacists and pharmaceutical scientists. Following extensive consultation, the roadmap for the global transformation was created by declaring a clear global vision for transformative pharmacy and pharmaceutical sciences education and workforce development (Bader et al., 2018; International Pharmaceutical Federation, 2017b).

The principal outcomes were three milestone documents presented and adopted at the global conference, which are the Global Vision for Education and Workforce; the Pharmaceutical Workforce Development Goals (PWDGs); and the Statements on Pharmacy and Pharmaceutical Sciences Education (the Nanjing Statements) (International Pharmaceutical Federation, 2017b).

FIP, in line with the WHO, is continually monitoring and evaluating the global pharmacy workforce and advocates for enhancing the role of pharmacists in the WHO health agenda. Also, FIP has called on countries/regions to support workforce planning and embrace the workforce development and transformation vision and goals to reshape pharmaceutical policy formation for the advancement of practice, science, and education (International Pharmaceutical Federation, 2018).

1.3.2 The FIP Pharmaceutical Workforce Development Goals

As a result of the Global Conference in Pharmacy Education in 2016, the FIP developed 13 Pharmaceutical Workforce Development Goals (FIP PWDGs) in alignment with global health challenges for the health workforce aligned with WHO Human Resources for Health strategies. These series of systematic workforce development goals are measurable, feasible and tangible that aim to promote adequate workforce planning strategies and have a role as indicators to measure progress towards global implementation of the pharmaceutical workforce vision. Also, these goals are aligned with the global initiatives of the WHO Human Resources for Health (HRH) and the UN sustainable development goals (Bader et al., 2018; International Pharmaceutical Federation, 2017b).

The FIP PWDGs is a conceptual framework that aims to lead the transformation of the pharmacy workforce from different perspectives. The 13 PWDG are grouped into three clusters: 1) academy: which focus on schools, universities, and education provider; 2) professional development: which focus on the pharmaceutical workforce; and 3) systems: which focus on policy development, governmental strategy and planning, and monitoring systems (Bader et al., 2018; International Pharmaceutical Federation, 2017b).

These goals have established the milestones for impactful global transforming for pharmacy education and workforce development to form a consistent structure that helps meet future workforce development needs according to global, regional, and national demands (Bader et al., 2018; International Pharmaceutical Federation, 2017b).

1.4 Influence of epidemiological changes and demographic variations and other factors on health systems

Numerous intrinsic factors and trends will continue the upward pressure on quality healthcare systems (Wright et al., 1998). Because of the current epidemiological transitions towards augmented non-communicable disease and the changing population demographics in many countries, healthcare services have to tackle increasing ageing populations, multi-morbidity and other complex cases, where establishing good-quality care provision is vital (WHO, 2018b).

In addition, with the current global economic changes, massive demographic shifts, changes in population distribution and increasing health impacts of climate change, new challenges have been raised to increase the health challenges facing humanity. Unfortunately, many people will not have equal access to adequate and effective health care, and then many governments will not be able to provide UHC. Clearly, it is imperative for all countries to focus on promoting and investing in a

primary-care-centred to reach equity in health access and achieve universal health coverage (Rao & Pilot, 2014; Wright et al., 1998).

1.5 Chapter summary

This chapter has described the emergence of the pharmaceutical care concept in the area of pharmacy practice and highlighted the challenges faced in implementing this concept. Also, it has elucidated the necessity of establishing a multidisciplinary integrated primary health care system to ensure achieving equity in access to care services and UHC.

It is also worth noting the essential role of pharmacists in delivering and improving pharmaceutical services with the challenges they face during their professional journey. Most importantly, investing in the pharmaceutical workforce has become imperative to ensure providing high quality and advanced pharmaceutical services to improve patient outcomes, advocate for transformative pharmacy and pharmaceutical science, and maintain a sustainable health system.

The next chapter reviews the existing literature conducted, as an evidence-based example, to study the global impact of the delivery of some pharmaceutical services currently available on the health system. In addition, it discusses the global measures and indicators employed to monitor the performance of these services.

Chapter 2: Literature Review

2.1 Introduction

This literature review was undertaken to provide a global overview of some evidence-based impactful pharmaceutical care services and reinforce the narrative in the previous chapter. The services under review focus on tackling and preventing major non-communicable diseases (NCDs) and promoting the role of pharmacists. NCDs were selected for evaluation due to their significance as a WHO health imperatives and their status as the leading cause of global mortality, representing 71% of all deaths, with 85% of premature deaths concentrated in low and middle-income countries. Specifically, the review focused on cardiovascular diseases and Diabetes Mellitus, which are recognized as major global health concerns, imposing substantial health implications on patients and incurring significant costs for healthcare systems. Besides, the review helped identify the indicators applied to monitor the performance of these services provided. This chapter includes the research question chosen for the literation review and a systematic illustration of the search strategy performed. Relevant results are presented, and the literature review objectives are addressed. Finally, the findings and gaps identified in the literature are discussed and utilised to achieve the research project aim for designing and developing a globally relevant, goal-oriented pharmaceutical development framework and measuring indicators.

2.2 Literature review question and objectives

A literature review was conducted to answer the question: "What is the global impact of pharmacist-led Medication Management Therapy services on the management and prevention of the major non-communicable diseases (NCDs), and what global indicators are being used to monitor the impact and outcomes of these services". A systematic review will provide evidence and direction for the development of an initial set of pharmaceutical development goals related to the advancement of pharmacy services provision (with an emphasis on PHC).

The following objectives were set to answer this question:

1- To identify the major NCDs, risk factors, and the economic burden in a global policy context.

2- To identify the clinical and economic outcomes of Medication Therapy Management (MTM) services in managing the major non-communicable diseases, exemplars being cardiovascular diseases (CVD) and diabetes mellitus (DM).

3- To identify global indicators used to evaluate and monitor the impact and outcomes of MTM services and the necessary pre-conditions for implementing advancement in pharmacy services in the face of global healthcare challenges.

2.3 Methodology

2.3.1 Search e-sources and strategy

A systematic literature approach was conducted to identify and assess the relevant literature using the following electronic databases: EMBASE, Cumulative Index to Nursing and Allied Health Literature (CINAHL Plus), SCOPUS, PsycINFO, PubMed, and the Ovid MEDLINE. The following search terms were used to cover all combination possibilities to the relevant articles: Non-communicable Diseases, risk factors, Financial Stress OR Cost of Illness, Medication Therapy Management, Cardiovascular Diseases, Diabetes Mellitus, Clinical Pharmacy Services, Outcomes, cost, impact, benchmarking, Quality Indicators, or performance indicators, Outcome Assessment, Process Assessment, performance indicators. The search combination is illustrated in (Appendix 1). The literature search was conducted in April 2019 and re-run in November 2021, and no time limit was imposed to restrict the search.

2.3.2 Inclusion criteria

Retrieved articles that met the following inclusion criteria were selected: patients are adults>18 yrs; only patients with the major non-communicable disease (DM and CVD) (exclude HIV, renal transplant patients, patients on certain drugs); no specific patients group; apply to community, and hospital settings; MTM face-to-face services; no geographical limitations for the countries providing services (worldwide countries); only MTM pharmacy-led services were included; original research articles, analytical study designs, including observational and interventional (experimental) studies, prospective and retrospective studies, randomised and non-randomised studies; and only English language articles were included.

2.3.3 Exclusion criteria

Conference abstracts, poster abstracts, letters, commentaries, and grey literature were excluded due to the potentially limited quality and difficulties in searching and retrieval. Papers that searched care services-led by other healthcare professionals (nurses, physicians) were excluded. Online/virtual or paid services were excluded. Descriptive studies were also excluded.

2.3.4 Search strategy results

Initially, a total of 3027 studies were identified from the databases, of which 32 were excluded due to duplication. Afterwards, 2995 articles were screened, and 2945 studies were excluded based on irrelevant titles or abstracts reviewed. Subsequently, 50 articles were reviewed in detail, of which 15

articles were included in this literature review. Articles were excluded based on the inclusion criteria selected for this literature. Figure (3) below illustrates the literature search profile.

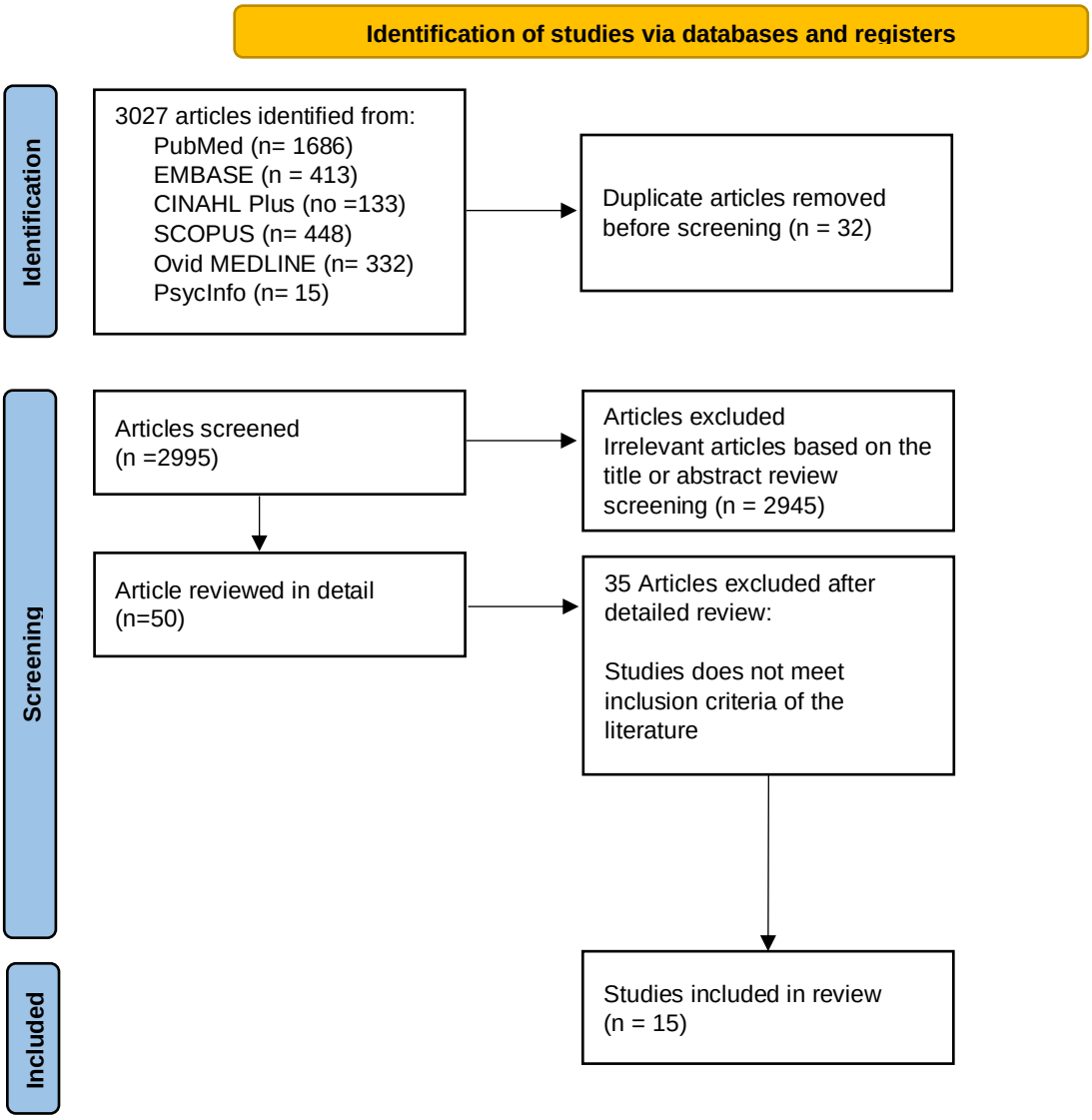


Fig. 3. Flowchart of articles identified, included and excluded

2.3.5 Overview of the included studies

A summary of the included studies, including the title, author(s), study design/methods used, sample size, practice setting, intervention, main findings, and strengths and weaknesses of the articles, can be found in table 1.

The literature included 15 studies. The majority of studies were conducted in the United States (n=10), followed by Canada (n=2), India (n=1), Brazil (n=1), and New Zealand (n=1). Three studies reported the clinical and economic outcomes of MTM services on the management of CVD (Bunting et al., 2008; Isetts et al., 2008; Wittayanukorn et al., 2013); three studies reported only the clinical outcomes of MTM services on the management of CVD (Planas et al., 2009; Thumar & Zaiken, 2014; Tsuyuki

et al., 2016). Two studies reported the clinical and economic outcomes of MTM services on the management of DM (Cranor et al., 2003; McAdam-Marx et al., 2015); two studies reported only the clinical outcomes of MTM services on the management of DM (Theising et al., 2015; Tilton et al., 2018); two studies reported only the clinical outcomes of MTM services focusing on the behavioural interventional aspect (medication adherence) in the management of DM (Bindu Murali et al., 2016; Skinner et al., 2015). Three studies reported the available performance indicators to measure the impact of the pharmaceutical service under review (Fernandes et al., 2015; Lima et al., 2019; Ng & Harrison, 2010).

Table 1: Data extraction sheet summarised the studies included in the literature review

Study	Design	Site and population	Intervention	Results	Strengths	Weaknesses
The Effectiveness of Pharmacist Interventions on Cardiovascular Risk The Multicenter Randomized Controlled RxEACH Trial **Canada** Journal of the American College of Cardiology 2016 Vol. 67 Issue 24 Pages 2846-2854	Randomised Trial **The main outcome:** The difference in change in estimated cardiovascular risk between intervention and usual care groups at three months.	56 community pharmacies. Participants: 723 adult patients were recruited by their pharmacists based on their high risk for CVD	Patients were randomized to usual care (usual pharmacist care with no specific intervention) or intervention, comprising a Medication Therapy Management review from their pharmacist and CVD risk assessment and education. Pharmacists prescribed medications and ordered laboratory tests as per their scope of practice to achieve treatment targets. Subjects received monthly follow-up visits for 3 months	• There was a 21% difference in change in risk for CVD events ($p<0.001$) between the intervention and usual care groups. • The intervention group had greater improvements in low-density lipoprotein cholesterol (–0.2 mmol/l; $p<0.001$), systolic blood pressure (–9.37 mm Hg; $p<0.001$), glycosylated haemoglobin (–0.92 %; $p<0.001$), and smoking cessation (20.2%; $p=0.002$).	• Using a Randomised controlled design signified a high level of casual interference. • The use of the medication management remuneration programme enhanced the suitability of the interventions.	• The follow-up duration was relatively short. • Another potential limitation: the variability across jurisdictions regarding the scope of practice may limit the generalisability of the findings.
Impact of live medication therapy management	Prospective, multicentre, observational study	Patients with established CVD who were not at their LDL goal	live Clinical Pharmacist intervention programme on mean	• Mean LDL reduction from baseline in the chart-review MTM group	• Direct pharmacist-patient interactions	• Lack of uniformity with CP recommendations and

on cholesterol values in patients with cardiovascular disease **USA** Journal of the American Pharmacists Association 2014 Vol. 54 Issue 5 Pages 526-529	**The main outcome:** Primary outcomes included mean LDL reduction from baseline, number of patients achieving their LDL goal, and percent of implemented CP recommendations.	(poorly controlled) over a 6-month timeframe.	LDL reduction from baseline in patients with CVD as compared to standard CP chart-review MTM services	and the live MTM group was statistically significant (P = 0.001). • The chart-review MTM group had 30% of patients reach their LDL goal, with 66.3% of CP recommendations implemented, • Compared to 51.3% and 86.3% for the same parameters in the live MTM group (P = 0.006 and P = 0.003, respectively).		patient populations at the different sites. • Patient compliance was difficult to assess. • The short timeframe of this study may limit the generalisability.
Clinical and economic outcomes of medication therapy management services: The Minnesota experience **USA** J Am Pharm Assoc (2003) 2008 Vol. 48 Issue 2 Pages 203-11; 3 p following 211	1-year prospective study of an MTM services intervention group **The main outcome:** • Percentage of patients' goals of therapy achieved and meeting HealthCare Effectiveness Data and Information Set (HEDIS) measures for hypertension and hypercholesterolemia. • Total health expenditures per person were measured for a 1-year period before and after enrolling patients in MTM services.	Six ambulatory clinics in Minnesota from August 1, 2001, to July 31, 2002. Participants: • 285 intervention group patients with at least 1 of 12 medical conditions. • 126 comparison group patients with hypertension. • 126 patients with hyperlipidaemia.	MTM services provided by pharmacists	• 637 drug therapy problems were resolved among 285 intervention patients, • The percentage of patients' goals of therapy achieved increased from 76% to 90%, • HEDIS measures improved in the intervention group compared with the comparison group for hypertension (71% versus 59%) and cholesterol management (52% versus 30%). • Total health expenditures decreased from $11,965 to $8,197 per person (n = 186, P < 0.0001).	• Patients received face-to-face MTM services • Multiple drug therapy problems	• Selection bias influencing the use of MTN services benefit patients with more medical care concerns and drug-related needs. • Selection bias of patients based on high health resource use. • Measuring the total annual health expenditure using the insurance payment claims database.
Evaluation of a hypertension	Randomised controlled trial	9-month community pharmacy-	Monthly visits, intervention	• Decreased in the mean SBP within the	This RCT was part of a larger study of	• Small sample size

medication therapy management program in patients with diabetes **USA** J Am Pharm Assoc (2003) 2009 Vol. 49 Issue 2 Pages 164-70	**The main outcome:** • Systolic blood pressure (SBP), percentage at goal blood pressure (<130/80 mm Hg) • Antihypertensive medication adherence.	based MTM programme between November 2005 and July 2007 Participants: 52 patients with diabetes and hypertension who were enrolled in a managed care organization.	group participants received MTM services for Hypertension (HT) and DM management	intervention group. • Increased the percentage of patients who achieve the goal blood pressure within the intervention group. • No statistically significant difference regarding the adherence rate between two groups	patients with diabetes	• Limited generalisability due to the selection bias among programme participants
Evaluation of Medication Therapy Management Services for Patients with Cardiovascular Disease in a Self-Insured Employer Health Plan **USA** J Manag Care Pharm 2013 Vol. 19 Issue 5 Pages 385-95	2 pre- and post-retrospective designs: A cohort study with comparison groups and (2) a cohort study within group comparison. **The main outcome:** Compare economic outcomes and clinical outcomes between patients who received MTM service and those who did not receive the service.	A public university-sponsored insurance plan between 2008 2010. Participants: • Patients aged 19 years or older who were diagnosed with CVD conditions • 63 patients in the MTM group • 62 patients in the non-MTM group	Patients were divided into MTM and non-MTM Groups MTM services were provided to patients via face-to-face consultation for 30-60 minutes per encounter	• The mean cost (SD) per patient in the MTM group during the 6 months post-index period for CVD-related pharmacy, all-cause medical, and total expenditures was lower than the 6 months pre-index period by $22.0 (19.1), $79.2 (99.6), and $75.1 (136.2), respectively. • The mean cost (SD) for the non-MTM group increased during the 6 months post-index date by $10.7 (24.2), $246.4 (248.4), and $289.0 (269.5) for pharmacy, medical, and total expenditure, respectively. • MTM services increased the percentage of patients who had achieved their goals from 55% to 70% for BP and from 13.0% to 21.7% for normal BMI	Patients received face-to-face MTM services	• The nonrandomized nature of this study could increase the potential of selection bias. • The lack of data regarding other possible drug sources for patients to receive their medications. • Relatively Small sample size for both groups.

				compared with the pre-index period. In terms of the extent of improvement in disease stages, clinical.		
The Asheville Project: Clinical and economic outcomes of a community-based long-term medication therapy management program for hypertension and dyslipidaemia **USA** J Am Pharm Assoc (2003) 2008 Vol. 48 Issue 1 Pages 23-31	Quasi-experimental, longitudinal, pre–post study **The main outcome:** Clinical and economic outcomes of a MTM programme for HTN/dyslipidaemia	12 community and hospital pharmacy clinics over a 6-year period from 2000 through 2005. Participants: • 18 pharmacists at 12 community pharmacy and hospital clinic locations participated • All patients covered by the participating employer's health plans with a diagnosis of HTN and/or dyslipidaemia, regardless of their baseline control • 620 patients for the financial analysis and 565 for the clinical analysis	One-on-one self-care education programmes related to CVD every 3 months for 30 minutes.	Patients were significantly less likely to have a CV-related ED visit or hospitalization, a CV-related event, or CV-related medical expenses	Adequate sample size	• A typical of a nonrandomized, real-world study with no control group. • Missing and/or unreported clinical data, resulting in diminished cohort sizes over time, and in limitations in the level of detail of claims data available for use in economic assessments. • No consistent protocol or documentation format were followed, which led to variability in the frequency of patient follow-up and availability of patient data.
The Asheville Project: long-tem clinical and economic outcomes of a community pharmacy diabetes care program. **USA** J Am Pharm Assoc (Wash) 2003 Vol. 43 Issue 2 Pages 173-84	Quasi-experimental, longitudinal pre–post cohort study **The main outcome:** Clinical and economic outcomes of a MTM programme in diabetic patients, including changes in HbA1c level, LDL, diabetes-related medical utilisation and costs.	12 community-based pharmaceutical care services over a 5-year period from 1997 through 2001. Participants: • Diabetes-certified community pharmacy • Patients with diabetes covered by self-insured employers' health plan. • 187 patients for the	Patients received ongoing pharmaceutical care services to maintain improvement in A1c and reduce direct medical costs	• Mean HbA1c values and lipid levels of programme participants decreased, with more than 50% of participants demonstrating improvements at every measurement. • After the first 6-month follow-up, 24.3% more patients reached their optimal HbA1c values (< 7%).	• Adequate sample size Long timeframe	• A typical of a nonrandomized, real-world study with no control group • Missing and/or unreported clinical data, resulting in diminished cohort sizes over time, and in limitations in the level of detail of claims data available for use in

		clinical cohort, 164 for the economic cohort, and 157 for both economic and clinical cohorts.		• At the second and third 6-months follow-ups, more patients were overserved to attain their A1c values, 27.2% and 18.2% respectively. • A significant reduction in total direct medical costs of $1200 to $1872/patient/ year.		economic assessments. • No consistent protocol or documentation format were followed, which limited the ability to describe the specific PCS interventions or relate them to patient outcomes.
The Effect of a Diabetes Collaborative Care Management Program on Clinical and Economic Outcomes in Patients with Type 2 Diabetes **USA** Journal of Managed Care Pharmacy 2015 Vol. 21 Issue 6 Pages 452-468	A retrospective cohort analysis **The main outcome:** • Evaluate the association between a pharmacist-led, diabetes collaborative drug therapy management program and patient outcomes, including glycaemic control and health care costs,. • Assess short-term economic outcomes in a primary care setting.	Analysis of medical record data of patients with uncontrolled T2DM from 2009 through 2012 Participants: • 303 patients with uncontrolled T2DM enrolled in the programme. • 394 patients with diagnosed T2DM as a comparison group • Community clinic providers.	Patients were followed for a minimum of 180 days before entering the programme with an HbA1c baseline ≥7% and at least 1 follow-up HbA1c value documented in the EMR or clinical pharmacist notes from 3 to 18 months after the index date	• A significant reduction in HbA1C value after a 9-month follow up in the MTM group. • Improvement in all-cause medical cost trends in patients with uncontrolled T2DM	This study's results align with the findings of other studies reporting pharmacists' interventions on the studied parameters in patients with DM in a similar work setting.	• Relatively small sample side to consider clinical and economic outcomes. • The administrative costs of the programme were not included, which may underestimate costs for the intervention group. • Risk of uncontrolled confounding due to incomplete or unavailable data. • A possible selection bias due to the requirements of the study (HbA1c values and minimum duration of treatment by community clinic providers.
Impact of a Medication Therapy Management Clinic on Glycosylated Haemoglobin, Blood Pressure, and Resource Utilization	A retrospective controlled cohort study **The main outcome:** Mean change in glycosylated haemoglobin (A1C), diastolic (DBP) and systolic	Between 2001 and 2011, MTMC patients were matched to control patients by age, gender, and comorbidities in the Academic health centre	Longitudinal patient-pharmacist relationship and a comprehensive scope of practice with frequent (at least monthly)	• Patients in the MTMC had greater A1C improvements, compared with controls, of 0.54% (P =0.0067) at 6 months and 0.63% (P = 0.0160) at 12 months.	• Adequate timeframe • Wide range of pharmaceutical interventions • Inclusion of underserved population	• Frequency of provider visits or medication changes resulting in improved diabetes or hypertension care, were not evaluated.

USA Annals of Pharmacotherapy 2018 Vol. 53 Issue 1 Pages 13-20	blood pressure (SBP), and emergency department (ED) and hospital admissions at 6 and 12 months	serving low-income, African American and Latino populations Participants: Patients diagnosed with diabetes and/or hypertension who were enrolled in the MTMC at UI Health between January 2001 and January 2011	patient visits. The MTMC provides medication reconciliation based on information obtained from the patient, electronic medical record (EMR), and pharmacy; optimization of medication regimens to improve humanistic, clinical, and economic outcomes; adverse drug events monitoring; adherence assistance with tools, such as prefilled pill boxes; and collaboration with other health care providers to manage chronic illness.	• At 6 months, SBP and DBP decreased in MTMC patients by 6.5 mm Hg (P = 0.0108) and 3.8 mm Hg (P = 0.0136) more than controls, respectively. • At 12 months, those receiving MTMC services had SBP and DBP decreases, respectively, of 8.2 mm Hg (P = 0.0018) and 1.7 mm Hg (P = 0.2691) compared with controls. • ED and hospital visits were not statistically significantly different between groups.		• Patient adherence was also not evaluated because claims data were not available for control patients.
Implementation and Clinical Outcomes of an Employer-Sponsored, Pharmacist-Provided Medication Therapy Management Program **USA** Pharmacotherapy 2015 Vol. 35 Issue 11 Pages e159-63	A single-centre retrospective medical record review. **The main outcome:** Mean change in Ac1 and BP from baseline to programme completion in diabetics	The setting was a Pharmacy MTM Clinic at a self-insured health system consisting of six hospitals and several ancillary facilities over 2-year. Participants: • Patients with uncontrolled diabetes (A1C ≥7%). • 161 patients with diabetes were identified during annual wellness screening in 2012.	Pharmacist-provided medication therapy management (MTM) programme for health plan beneficiaries with diabetes mellitus and/or hypertension.	• For the A1C level, a significant reduction in the mean difference (P< 0.05) in MTM group. • For the BP, a significant reduction in the mean difference (P< 0.05) in MTM group.	• Patients received face-to-face MTM services	• Nonrandomized and retrospective, with a small sample size. • The findings may not be generalizable to MTM due to permission variability for pharmacists to implement drug regimen changes under state law.

		• 225 patients with diabetes and/or hypertension were identified during annual wellness screening in 2013.				
Medication therapy management (MTM): an innovative approach to improve medication adherence in diabetics **India** Drug Metab Pers Ther 2016 Vol. 31 Issue 3 Pages 151-5	A prospective interventional study **The main outcome:** Improve medication adherence in diabetic patients	1-year period in the general medicine department of a hospital Participants: 104 diabetic patients, aged (30-80 years), were included in this study	MTM programme was applied to improve medication adherence	• A significant improvement in medication adherence (P< 0.05) • 24% of patients became highly adherent • 68.3% of patients reached medium adherence.	Innovative method using three approaches to improve patients adherence: personal medication record, medication-related action plan and detailed counselling	• Small sample size • Short timeframe • The modified Morisky Medication Adherence Scale-4 (MMAS-4) was a self-reported method
Assessing the Effectiveness of Pharmacist-Directed Medication Therapy Management in Improving Diabetes Outcomes in Patients With Poorly Controlled Diabetes **USA** Diabetes Educ 2015 Vol. 41 Issue 4 Pages 459-65	A retrospective review study **The main outcome:** Clinical outcomes were A1C, medication adherence, blood pressure, lipids, and creatinine	Retrospective review of 100 patient records Participants: • Adult patients from a community health clinic were identified through administrative medical record • Poorly controlled diabetic patients who received the MTM service (A1C value >7%). • Poorly controlled diabetic patients who received usual care	A Clinical pharmacist provided at least 3 clinic visits during a consecutive 12-month period following the first MTM visit for optimizing therapeutic outcomes of anti-diabetes Medication and T2DM disease management	• Higher rate of medication adherence in the MTM group compared to the non-MTM. • Lower A1c level in the MTM group compared with the non-MTM group • Lower LDL level in the MTM group compared with the non-MTM group	• Community-academic partnership. Both academic and clinical pharmacists were experts in their field to serve the aim of this study. • This study collected data on modifiable markers of T2DM that are responsive to MTM in a high-risk, vulnerable population, often underrepresented in clinical research. • Implementation of this study in a community health setting sheds light on the potential benefits of MTM as an effective tool	• Dependence on existing documentation and causality cannot be determined. • The generalisability of the findings might not be achieved due to the small sample size. • Information on the number of clinic visit was not collected in this study.

					to treat chronic disease and address ethno-racial and socioeconomic health disparities.	
Development and validation of key performance indicators for medication management services provided for outpatients **Brazil** Research in social & administrative pharmacy: RSAP 2019 Vol. 15 Issue 9 Pages 1080-1087	A methodological study with a quantitative approach using an internet based 2-round Delphi method was employed. **The main outcome:** To develop and validate KPI instrument for MTM services provided for out patients in Brazilian context.	Outpatients setting Participants: • 16 experts were invited to participate in the study. • Eleven (68.8%) experts participated in the Delphi round 1 and nine (81.8%) experts completed the 2 Delphi rounds. • 82 pharmacists work in primary care to understand their views	• Expert panel rated 7 possible KPIs using 7 attributes on a 5-point Likert scale for consensus. • Later, a comparison between expert and pharmacist views about the indicators relevance was performed to construct validity and reliability.	• A set of 6 KPIs was developed for MTM services provided for outpatients, which are: Pharmaceutical consultation provided (I_1), Pharmacist intervention accepted by the prescriber (I_2), drug therapy problems resolved (I_3), Patient clinical status (I_4), Patient satisfaction (I_5), and patient quality of life (I_6).	• The final instrument showed a good reliability and validity evidence, which may be used for benchmarking in other MTM services.	• All expert panels worked in public universities; thus, "Ideological bias" can be associated in the expert's viewpoints. • The disagreement within the expert panel may not have been explored because of the lack of a live meeting. • The study was conducted only in Brazilian context, and the judgment of experts might be different in a different context.
Development of Clinical Pharmacy Key Performance Indicators for Hospital Pharmacists Using a Modified Delphi Approach **Canada** Ann Pharmacother 2015 Vol. 49 Issue 6 Pages 656-69	A systematic internet-based 3-round Delphi method with quantitative approach. **The main outcome:** Develop national cpKPIs to advance clinical pharmacy practice and improve patient care	Canadian hospital setting Participants: A group of hospital pharmacists, including 26 clinical pharmacists and hospital pharmacy leaders	• Panellists rated 26 candidate cpKPIs using 11 cpKPI ideal attributes and 1 overall consensus criterion on a 9-point Likert scale. • Consensus was reached if 75% or more of Panellists assigned a score of 7 to 9 on the consensus	Eight candidate cpKPIs met the consensus definition: (1) performing admission medication reconciliation (including best-possible medication history), (2) participating in interprofessional patient care rounds, (3) completing pharmaceutical care plans, (4) resolving drug therapy problems, (5) providing in-person disease and medication education to patients, (6)	• The expert panel represented all aspects of hospital pharmacist practice in Canada, with a combination of experienced clinical pharmacists and hospital pharmacy leaders. • The initial draft list of indicators was created based on published evidence, supported by grey literature,	• The Delphi method may be limited due to the low possibility of panellist members communicating before the meeting between rounds 2 and 3, which may not reflect a true consensus. • The potential of ignoring or not exploring disagreement within the panel

			criterion during the third Delphi round	providing discharge patient medication education, (7) performing discharge medication reconciliation, and (8) providing bundled, proactive direct patient care activities.	and included the suggestions made by the expert panellist, which reflect the real-world and provide high-value activities. • The previous points should strengthen the external reliability of the created indicators.	
Key performance indicators for clinical pharmacy services in New Zealand public hospitals: stakeholder perspectives **New Zealand** Journal of Pharmaceutical Health Services Research 2010 Vol. 1 Issue 2 Pages 75-84	An observational survey study following the Delphi process **The main outcome:** Develop a set of measurable (KPIs) demonstrating hospital clinical pharmacy's contribution to patient care that can be used for benchmarking in the New Zealand setting.	New Zealand Hospital setting Participants: 103 key stakeholders from public hospitals in each of the 21 District Health Boards were mailed to participate in the study. The professional groups included Chief Medical Officer, Director of Nursing, Chief Pharmacist, Quality and Risk Manager, senior management team (SMT) responsible for pharmacy.	• Participants were asked to rate 52 proposed KPIs based on two attributes: relevance to clinical pharmacy's contribution to patient care and ease of measurement in their organisation between two variables: hospital size (i.e. tertiary vs secondary) and professional groups.	• 37 KPIs (71.1%) were rated as "relevant" or "extremely relevant". • Chart review and medication reconciliation were rated as the top most relevant KPIs and most measurable. • Only three of 52 KPIs were rated 'easily' measurable. • Measurability appeared to be a major issue due to resource constraints. • No statistically significant differences were seen between professional groups (P=0.3) and different hospital sizes (P=0.36).	• This study highlighted the challenges inherent with founding national KPIs standards. • Also, it gave an insight into the most reflective KPIs that can measure the CPs contribution to improving patient care.	• No rural/special hospitals were involved. • Small sample, which makes it difficult to identify the statistical difference between groups. • The methods followed for attaining KPIs, first by the Delphi process and then by convenience sampling, limited the validity of the rating of the KPIs selected. • The survey may present a personal perspective, not the clinical pharmacy services provided. • Differences in the professional experience of participants may also limit the validity of the rating of the KPIs. • The generalisability of this

						study might be difficult. • Social desirable responses are a bias within the respondents.

2.4 Results of literature Review

2.4.1 Objective 1: identify the major NCDs, risk factors, and the economic burden in a global policy context.

Non-communicable diseases (NCDs), also known as chronic diseases, are the substantial leading cause of mortality in developed and developing countries, equivalent to 71% of all deaths worldwide. In addition, 85% of premature deaths aged 30 and 69 years occur in low and middle-income countries due to NCDs (Alamnia et al., 2021; Dahal et al., 2021).

According to the WHO, four main groups of diseases account for the current epidemiological transition: cardiovascular diseases (including heart disease and stroke), diabetes mellitus, chronic respiratory diseases (including COPD and asthma), and cancer. Most NCDs-related deaths are associated with multiple risk factors, which can be categorised into non-modifiable risk factors and modifiable behavioural and metabolic risk factors (Alamnia et al., 2021; Dahal et al., 2021; Russell et al., 2019).

Non-modifiable factors refer to characteristics that cannot be changed or controlled by an individual (or the environment); for example, age, gender, race, and genetic make-up. Modifiable behavioural risk factors refer to characteristics that can be changed or adjusted by societies/individuals to improve health outcomes, including tobacco use, alcohol consumption, a sedentary lifestyle, and an unhealthy diet. The pathway from the behavioural (modifiable risk factors) to NCDs can lead to metabolic changes (intermediate) risk factors, including raised blood pressure, hyperlipidaemia, hyperglycaemia, and overweight/obesity (Alamnia et al., 2021; Dahal et al., 2021; Russell et al., 2019).

Non-communicable diseases have been established as a significant global threat not only to individual health states but also to development and economic growth (Chand et al., 2020; Khiari et al., 2021). Moreover, the rapid rise of people affected by NCDs is predicted to increase substantially in the coming decades, associated with ageing, an increasing global population, and a sedentary lifestyle (Khiari et al., 2021). The global economic burden of NCDs is enormous and continues to rise

worldwide, with a cost estimation of output loss to reach more than 30 trillion US$ within the next two decades (Chand et al., 2020; Khiari et al., 2021; Saleh et al., 2018).

Economists are expressing considerable concerns regarding the long-term macroeconomic impacts that NCDs will cause on several economic aspects, including capital accumulation and GDP worldwide and labour supply with the most severe consequences in developing countries (Chand et al., 2020; Saleh et al., 2018).

The United Nations (UN) recognised NCDs as a global epidemic. They were reflected in the UN Sustainable Development Goals, aiming to reduce and control premature deaths from the major NCDs by one-third by 2030 (Khiari et al., 2021). An efficient way to control NCDs is to focus on reducing risk factors associated with multiple NCDs diseases. Better detection and management of the common modifiable risk factors is crucial in addition to monitoring NCDs' progress and trends to drive policy-making and priorities. Evidence shows that high-impact essential NCDs intervention; for example, improving the prevention of a single risk factor, may lead to a decrease in the prevalence of several NCDs and vice versa. In addition, continued evidence-based prevention and control interventions could reduce mortality, improve quality of life, and oppose the high costs associated with NCDs (Russell et al., 2019).

In conclusion, the globally increasing burden of disability and mortality caused by NCDs poses a significant challenge and threat to the global and national economic stability and development and the effectiveness of the health care systems to cope with the rising costs, especially in resource-limited countries (Chand et al., 2020; Saleh et al., 2018).

2.4.2 Objective 2: identify the clinical and economic outcomes of Medication Therapy Management (MTM) services in managing the major non-communicable diseases, exemplars being cardiovascular diseases (CVD) and diabetes mellitus (DM).

The WHO defines Medication Therapy Management (MTM) as a "structured evaluation of patient's medicines with the aim of optimising medicines uses and improving health outcomes". MTM services have been developed and implemented worldwide in different settings (community, hospital) and supported by remunerated or free model services. Abundant evidence-based data has shown the clinical and economic impact of implementing this service (International Pharmaceutical Federation, 2020c).

The benefit of pharmacist-led MTM service can be shown in improving and optimising the delivery of this service. Pharmacists, as medicine experts, play a crucial role in delivering such services. Several studies have demonstrated that the proper management of chronic diseases, including the

rational use of medications, and ongoing screening and monitoring of chronic disease-related risk factors, can show better disease control, reduce disease-related complications, and improve overall patient quality of health (Lancaster et al., 2018).

Cardiovascular diseases (CVD)

Cardiovascular disease (CVD) is the cause of nearly half of the non-communicable diseases and the major leading cause of hospitalization, disability, and death worldwide. In addition, CVD is considered one of the world's highest disease burdens, among other major diseases. Consequently, evidence-based pharmaceutical interventions to prevent CVD events have become a global imperative to improve patient quality of care and reduce health care costs (Branham et al., 2013; Tsuyuki et al., 2016).

Several studies demonstrated how MTM-delivered services resulted in statistically significant improvements in overall clinical health outcomes and reductions in disease costs. The Asheville Project, a 6-year study involving 620 patients diagnosed with HTN and/or dyslipidaemia at 12-community and hospital pharmacies led by 18 certificate-trained pharmacists, showed a significant decrease in the primary CVD-related risk parameters throughout the study: mean systolic/diastolic blood pressure from 137.3 to 126.3 mmHg and from 82.6 to 77.8 mm Hg, respectively; percentage of patients at blood pressure goal, from 40.2% to 67.4%; mean low-density lipoprotein (LDL) cholesterol, from 127.2 to 108.3 mg/dL; mean total cholesterol from 211.4 to 184.3 mg/dL, in addition to other lipid profile indicators. Additionally, this study found that the cardiovascular events risk declined by 53%, a more than 50% decrease in risk of cardiovascular (CV)-related emergency/hospitalisation visits, and a decrease in CV-related medical costs by 46.5% (Bunting et al., 2008).

The Ashville study focused on the clinical question of assessing both clinical and economic outcomes of MTM services for hypertension. The study setting was community and hospital-based pharmacies, which ensured that the programme was not biased towards a specific practice setting. The interventions used in the study validate the results obtained as qualified pharmacists were committed to educating and conducting follow-ups through scheduled consultations, monitoring, and recommendations to physicians.

However, due to the 6-year timeframe of this study, the chances of diminished cohort sizes over time were very high. Furthermore, the participants neither followed a protocol for the study nor an electronic documentation system. This undermined the validity of the results. The details of the claims data used for economic assessments were limited, undermining the study's economic outcomes.

In another 1-year prospective study, the Minnesota experience, pharmacists provided MTM services for 285 selected patients with hypertension or hyperlipidaemia at six ambulatory clinics in Minnesota. This study's findings demonstrated that 637 drug therapy problems were resolved among the intervention group, and the percentage of patients who achieved their therapeutic goals increased from 76% to 90%. Hypertension and cholesterol management improved in the intervention group compared with the comparison group by (71% versus 59%) and (52% versus 30%) according to Healthcare Effectiveness Data and Information Set (HEDIS) goals, respectively. This study also studied the total health expenditure for the year before and after providing MTM services and showed a statistically significant decrease in the total health expenditures from $11,965 to $8,197 per person ($n = 186$, $P < 0.0001$). Similar to the Asheville study, the Minnesota experience presented evidence-based findings that showed an improvement in clinical outcomes and a reduction in total health expenditures (Isetts et al., 2008).

In the Minnesota experience, the study's research question seeks to evaluate the clinical and economic outcomes of MTM. The sample selection was on the basis of randomisation as the patients were selected from 6 clinics over a period of one year. The intervention methods used were appropriate and ensured valid results, as the MTM services were provided by qualified pharmacists. The study also measured its outcomes using HEDIS analysis which allowed for efficient data management, unlike the Ashville study. The study, however, used patients from the BlueCross BlueShield health plan, which comprises participants with resources that produced bias in the results. The economic outcomes were measured using the insurance plan, which is not a true reflection of the economic life of an individual. This study's results were biased due to the use of insurance plans and patients with high resource capability and complicated drug therapies, unlike the Ashville study, which was based on communities and hospital pharmacies.

Two randomised controlled trials (RCTs) were also conducted to evaluate the effectiveness of an interventional community pharmacy-based MTM programme on cardiovascular risk (Planas et al., 2009; Tsuyuki et al., 2016). In the multicentre RxEACH (Alberta Vascular Risk Reduction Community Pharmacy Project) study, 723 adult patients were recruited by their pharmacists based on their high risk for primary/secondary CVD events located in 56 community pharmacies. Patients were assigned to usual care (no intervention) or intervention, comprising an MTM review, CVD risk assessment and education, and receiving monthly follow-up visits for three months by their pharmacists. This study presented a 21% change in risk related to CVD events ($P< 0.001$) between both comparison groups. The intervention group showed higher improvements in LDL-cholesterol (–0.2 mmol/l; $p<0.001$), systolic blood pressure (–9.37 mm Hg; $p<0.001$), glycosylated haemoglobin (–0.92%; $p<0.001$), and smoking cessation (20.2%; $p=0.002$) (Tsuyuki et al., 2016).

This study was based on the lacking identification and control of the risk factors associated with CVD. The RCT covered a large sample size, facilitating better study results. The pharmacists providing MTM services were qualified and offered the patients CVD risk assessment and education. They also prescribed medication and lab tests based on treatment targets.

A high level of causal inference is predicted by the controlled design. In order to ensure the intervention's long-term viability, the Alberta government's medication management compensation scheme, which reimburses pharmacists for their services, was used. The follow-up period by the pharmacists in the study was limited (3 months). The applicability to other pharmacists in other jurisdictions is limited since pharmacists in Alberta had the advantage of having a broad scope of practice that included independent prescribing and the capacity to order laboratory tests.

In a similar setting, an RCT study was conducted to assess the effect of a 9-month community pharmacy-based MTM programme for HTN and DM management on 52 patients during monthly visits. Participants were 12.92 times more likely to achieve their blood pressure goals in the intervention group. The percentage of patients with blood pressure goal increased from 16% to 48%; conversely, it decreased from 20% to 6.67% in the control group, which was consistent with the RxEACH study, the Minnesota experience study, and the Asheville Project (Planas et al., 2009).

The study question posed in the randomised control trial described above was sound and intended to be answered by patients representative of a community with high blood pressure and diabetes. Because the sampling was done in a random fashion, the data acquired by the researchers can be trusted. As a result of patients receiving the MTM on a monthly basis during the course of the intervention, it was possible to determine whether or not the MTM was effective at the conclusion of the study period after a period of nine months.

The findings suggested that patients in the intervention group were more likely to achieve the goal pressure than those in the control group, which supports the utilization of MTM services among patients. This study's findings are significant for the patients and the pharmacists since they demonstrate that the MTM is an effective method of providing medical attention. However, this study used a smaller sample than initially planned, resulting in limited sample size and power. There was also a selection bias of the participants, which led to a limited generalization of managed care enrolees. The RCT method is quite expensive in terms of money and time, which limits the generalisability as patients who volunteer may not represent the population being studied, leading to questioning the validity of the results.

Both of these community pharmacy-based studies demonstrated the effectiveness of the advance practice of the community pharmacist in reducing CVD events and controlling their associated risk

factors. Engaging this expanded scope of practice may have essential public health implications (Planas et al., 2009; Tsuyuki et al., 2016).

A prospective, multicentre, observational study was conducted to evaluate the impact of a live (one-on-one) clinical pharmacist (CP) intervention programme in patients with established CVD and not on their LDL goals compared to standard CP chart-review MTM services over six months. This study's findings showed a statistically significant reduction in the mean LDL from the baseline in both groups (Live and chart-review MTM groups, P=0.001). Also, the results demonstrated that 51.3% of patients reached their LDL target and 86.3% of CP recommendations implemented in the live MTM group compared to 30% and 66.3% for the same parameters in the chart-review group (P= 0.003 and P= 0.006, respectively). Although both intervention groups provided a significant reduction in patients with CVD, the results were in favour of the Live MTM service. Live MTM service yielded better patient outcomes regarding the patient target attainment and CP recommendation implementation parameters measured (Thumar & Zaiken, 2014).

This study utilised data from the sample it used with no reference to previous data collected, making the results authentic and valid. Using the electronic medical record to provide recommendations ensures data consistency and accuracy; thus, no error is made over the observation period. Due to the different expertise of the clinical pharmacists, there was a lack of uniformity in their recommendations and patient population at different sites, which would significantly affect the validity of the results. Furthermore, the refill history was only provided if patients filled their prescriptions at HVMA-based clinic pharmacies, making it challenging to assess patient compliance. The short term of this study restricted generalisability while also indicating the need for further investigations with longer timeframes and additional outcomes.

Another study of two pre- and post-retrospective designs was conducted to compare the clinical and economic outcomes between patients with CVD who received MTM service and those who did not receive the service through individualised consultation sessions for 30-60 minutes over six months. The study found that the mean cost per patient in the MTM group for CVD-related pharmacy, all-cause medical and total expenditures were significantly lower than the six months pre-index period. Conversely, the same indicators increased in the non-MTM group for the study's timeframe. From an economic standpoint, the decrease in the cost indicators studied in this study was similar to other studies regarding pharmacist-led MTM services, including the Asheville Project and the Minnesota experience (Wittayanukorn et al., 2013).

In terms of the clinical outcomes, the percentage of patients who attained their therapeutic targets increased from 55% to 70% for blood pressure (BP) and from 13% to 21.7% for normal BMI values

compared to the pre-enrolment period. With respect to BP, the result of this study was consistent with the Asheville Project and the Minnesota experience (Wittayanukorn et al., 2013).

This study was compared to the study by Thumar and Zaiken (2014) since it included a cohort study with comparison groups as well as a cohort study within-group comparison. It also divided the patients into two groups: MTM and non-MTM, which ensured the authenticity of the results as the clinical outcomes and economic effects amongst the patients were easily compared. However, the study falls short in the measurement of the economic outcome measurement as the patients in the study were under a public university-sponsored insurance plan. Because this trial is nonrandomised, patients' self-selection to engage in the MTM program may enhance the possibility of selection bias. The lack of data when doctors offered drug samples to patients in their offices harmed this study, and the sample size was much smaller than Thumar and Zaiken (2014).

From the above studies, MTM is effective for lowering systolic and diastolic blood pressure; lowering LDL cholesterol and other health indicators (e.g., glycosylated A1C, HBA1c); increasing patient knowledge; improving patient quality of life and medication adherence; and improving the safe and effective use of medications, including reducing therapeutic duplication, lowering total medications prescribed, and increasing therapeutic care adherence. Expanding the pharmacist's role through MTM is expected to boost access to health care for the most vulnerable groups. However, a few research have looked into MTM's ability to improve health disparities in CVD outcomes. Although there is some evidence that MTM can improve results for minority and low-income people, the scope of this research is limited and inconsistent. More research is required to directly assess the impact of MTM on various groups. According to studies, MTM can result in healthcare cost savings and a good Return on Investment (ROI) for healthcare systems.

Diabetes Mellitus (DM)

Diabetes is a chronic condition that may affect a person's well-being, productivity, and quality of life if not tackled properly. In addition, poorly controlled high blood glucose levels can lead to other complications, including nephropathy, neuropathy, retinopathy, and CVD-related conditions. Nowadays, diabetes is considered a global health concern because of the health implications and the very high expenditures. However, limited data is available that demonstrates the impact on the health cost of care. This literature will discuss the impact of pharmacist-led MTM care services on the clinical and economic outcomes among patients with DM (Bindu Murali et al., 2016; Ndefo et al., 2017).

In the Asheville Project, well-trained community pharmacists held face-to-face sessions with 508 diabetic patients at 12-community pharmacies over a 5-year. These sessions included setting and

monitoring long-term diabetes management targets, patient adherence and compliance assessment, and patient home self-care education (BP, feet-care, lipid and weight education management). This study demonstrated a significant decrease in the mean HbA1c values and lipid levels, with more than 50% of patients showing maintained improvements at every measurement. After the first 6-month follow-up, 24.3% more patients reached their optimal HbA1c values (< 7%), and more patients were overserved to attain their A1c values at the second and third 6-month follow-ups, 27.2% and 18.2%, respectively. Moreover, this programme demonstrated a significant reduction in total direct medical costs of $1200 to $1872/patient/year (Cranor et al., 2003).

The Ashville study focused on its research on a valid clinical question of evaluating the economic and clinical outcomes of MTM services provision. The research was set up in a broad area which was carefully selected and ensured that valid results were obtained. The intervention of the study was to mainly educate patients through trained and certified pharmacists for a long duration, with scheduled visits, goal setting, evaluation and monitoring and therapy services. The intervention was fully defined to respond to the clinical question being addressed adequately. The results indicated an improvement in A1c each year by over 50% and a continual increase of 7% yearly. The medication costs decreased significantly, which could be attributed to the knowledge of insurance plans gained by the patients through the education offered by the certified pharmacists.

This longitudinal study of diabetic patients had the disadvantages of a typical nonrandomized, real-world research with no control group. The limitations of this study are due to missing and/or unreported clinical data, which results in smaller cohort sizes over time and limits the degree of detail of claims data available for use in economic calculations. Because neither physicians nor patients followed a defined protocol or record style, it was not possible to describe specific pharmaceutical care services (PCS) interventions or relate them to patient outcomes.

Other studies were also undertaken to provide evidence of the benefits of pharmacist-led MTM services in improving health outcomes and reducing disease-related costs. A retrospective cohort analysis study was conducted using medical record data of 303 patients with poorly controlled T2DM (HbA1c≥ 7%) who received the MTM service and 394 patients as a comparison cohort. Patients in the intervention group were followed for a minimum of 180 days before entering the programme. At least one follow-up for HbA1c value was documented from 3 to 18 months after the enrolment date. Patients experienced a significant reduction in HbA1c value ($P< 0.05$) in the MTM group after a 9-month follow-up. In addition, the study showed cost trends improvement in all-cause medical expenses (McAdam-Marx et al., 2015).

The strategy utilized in this study provided a clear comparison between patients referred to a diabetes collaborative care management (DCCM) intervention and those who did not engage in the DCCM program from 2009 to 2012. The use of multivariate regression models to aid in the control, thus ensuring the results were based on the DCCM. The sample used for this study was very small, thus limiting the clinical and economic outcomes. Furthermore, the DCCM program's administrative costs were not included. As a result, the study's expenses for the DCCM group may be understated. The danger of uncontrolled confounding further hampered this study due to missing or inadequate data. Due to the necessity for community clinic providers to have a minimum treatment period and charted HbA1c results, selection bias is also potential.

Another retrospective controlled cohort study was analysed by (Tilton et al., 2018) to evaluate the impact of a comprehensive Medication Therapy Management Clinic (MTMC). The MTMC measured the health outcomes on improving A1C levels, diastolic (DBP) and systolic blood pressure (SBP), emergency department (ED) and hospitalisation at baseline (index date), 6- and 12-month outcomes. A total of 158 MTMC patients and 158 matched controls diagnosed with the presence of diabetes and/or hypertension were enrolled in the study. MTMC pharmacists provided medication reconciliation, medicines optimisation, adverse drug events monitoring, and adherence assistance with at least one visit/month. The first visit was scheduled for 60 minutes to establish patients' adherence and health education, followed by 30-minute follow-up visits to manage other medication and disease-related issues.

Compared with the control group, patients in the MTMC group expressed greater A1C improvements of 0.54% (P= 0.0067) at six months and 0.63% (P= 0.0160) at 12 months. Moreover, SBP and DBP decreased in MTMC patients (P= 0.0108, P= 0.0136) at six months and (P= 0.0018, P= 0.2691) at 12 months more than in controls, respectively. There was no statistically significant difference between both groups in terms of hospitalisation and ED visits. This MTMC programme showed a statistically significant and consistent decrease in A1C and BP levels at 12 months more than the matched group, with a positive impact on improving DM and CVD modifiable risk factors.

This study sought to analyse the clinical question on the impact of MTMC on managing haemoglobin, blood pressure and use of resources among patients, which was fully described. The setting of the study was broad to ensure valid results were obtained as the study was conducted among Africans American and Latino populations of low income. The study duration (12 months) was long enough to ensure the patients obtained valid results. The results indicated improvements among patients in the AIC and DBP in semi-annual check-ups that were conducted. The intervention used in the study further qualified the results obtained.

Another study found that patients with uncontrolled diabetes who received direct counselling in a pharmacist-led MTM service had improvement in AC1 and blood pressure control. Theising et al. (2015) conducted a retrospective medical record review for a pharmacy MTM clinic, including six hospitals and their affiliate facilities, over 2-year. The first visit lasted one hour and comprised a thorough medication reconciliation, one-on-one patient interview, review of patients' medication treatment regimen, blood glucose and pressure measurement at baseline, and overall disease state and patient literacy. Subsequent follow-up visits (30 minutes) were set based on the pharmacist's clinical judgment and the patient's disease state needs.

A total of 161 patients identified with DM and 225 patients identified with DM and/or HTN with uncontrolled A1C level ≥ 7% over 2 years in 2012 and 2013, respectively. For the first-year follow-up, a significant reduction of the mean difference in A1C from baseline to programme ending ($P< 0.05$) with an overall 45% of patients attained an AC1 level <7% at the end of the programme compared to 39% at baseline. Similar findings were achieved in the second year follow-up ($P< 0.05$), with overall 59% of patients attaining an AC1 level <7% at the end of the programme compared to 35% at baseline. Consistent with other hypertension studies, this study saw a statistically significant decrease in the mean difference in BP from baseline to programme ending ($P< 0.05$). The results of this study were compatible with other studies assessing the impact of MTM programmes on decreasing AC1 and BP levels in diabetic patients.

The intervention ensured that random patients were selected and sent to the MTMC, which provided the validity of the results obtained from the study. The results validated the use of employer health insurance plans since there were reduced levels of diabetes and hypertension among these patients who fully responded to the clinical question. The study's limitations include the fact that it was nonrandomised and retrospective, with a small sample size. These findings may not be applicable to MTM programs where pharmacists are not permitted by state legislation to execute drug regimen adjustments. Because the MTM programme was part of a larger employee wellness programme, the outcomes could have been influenced by other parts of the wellness programme.

Patients' adherence to the prescribed therapeutic treatment is one of the major challenges in achieving the desired therapeutic targets in people with diabetes (Bindu Murali et al., 2016). Several studies were conducted to identify and evaluate the effectiveness of enhancing patient adherence to medication (behavioural interventions) to better-attaining diabetes treatment goals.

Bindu Murali et al. (2016) carried out a prospective behavioural intervention study to apply MTM in patients with type 2 diabetes and to identify the impact of this programme in enhancing patient medication adherence within a year in the general medicine department of a hospital. The MTM

programme was implemented on 104 patients and included a medication record review, a medication-related action plan, and detailed counselling. Before and after the programme, the initial assessment for patients' adherence to anti-diabetic drugs was considered using the Modified Morisky Medication Adherence Scale-4 (MMAS-4). Before the intervention, patients showed very low adherence to their therapeutic plan. However, after applying the intervention, patients demonstrated significant medication adherence improvement ($P< 0.05$). To summarise the findings of this study, 24% of patients became highly adherent, and 68.3% of patients reached medium adherence with a significant improvement in medication adherence to optimise the benefits of the diabetes therapeutic regimen.

However, the study does not choose the sample size following a standardised procedure. Additionally, just one facility is the subject of the investigation. As patients from the same social setting were selected for the study, this would cast doubt on the validity of its findings. The study's findings suggest only two elements as having the potential to promote patient adherence (age and education). This is insufficient because the findings did not address the high expense of medication, which was one of the main barriers to adherence.

Skinner et al. (2015) retrospectively reviewed 100 patients records to compare medication adherence rates and the clinical outcomes of poorly controlled diabetic patients (A1C> 7%) who received an MTM programme to those who did not receive it. The MTM programme engaged pharmacists in patient-centred services to fulfil patients' health needs and optimise health outcomes, considering A1C levels, medication adherence, BP, lipids, and creatinine. Patients in the intervention group received three MTM visit clinics during a 12-month period after the first MTM visit. The study observed a higher medication adherence rate in the MTM group than in the non-MTM group ($P< 0.001$). Significant differences were also observed with lower levels of A1C and LDL in the intervention group compared to the usual care ($P< 0.0001$, $P= 0.02$, respectively). The findings of this study were similar to other work studying the positive association between pharmacist-directed MTM services on the improvement of medication adherence and DM modifiable factors in diabetics.

This study utilised a variety of measurement outcomes, including A1C, medication adherence, blood pressure, lipids, and creatinine. The use of the group comparisons on the clinical outcomes was analysed before and after matching MTM and non-MTM patients. Patients were selected on a demographic base, promoting the validity of the results. The limitations of the study's design were reliance on existing documentation and the inability to determine causality. Because of the small number of patient health data used in this investigation, the findings may not be generalisable. This study did not collect data on the number of clinic visits. Study findings may be partly attributable to group variations in the number of clinic visits. This study's retrospective case-control cohort design

can only assess connections between MTM intervention participation, medication adherence, and T2DM outcomes.

Overall, pharmacists engaging in MTM interventions, as members of the health care team, are responsible for educating the patient and monitoring the illness condition along the process, particularly between primary care visits. Pharmacists play an important role in enhancing the quality of treatment provided to patients. Pharmacists can help improve treatment results by evaluating drugs with patients and educating them about their illnesses, conditions and medications. Monitoring the pilot's endpoints with pharmacist follow-up has revealed improved HbA1c readings, indicating better diabetes control and therapy adherence. Longer follow-up studies are needed to give more conclusive evidence that pharmacist-provided MTMs can enhance objective clinical biomarker outcomes in individuals with diabetes, hypertension, and/or dyslipidaemia.

To summarise, the role of pharmacists in improving short and long-term clinical and economic outcomes in patients with diabetes and CVD has been well documented in several studies conducted around the world. The results of the pharmacists-delivered MTM services mentioned in this literature align with the findings reporting the impact of the implementation of these services on significantly improving the risk factors related to the major NCDs (CVD, DM) and effectively reducing health costs associated with these diseases.

2.4.3 Objective 3: To identify the indicators used to evaluate and monitor the impact and outcomes of MTM services and the necessary pre-conditions for implementing advancement in pharmacy services in the face of global healthcare challenges.

Lohr (1990) defined the Quality of care as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge".

Evaluating and measuring the Quality of care has become widely agreed important and essential in ensuring and improving the Quality of the clinical pharmacy services provided, including Medication Therapy Management (MTM) services. Quality indicators (also called Key performance indicators, KPIs) can be used as quantitative, evidence-based measurement tools to measure the performance and track the progress and outcomes of these services. However, few well-controlled studies have been conducted to measure the impact of MTM services. Only three studies were held to measure the impact of the pharmacist-provided MTM services, two of which were created for hospital settings and one for outpatients. The absence of validated clinical pharmacy quality indicators was also documented (Lima et al., 2018, 2019).

This literature review will elaborate on the three relevant pieces of literature that focus on measuring the quality of care and developing quality indicators to assess the quality improvement of clinical pharmacy services in outpatients and hospital settings.

From May 2017 to April 2018, Lima et al. (2019) designed a methodological study employing an online 2-round Delphi method with a quantitative approach for the systemic development and validation of quality indicators (QIs) for MTM services delivered for outpatients in a Brazilian context.

Initially, the study's working group created seven proposed QIs established for the assessment. To perform the Delphi method, the working group contacted 16 experts to participate in this study, of whom 11 (68.8%) experts participated in the first round, and 9 (81.8%) completed the second Delphi round. The expert panel were well-recognised and had a strong knowledge of MTM services. The Expert panel were asked to rate seven proposed QIs using seven attributes on a 5-point Likert scale for consensus. In addition, 82 primary care-based pharmacists were also contacted to construct the validity and reliability of the results by answering an online questionnaire designed for them. To reach the final consensus on the approved set of QI, statistical analysis between the experts' and pharmacists' responses about the relevancy of the proposed indicators was also performed. Eventually, a set of six QIs was developed for MTM services delivered in outpatients setting, which are: Pharmaceutical consultation provided (QI_1), Pharmacist intervention accepted by the prescriber (QI_2), drug therapy problems resolved (QI_3), Patient clinical status (QI_4), Patient satisfaction (QI_5), and patient quality of life (QI_6).

The systematic methods used in this study help improve the reliability and validity of the obtained evidence. Hereafter, the implementation of these developed QIs may improve the quality of MTM services, and they could be used as a reference point in other services worldwide. The Delphi approach utilized in this study is an iterative process, similar to an extended series of focus groups that leads an identified group of experts to consensus. Claims of generalizability are frequently hidden within Delphi applications, with result validity founded in the iterative process of expert opinion creation and consensus building rather than statistical significance.

The expert panel was made up entirely of professionals who worked at public universities; the experts' perspectives may have been influenced by an "ideological bias". The pharmacist questionnaire, which included both the public and private sectors, helped to reduce this situation. Furthermore, because there was no live meeting, the debate within the expert panel may not have been explored. On the other hand, the working group was attentive to all ideas and proposals made

by the expert panel on the internet-based questionnaire and believed that a genuine consensus was formed. Finally, the study was only conducted in the Brazilian environment, and the expert panel and pharmacists' judgements may differ in another context.

At present, there is no global consensus on clinical pharmacy key performance indicators (cpKPIs). However, KPIs for hospital pharmacy services were available to measure the workload and distribution but not to measure the quality-of-care delivery (Fernandes et al., 2015). The following two studies are the first available investigation of their kind into developing national standardised KPIs for hospital clinical pharmacies to monitor the quality of care provided in the context of Canada and New Zealand. A systematic, internet-based 3-round Delphi method with a quantitative approach was used to develop national (cpKPIs) for assessing clinical pharmacy services in Canadian hospital settings. Panellists were contacted and agreed to participate in this study, including 26 frontline clinical pharmacists and hospital pharmacy leaders from across all 10 Canadian provinces. The study's working group extracted eight thematic evidence-derived cpKPI from the relevant practice literature to present to the panellists. The panellists were asked to rate 26 suggested cpKPIs using 11 attributes and one consensus criterion on a 9-point Likert scale. All panellists finished the three Delphi rounds. After reaching the consensus, eight suggested cpKPIs were approved: (1) performing admission medication reconciliation (including best-possible medication history), (2) participating in interprofessional patient care rounds, (3) completing pharmaceutical care plans, (4) resolving drug therapy problems, (5) providing in-person disease and medication education to patients, (6) providing discharge patient medication education, (7) performing discharge medication reconciliation, and (8) providing bundled, proactive direct patient care activities (Fernandes et al., 2015).

The eight indicators covered different clinical pharmacy practice areas. It is expected that the adoption, measurement, and evaluation of these evidence-based cpKPIs will enhance the advancement of clinical pharmacy practice, inform policy development, and improve outcomes for hospitalised patients. Multiple methodological points have strengthened the validity of the findings. First, the expert panel represented all areas of hospital pharmacist practice in Canada, with a combination of an experienced group of clinical pharmacists and hospital pharmacy leaders who finished all three rounds of the Delphi method. Second, the initial draft list of indicators was created based on published evidence, supported by grey literature, and included the suggestions made by the expert panellist, which reflect the real-world and provide high-value activities. Panellists had the opportunity to discuss and provide feedback through a live meeting to explore the disagreement within the panellists and then make better-informed decisions (Fernandes et al., 2015).

Fernandes et al. (2015) used a multiple-iteration survey technique to allow anonymous, systematic refinement of expert opinion to arrive at a merged or consensual opinion in a short time. The Delphi method was modified to include discussion and live gatherings. The in-person meeting allowed the panellists to discuss the candidate's cpKPIs and address questions about the phrasing and definitions of the candidate indicators. The limitations of this study include the Delphi method could have been constrained in that it did not always reflect a true consensus. For example, it is assumed that the panellists were unaware of the identities of the other panellists prior to the meeting between rounds 2 and 3; however, there is a low likelihood that panellists communicated prior to the meeting, which could have influenced one or more panellists to make decisions that were not entirely their own. Another potential disadvantage of this study design was the possibility of disregarding or failing to investigate conflict within the panel. On the other hand, the live meeting facilitated a constructive discussion and built a rapport among panellists, generating a genuine consensus.

Ng and Harrison (2010) conducted an observational survey following the Delphi process to develop measurable national indicators illustrating hospital clinical pharmacy's contribution to improving patient care, which can be utilised as standards in New Zealand public hospitals. Professional groups of 103 key stakeholders from public hospitals in each of the 21 District Health Boards were mailed to participate in the study. The professional group was asked to provide their perception and rate 52 proposed KPIs based on two attributes. First, the relevance of clinical pharmacists' impact on individual patient care and second, the ease of measurement of these KPIs in their organisation using a 5-point Likert scale.

The study received a relatively high response rate (43%). Out of 52 proposed KPIs, 37 (71.1%) were identified as "relevant" or "extremely relevant". An overall of 10 top KPIs were determined to present the best hospital clinical pharmacy practice to enhance patient care. "Chart review" and "Medication reconciliation" were rated as the topmost relevant and measurable KPIs by all. The "Clinical pharmacy intervention" indicator was also identified as a common indicator that is widely used by pharmacist services to monitor the outcomes of the services provided. Compared with the indicators developed in the previous study held by Fernandes et al. (2015), some commonalities were found with respect to the developed indicators. Both studies identified Medication reconciliation, Pharmaceutical care plans, and Chart review as cornerstones reflective measurements that highlight the core function of pharmacists in improving patient-centred care services.

However, only three of 52 KPIs were rated "easily" measurable. Measurability seemed to be a significant concern that prevented adopting and implementing this set of KPIs. Respondents provided some comments on the measurability attribute considering several factors, including the time for data collection taken, the facility size/type, and the variation in the capacity of staffing levels per patient

day (resource constraints). Ng and Harrison (2010) suggested some possible solutions that may overcome measurability issues, including conducting a regulated audit at a pre-determined time, adding the use of e-records, and assigning an observer to collect and analyse data.

The terms employed in this investigation were clearly specified, ensuring that the results produced were accurate. Relevance was defined as the KPI's capacity to reflect the clinical pharmacy service or clinical pharmacist's impact on individual patient care. Measurability was defined as the simplicity with which the KPI could be collected inside the business. However, there was insufficient electronic infrastructure to support measurement. This is a significant discovery because this study may reveal KPIs that are both highly relevant and easily measurable (by technological methods), but the KPI may not be relevant in today's health situation. The lack of SMT (senior management team) and DON (Director of Nursing) responders calls the integrity of the ratings into question. Many SMTs believed they lacked the clinical skills to judge the KPI's relevance. There were no rural or specialized hospitals available. However, because each DHB (District Health Board) was only assigned one delegate (one for each professional group), rural/special hospitals may have been underrepresented. The majority of hospitals are secondary in size, with only two or three centres offering a full range of healthcare services. Because the sample size was limited, any differences between groups may not have been statistically determined. The survey's final KPIs may have represented the group's own judgments rather than a true reflection of the clinical pharmacy services provided. Differences in each stakeholder's professional expertise limited the validity of each KPIs' ranking. This study was conducted pragmatically, which meant that the members of staff who held stakeholder positions typically had diverse professional competence and experiences.

Consequently, there is a paucity concerning performance indicators to demonstrate the impact of pharmacists-led clinical services. The implementation of evidence-based national and/or international indicators has become imperative to measure the progress of the implemented services to improve patient care and advance pharmacy care services. Further studies are needed to bridge this indicator gap as pharmacy practice has witnessed a dramatic shift in developing the profession from product-centred towards patient-centred care.

2.5 Limitations in the review of literature

The studies discussed in this review showed several limitations. The majority of the studies reviewed are limited to the setting in which they were performed, as most of the studies were conducted in high-income/developed countries and few in mid-low-income/developing countries. Also, the variability across jurisdictions regarding the scope of pharmacists' practice differs amongst countries worldwide. Accordingly, the generalisability of the results to other locations/countries might be

limited or not applicable. The short timeframe and the relatively small sample size of some studies may render them incapable of generalising results.

There was no consistent practice protocol or documentation format followed at different sites in most of the studies, which limited the ability to accurately describe the interventions made and relate them to patient outcomes. The non-randomised nature of most of these studies could also limit the generalisability because of the potential increase in the selection bias among MTM programme participants.

Another identified limitation in studies focused on measuring the economic impact is using insurance claims databases to measure total annual health care services, which excluded any other health costs paid for by patients. The risk of uncontrolled confounding, missing and/or unreported clinical data due to incomplete or unavailable data could also reduce the economic assessment accuracy.

Although methodological rigour was used in the studies for developing quality indicators (QIs), there are some limitations. For example, all expert panels worked in public universities only; thus, the "Ideological bias" can be associated with the expert's opinions regarding the study conducted in Brazil. As mentioned, this study was performed in the Brazilian context, which might limit the implementation of the findings in the global context.

Due to the relatively small sample size of the panel members in the three QIs studies, the potential of not exploring the statistical difference of disagreement among the panellists cannot be ignored. Finally, diverse panellists professional backgrounds and work sectors may also limit the validity of the rating of the QIs selected, as it depends on each participant personal experience and perspective.

Finally, the population, intervention, and setting limits placed on this systematic literature review may have limited its reliability. The search process was challenging by the need to guarantee that all phrases that could be used to describe MTM treatments across time were covered. All of the limitations stated could potentially affect the validity and hinder the generalisability of the findings.

2.6 Discussion and conclusion of the literature findings

Despite the limitations identified in the retrieved studies, the findings of these studies highlighted important implications of the care services reviewed. Reviewed studies have assessed the impact of Pharmacist-led MTM provided on clinical and economic outcomes within the context of CVD and DM prevention. All studies results were aligned with the findings of similar work settings and showed significant positive outcomes for the clinical parameters investigated and overall patient-related cost savings at national/country levels. Accordingly, further investigation is needed to search for the

implementation of a globally accepted approach to improve the efficacy of MTM services for the aim and support of global health developmental changes and policymaking.

These studies pointed out the variability of jurisdictions regarding the scope of practice across and/or within countries; therefore, more effort should be made to align the existing national policy with the global policy. Further recommendations address the development of a global framework focusing on improving pharmacy practice aspects to be adopted and adapted by nations according to their health demands.

Fewer clinical-type indicators have been developed to demonstrate MTM services contribution to patient care. Despite the difference in countries and work settings, some commonalities were found between the generated indicators and showed good reliability and validity evidence, which might be applied as standards in other MTM services worldwide. For that reason, there is a need to bridge the data and evidence obtained at the national levels to design and develop globally relevant indicators to measure the progress and improve the quality of care provided in a global context.

In conclusion, transforming global pharmacy can be achieved by applying emerging evidence and effective strategies to be used in management and policy development towards the global advancement of pharmacy practice and pharmaceutical care services. This needs to be translated into the design features for a systematic framework of pharmaceutical development goals (PDGs) in order to enhance the global development of pharmacy services for the population demographic challenges of co-morbidity and medicines complexity previously described.

Chapter 3: Research Aim and Objectives

3.1 Research rationale

This project seeks to construct, develop and validate a global set of systematic and integrated Pharmaceutical Development Goals (PDGs) to shape and guide the advancement of pharmacy practice and pharmaceutical services and to develop a global set of indicators that can be used to map and monitor the progress of the PDGs.

In line with the current evidence reviewed in the literature review, the advancement of pharmacy practice and effective patient-focused pharmaceutical services has become imperative in a global context. Accordingly, a significant and dramatic shift in the profession trend needs to set future milestones for pharmaceutical practice development; evidence and collaboration are required amongst key leaders and decision-makers to create a transformative pharmaceutical practice roadmap.

The continued development of healthcare systems and pharmacy services cannot be achieved without a well-educated, trained, competent, and well-distributed pharmaceutical workforce. This research will focus on developing a systematic framework of Pharmaceutical Development Goals that will shape the roadmap for linking the workforce with pharmaceutical healthcare provision in order to achieve a global, impactful practice development transformation programme for nations. In other words, to develop global **goals** and **indicators** for how we can transform our pharmaceutical services and delivery to meet the national and global healthcare challenges.

3.2 Research aim

The research project aims to design and develop a global, relevant, goal-oriented pharmaceutical development framework and corresponding indicators for the advancement of pharmacy practice following evidence-based pathways.

3.3 Research objectives

In order to fulfil the aim and purpose of this research project, the following principal objectives will be set:

1. To develop an initial, evidence-led design, for a systematic and integrated framework of individually distinct PDGs.
2. To validate the descriptive content of the individual developed PDGs.
3. To generate global consensus and agreement on the whole set of goals as an integrated framework that would drive the advancement of pharmaceutical practice and services.

4. To identify and develop progress indicators (evidence-based tools) to map, monitor and measure the future impact of these pharmaceutical development goals.

3.4 Project Overview

<table>
<tr><th colspan="3">Part 1: Exploratory phase for developing the Pharmaceutical Development Goals (PDGs) framework</th></tr>
<tr><td colspan="2">Stage 1: Identification of initial areas and goals</td><td>Status - completed</td></tr>
<tr><td rowspan="3">Aim, Methods, Expected outcomes</td><td>To identify priority areas for pharmaceutical development within a systematic framework of global goals for pharmacy services.</td><td rowspan="3">Chapter 2:
Identification of need.
Chapter 3:
Aim, objectives, purpose.
Chapter 4:
Methods.</td></tr>
<tr><td>1. Literature review: Reviewing the literature focused on the innovative pharmaceutical provision in a global context.
2. Content analysis of the FIP-strategic plan for the transformation and advancement of pharmaceutical practice aspect.</td></tr>
<tr><td>To produce a recommendation for a draft set of initial, unvalidated PDGs (Version 0).</td></tr>
<tr><td colspan="2">Stage 2: Exploratory fieldwork: Acceptability and credibility assessment</td><td>Status - completed</td></tr>
<tr><td>Aim</td><td>To assess the credibility of the (Version 0) of the PDGs draft by conducting exploratory fieldwork.</td><td rowspan="4">Chapter 5:
Preliminary fieldwork - focus group methods.

PDG Framework v0 as output.</td></tr>
<tr><td>Methods</td><td>A focus group was conducted, followed by a qualitative analysis of the collected data.</td></tr>
<tr><td>Expected outcomes</td><td>To get a primary assessment towards the proposed goals with suggestions and recommendations to guide the next steps.</td></tr>
<tr><td colspan="2">Development of the Pharmaceutical Development Goals (PDGs) framework</td></tr>
<tr><td colspan="2">Stage 3: Consultation stage- Development of PDGs (version 1)</td><td>Status - completed</td></tr>
<tr><td>Aim</td><td>To explore in-depth participants’ perspectives and views on the draft list and to develop the content of the PDGs framework</td><td rowspan="3">Chapter 6:
Development stage by global experts using NGT.

A Steering group for guidance, oversight, facilitating participants’ selection and recruitment, and strategic direction

PDG Framework v1 as output.</td></tr>
<tr><td>Methods</td><td>1. Modified nominal group technique (NGT) was used by leading a leadership meeting of global pharmacy leaders.
2. Data were coded and analysed using the PDGs (version 0) as the framing code and employing the framework analysis method.</td></tr>
<tr><td>Expected outcomes</td><td>To reframe the initial PDGs framework to PDGs (version 1).</td></tr>
<tr><td colspan="2">Stage 4: Review/consensus stage- Internal Reference Group (IRG) Review- Development of the final version of the PDGs framework</td><td>Status - completed</td></tr>
<tr><td>Aim</td><td>To perform a review/consensus exercise to agree and validate the content of PDGs (version 1)</td><td rowspan="3">Chapter 7:
Validation and consensus (modified Delphi).

A Steering group for guidance, oversight, facilitating participants’ selection and recruitment, and strategic direction

PDG Framework v2 as output</td></tr>
<tr><td>Method</td><td>1. A modified Delphi method was employed with international pharmacy experts from different sectors.
2. Data were coded and analysed using the PDGs (version 1) as the framing code (framework analysis method).</td></tr>
<tr><td>Expected outcomes</td><td>To reframe the PDGs (version 1) and develop the final PDGs (version 2) framework.</td></tr>
</table>

Part 2: Development of the Global FIP Development Goals Indicators		
Stage 1: Identification of the initial draft lists of global PDG INDICATORS		**Status – completed**
Aim	To identify and link measurable PDG indicators compiled from reviewing relevant literature & publications with the validated 21 Pharmaceutical Development Goals (PDGs).	*Chapter 8:* Global PDGs Indicators and metrics; An initial listing of PDG Indicators as output.
Method	1. Review international collated reports, surveys, and publications to extract all indicators included in all proposed lists of indicators. 2. Delphi method was followed to create the proposed initial lists of indicators.	
Expected outcomes	To generate the initial consensus on the development of unvalidated global indicators aligned to the 21 PDGs.	
Stage 2: Relevancy and availability/accessibility assessment of global PDG INDICATORS		**Status – completed**
Aim	To construct the validity and reliability of the proposed unvalidated PDG indicators (21 lists) in terms of the indicators' relevancy and availability/accessibility at a country level.	*Chapter 9:* Quantitative global responses from a series of online surveys linked with each PDG. A valid and correlated set of "Usable" PDG indicators as output
Method	A cross-sectional survey using online questionnaires to validate the relevancy and availability of the proposed PDG Indicators. Quantitative analysis was performed to describe and interpret the collected data. Descriptive and statistical, boxplot examination, heat maps and cross-tabulation methods.	
Expected outcomes	To determine the relevance and availability/accessibility of the proposed PDG Indicators.	
Alignment of the Global Pharmaceutical Development Goals framework to the initially generated PDGs indicators		**Status – completed**
Aim	To cluster developed "usable" indicators from Stage 2; validation and correlation of PDGs Indicators/metrics for construction of global development Dashboard.	Facilitate the construction of a data dashboard for monitoring global progress linked to the PDGs for dashboard outputs. A display of visualisation for clustering the final approved list of "Usable" indicators that can be used for the construction of a global dashboard to monitor progress, particularly in LMICs, of the global PDGs over long-term time periods.
Method	**Qualitative analysis:** An independent (deductive/inductive) coding for the proposed indicators was required by two coders using Software (NVivo). **Quantitative analysis:** Associative tests were performed to compare the individual agreement level between two coders. Kappa test, Heat maps and cross-tabulation methods.	
Expected outcomes	As a second dimension, to cluster the "usable" developed indicators under the PDG framework three principal elements (W/E, P, S) and the emerging themes.	

Chapter 4: General Methodology

This chapter focuses on the methodology used in the research project, including an overview of the qualitative, quantitative, and mixed methods research designs. It also presents the project's research strategies for data collection, data management, data analysis, sampling techniques, and the credibility and validity of the research. Finally, it clarifies the process used for data protection and ethical approvals.

4.1 Research design

The research aimed to develop goals and processes (metrics, measures) for how we can transform our pharmaceutical services and delivery to meet the national and global health challenges. In order to answer the research purpose, it was required using multiple qualitative methods (e.g., Focus group, the modified nominal group technique, and the modified Delphi process) to engage more people from different pharmaceutical professional aspects and gain their comments to reflect their opinions and give a more robust understanding of the gaps of the researched area.

Mixed method research is an emergent methodology that is increasingly employed by health researchers, particularly within health services research. It is defined as "the focus on collecting, analysing, and mixing both quantitative and qualitative data in a single study or a series". The rationale use of mixed methods is that it can answer some research questions that neither qualitative nor quantitative methods alone are sufficient to address the phenomena in such a comprehensive way (Creswell, 2018; Tariq & Woodman, 2013).

Recent evidence proved that the integration of qualitative and quantitative research methods in a single research project has shown some advantages in certain research, which allow the researchers to explore in-depth complex phenomena (Creswell, 2018; Halcomb & Hickman, 2015). Moreover, using mixed-methods can help the researchers demonstrate the nature of their work intentions and accomplishments and give the research a more rigorous sense (Bryman, 2006).

Quantitative methods are intended to achieve a breadth of understanding, while qualitative methods are, for the most part, intended to achieve a depth of understanding (Etikan I. et al., 2016). In quantitative research, it is usually associated with a belief and a positive attitude that fact and reality can be objectively measured and observed (Creswell, 2018; Tariq & Woodman, 2013). Quantitative research is conventionally described as "deductive" since it is designed to test out a priori hypothesis. The strength of quantitative research is its procedure followed to minimize confounding; in addition, results of quantitative results have greater potential to be generalized, provided samples are large enough and representative. Nevertheless, the "deductive" method is less convenient for generating

hypotheses regarding the originality of concepts or explicating complex cultural or social phenomena (Creswell, 2018; Tariq & Woodman, 2013).

On the other hand, qualitative research mostly develops from an interpretive framework, and it is generally believed that there are several actualities formed by people's opinions, textual context and meaning (Creswell, 2018). Qualitative research usually aims to present a dense depiction of views, conceptual meanings, and beliefs. Moreover, qualitative research keens to address the role of the researchers and context in forming and generating the data (Creswell, 2018). While the quantitative approach is described as "deductive", a qualitative approach is described as "inductive". The inductive approach is characterized by using open-ended questions followed by data analysis, which allows hypotheses to generate from the data. Strength of the qualitative research is that highly-conducted qualitative approach can create vigorous theory which can be applied to context out of the research area, in attempting to direct policy-makers and practitioners. However, qualitative research has some limitations. In term of the findings, they can be restricted by the small sample sizes, which are essential to thorough exploratory work and to achieve generalizability (Creswell, 2018; Tariq & Woodman, 2013).

Consequently, mixed-methods research has the power to employ the strength and overcome the weaknesses of both approaches and can be particularly powerful when dealing with complicated and many-sides issues, such as health services research (Tariq & Woodman, 2013).

Several ways of methods can be combined to collect both qualitative and quantitative data. The method used will be mainly determined by both the research question and the data required, which could be affected by feasibility, the researcher(s) experience and competences, and timeframe (Tariq & Woodman, 2013). Accordingly, Creswell (2018) outlined six mixed methods design strategies, as illustrated in (table 2).

Table 2: Types of mixed methods designs

Mixed methods designs	Characterization	Purpose
Sequential Explanatory	Collection and analysis of quantitative data followed by a collection and analysis of qualitative data.	Qualitative findings are used to help in explaining and interpret the results of a quantitative study.
Sequential Exploratory	Collection and analysis of qualitative data followed by a collection and analysis of quantitative data.	• To Explore a phenomenon • To generate and test a new tool.
Sequential Transformative	Collection and analysis of either quantitative/qualitative are separately used. Then, the	To apply the methods that best assist a theoretical perspective.

	findings are combined in the interpretation phase.	
Concurrent Triangulation	This is a concurrent mixed model design where QUAL and QUAN methods are employed to confirm, cross-validate, or corroborate findings within a single study.	Generally, using both methods will help overcome the weakness that exists in one method with the power/strength of another.
Concurrent Nested	A nested approach is when one method is more dominant and drives the project, while the other method is embedded or "nested".	To address and answer other questions than the dominant one and get information from several levels.
Concurrent Transformative	• Guided by a theoretical perspective. • Concurrent collection of both quantitative and qualitative data. • One design might be embedded in the other.	To evaluate a theoretical perspective at different levels of analysis.

Mixing methods also have the opportunity to implement the "triangulation approach" through founding associations between and within a different set of data (Creswell, 2018). According to Carter et al. (2014), "triangulation" is the use of various methods or sources of data to explore phenomena and generate a broader understanding of the phenomenon of interest. Triangulation has also been considered as a strategy to increase the validity (accuracy of the findings) and credibility (trustworthiness of a study) of research outcomes by gathering information from several sources (Carter et al., 2014; Creswell, 2018; Noble & Heale, 2019).

Triangulation, by combining multiple methods, helps limit the potential biases arising from using a single method so as to ensure the validation of data in both qualitative and quantitative studies. Also, triangulation help explores and understand human attitudes and perspectives by using different data sources. Finally, triangulation is a powerful way to enrich a research study and demonstrate more confidence and more unbiased in the research findings (Carter et al., 2014; Noble & Heale, 2019).

Carter et al. (2014) identified four types of triangulations: method triangulation, investigator triangulation, theory triangulation, and data source triangulation (see table 3).

Table 3: Types of triangulations

Triangulation method	Description
Method triangulation	Involves the use of multiple methods of data collection about the same phenomenon of interest and is frequently used in qualitative studies.

Investigator triangulation	Involves the contribution of more than one researcher in the same study, which yields both validation of findings and different views, and gives a wider scope for the phenomenon of interest.
Theory triangulation	Uses different theories for analysing and interpreting data instead of relying on one theory/viewpoint only, which helps the researcher support or refute findings.
Data source triangulation	Involves data collection from different types of people (individuals, groups, families) and different data sources (time, location) to gain several viewpoints and data validation.

4.1.1 The project research design employed in this research project

In order to fulfil the aim and objectives of this study (see chapter 3) and for the reasons mentioned above, the sequential exploratory mixed-methods approach was used. The rationale use of the sequential exploratory mixed methods in this project is that the primary focus of this study is **first** to explore pharmacists' and stakeholders' perceptions and acceptance of the proposed list of pharmaceutical practice goals, which help understand the current global challenges and ensure the relevance of these goals within the global context. Second, this project aims to design and generate a development framework and indicators as "**tools"** to guide the transformation process and monitor the impact of these goals towards the advancement of pharmaceutical services and practice (see table 2). Accordingly, a set of qualitative approaches (focus group, modified nominal group technique, modified Delphi process) and quantitative approaches were both employed in this study. Triangulation of both qualitative and quantitative data has also been used to yield greater credibility and validity for the study (Carter et al., 2014; Noble & Heale, 2019).

In this research project, method triangulation and data source triangulation were used. Methodology triangulation is a well-established technique which has proved benefits in confirming outcomes and allowing deeper understanding and validity to the phenomenon of interest (Creswell, 2018). Also, this technique can be useful in promoting the interpretation and analysis of findings as data were collected from different sources (several events, different participants) (Bekhet & Zauszniewski, 2012).

4.2 Qualitative research strategy employed for data collection

To conduct this project, it was required to follow several practical approaches to data collection. Using multiple sources and methods to collect information was adopted to validate the gathered data and to answer a list of standard questions in relation to the area under study (Kheir et al., 2008). In the following sections, the methods of data collection used in the project are addressed with reference to the relevant chapters.

4.2.1 Interviews Method-Focus group

A Focus group is a type of unstructured interview (using open-ended questions) conducted by a facilitator (the researcher) and is usually considered a qualitative data collection technique (Bowling, 2014; Smith, 2010). The focus group technique is deemed to be important in conducting health research due to its efficient and economic nature (Flynn et al., 2018). Also, the focus group technique can be described as the interaction between a group of people who are gathered to discuss, focus and enhance their understanding of a research issue of interest to collect and generate the data that would not emerge using other methods. It is "focused" because the process includes a collective activity and yields large amounts of data (Bowling, 2014; Flynn et al., 2018).

Focus group is commonly employed in exploratory work to explore participants' views and perceptions and elicit a wide range of discussions which allow a more in-depth understanding of the research under study and help the researcher to think about the different aspects and views regarding the research (Bowling, 2014; Smith, 2010). Some disadvantages of this technique are that some participants might dominate the discussion or other participants might be influenced by other people's views (Smith, 2010). One of the limitations of this method is the possibility of social desirability bias (a tendency to show and behave in a way to perceive social acceptance) that can be shown amongst some participants by reporting favourable data and demonstrating good experiences to please and satisfy the researcher/interviewer and hence might affect the reliability/credibility of the data and create some difficulties in interpreting the findings. Some strategies can be adopted to limit this bias, for example, following some techniques for introducing the study, building rapport, and asking questions (Bergen & Labonté, 2019). In qualitative research, demographic information is usually used to show the diversity of the sample or to show particular attributes of each participant; however, qualitative research does not process such data as a variable. Demographic information is more relevant to the quality criteria of the research, and it is not data for analysis or interpretation (Braun, 2013).

As a qualitative approach to data collection, a focus group was employed in the preliminary exploratory fieldwork (Chapter 5) in this project. This approach was chosen as the most suitable approach to answer the objectives of the preliminary stage, and the aim of this stage to gather better understanding and perceptions from the diversity pool of pharmacists was fulfilled. More details about the recruitment and focus group guide are illustrated in the related chapter.

4.2.2 Consensus groups methods

Consensus methods have become increasingly employed to resolve dilemmas related to medicine and health, where healthcare professionals have the uncertainty of making decisions in situations where

there is contradictory information about a given issue (Fink et al., 1984; Jones & Hunter, 1995). The primary purpose of these methods is to determine the level of agreement on controversial subjects, and they have been used in different settings. Moreover, the importance of adequately employed consensus methods is that consensus methods can be found in well-structured environments where experts are provided with the best relevant information, and hence give their solutions to problems higher validity and reliability than otherwise (Fink et al., 1984; Jones & Hunter, 1995).

In other words, these techniques aim to express the quantity of agreement (consensus measurement) and to define and resolve disagreement (consensus development). Three well-described consensus methods are widely used in qualitative research, which are the Delphi process, the nominal group technique (commonly known as expert panel), and the consensus development conference. All of these methods include measuring consensus, and the nominal group and consensus development panel are also engaged in developing consensus (Jones & Hunter, 1995).

The Delphi Process

The Delphi method has been widely employed in health field research, which includes clinical practice, education and training, developing guidelines on the standard practice of care or quality indicators, and information and health technology assessment. This method allows a large number of experts to be anonymously engaged and, normally by email or post, to answer a self-administered questionnaire. This method is considered not expensive, with fewer geographic limitations on the participants (Fink et al., 1984; Jones & Hunter, 1995). This method is an iterative process which uses a systematic progression over several "rounds" where the outcomes are generated, listed, and presented to the group. The Delphi round is deemed completed when the participants' opinions reach an agreement point and meet the researcher's needs (Eubank et al., 2016).

Conventionally, the Delphi method includes at least two rounds. The first round begins with open-ended questions to explore the topic of interest and is called the "exploration phase". Whereas the subsequent rounds become part of the "evaluation phases", in which the outcomes of the previous rounds are assessed and validated for use as a new set of questions for subsequent rounds (Fletcher & Marchildon, 2014). Using the Delphi technique enables participants to respond and revise their answers in light of the previous rounds' responses until they gradually reach a consensus. Besides, it allows experts to share their opinions objectively while providing the generated information as an entire group eventually (Fink et al., 1984; Fletcher & Marchildon, 2014).

The Delphi method's anonymity enables participants to initiate more open discussions and provide their free opinions without fear of any external influence or criticism (Fletcher & Marchildon, 2014). However, the Delphi process has shown some limitations in terms of reliability of the process. For

instance, since the reliability of the process increases with the number of participants and the number of conducted rounds, some participants lose enthusiasm and commitment after the second or third rounds, and leading large groups and several rounds can become more complex and expensive (Fink et al., 1984).

This method has been modified in (Chapter 7) to serve multiple purposes in this phase. Accordingly, the **modified** Delphi process was used rather than the conventional method as a qualitative approach for data collection in the review phase. This method was chosen as the best suitable approach to serve this phase's desired results for the following reasons. **First**, the modified Delphi takes an epistemological position where it creates space for academic and other experimental knowledge to contribute to knowledge construction regarding the topic being studied. Hence, this approach helped in drawing participants' experimental insight. **Second**, it facilitated confidentiality and inclusivity. **Third**, the Delphi method increases researcher accountability to the participants. During the analysis, the researcher is keen to conduct more careful data processing and responsible interpretation of results for each round. Afterwards, the researcher's interpretations of the participants' feedback will be sent back to them to evaluate further issues that emerged, which encourages researcher accountability (Fletcher & Marchildon, 2014). **Finally**, the systematic progression of iterative rounds is an effective way of identifying the collective opinion of experts where evidence is lacking or limited in the research study (Eubank et al., 2016).

The nature of this study required implementing two deviations from the conventional Delphi method. A two-step modified Delphi method was used by involving **two different groups** of participants for each round (the first deviation). The first group represented international pharmacy experts and was called the "Internal Reference Group-IRG"; the second group also represented global experts and was called the "validation expert group". The aim of including different groups throughout the different project studies was to maximise the inclusion of participants to ensure receiving reliable global inputs and reduce selection bias.

In the first round, the IRG members were requested to answer an online questionnaire and be responsible for providing feedback on the amended PDGs draft content. In the second round, the validation expert group met through an **interactive video conference** (the second deviation) and were responsible for reviewing and validating the inputs provided by the IRG and ensuring that the data selected were relevant and applicable to the context for decision-making and reaching the final consensus. The online meeting was not part of the conventional Delphi method; rather, it was adopted. The modification was chosen because it permitted expert interaction in the second round. This interaction allowed the validation group members to provide further clarifications on some issues and raised arguments, present and justify their viewpoints, and facilitate the development of the final

consensus on the draft document. According to several studies, following a modified Delphi method has demonstrated superiority over the conventional Delphi method and is considered powerfully effective and cooperative (Eubank et al., 2016).

More details about participants' characteristics, method process, and recruitment are illustrated in (sections 7.3 and 7.3.1). Therefore, this method has been modified to suit and serve the purpose of this phase.

The Nominal Group technique (NGT)

The nominal group approach is identified as a highly structured, multistep, facilitated group meeting technique that aims to generate and collect qualitative information and then rate responses to a series of specific topics or questions by targeted experts (usually 9 to 12 in number or more) who are mostly associated and have expert insight into the field of interest (Fink et al., 1984; Jones & Hunter, 1995; Søndergaard et al., 2018).

The nominal group process mainly consists of two rounds. First, participants are gathered and asked their individual opinions about a pre-determined question(s) or topic(s) over a period of time. Afterwards, the facilitator collects and displays the ideas in a way that everyone can see them by using facilitation tools (e.g. flip chart, cards + sticky wall) with grouping similar ideas together, where appropriate. Finally, the listed ideas are collectively discussed to clarify and evaluate each idea for prioritising and agreement (Fink et al., 1984; Jones & Hunter, 1995; Søndergaard et al., 2018). Ensuring the successfulness of this technique depends on the skills and objectivity of the group leader (facilitator) and on the willingness and commitment of the participants to work together in an extremely structured face-to-face setting (Fink et al., 1984; Jones & Hunter, 1995).

Another qualitative method used for data collection in this project, the modified nominal group technique, was employed in the consultation stage (chapter 6). This method was chosen as a suitable working method to serve the purpose of this stage for the following reasons. First, the individual opinion of experts is needed, and the NGT structure and process give participants equal opportunities to speak and share their own ideas. Second, the flexibility of the method enables participants to work as a group and in pairs and hence allows more free discussion on the topic under research. Third, the collective discussion and reflection will help produce and refine the layout or template that could be adapted for the next study steps. Finally, the systemise structure of this method will help develop the content of the next version of the PDGs based on the experience and opinions of leaders of the relevant field (Søndergaard et al., 2018).

As the NGT recognised by its flexibility and modifiability model that suits to answer complex and different research questions, it was found that there was no need to follow the model's original outline

strictly. Therefore, an adjustment to the NGT model is needed as the aim of this group meeting was to receive inputs and develop relevant content to the suggested themes and not to produce a prioritised list. Accordingly, a **modified** nominal group technique was adapted by omitting the usual last step of rating the responses and ideas; the modifications made were applicable and did not affect the method's feasibility structure.

The process of participants' recruitment and how the interactive global leadership meeting was conducted are detailed in the respective chapter (chapter 6).

The consensus development panels

It is also known as a consensus development conference. This method should be chosen when there is a lack of evidence in the literature. It involves arranging a meeting with panels of experts (decision-makers) in a particular field or panels of laypeople assembled together to discuss specific subjects. Usually, the purpose of this panel is to improve the comprehension of an area or develop a consensus. This method is usually employed in assessing health care technologies by government organisations, large health care organisations, and other stakeholder groups to carry out a qualitative study (Bowling, 2014; James & Warren-Forward, 2015).

This method requires a facilitator who is commonly the researcher (an expert on the topic) or could be a non-expert; however, has credibility with the participants. The main advantage of this method is that it promotes interchanging, debating, and discussing information in an interactive way between participants. Some of the challenges of this method are that it requires a high level of organisation and is costly (Bowling, 2014; James & Warren-Forward, 2015).

A "Steering group" was committed to overseeing the findings of the research project at key stages during the progress of the research, and they are experts in the area under investigation. The group members were involved throughout the research process (chapters 5, 6, 7) and acted as a decision-making reference group. They provided insight and input based on their experience in the content validation of the PDGs framework and assisted with participant selection and recruitment.

4.3 Quantitative research strategy employed for data collection

4.3.1 Online questionnaire

Survey research using questionnaires is commonly used in health services and pharmacy practice studies. This method showed efficacy and efficiency for data collection in many types of research (Smith, 2010). Questionnaire research strategies can employ qualitative strategy (e.g. using open-ended questions), quantitative strategy (e.g. responses with numerical value), or both strategies in mixed-methods design (Ponto, 2015).

Questionnaires are relatively cheap and fast means to collect information from a large sample in a suitable time (Ponto, 2015; Smith, 2010). Designing a robust and effective questionnaire is essential for any research project in order to provide the research with the required data and clear enough to complete by respondents. Once the questionnaire is well-constructed, the concerns related to the validity and reliability of data have been adequately considered. Then data processing and analysis will be more significant and meaningful (Smith, 2010).

An online questionnaire is a self-administered questionnaire distributed through email or an Intra-based programme, such as "Qualtrics". Typically, it contains information reflecting the aim of the research and also includes questions about the demographic data of the respondents in addition to reliable and helpful research tools (Ponto, 2015). A self-administered questionnaire is characterized by the anonymity of the respondents, which enhances the honesty of respondents and hence would decrease the research bias (Cohen et al., 2017; Smith, 2010).

Ponto (2015) mentioned that improving the visual appeal and graphics of an electronic questionnaire can improve the response rate and reduce measurement error (i.e., lack of validity or reliability). Moreover, online questionnaires are a considerably feasible method as it allows respondents to freely access/re-access to complete the questionnaire at any time (Cohen et al., 2017). One of the limitations of the online questionnaire is that respondents who do not have access to a computer/internet would be excluded (Ponto, 2015).

Consequently, for the reasons mentioned above, an online questionnaire was chosen to collect data in this research study. The questionnaire design and dissemination method are detailed in (Chapter 9).

4.4 The theoretical approach used to shape the project: The Theory of Change (ToC) model

In the search for the best suitable theory framework to guide the project, the Theory of Change (ToC) model was examined as a basis. The Theory of Change model can be described as "an outcomes-based approach that applies critical thinking to the design, implementation and evaluation of initiatives and programmes intended to support change in their contexts" (Vogel, 2012). The Outcomes Framework is the basis for recognising what type of activity/intervention leads to the desired outcomes identified as prerequisites for achieving long-term goals (Center for Theory of Change, 2020). ToC is also seen as both "a process and a product" (Vogel, 2012).

ToC is currently being widely used in global development as a tool and methodology to support development outcomes for service transformation or workforce transformation programmes (De Silva et al., 2014; Paina et al., 2017; Vogel, 2012). It has also been shown that applying ToC supports countries or organisations with strategic planning, monitoring and evaluation, description and

learning (De Silva et al., 2014; Paina et al., 2017). In strategic planning, the ToC model is used to identify what types of processes and activities need to be carried out to achieve long-term outcomes in organisations (Anderson, 2004; DuBow & Litzler, 2018). In monitoring and evaluation, the ToC is used during the implementation stage to evaluate progress towards the expected outcomes and revise implementation when needed (Breuer et al., 2016). The ToC is usually presented in a visual diagram and/or narrative summary, capturing the outcomes and helping organisations communicate their change process to their partners (Breuer et al., 2016; Vogel, 2012). The ToC is also used as a thinking and learning tool to develop the theory behind the organisations' change (Vogel, 2012).

ToC was developed within the context of theory-driven evaluation, which affirms the importance of understanding how and why a programme (organised activities) works in order to evaluate it (Breuer et al., 2016). The ToC is usually generated using a backward mapping technique which begins with recognising the context of change (input) through evidence-led needs-based assessment (Breuer et al., 2016; Reinholz & Andrews, 2020). This needs-based assessment can be derived from situational analysis, existing documentation review, relevant research evaluation and evidence from similar programmes/projects, activities, or engagement with experts and stakeholders (BETTER EVALUATION, 2020; De Silva et al., 2014). The process then follows a backward mapping process, first focusing on the end results (outputs, outcomes, impact) and then looking backwards to specify all conditions required (process/activities) in order to achieve the end results (Breuer et al., 2016; Reinholz & Andrews, 2020).

Therefore, the principal sequential steps of the ToC followed in this project are:

(1) To determine/recognise the context of change the "inputs" through evidence-led needs-based assessment. The input for this research project is to identify and review the priority areas for practice development to develop the initial set of pharmaceutical development goals based on the current global health challenges of changing population demographics, and

(2) Mapping to the endpoint (end results) to determine the outputs, outcomes, impact. The global pharmacy practice transformation is the outcome of this project to enhance advancing pharmaceutical practice and delivery to meet the national and global healthcare challenges, and

(3) Implementation of national tools and mechanisms for transformation (activities/strategies) through developing a systematic and valid framework of pharmaceutical development goals (PDGs) (NCVO, 2020; Vogel, 2012).

In this research project, the principles of the ToC model were used as a general approach in identifying practice development priorities and the tools and mechanisms for developing a valid systematic framework for global practice transformation.

4.5 Reliability, validity, and credibility of data

It is essential while conducting any research study (qualitative/quantitative) to outline the rigorousness and integrity of the study by ensuring the credibility, validity and reliability of the findings in relation to qualitative/quantitative research. Moreover, it will be helpful to evaluate the quality of the research, especially if findings are to be implemented in practice and care delivery (Noble & Smith, 2015).

Typically, the terms (reliability, validity, and generalizability) are associated with quantitative research, while other alternative terms (true value, consistency and neutrality, and applicability) are used with qualitative research. Noble and Smith (2015) outlined the differences in terminology used between qualitative and quantitative research (table 4).

Table 4: Terminology and criteria used to evaluate the credibility of research findings

Terminology used in quantitative research	Terminology used in qualitative research
Validity The precision of how accurately the findings reflect and represent the data of the research phenomenon	**True value (trustworthiness)** The gathered data clearly and accurately represents participants' views.
Reliability Describe consistency within the used analytical methods, including researcher and research method biases that may influence the findings.	**Consistency/Neutrality** It depends on the consistency of the methods employed to achieve similar or comparable findings with any other independent researcher. The researcher's view should be clear and transparent.
Generalizability The ability to transfer and apply the findings to other settings and contexts.	**Applicability** Consider the applicability of findings to other settings, groups, and contexts.

Lacking scientific rigour, in addition to the weak justification of the utilized methods, are mainly the reasons to criticize the quality of qualitative research. Qualitative research is more subjected to a lack of transparency in the analytical methods, and research bias since the findings are merely collected from personal opinions. Accordingly, qualitative researchers have employed several methodological strategies to enhance and achieve the "trustworthiness" of the findings (Noble & Smith, 2015).

In this regard, several strategies were undertaken to maximize the credibility of the results. First, the triangulation approach was adopted, where method triangulation and data source triangulation were used. The qualitative data collection approach and data sources of each study were different from the

others. Each study had its protocol guide, material tools, and the pool of participants, which helped in overarching most aspects of the study and bridging any gaps missed in the previous stages.

Accordingly, the following strategies were applied for the qualitative studies (Chapters 6,7, 8, and 9):

1. The NGT and Delphi technique plans and prepared materials were conceived and designed by the researcher to address the research question.
2. The NGT and Delphi technique plans and prepared materials were pre-reviewed by the supervisor to ensure clarity and avoid any ambiguity.
3. The researcher attended several training courses to familiarise herself with the qualitative approaches (data collection, management, and analysis) and enhance her interactive and facilitation skills.
4. The researcher and supervisor oversaw the meetings to prompt and probe participants and resolve any ambiguity.
5. The identified codes and themes were reviewed by a second researcher with experience conducting qualitative research.

Concerning the quantitative study conducted in this research project, the validity of the designed questionnaire was achieved by reviewing the questionnaire by experts in the field. All the suggestions were addressed, and the questionnaire was modified before disseminating accordingly. In addition, the questionnaire included a commentary box to allow participants to add any opinions/views they feel are relevant and add value to the questionnaire outcome. Moreover, the questionnaire replies were automatically coded and exported to statistical software for analysis (SPSS), and the data were systematically cleaned and reviewed.

4.6 Reflexivity

In much qualitative research, a reflexivity approach is now widely employed to reduce the potential researchers' bias and subjectivity in the research process (Amin et al., 2020; Ortlipp, 2008). Reflexivity is unique because it can provide researchers with techniques to manage the inherent influence they might bring to the research project. It is a systematic approach to keep the researcher vigilant during the creation of knowledge as well as the analysis and interpretation of the data throughout the research process (Amin et al., 2020). Ortlipp (2008) and Amin et al. (2020) discussed how the researchers' backgrounds, experiences, positions, values and insights influence their research interests, how they choose data collection/analysis methods, and how to interpret and present their findings. Hence, there is no neutrality in qualitative research, and there is a need for greater attention to one's biases (Braun, 2013; Dwyer & Buckle, 2009). Therefore, the researcher found that it is important to talk about herself, declare her identity and professional background, and acknowledge

that her insights might influence how she grasps and examines the study under investigation, from study design to data collection/management and analysis.

4.6.1 The principal researcher's prior education and experience

The principal researcher obtained her undergraduate degree in pharmacy from Jordan, and she is a registered pharmacist in Syria. After graduation, she worked in a pharmaceutical company as head of a production line for three years. Then, she moved to the scientific office of the same company to establish and lead the quality assurance team in the office for around three and half years. She also had an opportunity to work as a lab instructor at the Damascus University "School of Pharmacy" for a full academic year. In 2017, the researcher was awarded a Merit-based scholarship to undertake a Master's degree in Clinical Pharmacy, International Practice and Policy at the University College London School of Pharmacy to acquire new skills and expand her knowledge. After completing the Master's degree, the researcher was awarded a second Merit scholarship to pursue a PhD degree at the same university under the department of Pharmacy Practice and Policy.

As participants of the development and consultation stages (Chapters 5,6 and 7) were FIP leaders and members, the principal researcher introduced herself as a researcher from UCL School of Pharmacy representing UCL, not the FIP. This was to avoid any conflict of interest, reduce the influence and give participants more freedom to express their insights and perspectives. Before each global meeting, the principal researcher and supervisor explained the project's background/aim and objectives to the participants and clarified the tasks assigned to them. The principal researcher and supervisor oversaw the global leadership meetings to ensure professionalism, clarify ambiguity, and keep participants on track.

4.6.2 Conceptualisations of the research project

The concept of this research project came from global and country imperatives. The principal researcher came from Syria, where the pharmacist's role in Syria is limited to dispensers, and any other pharmacist practice interventions are not more than self-initiatives and are not driven by evidence. She also searched other studies within her region, i.e., EMR, where she found that limited scope of practice and lack of policy development strategies are also common within the region. From here, she recognised that these gaps and challenges in the profession are not restricted to Syria but expanded to other EMR countries or the LMICs. When she first came to the UK, she wanted to learn how to do some practice development that could apply and have an impact on the EMR region. She started her journey by taking the MSs course, Clinical Pharmacy, International Practice and Policy

course, where she recognised how pharmacists are important in advancing and developing the pharmacy practice and their vital role in delivering quality pharmaceutical services or care.

To address her country's needs, the researcher went through some international publications to find what is the current evidence available to advance pharmacy practice and services. Also, she went through the FIP publications where the FIP had recognised the same gaps and challenges in the profession. This was when the principal researcher became interested and had this great opportunity to work on this research project through the UCL-FIP collaborating centre. The FIP works in the area of global development, and they were planning to develop some global development goals built on the workforce development goal published in 2016 and aligned with the WHO strategies to overcome global health challenges and lead the transformation of the pharmacy practice. Driven by global and country imperatives, this research methodology was designed, and different steps were undertaken to minimise personal views and ensure that all decisions and actions were taken based on evidence.

To mitigate the researcher's bias, the principal researcher encouraged and adopted several techniques throughout the research process. The principal researcher used to keep a self-reflective journal which can facilitate reflectivity and help her address the "individual assumptions and objectives", clarify "personal believes and subjectivities", and create transparency in the research process (Ortlipp, 2008). The principal researcher used this technique during the focus group meeting (Chapter 5), the global leadership meeting (Chapter 6, NGT), and the online meeting with the validation group (Chapter 7, Delphi method 2nd round). The researcher was keen to take notes and reflect upon her thoughts, impressions, experiences, expectations, and decisions.

The debriefing technique was also used in (Chapter 6) where the participants of the NGT experiment were asked to debrief their groups' discussions vocally. Using this technique was useful and helped locate the findings later (Amin et al., 2020; Hanna & Hughes, 2012). Additionally, a second expert researcher volunteered to check the coding process conducted in (Chapters 6, 7 and 9). The coding review process helped foster reflexivity, enhanced the credibility and reliability of the findings and managed the risk of subjectivity and inherent biases (Amin et al., 2020; Witry & Doucette, 2014). The principal researcher also maintained regular meetings with supervisors to keep them informed, receive feedback, and discuss the process before initiating any steps or making any decisions relating to the research project. The researcher also discussed her research PhD project with other colleagues who provided neutral comments and enlightened her on any "blind spots" she might have missed (Amin et al., 2020; Witry & Doucette, 2014).

4.7 Ethical approval

Formal ethical approval from the research ethics committee was not required, given that none of the studies conducted involved vulnerable participants or identifiable or sensitive data or protected characteristics under GDPR regulations. Also, participants engaged in this research project were voluntarily recruited by virtue of their professional backgrounds and roles (guideline available at http://ethics.grad.ucl.ac.uk/exemptions.php).

Nevertheless, data collection approval and ethical oversight were gained from the International Pharmaceutical Federation, Executive and Board structures, and is on record.

Thesis PART 1

Part 1 of the thesis aimed to develop a set of valid and consented global pharmaceutical development goals (PDGs) to support systematic advancement in the delivery of pharmaceutical services in order to better guide practice transformation needed to meet the national and global demands of changing population demographics.

The aim, objectives, data collection and analysis methods employed in obtaining the final results was described. This study was conducted through a series of mixed methods approach stages to achieve the aim of this part.

Stage 1) is to evaluate the appropriateness and acceptance of a set of proposed global pharmaceutical development goals (PDGs) by conducting a series of focus groups. (Chapter 5)

Stage 2) is to engage with a sample of global pharmacy leaders from different sectors and nations for wider-scope consultation to further develop the content of this initial PDG framework. (Chapter 6)

Stage 3) is to ensure the credibility and content validity of the outcomes of the previous consultation stage and generate consensus on the final matrix of the proposed global pharmaceutical development goals. (Chapter 7)

Chapter 5: Preliminary fieldwork - a global Pharmaceutical Development Goal framework.

5.1 Introduction

In this chapter, the aim, objectives, and methods used to conduct the preliminary fieldwork as an exploratory stage on developing global pharmaceutical development goals will be discussed and aligned with the purpose of Stage 1.

The starting point for the preliminary fieldwork resides in two principal documents.

The FIP Nanjing Statements (International Pharmaceutical Federation, 2017b) which were consented and launched at the 2016 Global Education Conference held in Nanjing. These statements included the first systematic set of global Pharmaceutical Workforce Development Goals (PWDGs), which have subsequently been widely used worldwide to push forward on workforce development and advancement of the pharmaceutical workforce. The description and use of a goal-oriented development framework is now well established (akin to UN SDGs, for example).

The second document is the FIP Global Strategy Plan and mission (International Pharmaceutical Federation, 2019b), adopted by more than 140 countries and territories worldwide. The International Pharmaceutical Federation, as the global leadership body, set out a strategy that required concerted actions and mechanisms to ensure progress towards key goals described (and agreed upon) in the Astana Declaration (Duggan, 2020).

The FIP-strategic plan was used as the primary resource document because it reflects the demanding challenges facing the profession and focuses on the different needs that support the advancement of pharmacy practice and improve patient outcomes worldwide (International Pharmaceutical Federation, 2019b).

A shortlisting of initial pharmaceutical development goals was created as the result of a content analysis of the 2019 FIP Strategic plan; the content analysis was aligned with the strategic global health outcomes described in the document. The relevant aspirational strategic outcomes are:

Everyone has access to the medicines they need;

Everyone has access to the health and medicines-related information they need;

Everyone benefits from innovations in medicines, health technologies and services;

Pharmacists ensure the responsible and quality use of medicines;

Work collaboratively to ensure comprehensive & integrated healthcare outcomes for patients.

Therefore, a task and finish group, established by FIP Boards (and including the researcher), created a drafting of a potential set of pharmaceutical development goals that form a basis for the initial framework. This was used as a starting point for subsequent preliminary fieldwork, described in this Chapter, and the subsequent research development plan of this thesis (table 5).

Some principles were applied to create this initial framework list; in particular that any developed PDGs need to be:

1. Compliant with the WHO imperatives of UHC, primary health care, and NCDs/LTCs;

2. Have a focus on the advancement of pharmaceutical practice aspect (e.g., advanced and integrated services, medicine expertise, policy development) and innovative pharmaceutical provision (e.g. IT and digital health).

The methodology used in developing the previously published Pharmaceutical Workforce Development Goals (PWDGs) was adopted and adapted for planning the consultation and consensus stages of the project. As a result, a recommendation for a draft initial set of unvalidated PDGs (Version 0), grouped into 3 clusters, was produced as a starting point for the research development work.

Table 5: The draft set of unvalidated Pharmaceutical Development Goals

Clusters	**Pharmaceutical Development Goals (draft)**
Population needs	1. Quality assurance mechanisms
	2. Patient Safety
	3. Medicines access and supply chain
Pharmaceutical services .	4. Prevention strategies and implementation
	5. Self-care and triage/appropriate referral
	6. LTCs/NCDs
	7. Fragile patient populations
	8. Medicines information
Systems	9. Interprofessional (IP) and collaborative working (& technology)
	10. Information technology (IT) and digital health initiatives
	11. Service intelligence
	12. Regulation and Remuneration reform
	13. Equity and diversity in pharmaceutical services delivery, service access and service impact

The initial draft of PDGs comprised three “Strategic Clusters”, which are (1) needs (focus on quality and safe medicines and equity access to effective medicines and pharmaceutical care), (2) services (focus on the pharmaceutical services provided to patients), and (3) systems (focus on policy development, digital pharmaceutical services, services impact, ensure equity and diversity); each cluster includes a set of goals (table 5). The initial PDGs will be revised and approved over the

different stages of the current study to develop a globally validated set of pharmaceutical development goals which serve as structural support for pharmacy development in a national and global context.

The next sections will include more details regarding the aim and objectives, procedures and the methods of data collection employed, participants recruitment and the outcomes of the preliminary fieldwork.

5.2 Aim and objectives of the preliminary fieldwork

In this section, the aim and objectives of the preliminary fieldwork will be discussed. The pharmaceutical development goals (PDGs) project had the first exposure during the FIP Amman regional conference in April 2019. The preliminary fieldwork aimed:

1- To assess the credibility and acceptance of the pharmacists and stakeholders regarding the proposed goals.
2- To gain initial and immediate comments and feedback in terms of the responsiveness and acceptance of these proposed goals.
3- To gain ideas on how to implement these goals considering the global challenges and ensuring that these goals are relevant globally in every context.
4- To guide the researcher to design the most feasible and applicable study protocol to facilitate conducting and setting up the study in a global context.

5.3 Study design

The preliminary fieldwork; Acceptability and credibility assessment stage

Preliminary exploratory fieldwork was carried out before starting the main study in order to evaluate the acceptability and credibility of the proposed project, to facilitate planning and designing the procedures and data collection and analysis methods required to conduct the study, and to maximize the possibility that the research study will be conducted successfully (Smith PG et al., 2015).

In many qualitative studies, a relevant number of participants are asked to review a draft information document to identify clarity and acceptability, in addition to checking the potential community acceptance of the area under study. Usually, the preliminary fieldwork is relatively short and inexpensive, and the methods used should be tailored to answer the purpose of the preliminary fieldwork study (Smith PG et al., 2015).

The aims mentioned above were achieved through conducting a focus group (as a qualitative approach) at an international pharmacy leadership meeting in Jordan, with an international representation of pharmacy leaders working in different settings. Participants were invited to

participate in this meeting to allow a brainstorming discussion around the potential goals and verify that these goals are relevant in various contexts.

5.3.1 Sampling strategy and data collection methods

Focus group recruitment

As the aim of this focus group meeting was to gain initial primary data regarding the participants' perception of the proposed goals, convenience sampling (a nonprobability sampling technique) was employed to recruit the participants of the focus group. Convenience sampling is usually chosen to collect data from participants who are easily accessible and available to the researcher and willing to take part in the study at a given time.

Participants of the initial focus group were first asked to give their consent to be part of this exploratory phase of the project. Lately, participants were asked to fill in a short demographic profile spreadsheet after finishing the meeting. Demographic variables from participants included national status, job title/status, sector of practice (academia, hospital, community, and industry), years of practice/register, and gender.

Focus group; data collection

An introductory presentation was given to familiarise the attendees of the international pharmacy meeting with the topic of the project. Following the presentation, convenience sampling was used to invite the attendees to participate and form the initial focus group.

The 14 participants were randomly divided into two roundtable discussions to discuss and share opinions regarding the "Pharmaceutical Development Goals" proposed draft list. The focus group was conducted by the researcher and the researcher's supervisor. It lasted for 45-60 minutes, and English was the language of the discussion amongst the participants. The researcher's supervisor opened the focus group with a brief explanation of the aim and objectives of the preliminary work. The above persons oversaw the open discussion to guide and keep the discussion on track.

Participants were asked to provide comments on the e-slide exposed during the session (table 5) by writing down their comments on the potential goals **as a group** and answering the following questions generally.

1. How do you see these goals, and how are they applying in your context?
2. Is there anything missed out?
3. Suggest ways of measurement and monitoring.

The researcher and supervisor were overseeing the group discussion and trying to facilitate understanding of the assigned task to the participants and prompt and guide participants' discussions by asking different questions to reduce the possibility of social desirability bias (Bergen & Labonté, 2019). At the end of the meeting, the notes were collected and compiled by the researcher based on the comments provided on each goal separately.

5.4 Data handling

The group discussion was not recorded, but the researcher was taking notes during the focus group work. All notes collected were kept in a locked cabinet at the Department of Practice and Policy at the School of Pharmacy, University College London, in order to maintain the confidentiality of data obtained throughout the research study. Only the researcher and the supervisors have access to the collected data.

5.5 Ethical considerations

Formal ethical approval was not required (see section 4.6). Instead, ethical oversight and approval were gained from the FIP Executive and Board structures for the use of data and access to listed experts for this study and are on record. Focus group participants were provided with full information about the study. They were also informed that their participation is voluntary, and they can withdraw from the discussion at any time without any explanation or consequence.

5.6 Results of the Preliminary fieldwork

In total, 14 pharmacists participated in the focus group, most of whom were from Jordan (35.7%). Out of 14 participants, five were from Jordan, three from Indonesia, two from Palestine, two from Pakistan, one from Cameroon, and one from Lebanon (see table 6).

Participants were working in different practice settings (academia, community, hospital, and industry). Only one participant was working in a "Non-governmental organisation-development and humanitarian aid sector", and one participant was an undergraduate student. The majority of the participants were female (n= 9, 64.28%).

Table 6: Demographic profile of the focus group

Demographics	
Gender	**N= 14 (%)**
Male	5 (35.7%)
Female	9 (64.2 %)
Nationality	
Jordan	5 (35.7%)
Indonesia	3 (21.4 %)
Palestine	2 (14.2 %)

Pakistan	2 (14.2 %)
Lebanon	1 (7.1 %)
Cameroon	1 (7.1 %)
Regions classification according to "WHO World Bank regions"	
Eastern Mediterranean	8 (57.1 %)
East Asia and the Pacific	3 (21.4 %)
South Asia	2 (14.2 %)
Sub-Sahara Africa	1 (7.1 %)
Sector of practice	
Community	3 (21.4 %)
Hospital	1 (7.1 %)
Industry	4 (28.5 %)
Academia	4 (28.5 %)
Other	2 (14.2 %)
Years of practice/register	
0-5	2 (14.2 %)
6-10	1 (7.1 %)
>10	11(78.5 %)

The following sections present the participants' discussions on most of the proposed goals and highlight some challenges and issues raised that mainly face and affect the Eastern Mediterranean Region (EMR) and other regions.

5.6.1 Cluster one: Needs

Goal 1: Quality assurance mechanisms

Participants mentioned that quality assurance is needed when designing any pharmaceutical services and should include and extend to involve both public and private sectors within the different fields of pharmacy (industry, community, hospital).

Participant 1 "the problem maybe in the private practice, there isn't any quality assurance, I am not sure if there is, …in the communities' pharmacies, the same person who is dispensing, he is checking, so there isn't a process for a quality assurance."

Moreover, participants reported that the identification and development of metrics and tools are also required to meet the objective of the services and to ensure continued impact and development. In addition, monitoring of service provision is required to support implementation and measurement of the quality of the system; for example, by enhanced use of quality management systems, an International Organization for Standardization (ISO) system, and digital systems.

Participant 1 "if you have a quality management system, … if pharmacists have an ISO system, it will cover all these issues…..if we have a digital system, it will fill the gaps of the service…so the metrics are how to measure the service that you are given."

Goal 2: Patient safety

Participants pointed out that patient safety can be hindered by multiple factors. Fragmentation of the healthcare system, lack of communication and integration of health records are often principal problems that can pose a serious risk to patient safety. Nevertheless, participants suggested several initiative steps can be taken to improve the services provided to patients and to ensure safety, such as increasing the number of advanced practice healthcare providers and multi-services, ensuring a high cooperation level amongst all services, and ensuring the safety of the products (imported vaccination, storage conditions, etc.).

Participant 2 ***"In Palestine, we have a manual system to provide health and pharmaceutical services for the community, and there is no connection between them…so the diversity makes gaps in the connection and affects the quality of the services provided to the patient."***

Participants believed that links between different strategic clusters will also be essential to promote patient safety by correlating the QA strategy with service intelligence (data) and regulation strategies. For example, automate patients' records and liaise with a unified quality assurance system which comprises all national healthcare services.

Participant 2 "*The majority of clinics are now computerised…but still not connected with different authority bodies."*

Goal 3: Medicine access and supply chain

Participants stated that supply chain efficiency and affordability of the prices of medicines could pose inequity issues which may not enable some people to have access to medication. Also, participants mentioned that inequity in medicine availability often occurs during emergency situations. Consequently, this point should be taken into consideration and needs more attention and collaboration amongst national and international healthcare services to secure and supply medication to all people in disastrous situations (humanitarian, conflict zones, and natural disasters) and remote areas.

Participant 2 ***"last year, we had a problem; they had to reschedule all the vaccination programmes….so I think in war zones or conflict areas, it may need more attention."***

Summary of the Cluster One discussion: Needs findings

The findings enhanced the necessity of establishing a quality assurance system when designing any pharmaceutical services. It has become imperative to ensure delivering high-quality services to patients and meet patients' and health care demands. Achieving the required objectives of the pharmaceutical services and ensuring the continuity and sustainability of the services needs

measuring and monitoring the quality of the implemented systems. Many metrics and tools have been identified and generated to assess the quality of the services provided, such as ISO systems, digital systems, and quality management systems.

Also, the findings highlighted several factors that can hinder and cause a hazard to patient safety; for example, lack of communication and integration of patients' health records and fragmentation amongst the national healthcare system. However, several initiative steps can be considered to integrate and improve service provision to ensure patient safety. Finally, all people should have access to medicines; therefore, cooperation amongst different national and international services is needed to ensure equity in medicines availability and affordability for all patients.

Overall, participants expressed that the goals of this cluster are appropriate and acceptable in terms of the necessity of establishing and maintaining pharmaceutical services equipped with a high-**quality assurance system**. They also agreed that **patient safety** is a global health priority that should be addressed to ensure optimal patient outcomes. The inequity of **access to safe medicines** and health services is also a global concern that should be tackled to ensure providing all patients with the required health provision.

5.6.2 Cluster two: Services

Goal 4: Prevention strategies and implementation

Participants enhanced the vital role of pharmacists in integrating public health policies. Some pharmacists are participating in health awareness campaigns (like smoking cessation and lifestyle changes). One of the Jordanian participants pointed out that pharmacists in Jordan have access to specific training to provide patients with adequate pharmaceutical care; however, pharmacists need further support to be proactive to provide patients with the necessary services to improve patients' well-being. It was also mentioned that some chain pharmacies in Jordan have expanded the scope of service provision and have a consultation area to refer patients to a pharmacist, where pharmacists in those pharmacies are well-trained to give additional information and counsel patients about their diseases and medications. Unfortunately, it is deemed an individual initiative movement, and it is not consistent in terms of service provision.

Participant 3 ***"As practitioners, we are involved in raising awareness campaign for smoking cessation…for lifestyle changes, but it is individualized; you cannot just say that everybody does that".***

One of the suggestions was to establish/adopt a legal framework on how to implement the system and how pharmacists can be involved in the prevention strategy. Furthermore, new legislative requirements are necessary to support and strengthen the position of pharmacists. For example, in

Portugal, all community pharmacies are required by law to have a private consultation area for the provision of advanced services.

Goal 5: Self-care and triage/appropriate referral

Participants believed that pharmacists, particularly community pharmacists, are often the first gateway for people to access primary care services, especially when they have minor health problems. Therefore, pharmacists can be involved in referring at-risk patients or patients with specific symptoms to the physician (triage) for evaluation and eventual diagnose for certain diseases (e.g. diabetes, respiratory diseases, colon cancer, etc.) by providing them with validated instruments/services which ascertain risk disease areas.

Participant 4 ***"We need to be involved in screening as pharmacists because we are often the only health professionals that people see before they know or think that they are ill."***

From the point of view of participants, there is a greater opportunity for pharmacists to identify people at risk. In the same context, we should, as pharmacists, take advantage of this opportunity to increase the visibility of our roles and enhance the trust that people place in the pharmacist to solve these issues.

In light of the above, it will be necessary to enhance and advance competencies and scope of practice, using validated mechanisms, and to be able to work in more collaborative ways with other health care providers; additionally, to promote the main aspects of self-care, risk evaluation and triage strategies.

Goal 6: Long-term conditions and Non-communicable disease

Participants stated that long-term conditions (LTCs) and non-communicable diseases (NCDs) are considered the leading cause of morbidity and mortality worldwide. Accordingly, enhanced pharmacists' roles can be seen in encouraging people to engage with regular screenings, monitoring of disease control, and follow-up to assist with treatment adherence, e.g. for early diagnosis and control of cancer and NCDs such as diabetes, COPD, and asthma, amongst others.

Participants also suggested that pharmacists can be integrated into implementing strategies to overcome the challenges and adverse effects of therapy (through patient counselling in community pharmacy); hence, pharmacists can prove their knowledge and proficiency in tackling LCDs/NCDs.

Participant 5 ***"Cardiovascular disease is the leading cause of death in Jordan, and then comes, I think, cancer and diabetes, so it is a big issue, and this is a link to preventive strategies, I think".***

Summary of the Cluster two discussion: Services findings

The findings showed that some pharmacists have the initiative movement and the proactivity to participate and provide patients with the needed healthcare services; however, they need more support and training to enhance their efficient roles as healthcare providers to improve patients' well-being and maintain consistency of the service provision. Accordingly, pharmacists should be more integrated into public health policies and regulations in prevention strategies, which can be achieved by legislating new requirements that support the responsible role of pharmacists.

Since pharmacists are often the first gateway for people to access primary care services, pharmacists can play an essential role in identifying and evaluating people at risk for certain diseases (triage), such as LCDs/NCDs. Most important, it is considered a huge opportunity for pharmacists to prove their competencies in providing advance healthcare services, to show their ability to collaborate with other healthcare providers and to gain patients' trust in the services provided by pharmacists.

On the whole, participants found the components of this cluster were relevant to pharmacy practice and considered a real opportunity to highlight and increase the visibility of the essential role of pharmacists in tackling particular diseases (triage) and improving patients' outcomes in different aspects.

5.6.3 Cluster three: Systems

Goal 9: Interprofessional and collaborative working (& Technology)

Participants pointed out that interprofessional collaboration work strategy needs more work, and it is a global challenge. In addition to the fragmentation of care due to lack of communication between different facilities, there is also the fragmentation of care due to poor communication among healthcare professionals who are in the team taking care of the same patients.

Participant 5 ***"It needs more work definitely…like everywhere in the world…it is a challenge all over the world…How do we communicate, and that links to point 11 (Service intelligence)…we were talking about the fragmentation of care between different healthcare facilities, but there is also the fragmentation of care between healthcare professionals."***

Participants proposed that IT solutions and technologies can be a tool to overcome the challenges related to poor connection and exchange of information, for example, through the establishment of a shared patient record that reconciles patients' records of all settings, considering the public, social and private sectors.

Participant 5 ***"So we really can start looking at IT solutions and the health technologies as tools to overcome those challenges related to poor communication and exchanging information."***

Goal 11: Service Intelligence

It is mainly related to data collection and transformation into information. Participants believed that once patients' data is recorded, data analysis is useful to evaluate and monitor the care provided. Meanwhile, the recorded data should be appropriately used and ensure patients' confidentiality.

Participant 1 ***"This has to do with the service level…how the aggregated data can help us find what kind of services are priorities and how they should work."***

Goal 12: Regulation and Remuneration reform

Participants emphasised that pharmacists need new legislative requirements and necessary changes to implement and support their new roles. Also, participants agreed that certification and extension of specific qualifications of the pharmacist to provide specific services should be considered within the context of post-graduate education programmes and eventual competency-recognition by Professional Associations.

Participant 1 ***"This is very important…we need a clear structure...we want to be more visible."***

Summary of the Cluster three discussion: System findings

Poor communication amongst healthcare professionals is one of the main world challenges that has affected the quality of the healthcare services provided to patients. IT service intelligence would be a proper solution to fill this gap and increase the level of integration and collaboration amongst the healthcare team within all sectors (public, private, social) to ensure improving patients' wellbeing and meet health care demands, taking into account patients' confidentiality. Finally, a new system that includes the necessary changes, including remuneration and competency-recognition by higher authorities, to activate and highlight the role of pharmacists is imperative.

Overall, participants accepted the components of this cluster and promoted the necessity of involving **IT and digital health technologies** to help improve quality, efficiency, and patient experience. It can also help to bring about better integration of health care and more **collaboration amongst health** providers to improve the health of the population. However, a review of pharmacy **regulation and remuneration** is necessary and should incorporate a clear structure of the broad roles and duties of pharmacists that can provide.

5.6.4 Challenges and issues raised

Participants have addressed several challenges and barriers that encounter pharmacists and hinder the improvement of the role of pharmacists and pharmaceutical services in the EMR and global context. (1) Lack of patient safety standards is a central problem in the EMR. Participants suggested that pharmacists need some real initiative steps to set regulations and standards for patient safety and then

start collaboration with the authorities. For instance, accrediting a medicine information system led by pharmacists can be a good start since pharmacists are more recognized as medicine experts. (2) Patients need to know that they can trust pharmacists' advice and recommendation related to their medications. Hence it is essential to enhance the patient-pharmacist relationship by increasing the visibility of pharmacists in public and promoting the role of pharmacists as a cornerstone in the healthcare system with collaboration with other healthcare providers. (3) Lack of efficient follow-up, duplication or loss of patient records, so it is necessary to establish a consistent system implementation to ensure delivering proficient services to the patients. (4) Lack of a clear transition within the healthcare system (primary care to secondary care). Finally, (5) the regulatory role of pharmacists is limited in terms of participation in setting the regulations and legislation related to the profession. Therefore, pharmacists need to be proactive by influencing the regulations to change, supporting the development of the role of pharmacists by adapting the remuneration system, and ensuring that these regulations are in place for the patient's benefit.

5.7 Bias and limitations of the preliminary fieldwork study

The focus group was conducted at the FIP Regional Conference, Amman, in 2019; it was restricted to the participants of this FIP conference and biased towards the limited nationalities presented, most of whom were from the Eastern Mediterranean region (EMR). Also, the priorities and demands of the EMR are different from other international regions. In addition, the sampling method used (convenience sampling) exposed the study to the selection (inherent) bias. However, convenience sampling has been proved to be effective during the preliminary fieldwork and exploration stage, where the researcher in this primary stage aims to identify the feasibility of the methodology and not to generalise the results (Etikan I. et al., 2016; Saunders, 2016; Smith, 2010).

Therefore, the need for wider further consultation, which includes a broader spectrum of nationalities with different global perspectives of needs, is imperative to achieve the desired outcomes of the consultation process. Finally, the short time of the focus group discussion (45-60 min) did not allow participants to conduct an in-depth discussion and scrutinise the goals in detail.

5.8 Conclusion

Primary evidence gathering from the preliminary fieldwork was conducted to explore the credibility and acceptance of the concept of the PDGs. This preliminary fieldwork aimed to check pharmacists' responsiveness and acceptance of the studied area and propose initial suggestions for measurements and monitors required to implement these goals. Participants showed general credibility, acceptance and interaction towards the proposed goals and found them comprehensive, covered the bases and relevant to the practice; they expressed willingness for continued engagement. Overall, this

preliminary fieldwork met the aim and objectives of the focus group conducted and helped get a primary assessment regarding the strategic priorities and the needs of different participants/countries and provided a broad roadmap for the next stages of the study research.

Chapter 6 Development of the Pharmaceutical Development Goals (PDGs) framework stage 3: Consultation stage

6.1 Introduction

In this chapter, the aim, objectives, and methods used to research stage the development phase of the proposed framework will be described and how these will be used to achieve the purpose of this stage. Chapter 5 described preliminary fieldwork conducted to gather primary evidence to explore the general credibility and appropriateness of the draft goals (Stage 2). This Chapter describes the conduct of a large nominal group technique (NGT) experiment to develop the initial PDGs framework content and to validate the first iteration of PDGs that will have the credibility to describe a systematic pharmaceutical development framework across all sectors and interfaces.

6.2 Aim and objectives

The purpose of the NGT was to engage the draft set of PDGs amongst recognised global pharmacy leaders from a mixed demography of sectors of practice and national representation. The purpose includes the evidence-led incorporation of input/commentary on the draft goals from the practice and service perspectives. Moreover, this global leadership group aimed to gain a primary assessment of whether the proposed PDGs are attainable, realistic, and measurable; additionally, to highlight and extend the scope of ways to implement and measure PDGs in the context of described global challenges (PHC, UHC, etc.).

Accordingly, the stage 4 objectives were:

1- To engage with a sample of global pharmacy leaders in a structured consultation and record and codify feedback data.
2- To present and inform the draft list of goals to key-stakes individuals to identify elements of contemporary practice development which were not covered by the draft goals.
3- To explore expert opinion on how these pharmaceutical development goals might be implemented, measured, and monitored in the context of global challenges.
4- To iterate the next stage of development of the content of the PDGs as an output (PDGs version 1).

6.3 Study design

The opportunity to perform a modified NGT investigation, engaging recognised global pharmacy leaders from mixed nationalities and professional sectors, was achieved using a scheduled global leadership meeting held at the FIP World Congress in 2019.

6.3.1 Sampling strategy and data collection methods

Sampling strategies and participants requirements:

As this global leadership meeting aimed to gain and gather in-depth comments and rich information from recognised experts, a purposive sampling technique was employed. Purposive sampling (a nonprobability sampling technique) involves identifying and selecting individuals or groups of individuals that are especially knowledgeable about or experienced with a phenomenon of interest. In addition to knowledge and experience, note the importance of availability and willingness to participate and the ability to communicate experiences and opinions in an articulate, expressive, and reflective manner (Etikan I. et al., 2016; Palinkas et al., 2015).

Using a structured global meeting of pharmaceutical academics, scientists, and practitioners engaged with leadership consensus development methods will strengthen the rigour and validity of the proposed objectives (Hutchings & Raine, 2006). The expected evidence captured is meaningful input from diverse international perspectives that have an impact on the decision-making process.

Accordingly, the FIP was contacted to facilitate the sampling of high-level conference attendees (national Professional body leaders). Participants received an official invitation email to participate in the global consultation NGT meeting via the FIP. The invitation included information stating the aim and structure of the meeting. All potential participants accepted the invitation (61 global leaders who were presidents, chief executives or elected professional Chairs of national leadership organisations).

NGT plan and data collection

A qualitative modified nominal group technique was conducted. This method sought a systematic approach combining experts' opinions and previously collected evidence-based research to achieve the objectives of this stage.

In this NGT meeting, participants, who represented global pharmacy leaders, were assigned to conduct a brainstorming discussion and an in-depth review of the draft set of PDGs developed in Chapter 5 (Stage 2) for practice and service provision development. Thereafter, participants were randomly divided into four groups, or 'tables' (Groups 1 to 4), of 15 participants. Each group was assigned a task to provide feedback to a pre-determined set of items derived from the PDGs v0. Each group was provided with three sets of specific information concerning the conduct of the NGT session.

Envelope 1: Briefing about the PDGs to be read.

Envelope 2: The list of PDGs to be considered (Appendix 2).

Envelope 3: The group task, with structured questions.

Each group had a different set of 'clustered' PDGs so that all of PDGs framework v0 was covered during the session.

1. Group 1 task: to discuss the goals themselves, "what's missing", and take an overview of all the goals to identify any relevant gaps.
2. Group 2 task: to discuss the first cluster of the goals "Needs", what is missing, and give ideas on ways of implementation, measuring and monitoring. This includes the following list of goals: quality assurance mechanisms and services metrics, patient safety, and medicine access and supply chain.
3. Group 3 task: to discuss the second cluster of the goals "Services", what is missing, and give ideas on ways of implementation, measuring and monitoring. This includes prevention strategies and implementation, self-care & triage, LTCs/NCDs, fragile patient population, medicine information.
4. Group 4 task: to discuss the third cluster of the goals, "Systems", what is missing, and give ideas on ways of implementation, measuring and monitoring. This includes IP and collaborative working (& technology), IT and digital health initiatives, service intelligence, regulation and remuneration reform, equity and diversity in pharmaceutical services delivery, service access and service impact.

Participants were asked to discuss the following three standard tasks:

1. *Identify any relevant gaps and missed points.*
2. *Suggest ways of monitoring and measurement – any ideas and suggestions (no limitations).*
3. *List any new goals to identify – have we missed something critical?*

Outcomes: Each group listed their ideas and discussions, which were recorded in writing. The four groups were asked to debrief their discussions orally. The oral debriefing significantly prompted the participants to provide a constructive critique of the discussion points and an opportunity for reflection (Cantrell, 2008; Krogh et al., 2016). Groups debriefing were recorded in written notes by several assistants and collated. Of note, English was the official language used to collect data during the meeting.

The meeting was observed and facilitated by the researcher to prompt and probe participants and to clarify and further discuss any ambiguity. Moreover, it is worth noting the benefit of having several observers present to enhance opportunities for noting aspects of interpersonal communication and

stimulate group dynamics (Søndergaard et al., 2018). The assistants (and researcher) were taking notes and using a self-reflective journal to help reduce the researcher's bias and issues of subjectivity. This process establishes the study findings' trustworthiness, validity, and transparency. In qualitative research, a self-reflective journal is used as a strategy that can facilitate the reflexivity of the research, whereby researchers use their notes and memos to examine personal assumptions and insights that may prompt during the process. These insights help to support the main conclusions from the findings (Amin et al., 2020; Ortlipp, 2008).

6.4 Data management

Data handling

All collected data were subsequently kept in a locked cabinet at the Department of Practice and Policy at the School of Pharmacy, University College London, to maintain the confidentiality of data obtained throughout the research study. Only the researcher and research team (two supervisors) have access to the collected data.

Data analysis

The qualitative analytical method employed to analyse the data obtained was the framework analysis method. The same draft of the PDGs framework used in the preliminary fieldwork was employed, which met the initial focus group acceptance, to help establish the new version.

The framework analysis method is recognised for its flexibility and systematic approach to analysing and mapping qualitative data. It is designed to answer research questions with pre-designed themes and *a priori* issues developed by the researcher (Srivastava. A & Thomson. S.B., 2009). In this method, the framework generates a new structure for the data that is helpful to summarise/reduce data in a way that can serve to answer the research question. This approach helps in identifying the commonalities and differences in qualitative data and thereby drawing descriptive and/or explanatory conclusions grouped around themes. Of note, this method accommodates homogenous data that can be compared and contrasted and not heterogeneous data. The Framework method is an adaptable tool to use with inductive, deductive, or combined types of qualitative analysis (Gale et al., 2013).

Data generated from the NGT meeting were analysed using deductive and inductive approaches. The initial draft (v0) of the PDGs framework was used as the framing code for the deductive analysis. However, the researcher also followed an inductive approach. Therefore "open coding" was performed to ensure important aspects of the data are not missed and to reflect on all participants' comments, which might lead to emerge new themes, other than the existing ones, relevant to and helpful for developing the content of the PDGs matrix.

The framework analysis approach provides highly structured and clear steps to follow in order to summarise data and produce efficient nominal outcomes, which involve a step-wise process (familiarisation; identifying the coding frame; coding/ indexing; charting/ mapping; and interpretation) (Gale et al., 2013; Srivastava. A & Thomson. S.B., 2009). In this study, the following outline was followed to systematically analyse the entire set of data and obtain a holistic and comprehensive interpretation of the collated data.

1- Familiarisation with the data: All comments collected were initially transcribed into a spreadsheet, and each comment was mapped under the relevant pre-defined code (goal). The researcher familiarised herself by repeatedly reading the comments to gain an overview and then grasp the overall meaning of the data collected. Throughout this process, the researcher became immersed in the data and was able to identify key ideas within the data (Srivastava. A & Thomson. S.B., 2009).

2- Identify the coding frame: In this step, the PDGs frame (see appendix 2) was used as a pre-coding frame to guide the coding process from the outset. The 13 predetermined PDGs represented the variables used to generate the initial codes.

3- Coding/Indexing: Coding aims to identify all aspects of data so that it facilitates to be compared systematically to the analysis framework. Each code is usually labelled with a number or abbreviation that describes a category or cluster for easy identification (Gale et al., 2013). In this step, the PDG abbreviation alongside a number (e.g., PDG1, PDG2) was used to refer to the intended potential goal in the conceptual framework (table 7).

In this stage, the researcher did line-by-line coding, comment-by-comment coding in this case. The initial draft of the PDGs framework was applied to the whole data set, where relevant. All comments were initially codded, and then several iterations were required for the relevance of new codes/themes until reaching saturation of data, where no additional codes/themes can be generated (Gale et al., 2013). A second expert researcher in conducting qualitative research (LB) reviewed the coding process and the identified themes to ensure the credibility and reliability of the findings and reduce the risk of subjectivity (O'Connor & Joffe, 2020). An independent second researcher individually re-coded all the comments and checked them against the researcher's original coding; identified discrepancies were resolved.

Table 7: Coding label

Coding label	
Population needs=cluster=theme	
PDG1=code	Quality assurance mechanisms, service metrics
PDG2	Patient Safety
PDG3	Medicines access and supply chain

Pharmaceutical services= cluster =theme	
PDG4=code	Prevention strategies and implementation
PDG5	Self-care and triage
PDG6	LTCs/NCDs
PDG7	Fragile patient populations
PDG8	Medicines information
Systems= cluster =theme	
PDG9=code	IP and collaborative working (& technology)
PDG10	IT and digital health initiatives
PDG11	Service Intelligence
PDG12	Regulation and Remuneration reform
PDG13	Equity and diversity in pharmaceutical services delivery, service access and service impact.
New emerged themes	
Clarity & Understandability	
Terminology & Definitions	
Implementation & Applicability	
Scope & gaps	
Purpose & interdependency	

4- Charting and mapping: Originally, most comments were pre-noted with the relevant name or number of the goal by participants. So, it facilitated the mapping process of the comments on the related PDGs draft for the researcher. However, the researcher did a second review of the meaning and relevance of the content before mapping each comment. In this step, a spreadsheet was used to generate a matrix, and the data were charted into the matrix. Each comment was mapped to the relevant code (goal); general comments were also mapped to the relevant newly emerged themes. The matrix structure is a straightforward way to facilitate the recognition of patterns in the data and draw attention to contradictory data by any member of the research team (Gale et al., 2013).

5- Interpreting the data: In this step, the researcher organised and wrote up the findings narratively. The process of analysis was reviewed and discussed with the research project team at different points of the data analysis. The results of this study were interpreted and explained in detail in the following sections.

The researcher kept a separate notebook to write down reflections, impressions, and early interpretations of the data. It may be helpful to explore an important idea, concept or potential theme by using an analytical memo (Gale et al., 2013).

6.5 Ethical considerations

Similar to the previous study, FIP (as the governing body) gained ethical oversight and approval for the use of data and access to listed experts for this study. NTG participants received all the relevant information they needed before starting the discussion. They were also aware they had the right to leave at any point of the study without any negative repercussions.

6.6 Results

6.6.1 Demographic data

The attendees of the NGT meeting were 61 participants; 39 males and 22 females. The participants were from different pharmacy professional backgrounds (academia, science, practice, and education). Moreover, they were national leaders and policy-makers of professional organisations, practising and representing 35 different countries worldwide (table 8). Hence, they represented the six global regions according to the classification of WHO regions, which can provide an overarching perspective and critical feedback from global experts to lead the development of the proposed global goals.

Table 8: WHO regions

WHO regions	Countries
African Region	Cameron, Nigeria, Rwanda, South Africa, Zambia
Region of the Americas	Canada, United States
South-East Asia Region	India, Indonesia
European Region	Belgium, Finland, France, Germany, Netherlands, Iceland, Norway, Portugal, Spain, Sweden, Turkey, Ukraine, United Kingdom
Eastern Mediterranean Region	Jordan, Kuwait, Lebanon, Oman, Pakistan, Sudan
Western Pacific Region	Australia, China, Japan, New Zealand, the Republic of Korea, Singapore, Taiwan

6.6.2 Groups Discussion and oral debriefing:

Group 1: Overview of the 13 Goals in the v0 Framework

Group 1 participants reported that as the primary 13 goals are a large number, it could be optimal for a smaller number through enhancing the high-level things. Participants noted that quality and patient safety goals are considered two of the highest-level goals, and all other goals are working towards achieving quality and safety.

Group one stressed that all goals should be understandable and applicable over the long term and not be outdated in certain years; in other words, to maintain the sustainability of the goals over a long time. Also, they said that it is well recommended to include and corporate any existing guidelines and recommendations to have minimum indicators.

Participants also noted the importance of focusing on patients and all patients, including LTCs/NCDs patients and the fragile population, due to the unknown health concerns which will come up in the future. They also stated to focus on the recognition of education and on-going education should also be taken into consideration to stay up to date. In addition, recognition of quality should be through

the entire chain from the stage of discovery to dispensing to the patient. They said, at the moment, it is not clear where the quality is.

In terms of employing terminology, they found remuneration term is considered inconvenient, and it is more favourable to use "values" instead. Also, it is important to be careful of all abbreviations used, such as MO is an abbreviation of "Medicine optimisation".

Finally, group one suggested that science must be clearly underpinning and binding to all these goals through the recognition of innovation, scientific contribution, and practice and scientific research. Endorse the biological environment as a substantial element in the context of practice goals. Finally, it is essential to look at process indicators and outcome indicators. Outcome indicators will give a wider vision of the outcomes; at the same time, it must have process indicators and different standard levels (globally and country-level) to ensure that we have a consistent approach across all areas in the context of PWDG and PPDG.

Group 1: "We like them to be all understandable and applicable over a long period of time, so we don't come up with outdated in certain years".

Group 1: "We'd like them to include incorporate any exiting guidelines and recommendations, so we have minimum indicators in them".

Group 1: "We'd like them to focus on patients and all patients to include NCDs/fragile population…While we're thinking about those, we're thinking about all population".

Group 1: "We'd like to see a recognition of through the entire chain from discovery to the patient".

Group 1: "We would like science to be able to bind off all these goals, recognition of innovations needs for ongoing science contribution, practice and scientific research".

Group 1: "We should look at process indicators and outcome indicators because outcome indicators can see much better, but we have to have process indicators".

Group 2: Discussed the first cluster of the Goals: 'Needs'

Generally, it could be helpful to describe theoretically how the different goals in the three clusters are linked. Group two suggested having a diagram that visually depicts the relationship between the different clusters of goals and how they are interdependent. Most of the existing goals, such as patient safety, quality assurance, access and supply, are related to a stable population; accordingly, it is important to address different situations as emergency contexts. Maintaining "good health" is also identified as a need to meet patient expectations. Participants suggested expanding the concept

of antibiotic stewardship to be broadened to all therapeutic groups that also need a stewardship process associate. Eventually, "Services" and "Needs" is important to be linked together.

Group 2: "It is so difficult to differentiate between the needs, services, and systems clusters, and it's important to describe theoretically how the different goals and the different clusters are interdependent to each other".

Group 2: "The goals do not address situations like pandemics/emergencies and displaced population".

Group 2: "Why not broader the concept of stewardship to include other therapeutic areas that also need stewardship process associate".

Group 3: Discussed the second cluster of the Goals: 'Services'

This group identified some missing points of the "Service" cluster goals. For instance, the sustainability and alignment of Green Pharmacy Practice with Good Pharmacy Practice are missed. As previously mentioned, vulnerable populations/emergencies and acute situations are not addressed.

Also, participants of this group reported that it is not well differentiated between advanced vs basic services. Initially, it is necessary to specify the needs of patients and then provide them with adequate services. Considering "good practice", Good Pharmacy practice should be based on existing works. Fortunately, there are a huge number of metrics and measurement tools for quality management already accredited and used by WHO. All these works, such as public health programmes and other programmes, should be used and integrated to be employed for both metrics and implementation programmes. Finally, the lack of coordination is not mentioned, so it is crucial to increase the level of coordination among all sectors.

Group 3: "In general, the goals are OK, but what is missing together is the sustainability of the green pharmacy practice and also the vulnerable population and emergencies, acute care, and the lack of coordination are also missing".

Group 3: "Good Pharmacy Practice should be based on existing works, and there are already a lot of metrics for the quality management accredited and used by WHO".

Group 4: Discussed the third cluster of the Goals: 'Systems'

Participants in group 4 stated that interprofessional working is to imply dependence, connectivity and the patient. In other words, the patient should be in the team, and the team must be interconnected and independent to be able to provide proper collaborative working and integration of care.

Participants mentioned, regarding IT and digital support, that patient participation is also considered necessary because patients will be the users of their mobiles and IT systems. Unsurprisingly, there is a huge variety of the advancement and development of IT systems globally; however, it is a challenge to place a system and digital infrastructure on every site. Moreover, participants proposed that it is essential to have a unified system to provide quality information through an accountable network of healthcare professionals, such as community pharmacies, to provide information to the patient and also provide scientific quality information for pharmacists to help in the workplace. Service intelligence can be considered as a dashboard of quality indicators and outcome measures for our services, where it is essential to measure the quality of our provided services. Therefore, we need an electronic patient record to help the healthcare system with equitable access for healthcare professionals and pharmacists in all sectors.

Regarding regulations and remuneration reform goal, participants mentioned that we need an independent regulatory body since it is not present in every country. As mentioned earlier, remuneration is not about price and fees, but it is about demonstrating the value and the cost-effectivity of the provided services. Finally, medicines are not commodities or commercial.

Group 4: "There were three big words coming back earlier through the discussion: the dependence, connectivity and the patient… the patient in the team".

Group 4: "About IT and digital support…here again, patients' participation was the first we discussed".

Group 4: "There is a huge variety in the advancement and development of IT systems globally, and it is a challenge".

Group 4: "We need a system, as the example in Lebanon, to provide quality information through an accountable network of healthcare professionals, such as community pharmacists".

Group 4: "We need a dashboard with quality indicators of our services and outcome measures; therefore, we need an electronic patient record throughout the healthcare systems with equitable access for all health professionals".

6.6.3 Summary of the findings

With regard to the main comments on the v0 PDGs themselves, participants considered quality assurance and patient safety to be two of the highest-level goals and are implied in other goals. It is also important to ensure and maintain the sustainability and validity of the goals over a long time. All patients' health concerns should be included (LTCs/NCDs, fragile population, mental health issues) to overcome any future health challenges.

It is worth noting the importance of recognition of education and continuing education to keep on with the latest knowledge updates. Considering the quality measurements, process indicators must be at different standard levels (global and national level), while outcome indicators will highlight the impacts and the outcomes. Choosing some terminologies and abbreviations should be carefully employed; for example, the "value(s)" term is more favourable to use than the remuneration term. Science must be clearly underpinning and binding to all these goals. Finally, the environment should be endorsed as an essential element in terms of the PDGs.

In terms of the commentaries on the first cluster of the goals, "Needs", participants suggested showing how the different goals in the three clusters are connected through a diagram that virtually depicts the relationship and overlap between the three clusters and demonstrates how they are interdependent. Addressing different situations, such as emergency contexts, should also be taken into consideration since most of the existing goals are tackling a stable population. Maintaining "good health" is also identified as a need to meet patient expectations. Expand the concept of Antibiotic stewardship to include all therapeutic groups that need a stewardship process associate.

Regarding the feedback on the second cluster of the goals "Services", participants pointed out some perceived gaps within the goals of this cluster. One of the potential needs-gap is sustainability and alignment of 'Green Pharmacy practice' (environmental issues) to Good Pharmacy Practice. Second, not all patients' situations are well addressed, such as the vulnerable population/emergencies and acute situations. Eventually, establishing quality measures/metrics to measure the impact and the performance of the services provided to patients taking into consideration the existing guidelines and recommendations as minimum indicators.

In respect of the comments on the third cluster of the goals "Systems", it is essential for healthcare professionals to work collaboratively to provide the highest standard of care to ensure providing the highest standard of services provided to patients. Patients should also be engaged with the many new advancements and innovations of IT systems related to healthcare since patients will be the users of these technologies. Service intelligence and digital health provisions can be considered as a reference and trustworthy resource to provide quality information to patients and healthcare professionals at work while taking care to ensure equitable access for healthcare professionals and pharmacists in all sectors. Founding an independent regulatory body is essential to deal with pharmacists' regulation in every context.

6.6.4 Text feedback collected from the nominal group event.

The analysis aimed to identify if there is any overlap, interdependency, or redundancy between the goals and clusters and refine the framework in accordance with the findings. The researcher

transcribed, processed, and initially mapped the feedback from all four groups to the relevant PDGs; general comments were also themed. The initial mapping and generating themes were reviewed by a second researcher for validation purposes. The comments were verbatim transcribed into a spreadsheet. In total, 192 comments were provided by participants, of which 152 comments were directly mapped to the relevant 13 goals, and 40 general comments produced emergent themes, which were coded into five codes/ themes (Clarity and Understandability, Terminology & Definitions, Implementation & Applicability, Scope & gaps, Purpose & interdependency).

Comments on the first cluster of the Goals 'Needs."

PDG 1: Quality assurance, service metrics goal

Most of the comments on this goal were in line with the initial mechanisms and indicators proposed by the goal itself (see table 9). In total, participants of the four groups mentioned **22** comments on PDG1. Comments can be summarized as the following: quality assurance should include several aspects, such as quality of medicines, quality of the information provided to patients, quality of education, CPD, life-long learning, and education accreditation to meet need-based education. However, the quality of education is more relevant in the context of PWDGs than PDGs.

Participants stressed that quality should be applied to all goals. They also considered effective and efficient governance guidance is needed to support the continuity of standard quality. Participants pointed out that it is also fundamental to find quality indicators and standards/guidelines (mini-standards) to measure the process and the outcomes, measure the quality of practice across all areas, and then ensure that these standards/guidelines are implemented. Setting these standards/indicators should be based on evidence-based research. Additionally, it must have process indicators at different standard levels (global and country-level) to have a consistent approach across all countries.

They also suggested having a global regulation system on drugs to set a core of competence frameworks where the outcome is the improvement of patients' health. One of the comments was to enhance the multi-disciplinary teamwork between pharmacists and other healthcare providers. Finally, take the safety of healthcare workers into consideration.

Table 9: Comments on the first cluster of the Goals "Needs", Quality assurance mechanisms, and service metrics (PDG1)

Cluster	Pharmaceutical Development Goals (draft)	Mechanisms and indicators
Needs	PDG1=Quality assurance mechanisms, service metrics	Standards and guidelines. Monitoring key attributes.
Comments		
1-Key attributes→ Indicators outcomes process.		12-Does increased scope of practice, competence management, CPD, accreditation etc..come under

	quality assurance mechanisms or are they focused on output?
2-On top of standards/guidelines →, add recommendations → then implement standards/guidelines (mini-standards)	13-QA of medicines..FIP to develop practice standards→, measure how many countries have implemented standards of practice.
3-Research on key indicators is needed, also for outcomes	14-Workforce transformation→ no clear goal for measuring the actual transformation process.
4-Different levels of measuring/country indicators, impact, etc	15-Where does quality assurance around the premises fit?
5-Indicators: Process + outcomes	16-Global standard in the regulatory system on drugs.
6-Quality of medicines.	17-Patient safety metrics: - measuring the impact of public health campaigns led by pharmacists, e.g. responsible use of medicines. - Training of pharmacists/pharmacy technicians/assistants (increase/decrease no) → certification of skills.
7-Quality of information to the patient	18-Metrics → implementing guidelines/administration order for execution.
8-Quality needs to include education, CPD, life-long learning	19-Pharmacists as a gateway to healthcare systems and rendering such systems more efficient.
9-Needs to be clear that quality applies to all goals	20-Defining competence frameworks used in workforce development.
10-Education accreditation to get needs-based education	21-Fostering interprofessional collaboration for better patient care.
11-Effective governance to support quality	22-Missing?→ Healthcare worker safety? like needle stick injury and hazardous drugs. Abusive/aggressive patients.

Missing points and Metrics/indicators to consider

Participants pointed out some missing points within this goal:

1- ***Participants comment:*** "Workforce transformation→ no clear goal on measuring the actual transformation process." However, this point could be considered as not relevant to the context of PDG, and it comes under the context of 'workforce'.

2- ***Participants comment:*** "Healthcare worker safety? Like needle stick injury, hazardous drugs. Abusive/aggressive patients."

Participants suggested that healthcare workers' safety should also be included as part of the quality management system, which could be achieved by providing health workers with adequate training programmes for the main health and safety regulations.

Participants also recommended designing metrics/ indicators for:

1- ***Participants comment:*** "Metrics → implementing guidelines/administration order for execution."

Participants suggested developing performance metrics to track how the guidelines and administration orders are well executed.

2- ***Participants comment:*** "Patient safety metrics":

- Measuring the impact of public health campaigns led by pharmacists, e.g. responsible use of medicines.

- Training of pharmacists/pharmacy technicians/assistants (increase/decrease no) → certification of skills.

Participants suggested developing reliable and valid metrics to measure the impact of pharmacists-led health campaigns, such as measuring the role of pharmacists in promoting the rational use of medicines. Also, build capacity for improvement through training across healthcare providers by developing quality improvement expertise.

3- ***Participants comment:*** "Defining competence frameworks used in workforce development." Participants suggested the importance of setting frameworks that well define the competencies needed for safe and effective practice as the framework used in workforce development.

PDG1 Overlaps and redundancies (repeats).

Participants suggested having a "global regulation system on drugs"; however, it is not entirely clear what aspects of regulations on drugs, for example, pricing, prescribing, dispensing, or supplying. Also, Participants inquired about the regulations and quality related to the premises themselves and the importance of considering this issue. Thus, these comments are overlapped with (Regulation and Remuneration reform, PDG12) goal. In addition, participants proposed developing "patient safety" metrics to measure the impact of the role of pharmacists in terms of leading healthcare campaigns. Besides, it is crucial to have high skills and competent cadres of pharmacists/ pharmacy technicians/assistants in order to improve patients' health; this comment is directly related to (the patient safety PDG2) goal. Participants considered pharmacists as a gateway to healthcare systems, and they mentioned pharmacists' essential roles in rendering the healthcare system to be more efficient. Therefore, there is an obvious overlapping with (Self-care and triage PDG5) goal. Finally, participants fostered high collaboration amongst healthcare provides for better outcomes for patients, which indicates the overlapping with (IP and collaborative working (& technology), PDG9) goal (see table 10).

Table 10: PDG1 Overlaps

	Comments
PDG1= Quality assurance mechanisms, service metrics	PDG12= Global standard in regulatory system on drugs. PDG12= Where does quality assurance around the premises fit?
	PDG2= Patient safety metrics: - measuring the impact of public health campaigns led by pharmacists, e.g. responsible use of medicines. - Training of pharmacists/pharmacy technicians/assistants (increase/decrease no) → certification of skills.

	PDG5= Pharmacists as a gateway to healthcare systems and rendering such systems more efficient.
	PDG9= Fostering interprofessional collaboration for better patient care.

PDG 2: Patient safety goal

Most of the comments on this goal were in line with the initial proposed **mechanisms and indicators** of the goal itself (see table 11). Participants provided **16** comments that are relevant to patient safety.

- Patient safety initiatives: participants suggested that patients should be included in their management plan, and their needs and complaints must be heard. Also, developing management strategies to comply and adapt to each patient's needs is necessary. Participants also thought that cultural considerations, including languages, must be taken into account when dealing with patients to defeat and reduce this barrier. Also, good communication with patients is an important feature of patient safety and quality of care. Focus on raising patients' awareness in relation to health education and patient information.
- Antimicrobial stewardship: participants mentioned the importance of finding metrics/indicators to measure the progress of antibiotic stewardship and the rational use of Antibiotics. As an original concept, expand antimicrobial stewardship to include other stewardship services, such as (anticoagulation, analgesic, etc.) where pharmacists can play a crucial and central role in the implementation and management of the stewardship programmes.
- Counselling, communication and advisory services: participants enhanced to ensure providing patients with high-quality services by qualified healthcare providers to manage their chronic and other conditions. Additionally, participants stressed, on several points, the necessity of increasing the collaboration amongst multi-disciplinary workforces to ensure the continuity of care provided to patients.
- ADR reporting and monitoring: patient safety can be achieved by regularly monitoring patient outcomes, reviewing Adverse Drug Reaction (ADR) reports and following global standards for clinical science-based judgement of adverse events.

Table 11: Comments on the first cluster of the Goals 'Needs', Patient safety (PDG2)

Cluster	Pharmaceutical Development Goals (draft)	Mechanisms and indicators
Population Needs	PDG2=Patient safety	Patient safety initiatives. Antimicrobial stewardship. Counselling, communication and advisory services. ADR reporting and monitoring.
Comments		
1-Cultural consideration		9-Measuring from year 1 to year 2:

	- % of hospital-acquired infections - Rate of use of antimicrobial medicines - Consumption of antibiotics
2-Communication, cultural understanding	10- Patient safety: ADR reporting, regulatory, feedback, monitoring of patient outcomes.
3- Providing specialised counselling to the citizens.	11- Global standard for science-based judgment of adverse events.
4- Managing their chronic conditions.	12- Continuity of care between levels of care (communication and medication reconciliation).
5- Qualified health professional.	13- Patient safety → is transversal Also, add: - patient information and health education - Referral - Medicines review - Medicines-Referral care - Patient management etc.
6- Patients should be included in all the processes, voicing their needs and complaints.	14-Multidisciplinary workforces.
7-Should make sure the strategies developed are well adapted to each patient.	15-Reducing the barriers.
8- Metrics: Antibiotic stewardship progress	16-Broaden Antimicrobial stewardship to include other stewardship services: anticoagulation, analgesic etc.

Missing points and Metrics/indicators to consider

Participants mentioned a potential gap within the pharmaceutical services that stewardship programmes should expand and broaden to involve not only antimicrobial stewardship but also other services, such as anticoagulation and analgesics. Participants also advocated the importance of continuity and consistency of care to improve communication and clinical management, and they shared their perspectives that continuity of care is missing, and people may not adequately understand their health care problems (see table 12).

Table 12: Missing points

	Comments
Missing points	Broaden Antimicrobial stewardship to include other stewardship services: anticoagulation, analgesics, etc.
	Continuity of care between levels of care (communication and medication reconciliation).

Participants proposed designing metrics/indicators to measure the progress of the antibiotic stewardship program through, for example, recording the number of hospital-acquired infections, monitoring the rate of use of antimicrobial medicines and consumption of medicines within a pre-determined timeline (see table 13).

Table 13: Metrics/indicators

	Comments
Metrics/indicators	Metrics: Antibiotic stewardship progress Measuring from year 1 to year 2:

	- % of hospital-acquired infections - Rate of use of antimicrobial medicines - Consumption of antibiotics

PDG2 Overlaps and redundancies (repeats).

One of the comments emphasised the role of pharmacists in managing patients' chronic conditions, and this point overlaps with (the LTCs/NCDs PDG6) goal. Developing and designing metrics to measure the services provided and the progress of antibiotic stewardship is necessary to achieve and improve patients' outcomes. The constant following of global science-based standards of adverse events is also a principle towards securing patient safety. These two points mentioned above overlap with the quality assurance aspect (quality assurance mechanism, service metrics, PDG1).

Also, patients should receive high-quality services provided by qualified healthcare professionals according to pre-set standards and regulations, which overlap with (the quality assurance mechanism, service metrics, PDG1, Regulation and Remuneration reform, and PDG12) goals. Integration of the healthcare system and the high level of communication and coordination between multidisciplinary workforces towards improving patients' safety and outcomes is also overlapped with ((IP and collaborative working (& technology), PDG9) goal.

Additionally, participants commented that patient safety is transversal, and it comes across several aspects. For example, patients should be provided with adequate health education and information related to their conditions, which overlaps with the (Medicines information, PDG8) goal. Patient safety can also be accomplished by appropriate patient management, medication review, and proper referral management, and this point overlaps with (Self-care and triage, PDG5) goal.

Participants emphasized that all patients should receive appropriate counselling and education regarding their conditions and medicines, and this comment overlaps with the (Medicine information PDG8) goal. Also, participants advocated for patients to be part of their management plan and that their voices must be heard. Besides, it should make sure the strategies developed are well adapted to each patient. Accordingly, these two comments can overlap with the (Prevention strategies and implementation PDG4) goal. Finally, it is also important to consider cultural issues, including languages, to reduce the barriers; thus, this comment is overlapped with (Prevention strategies and implementation PDG4, Medicine information PDG8) goals (see table 14).

Table 14: PDG2 Overlaps

PDG2= Patient safety	**Comments**
	PDG6= Managing their chronic conditions.
	PDG1= Metrics: Antibiotic stewardship progress PDG1= Global standard for science-based judgment of adverse events.

	PDG1+PDG12= qualified health professional.
	PDG9= Continuity of care between levels of care (communication and medication reconciliation). PDG9= Multidisciplinary workforces.
	PDG5+PDG8= Patient safety → is transversal, also add: - patient information and health education - Referral - Medicines review - Medicines-Referral care - Patient management etc.
	PDG8= Providing specialised counselling to the citizens.
	PDG4= Patients should be included in all the processes, voicing their needs and complaints. PDG4= Should make sure the strategies developed are well adapted to each patient.
	PDG4+PDG8= Cultural considerations, including languages.

PDG 3: Medicines access and supply chain goal

Most of the comments on the "Medicines access and supply chain" goal were in line with the proposed **mechanisms and indicators** of the goal itself (see table 15). Participants mentioned **16** comments that are relevant to this goal.

- Medicines supply chain: Participants ensured equitable access to medicines and care services to all populations, such as the indigenous population and vulnerable populations, regardless of location: city vs remote area. Participants were also concerned about the illegal practice of supply chains and the risk associated with single sources of the supply chain (monopoly of suppliers), and they suggested setting regulations to limit it. They also suggested setting standards for good practice in the supply chain to maintain the stability of medicines considering the different environmental conditions of countries.
- Cold chain systems: Participants recommended regular evaluation and documentation of medicines shortages, following standards on good practice in the supply chains, and ensuring following the manufacturer's recommended storage conditions for all medicines.
- Affordability of medicines/ pricing influence: Participants mentioned that decisions related to medicines affordability and care services should be built on an ethical basis. They also suggested following a systematic procedure to standardise the prices of medicines, including cost-effectivity analysis and health technology assessment of medicines and listing in the essential drugs formulary. Lastly, medicines shortages and accessibility can be influenced by policies and regulations on the prices and also related to the population size vs the global market.
- Substandard and falsified medicines: Participants pointed out the importance of having a medicines verification (tracking) system to report substandard/falsified medicines.

Participants also mentioned some general comments which can influence the stability of the supply chain and prevent drugs from reaching certain countries and areas, such as comments number (6, 10, and 15).

Table 15: Comments on the first cluster of the Goals "Needs", Medicines access and supply chain (PDG3)

Cluster	Pharmaceutical Development Goals (draft)	Mechanisms and indicators
Population Needs	PDG3= Medicines access and supply chain	WG supply chain. Cold chain systems. Affordability of medicines/ pricing influence. Substandard and falsified medicines.
Comments		
1-Indigenous population and vulnerable population → Access		9-Documentation/standards on good practices on supply chain/ medicines storage.
2-Illegal practice, supply chain regulation missing		10-Sanction impact on medicines
3-Access to services/vulnerable groups		11-Measuring effectiveness and falsified medicines tracking system.
4-Metrics: trained health & political leaders on supply chain integrity.		12-Accessibility regardless of locations: city vs rural.
5-Ethical decision making: - equity of care - Formulary - affordability		13-Medicines shortages/access influenced by - Pricing policies - Population size vs global market
6-World peace and free trade		14-Risk associated with single sources of supply.
7-Cost-effectivity analysis/health technology assessment of medicines to standardise prices of medicines and listing in the essential drugs formulary.		15-No redundancy.
8-Measuring medicines shortages (evaluation).		16-Stability of medicines in different environmental conditions.

Missing points and Metrics/indicators to consider

Participants pointed out the importance of generating metrics equipped with a qualified health and political leaders to ensure the integrity system of the supply chains. Also, it is important to measure the effectiveness and falsified medicines by establishing a validated tracking system. Eventually, supply chains should be worked according to good storage practices and good distribution practices (see table 16).

Table 16: Missing points and Metrics/indicators

	Comments
Missing points	Metrics: trained health & political leaders on supply chain integrity
	Measuring effectiveness and falsified medicines tracking system
	Documentation/standards on good practices on supply chain/ medicines storage.

PDG3 Overlaps and redundancies (repeats).

Adhere to ethical considerations while taking decisions related to medicine affordability and equity of care provisions to include all people regardless of their conditions. Facilitate medicines access to

all patients irrespective of their locations. These two points overlap with (Equity and diversity in pharmaceutical services delivery, service access and service impact, PDG13) goal. Cost-effectivity analysis and health technology assessment of medicines to standardise the price of medicines. Policies and regulations can also influence medicines shortage and accessibility. These two comments overlap with the (Regulation and Remuneration reform, PDG12) goal. Documentation and following standards on good practice overlap with (the quality assurance mechanism, PDG1) goal. Finally, it is an essential step to find processes and tracking systems for reporting and investigating falsified medicines; and ensuring good storage stability of medicines in different conditions is crucial. Both of these comments are directly related and overlap with (Patient safety PDG2) goal (see table 17).

Table 17: PDG3 Overlaps

	Comments
PDG3= Medicines access and supply chain	PDG13= Ethical decision making: - equity of care - Formulary - Affordability. PDG13= Accessibility regardless of locations: city vs rural. PDG13= World peace and free trade
	PDG12= Cost-effectivity analysis/health technology assessment of medicines to standardise prices of medicines and listing in the essential drugs formulary. PDG12= Medicines shortages/access influenced by - Pricing policies - Population size vs global market
	PDG1= Documentation/standards on good practices on supply chain/ medicines storage.
	PDG2= Measuring effectiveness and falsified medicines tracking system. PDG2= Stability of medicines in different environmental conditions.

Comments on the second cluster of the Goals 'Services.'

PDG4: Prevention strategies and implementation

Most of the comments on this goal were in line with the proposed **mechanisms and indicators** of the goal itself (see table 18). Relatively, Participants addressed a few comments on this goal where they mentioned **eight** comments that are relevant to this goal.

Participants identified maintaining "good health" as a need to increase well-being and wellness among healthy people as a prevention strategy and self-care, although the practice should be based on evidence gathering and monitored to measure the level of **impact** of the provision of services. Participants emphasised the crucial role of pharmacists in the commitment to antibiotic stewardship to promote the rational use of antibiotics. Most important, participants raised a vital missing point which is **medication adherence** which refers to the patients' compliance with their medicines and

therapy treatment. Participants believed that this point was missed and must be taken into consideration.

These mentioned points could also be considered as missing points, and there is a need to bridge this gap when setting the prevention strategies plans and the way of implementation.

Table 18: Comments on the second cluster of the Goals "Services", Prevention strategies and implementation (PDG4)

Cluster	Pharmaceutical Development Goals (draft)	Mechanisms and indicators
Services	PDG4= Prevention strategies and implementation	Preventative pharmacy services. Pharmaceutical public health policy (smoking cessation, nutrition, lifestyle). Vaccination. Patient information and health education.
Comments		
1-Prevention/public health is one of the pillars of self-care		5- Infectious disease→ Antimicrobial resistance (AMR)
2-Maintain Good Health		6- Wellbeing
3- Wellness and preventive care: the need to promote good health among healthy people.		7- Level of impact
4- Missing: Adherence Adherence= medical and treatment and prevention		8- Evidence gathering

PDG4 Overlaps and redundancies (repeats).

Since maintaining the wellbeing of the elderly is an aim of prevention strategies, then the "wellbeing" overlaps with the (Fragile patient populations, PDG7) goal. Also, measuring the level of impact and gathering of evidence can be more efficient and responsive to the needs of the service with the support of the (Service intelligence, PDG11) goal (see table 19).

Table 19: PDG4 Overlaps

	Comments
PDG4= Prevention strategies and implementation	PDG7= Wellbeing
	PDG11= Level of impact PDG11= Evidence gathering

PDG5: Self-care and triage

Participants only addressed **three** comments on this goal. They pointed out that acute situations (the vulnerable population/emergencies and acute situations) are not addressed, which is considered a **missing point**. It is also important to develop metrics/indicators to measure the quality of current care. Regarding the third comment, it is not noticeably clear what participants meant; probably, patients and healthcare providers must have equal access to evidence-based information and practice.

Thus, this comment is also **overlapped** with (Equity and diversity in pharmaceutical services delivery, service access and service impact, PDG13) goal (see table 20).

Table 20: Comments on the second cluster of the Goals "Services", Self-care and triage (PDG5)

Cluster	Pharmaceutical Development Goals (draft)	Mechanisms and indicators
Services	PDG5= Self-care and triage	Self-care advocacy and support. Pharmacy as a Gateway to Care. Referral and collaborative working.
Comments		
1-Acute care		3-Access→ Evidence
2-Current care/measuring		

PDG6: Long Term Conditions/Non-Communicable diseases (LTCs/NCDs) goal

Most of the comments on the "LTDs/NCDs" goal were in line with the initial **mechanisms and indicators** of the goal itself. Participants only mentioned **six** comments related to this goal (see table 21).

- Medicines and therapeutic review: the challenge to achieve safe prescribing is of huge importance to healthcare.
- Medicines-related care: participants suggested that mental health issues should be considered under NCDs, and health behaviour changes should be of interest within prevention/intervention strategies. Besides, participants were encouraged to take advantage of the existing trials and enhance measuring the implementation level of the services provided; these points are also considered missing within this goal.
- Patient Management and clinical services for NCDs and LTCs: Benefit from the availability and efficiency of **point-of-care testing (POCT)** to help clinical decision-making related to patients' health.

Table 21: Comments on the second cluster of the Goals "Services", LTCs/NCDs (PDG6)

Cluster	Pharmaceutical Development Goals (draft)	Mechanisms and indicators
Services	PDG6= LTCs/NCDs	Medicines and therapeutic review. Medicines-related care. Patient Management and clinical services for NCDs and LTCs.
Comments		
1- Mental health under NCDs		4- Health behaviour change
2- Prescribing		5-Use the existing trials
3- Point of care testing		6-Implementation level

<u>PDG6 Overlaps and redundancies (repeats).</u>

Prescribing needs the support of health authority bodies, which needs to legislate this right by law. Accordingly, this point of "prescribing" overlaps with the (Regulation and Remuneration reform, PDG12) goal. Focusing on "health behaviour change" can also overlap with (Prevention strategies and implementation PDG4 and Fragile patient populations PDG7) goals (see table 22).

Table 22: PDG6 Overlaps

	Comments
PDG6= LTDs/NCDs	PDG12= Prescribing
	PDG4+PDG7= Health behaviour change

PDG 7: Fragile patient populations goal

Most of the comments on this goal were in line with the initial **mechanisms and indicators** of the goal itself. Participants only mentioned **eight** comments related to this goal (see table 23).

- Care of elderly and aged: participants stated that all patients' health situations should be addressed and not focus only on special populations with the necessity of setting up strategic plans to tackle health problems related to patients of certain criteria, such as fragile and ill population, vulnerable population, mental health issues, and patients with rare diseases. Optimising medication management in frail older people is essential, including prescribing & deprescribing (polypharmacy management). Ensure the collaboration and integration among services and care chains provided for better patient outcomes. Finally, set plans for **crisis management**.
- Mental health and well-being, including aged related: ensure providing home care services for those populations.

Table 23: Comments on the second cluster of the Goals "Services", Fragile patient populations (PDG7)

Cluster	**Pharmaceutical Development Goals (draft)**	**Mechanisms and indicators**
Services	PDG7= Fragile patient populations	Care of elderly and aged. Mental health and well-being, including age-related. Care of children.
Comments		
1-Mental health and not just physical health, especially for the aging population		5- Home health care
2- Focus on all patients, not just special populations		6- Care chain & collaboration in the chain
3-Palliative care		7-Crises management
4- Patient with a rare disease		8-Prescribing & deprescribing

<u>Missing points to consider</u>

Participants found that these three points are missing within this goal, which is how to manage the crisis, tackle patients with rare diseases, and provide home care services.

PDG7 Overlaps and redundancies (repeats).

This goal has three overlaps with three other goals. First, the "patient with rare disease" comment can overlap with (the LTCs/NCDs PDG6) goal since frail patients may have other problems than frailty. Integration of the healthcare chain is also crucial to achieving better outcomes and improving the quality of life for elderly people, which overlaps with (the IP and collaborative working (& technology), PDG9) goal. Finally, prescribing and deprescribing (polypharmacy management) need to consider a guideline or approved practice that suggests its use, which overlaps with (The regulation and Remuneration reform PDG12) goal (see table 24).

Table 24: PDG7 Overlaps

	Comments
PDG7= Fragile patient populations	PDG6= Patient with a rare disease
	PDG9= Care chain & collaboration in the chain
	PDG12= Prescribing & deprescribing

PDG 8: Medicines information

Most of the comments on this goal were in line with the initial **mechanisms and indicators** of the goal itself. Participants only mentioned **six** comments related to this goal (see table 25).

- Expert information provision to HCPs and agencies: Participants suggested having an information system to provide quality information through an accountable network (server) of healthcare professionals in addition to providing health education programmes.
- Patient medicines education and advice: Participants enhanced patients' health education "**Health literacy**" by improving people's access to health information and enhancing their ability to self-manage their health. All patients should receive proper quality information, including **patients with special needs**. These two points are also considered missing within this goal.

Table 25: Comments on the second cluster of the Goals "Services", Medicine information (PDG8)

Cluster	**Pharmaceutical Development Goals (draft)**	**Mechanisms and indicators**
Services	PDG8= Medicine information	Expert information provision to HCPs and agencies. Patient medicines education and advice.
Comments		
1- Other information providers		4- Educational programmes
2- Server of information		5- Health literacy
3- Public health aspects missing in education		6- Specific information for disabled people

Group 4: Comments on the third cluster of the Goals 'Systems'

PDG 9: IP and collaborative working (& technology)

Most of the comments on this goal were in line with the initial **mechanisms and indicators** of the goal itself. Participants addressed **nine** comments related to this goal (see table 26).

- Collaborative working and multi-disciplinary teams: Participants emphasized the necessity of the active involvement and participation of patients in their own care and within the care team as ambassadors for their own health. They were also promoted to the role of technicians as a key-workforce within the team. In other words, they ensured to have a high level of integrity and collaboration in the healthcare system.
- Prescribing rights and clinical decision making: participants encouraged attaching pharmacists as key actors in policy development. From the participants' perspective, pharmacists should work in collaboration with other interdisciplinary teams to achieve better integration of care. Still, at the same time, they should have their independent qualifications and responsibilities.

Table 26: Comments on the third cluster of the Goals "Systems", IP and collaborative working (& technology) (PDG9)

Cluster	Pharmaceutical Development Goals (draft)	Mechanisms and indicators
Systems	PDG9= IP and collaborative working	Collaborative working and multi-disciplinary teams. Prescribing rights and clinical decision making.
Comments		
1- Technician workforce		6-It's important to have the patients in the team as well to act as an ambassador for their own health.
2- Level of care coordination		7-Policy/politics should be one of the goals.
3-Equal responsibility with other health professionals in terms of the scope of their practice		8-There is a need for more health care integration and collaboration.
4-Patient orientation, participation, and connectivity in the TEAM.		9-Connection (interdisciplinary collaboration/integration of care) and independence (qualification/responsibility)
5-Policy where pharmacists are key actors.		

Missing points to consider

Participants found that "**Policy/politics**" should be addressed as a goal where pharmacists are a key actor in making policy decisions. Also, participants enhanced the engagement of patients within the healthcare team.

PDG9 Overlaps and redundancies (repeats).

Patient engagement and participation within the team is overlapped with the (patient safety PDG2) goal.

Engaging pharmacists in policies/decisions making and having their independence relative to their qualification/responsibility could overlap with (The regulation and Remuneration reform PDG12) goal (see table 27).

Table 27: Table 26: PDG9 Overlaps

	Comments
PDG9= IP and collaborative working (& technology)	PDG2= Patient orientation, participation, and connectivity in the TEAM. PDG2= It's important to have the patients in the team as well to act as an ambassador for their own health.
	PDG12= Policy where pharmacists are key actors. PDG12= Policy/politics should be one of the goals. PDG12= Connection (interdisciplinary collaboration/integration of care) and independence (qualification/responsibility)

PDG 10: IT and digital health initiatives

Most of the comments on the "IT and digital health initiatives" goal were in line with the initial **mechanisms and indicators** of the goal itself. Participants mentioned **ten** comments related to this goal (see table 28).

- Service configuration and digital health provision: Participants recommended including artificial intelligence (AI) under this goal with the importance of facilitating the accessibility of digital health initiatives and the responsible use of (AI). It is also essential to have a digital infrastructure and unified system to provide quality information to the patient, healthcare professionals and the public where pharmacists are the health data managers and ensure equal access to information for health works in all sectors to help at work. Finally, Patients can be considered as friendly users of their mobiles and IT systems.

Table 28: Comments on the third cluster of the Goals "Systems", IT and digital health initiatives (PDG10)

Cluster	Pharmaceutical Development Goals (draft)	Mechanisms and indicators
Systems	PDG10= IT and digital health initiatives	Service configuration and digital health provision.
Comments		
1-Include artificial intelligence under IT. This should be under innovations (services)		6-Pharmacists are health data managers.
2-Service implementation and infrastructure		7-Mobile tools
3-Provide recommendations to make digital health initiatives more accessible.		8-User friendly application.
4-Responsible artificial intelligence (AI) and decision support.		9-Accessibility (equitable for all disciplines, patient in the team).
5-Systems should be patients friendly, so "patients" are missing in this goal.		10-Quality information @HCP'S @patients @public

PDG10 Overlaps and redundancies (repeats).

Provide recommendations to facilitate the access of digital health initiatives and allow equitable access for using digital provisions for all disciplines and patients— both of these comments

overlapped with (Equity and diversity in pharmaceutical services delivery, service access and service impact, PDG13) goal. Providing quality information for all healthcare professionals, patients and the public is overlapped with both (quality assurance mechanism, PDG1 and medicine information, PDG8) goals (see table 29).

Table 29: PDG10 Overlaps

	Comments
PDG10= IT and digital health initiatives	PDG13= Accessibility (equitable for all disciplines, patient in the team). PDG13= Provide recommendations to make digital health initiatives more accessible.
	PDG1+PDG8= Quality information @HCP'S @patients @public

PDG 11: Service intelligence

Most of the comments on the "Service intelligence" goal were in line with the initial **mechanisms and indicators** of the goal itself. Participants mentioned **seven** comments related to this goal (see table 30).

- ATLAS, Observatory, MOs.: Participants stated that service intelligence could be considered as a dashboard of quality indicators and outcome measures for pharmacy services. Also, it is essential to measure the quality of the provided services. It is noticeably significant to have an electronic patient record of helping the healthcare system with equitable access for healthcare professionals and pharmacists in all sectors. It should also be noted that a liaison with other agencies like WHO could be beneficial to get knowledge and information.

Table 30: Comments on the third cluster of the Goals "Systems", Service intelligence (PDG11)

Cluster	**Pharmaceutical Development Goals (draft)**	**Mechanisms and indicators**
Systems	PDG11= Service intelligence	ATLAS, Observatory, MOs.
Comments		
1- Relation with WHO AGENCIES→ Usage of the knowledge.		5-The need for an infrastructure of patients' records.
2- Outcomes metrics (PREMs and PROMs).		6-Quality indicators for pharmacy services.
3-Data collection and quality indicators for pharmaceutical services.		7-Digital patient records with equitable access
4-A global DASHBOARD of pharmacy services.		

Missing points and Metrics/indicators to consider

Participants suggested using Patient Reported Outcome Measures (**PROMs**) and Patient Reported Experience Measures (**PREMs**) as **outcomes metrics** to allow patients to provide direct feedback on their care to drive improvement in services.

Also, some missing points to consider are the need for establishing an **infrastructure of patients' records**, and at the same time, digital patients' records should have equitable access among healthcare providers.

PDG11 Overlaps and redundancies (repeats).

Designing and following quality indicators and metrics to measure outcomes and the level of pharmacy services is overlapped with (the quality assurance mechanism, service metrics PDG1) goal. Also, the necessity of establishing digital patient records and having equitable access to this provision is overlapped with (IT and digital health initiatives, PDG10, Equity and diversity in pharmaceutical services delivery, service access and service impact, PDG13) goals (see table 31).

Table 31: PDG11 Overlaps

	Comments
PDG11= Service Intelligence	PDG1= Outcomes metrics (PREMs and PROMs). PDG1= Date collection and quality indicators for pharmacy services.
	PDG10+PDG13= Digital patient records with equitable access.

PDG 12: Regulation and remuneration reform

Most of the comments on this goal were in line with the initial **mechanisms and indicators** of the goal itself. This goal received the highest number of comments among other goals, where participants stated **33** comments related to this goal (see table 32).

- Service provision and remuneration: participants pointed out that health technology assessment is needed to evaluate the effects and impacts of health technology systemically. Participants suggested that remuneration and incentives could be granted for demonstrating collaboration and working together with other healthcare professionals. Nevertheless, remuneration is not about price and fees, but it is about demonstrating the value and the cost-effectivity of the provided services.
- Drugs and medicines pricing, economical access to medicines: participants expressed that medicines/health care are not commodities or commercial. Also, cost-effectiveness analysis is important for weighing different costs and health outcomes.
- Prescribing reform; education & training for prescribing rights: Participants argued that pharmacies should be responsible pharmacists and that modernization of regulations (up to date) is needed to control the difference of ownership structures, for instance, pharmacists' response and presence in pharmacy in different settings (community pharmacy). It is also crucial to establish country-level guidelines against standards to align with the demands and challenges of each country, in addition to setting access regulations for rural areas. Accreditation and recognition of education level in addition to promoting needs-based education. However, the point is more relevant to PWDG.

Participants suggested setting a clear description of responsibility and accountability by governance guidance to separate prescribers and dispensers, **"Separation of prescribing and dispensing"**. Investing in both innovation initiatives and integrating pharmacists into the policy is important for decision-makers. Finally, the clinical pharmacy should be mandatory by law, and an independent regulatory body is needed.

Table 32: Comments on the third cluster of the Goals "Systems", Regulation and Remuneration reform (PDG12)

Cluster	Pharmaceutical Development Goals (draft)	Mechanisms and indicators
Systems	PDG12= Regulation and Remuneration reform	Service provision and remuneration. Drugs and medicines pricing, economical access to medicines. Prescribing reform; education & training for prescribing rights.
Comments		
1-Regulation guidance		18-Value of pharmacists, services, and pharmaceuticals
2-Alignment in country level→country guidelines		19-Separation of prescribers and dispensers "Lack of governance."
3-Remuneration→ Working with others		20- Modernization of regulations.
4-Incentives for collaboration with other HCPs		21-Health technology assessment is needed.
5-Influence/impact by pharmacists? Including policy makers → NO		22-There is a need for best practices for countries to measure against standards.
6-Regulation & remuneration are two different things		23-Invest in both innovation initiatives and integrating pharmacists in the policy.
7-Regulation for pharmacy ownership→ accountability		24- Clinical pharmacy should be mandatory
8-Professional responsibility and autonomy→ backing up by regulation.		25-Cost effectiveness to influence systems.
9-Regulation→ Pharmacists responsible for pharmacy		26-Medicines ≠ COMMODITY.
10-Education level→ Accreditation		27-Health care ≠ RETAIL.
11-Education level→ Needs-based		28-Independent regulatory body.
12-Ownership/responsibility from initial education		29-Pharmacy ownership regulation
13-Difference ownership structures need steps to be taken:- Pharmacists' response in pharmacy		30-Pay for the outcome.
14-Difference ownership structures need steps to be taken:- Pharmacists' presence in pharmacy		31-Price and remuneration vs value and health technology assessment (how many qualy's...).
15-Difference ownership structures need steps to be taken:- Regulation is controlled		32-To change remuneration to value.
16-Regulation for access in the rural area		33-Show quantified (COST-EFFECTIVITY) = Investment.
17-Remuneration as a title is confusing! Should be "Value"		

Missing points to consider

Participants found that **health technology assessment** is needed, and it is missed within this goal. Also, they enhanced the necessity of shaping regulations related to **pharmacy ownership**, which is also missed in the context of pharmacy regulations and policies.

PDG12 Overlaps and redundancies (repeats).

Health technology assessment is needed to evaluate the effects and impacts of health technology; this comment overlaps with (quality assurance mechanism, service metrics PDG1 and IT and digital health initiatives PDG10) goals.

Quality measures of best practice for countries is also overlapped with (quality assurance mechanism, service metrics PDG1) goal. Cost-effectiveness and its influence on the system can overlap with (Medicines access and supply chain PDG3, Service Intelligence PDG11) (see table 33).

Table 33:PDG12 Overlaps

	Comments
PDG12= Regulation and Remuneration reform	PDG1 + PDG10= Health technology assessment is needed.
	PDG1= There is a need for best practices for countries to measure against standards.
	PDG3+PDG11= Cost-effectiveness to influence systems. PDG3+PDG11= Show quantified (COST-EFFECTIVITY) = Investment.

PDG 13: Equity and diversity in pharmaceutical services delivery, service access and service impact

Most of the comments on this goal are in line with the initial **mechanisms and indicators** of the goal itself. Participants stated **eight** comments related to this goal (see table 34).

Participants mentioned that all people should be treated equally and fair regardless of their socio-economic status or any other situation, and the services provided to people are fair and accessible to everyone. Besides, all populations should be considered and addressed and not only the "stable populations".

Participants also inquired about the value of addressing "Equal access & diverse needs" and "patient engagement "in this goal.

Table 34: Comments on the third cluster of the Goals "Systems", Equity and diversity in pharmaceutical services delivery, service access and service impact (PDG13)

Cluster	**Pharmaceutical Development Goals (draft)**	**Mechanisms and indicators**
Systems	PDG13= Equity and diversity in pharmaceutical services	Gender, economic equity and poverty; all global citizens have access to the same quality of pharmaceutical care.

	delivery, service access and service impact	
Comments		
1-Fragile persons		5-What about refugees and poor people who have no access to medicines and care?
2-Socio-economic status		6-Is there a value in including diversity in this goal?
3-Current set addresses " stable populations" and do not consider unusual situations, such as emergency, displaced population, pandemic		7-When addressing citizens, don't also forget refugees/immigrants.
4-Equal access & diverse needs?		8-Engage patients!

PDG13 Overlaps and redundancies (repeats).

Medicines access to all people, as addressed in both comments below, can overlap with the (medicines access and supply chain PDG3) goal. Patient engagement within this goal overlaps with (patient safety PDG2, IP and collaborative working (& technology) PDG9) goals (see table 35).

Table 35: PDG13 Overlaps

	Comments
PDG13= Equity and diversity in pharmaceutical services delivery, service access and service impact	PDG3= What about refugees and poor people who have no access to medicines and care? PDG3= When addressing citizens, don't also forget refugees/immigrants.
	PDG2+PDG9= Engage patients!

6.6.5 Principal outcomes

Principal points were compiled on each goal:

1. Quality assurance mechanisms and service metrics (PDG1): Quality assurance should include several aspects, such as quality of **medicines**, quality of the **information** provided to patients, and quality of **education**. These aspects can be achieved by following effective and efficient governance guidance to support the continuity of standard quality. For example, setting process and outcomes indicators/metrics based on evidence-based research at different standard levels (global and country-level) to have a consistent approach across all countries and to assure that these quality standards are implemented.

2. Patient safety (PDG2): Good communication with patients and **cultural considerations** are important features of patient safety and quality of care. It is also necessary to focus on raising **patients' awareness** in relation to health education and patient information provided by highly-qualified healthcare professionals. The importance of finding metrics/indicators to measure the progress of antibiotic stewardship and the rational use of antibiotics is crucial, and as an original concept, expand antimicrobial stewardship to include other **therapeutic stewardship services**.

3. Medicines access and supply chain (PDG3): Ensure **equitable access** to medicines and care services to all populations regardless of their locations and conditions of countries. These challenges could be solved by setting standards on the **good practice in the supply chains** to limit the risk associated with single sources of suppliers and having a medicines verification (tracking) system to report substandard/falsified medicines.

4. Prevention strategies and implementation (PDG4): Identify **"Good Health"** as a need to improve well-being and wellness among healthy people as a prevention strategy and self-care. Most important, one of the potential missing points is **"Medication adherence"**, for which the available evidence suggests significant improvement in clinical outcomes and health is associated with better patient adherence strategies.

5. Self-care and triage (PDG5): This stage of care should address **all populations** and in **different situations** (the vulnerable population/emergencies and acute situations) in addition to developing metrics/indicators to measure the quality of the current care provided.

6. LTCs/NCDs (PDG6): Safe prescribing is of considerable importance and challenge to healthcare. In addition, **mental health issues** should be considered under NCDs. It is also important to benefit from the availability and efficiency of **point-of-care testing (POCT)** to help clinical decision-making related to patients' health.

7. Fragile patient populations (PDG7): Essential to set up strategic plans to **optimise medication** management and **polypharmacy** management in frail and ill populations with chronic and long-term conditions and patients with rare diseases; do not neglect to establish plans for **crisis management**.

8. Medicine information (PDG8): enhance **"Health literacy"** by improving people's access to health information and enhancing their ability to self-manage their health, for example, having an information system to provide quality information through an accountable network (server) of healthcare professionals.

9. IP and collaborative working (& technology) (PDG9): Increase the level of care coordination among healthcare professionals, including **patient engagement** within the healthcare team, to achieve better integration of care and patient outcomes. Additionally, encourage the engagement of pharmacists as **key actors** in policy development.

10. IT and digital health initiatives (PDG10): Consider facilitating the equal accessibility of digital health initiatives and the responsible use of **artificial intelligence** (machine learning) for patients and pharmacists in all sectors to help at work.

11. Service Intelligence (PDG11): This should serve as a **dashboard** for quality indicators and outcome measures for pharmacy services.

12. Regulation and Remuneration reform (PDG12): It is necessary to set up **country-level guidelines** to align with the demands and challenges of each country, in addition to setting regulations to shape the difference in pharmacy **ownership structures**. There is a need to clearly describe the responsibility and accountability by governance guidance to separate prescribers and dispensers, **"Separation of prescribing and dispensing". Health technology assessment** is imperative to evaluate the effects and impacts of health technology systemically. Finally, Remuneration is not about price and fees, but it is about demonstrating the **value** and the cost-effectivity of the provided services.

13. Equity and diversity in pharmaceutical services delivery, service access and service impact (PDG13): All people should be treated equally and fair regardless of their socio-economic status. Besides, the services provided to people are fair and accessible to everyone.

6.6.6 Principal issues and themes raised from general comments

The results of the analysis of "general comments" produced five newly emerged themes. General comments were grouped into: Clarity and Understandability; or Terminology & Definitions; or Implementation & Applicability; or Scope & gaps; or Purpose & interdependency themes. The emerged themes and comments are listed in (table 36). Participants raised 40 general/principle comments to express their perspectives on the goals in the overall view. The context of the "general comment" can be summarized as the following:

Emerged theme: Clarity & Understandability

First, all goals should be clear and understandable; however, it could be fewer number of goals. Participants suggested not employing many acronyms because it would confuse the intended meaning. They also mentioned the *"General ignorance about the services"* it is not very clear what participants intended to say in this comment, but it is probably about informing patients/care providers about the available services.

Emerged theme: Terminology & Definitions

One comment was, *"Clarify when "pharmacy" is indicated, it is really "pharmacist" is intended"*; pharmacy is the profession while the pharmacist is a component within the entire entity. Thus, both these key terms (pharmacy and pharmacists) need to be clearly defined.

The comment *"Implementation who's job? Roles' definition"* is not very clear about what the participants meant in this comment; it might be elaborate in defining and describing the role and responsibility of pharmacists more.

Emerged theme: Implementation & Applicability

As previously mentioned above, participants insisted on the importance of measuring the impact and evaluating how the goals will be implemented/achieved in addition to setting minimum standards on the country level to apply in alignment with the demands and challenges of each country.

"Good Pharmacy Practice" should be applied and implemented in all sectors (hospital and community settings), and as a suggestion of an effective implementation strategy, launch a pilot project for solutions using evidence-based practice for collating data. In addition, use these goals for better communication with authorities. Finally, Participants suggested developing a framework as a self-assessment tool and PDGs to be included and reviewed by FIP.

Emerged theme: Scope & gaps

Participants questioned whether these goals are centred on patient interest or pharmacist interest. So, this concept should be clearly defined within the goals. Participants stressed that Research and Development (science and practice) must be included and underpinning goals. They also mentioned the potential needs-gap to endorse sustainability in (environmental, economic, and systematic issues); and it is also essential not to ignore the influence of policy.

Participants thought that education, access to care, and interprofessional collaboration are missed in cluster 1 (Needs), and these three aspects should be linked to the "Needs".

The following comment is more relevant to PWDG. In terms of "Workforce development", participants indicated that the transition in practice is not entirely captured in the goals. Besides, population needs are about recipients (patients) of services, while workforce development is about the practitioners.

Participants reported that generating reports to explore the medicine usage rate for specific medicines, for example, (antibiotics) is crucial to optimise the rational use of medicines and to assess progress on antimicrobial resistance stewardship.

Also, participants suggested using different measures, such as process measures, outcome measures, and economic measures, depending on evidence-based practice to gain more effective and reliable results and to include the outcomes as one of the objectives of the service.

One of the potential needs-gap is the endorsement of 'Green Pharmacy practice' (environmental issues) in the goals. Participants also pointed out that it is essential to share equal responsibility with

other health professionals in terms of the scope of their practice. “Transition of care” was also missed in these goals. Participants emphasised that continuous research is a necessity to tackle unexpected health concerns, and fair treatment is imperative for all diseases and populations.

Participants mentioned that a well-defined structure of pharmacy regulations is missing and suggested setting regulations to identify and incorporate the clinical leadership responsibility and accountability, including ownership structures, responsibility for decisions making, and professional autonomy. There is a need to follow indicators to clearly separate and describe the difference between the prescribers and dispensers, “Separation of prescribing and dispensing”.

The comments related to pharmacist’s education are more about education in terms of PWDGs than in the practice context.

Emerged theme: Purpose & interdependency

Participants inquired about the overlap and the interdependency amongst goals and if they work cohesively in alignment with each other. Lastly, participants enhanced that everything revolves towards patients’ safety and needs.

Table 36: List of emergent themes raised from the general comments

Clarity & Understandability	Terminology & Definitions	Implementation & Applicability	Scope & gaps	Purpose & interdependency
Goals must be clear & understandable to all.	Clarify when "pharmacy" is indicated; it is really "pharmacist" intended.	Evaluation of how the goals are implemented/achieved in countries.	Is all of this pharmacy-centred or patient centred?	Are these separate? How do they work as a cohesive whole?
Fewer, clearer goals	Implementation who's the job? Roles' definitions	Look at the minimum standards every country can apply.	Research & Development (science practice) should be included	Everything revolves around cluster on patient safety+ Needs
General ignorance about the services		Implementation who's the job? Roles' definitions	Sustainability in environment	
The educational level of pharmacists: - training across the globe		Good pharmacy practice for different sectors (like based statements with hospital pharmacists)	Don't get rid of the policy and influencing	
		Implementation= pilot project for the solution	Missing (Needs): education, access to care, interprofessional collaboration	
		Better communication with authorities using these goals.	Sustainability (environmental, economical and systemic)	
		Collating with evidence/data on practice together with GOALS.	Workforce development: - Transition in practice is not quite captured in the goals.	
		Focus on what we can influence.	Workforce development: - Population needs are around recipients of services, while workforce development is about the practitioners.	
		Goals should focus on goals to aim for minimum standards	Medicines usage rates	
		FRAMEWORK = self-assessment tool	Outcomes: Economic and Humanistic evidence	
		FRAMEWORK = Reviewed by FIP	Process measures, outcome measures, economic measures??	

		FRAMEWORK = PDGS to be included	Missing: Green Pharmacy Practice	
			Services need to include outcomes	
			Missing: transitions of care	
			Unmet medicine needs/ for which diseases do we need treatment?	
			Research workforce to deal with unexpected health threat	
			Aspects missing from goals - Need to incorporate clinical leadership responsibility and accountability: ownership, responsible for the decision, professional autonomy	
			Indicators:- Prescribing + dispensing different	
			The educational level of pharmacists:- to dispense	
			The educational level of pharmacists:- to be responsible for pharmacy	
			The educational level of pharmacists:- training across the globe	

6.6.7 Analysis of the overall overlapping between the goals:

"Overlapping weights" weight each individual target (PDG) with the most and least overlap amongst other targets (PDGs) by continuously down-weighting the units. In other words, to find the relationship and interdependency between the goals (Ali et al., 2019; Li et al., 2019).

Mapping and interpretation: each PDG comment was mapped against other PDGs' comments, which helped to give a more quantitative impact. Overlapping weights (table 37) and overlapping strengths (table 38) below reflect the mapping process and illustrate the overlapping strength between goals. The three clusters (Needs, Services, and Systems) were found to be highly interlinked, and an intense overlapping between the goals, especially PDGs 1, 2, 3, and 12, were shown.

The diagram (fig. 4) helps visualise the extent of the overlap between goals and facilitates the interpretation of overall relationships between the clusters and goals.

Overlapping between the GOALS

Table 37: Overlapping weights

		Quantitative mapping													
		Goals													
		PDG1	PDG2	PDG3	PDG4	PDG5	PDG6	PDG7	PDG8	PDG9	PDG10	PDG11	PDG12	PDG13	
OVERLAPPING	PDG1		4	1		1				1	1	2	4		14
	PDG2	4		2	3	1	1		3	4			1	1	20
	PDG3	1	2										4	5	12
	PDG4		3				1	1				2			7
	PDG5	1	1											1	3
	PDG6		1		1			2					1		5
	PDG7				1		2			1			1		5
	PDG8		3								1				4
	PDG9	1	4					1					3	1	10
	PDG10	1							1			1	1	2	6
	PDG11	2			2						1		2	1	8
	PDG12	4	1	4			1	1		3	1	2			17
	PDG13		1	5		1				1	2	1			11
		14	20	12	7	3	5	5	4	10	6	8	17	11	

Legend	
PDG1	Quality assurance
PDG2	Patient safety
PDG3	Medicines access and supply chain
PDG4	Prevention strategies and implementation
PDG5	Self-care and triage
PDG6	LTCs/NCDs
PDG7	Fragile patient populations
PDG8	Medicines information
PDG9	IP and collaborative working
PDG10	IT and digital health initiatives
PDG11	Service Intelligence
PDG12	Regulation and Remuneration reform
PDG13	Equity and diversity

Table 38: Overlapping strengths

Quantitative mapping			
Goals	Overlapping strength	How many goals	Overlapped goals
PDG2	20	9	PDG1+3+4+5+6+8+9+12+13
PDG12	17	8	PDG1+2+3+6+7+9+10+11
PDG1	14	7	PDG2+3+5+9+10+11+12
PDG3	12	4	PDG1+2+12+13
PDG13	11	6	PDG2+3+5+9+10+11
PDG9	10	5	PDG1+2+7+12+13
PDG11	8	5	PDG1+4+10+12+13
PDG4	7	4	PDG2+6+7+11
PDG10	6	5	PDG1+8+11+12+13
PDG6	5	4	PDG2+4+7+12
PDG7	5	4	PDG4+6+9+12
PDG8	4	2	PDG2+10
PDG5	3	3	PDG1+2+13

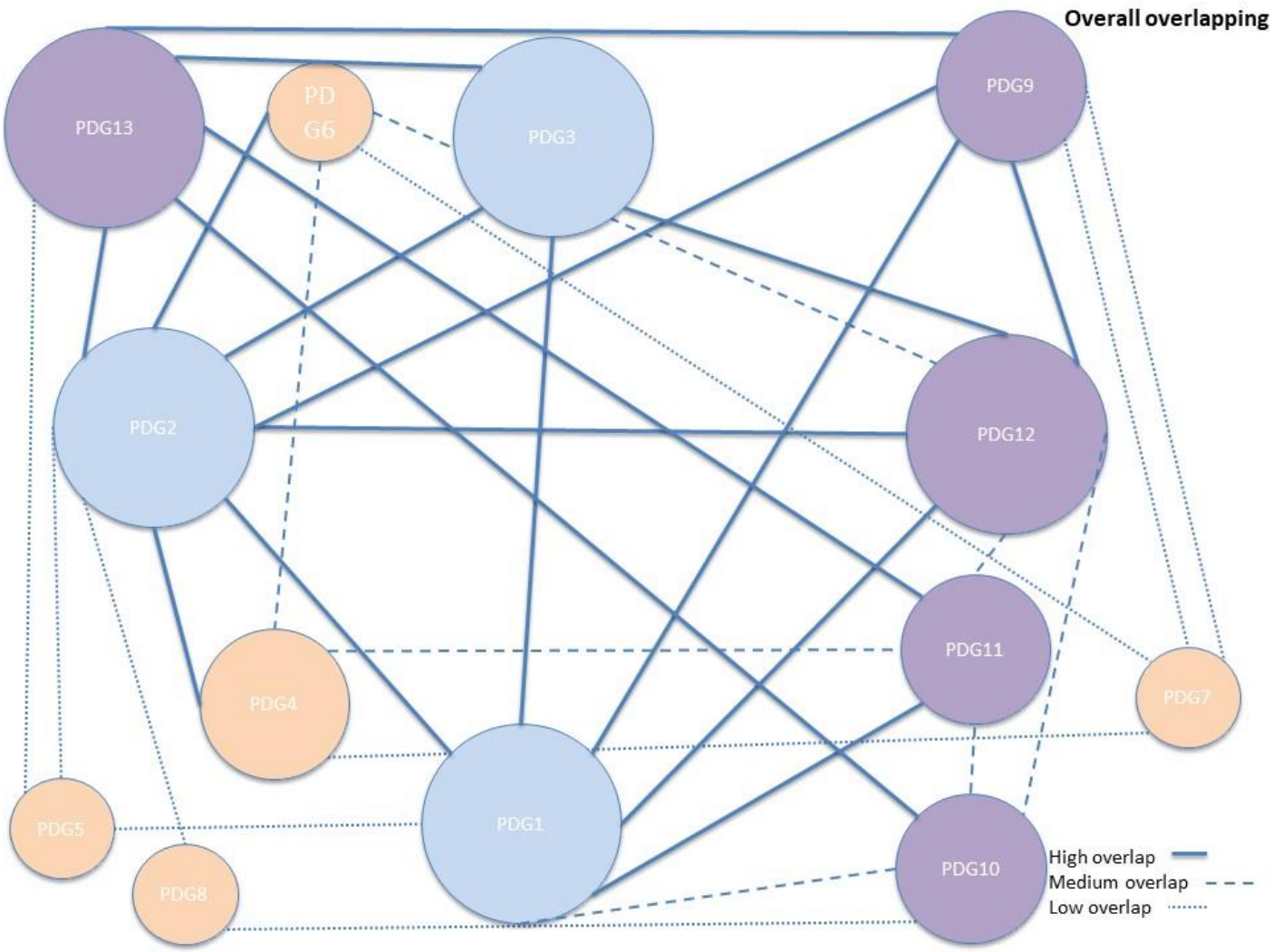
Lowest overlap

Highest overlap

Legend	
PDG1	Quality assurance
PDG2	Patient safety
PDG3	Medicines access and supply chain
PDG4	Prevention strategies and implementation
PDG5	Self-care and triage
PDG6	LTCs/NCDs
PDG7	Fragile patient populations
PDG8	Medicines information
PDG9	IP and collaborative working
PDG10	IT and digital health initiatives
PDG11	Service Intelligence
PDG12	Regulation and Remuneration reform
PDG13	Equity and diversity

This table illustrates the strength of overlapping between the goals. As can be shown, PDG1, PDG2, PDG3, and PDG12 have the highest overlapping strength, while PDG5 has the lowest overlapping strength, with only three comments overlapping with three goals. **Overlapping strength** is the number of overlapped comments that a goal has.

PDG2 overlapped with 9 out of 13 goals and had 20 overlapped comments. PDG12 overlapped with eight goals and has 17 overlapped comments. PDG1 overlapped with seven goals and has 14 overlapped comments. PDG3 overlapped with four goals and has 12 overlapped comments, and so on.



Legend	
PDG1	Quality assurance
PDG2	Patient safety
PDG3	Medicines access and supply chain
PDG4	Prevention strategies and implementation
PDG5	Self-care and triage
PDG6	LTCs/NCDs
PDG7	Fragile patient populations
PDG8	Medicines information
PDG9	IP and collaborative working
PDG10	IT and digital health initiatives
PDG11	Service Intelligence
PDG12	Regulation and Remuneration reform
PDG13	Equity and diversity

Fig. 4. Overall overlapping: area of circles expresses the overlapping strength

6.6.8 Development of Version 1 of the Pharmaceutical Development Goals (Revise/refine version).

The results of the analysis and the participants' comments have wider implications than a basic revision of the initial draft goals, which led the project team to re-reflect on the intent and purpose of the goals themselves. For instance,

- How are the Goals intended to be used?
- How do health challenges and priorities fit? (e.g. patient safety)
- How do we address the cross-cutting themes?
- How can we be clear about the interdependencies between them?
- How can we make them more individually distinct?

Referring to the original 2016 Workforce Development Goals (WDGs), these are discrete workforce Goals, and each, in a way, represents a specific challenge or need in itself so they can be directly used for mapping development needs. In the same way, the more generalizable PDGs should be discrete and form the base of a systematic transformative framework of drivers that can help nations address health challenges and priorities (patients and medicines). For example, PATIENT SAFETY is a multifactorial, multiagency, and global health challenge/priority, which requires a comprehensive, systematic and multipronged approach that the PDGs can offer.

Accordingly, for these emerged reasons:
First, the high-level of overall overlapping and complex intersections between clusters. Second, the goals themselves have some inheritance similarity which makes the linkages between some goals unclear and inconsistent. For example, some of the goals are very broad as PDG1 (quality assurance) and PDG 12 (regulation and remuneration). Some are more specific and specialised as PDG 5 (Self-care and triage), PDG 6 (LTCs/NCDs), PDG 7 (Fragile patient populations) and PDG 8 (medicine information). At the same time, some goals are cross-cutting themes across all (e.g. patient safety). Third, a relatively significant number of received comments addressed the workforce and education as an integral part of the practice area.

The supervisor and the researcher have decided to elaborate and expand the (pharmaceutical development goals) to have one set of practice goals underpinned and built around the Workforce DGs framework (PWDG). The PWDGs are the goals from (goal 1 to goal 13) in (table 39). Since the clusters were over-interlinked, the clusters were decided to be removed to produce 21 individual discrete/distinct goals. The sequence order of goals has changed; however, the numeric order has no relation with goals prioritisation as all goals equally have the same value in their context. For example,

PDG1 was the “quality assurance” in the original draft set (version 0), and it is the “Academic capacity” now, as illustrated in (table 39).

Similar steps for a second framework analysis were carried out as in (section 6.3.2). The newly emerged codes (goals) were produced in an inductive manner, and they were driven from the data (participants’ comments) and not by the pre-existing coding frame. Thereafter, as previously, multiple-coding was employed and reviewed by a second researcher. The research team frequently met to discuss and revise the themes and their consistent and meaningful relationship with the set of data. Then, data were re-mapped again thematically against the new and adopted codes (goals). Eventually, and taking into consideration all relevant commentaries and suggestions raised during the NGT event, the first iteration of the amended framework of the Pharmaceutical Development Goals framework (version 1) was developed; that comprises 21 individually distinct Pharmaceutical development goals, with each goal represents a tangible, measurable, achievable scope of practice, placed against clear priorities and needs, and based on the consensus and evidence gained from the NGT event described here.

The following (table 39) summarises version 1 of the PDGs framework after adding a new layer (**Description/ goal components)** and a textual description taken from the data of the groups’ discussion of each of the 21 goals. The relevant participant’s comments were also re-mapped and reviewed to feed the amended framework in the “Mechanism and indicators” section.

The PDG1 (Academic capacity) and PDG2 (Early career training strategy) were adopted from the PWDGs framework. As mentioned above, the description of both goals was textualised from the conceptual interpretations and conclusion of the group discussions and comments. The “Quality assurance” goal was originally called “Quality assurance mechanisms, service metrics” most of the comments were included, some of them were grouped into one meaningful comment, and some were included under other relevant goals. For example, comments linked to education/training were mapped under the “Academic capacity” goal. A similar process was followed for the goals from PDG4 to PDG13, where the first 13 GOALS were adopted from the PWDGs. However, the description and the content of each goal were iterated in a way that represents and achieves the criteria of a practice development goal as achievable, measurable, and tangible.

Another example, GOAL 7, “Fragile patient populations”, in the original draft version (0), found that it does not align with the above criteria of a goal, but rather the recipients of pharmaceutical care and services. These populations are stakeholders, constituencies, audiences, or targeted groups of a goal, so it can not be considered a practice development goal. Hence, this targeted population was included under the description/ goal components and/or mechanisms of the newly adopted goal PDG 10,

“Equity and equality”, and emerged goals PDG 15 “, People-centred care”, and PDG 18 “, Access to medicines and services”.

Similarly, the original goals in (version 0), GOAL 4, “Prevention strategies and implementation”, and GOAL 5, “Self-care and triage”, are mechanisms, not a goal. It is the way how to respond to patients’ and public needs and how to deliver the services to them; we are the provider of the services. Then, it meets the intended criteria of a goal (what we can control). Accordingly, the concept of both goals (Self-care/triage/prevention strategies) were included under the description/ goal components and/or mechanisms of the emerged goals PDG 16, “Communicable and vector diseases”, and PDG 18, “Access to medicines and services”.

The original goal in (version 0), GOAL 6, “LTCs/NCDs”, are conditions that require management and do not meet the criteria of a goal. So, these conditions were included under the description/goal components of the emerged goal PDG 15, “People-centred care”. The original goals in (version 0), GOAL 8, “Medicines information”, was expanded to cover information not only on medicines education but also different aspects of information and stakeholders. So, it was included under the description /goal components of the emerged goal PDG 14, “Medicines expertise”, and the mechanisms of the emerged goal PDG 20, “Digital health”.

The “working with others” goal that was originally called GOAL 9, “IP and collaborative working (& technology)”, all of the comments were included; some of them were grouped into one meaningful comment, and some were included under other relevant and overlapped goals (patient safety and policy development) goals. The “Digital health” goal that was originally named GOAL 10, “IT and digital health initiatives”, all of the comments were included; some of them were grouped into one meaningful comment, and some were included under other relevant and overlapped goals (equity and equality) goal.

The original goal in (version 0), GOAL 11, “Service intelligence”, was included in the description/ goal components and/or mechanisms of the emerged goals PDG 11, “Impact”, PDG 12, “Pharmacy intelligence”, and PDG 20 “Digital health”. The original name of GOAL 12, “Regulation and Remuneration reform”, was not convenient for many participants; then, the initial components of this goal were expanded and included under the emerged goals PDG 21, “Sustainable pharmacy and pharmaceuticals”, which gives an overarching understanding on the goal. All comments were relevantly added in the same way as previously mentioned.

Both newly emerged goals, PDG 16, “Communicable and vector diseases”, and PDG 17, “Antimicrobial stewardship”, resulted from the intensive comments received about the necessity of establishing effective pharmaceutical management and services.

Finally, the name of the original GOAL 13, “Equity and diversity in pharmaceutical services delivery, service access and service impact”, was slightly edited and relabelled to the adopted PDG 10, “Equity and equality”, to ensure inclusivity. Similarly, the name of the original GOAL 3, “Medicines access and supply chain”, was slightly edited and relabelled to PDG 18, “Access to medicines and services” goal. The name of the “Patient safety” goal was kept the same. All comments were relevantly added in the same way as previously mentioned.

Table 39: Global Pharmaceutical Development Goals (Version 1)

Pharmaceutical Practice Development Goal:	Description/ goal components	MECHANISMS & INDICATORS
1- Academic capacity	Capacity for in practice-training and development linked with education providers. Capacity development of teacher practitioners. Frameworks, standards, structures for post-graduate and advanced education/training. Interprofessional education and training in practice.	
2- Early career training strategy	Training infrastructures for early career pharmacy practitioners including pharmacy support workers linked to advanced practice and specialisation frameworks & professional recognition & certification.	
3- Quality assurance	Service evaluation and monitoring. Workforce development. Collaborative working as quality improvement. Oversight the Ethics and the jurisdictional role of many organisations. Audit & practice development.	**Service evaluation and monitoring** Evidence-based service implementation Patient feedback Outcomes & cost effectiveness **Workforce development** Effectiveness Education & training standards Self-development
4- Advanced and specialist development	Sector specific competency and development frameworks for pharmacy practice and patient-centred services.	
5- Competency development	Scope of practice frameworks. Service-led competencies (e.g. prescribing, vaccination). Defining competence frameworks.	
6- Leadership development	Managing services Managing the team Service-sector leadership Clinical leadership Incorporate clinical leadership responsibility and accountability: ownership, responsible for decision, professional autonomy.	
7- Advancing integrated services	People-centered integrated quality health services foundation for practice development. Every service delivered/provided takes into account needs, relevance to needs. Design, process, evaluation. Health care settings: primary, secondary, tertiary etc Urgent and emergency care	
8- Working with others	Collaborative working and multi-disciplinary teams.	**Multidisciplinary teams** All cadres

	Inter and intra professional collaboration. Multidisciplinary teams Working across interfaces & transitions of care. Policy formation. Patient (and informal caregivers) engagement & empowerment Delivering primary health care with others. Other agencies	Pharmacy technicians and support personnel Levels of care coordination Equal responsibility and accountability with other health professionals in terms of the scope of their practice **Working across interfaces & transitions of care** Continuity of care between levels of care Communications Medicines reconciliation Care chain & collaboration in chain Digital interfaces **Policy formation** Policies where pharmacists are key actors Integration of care vs independence **Patient (and informal caregivers) engagement & empowerment** Patient orientation, participation and connectivity in the team Ambassadors for their own health **Delivering primary health care with others** Empowering informal caregivers and community health workers Capacity improvement **Other agencies** Developing pharmacy leadership roles
9- CPD strategies	In practice, CPD & CE linked to career development pathways and practice frameworks.	
10- Equity & equality	Equity and diversity in pharmaceutical services delivery, service access and service impact. Gender, economic equity and poverty; all global citizens to have access to the same quality of pharmaceutical care.	**Needs** Patient needs vs service needs Catering for diverse needs **Access** Equal access to services/care including digital services Equal access to medicines Rural vs Urban Private vs public **Advocacy** Engage patients in identifying and prioritising needs **Social accountability** Social value **Frail & vulnerable patient populations** Crisis, emergency & humanitarian situations Mental health and well being Age specific patient groups Communicable diseases Socio economic status Specialised needs-based care
11- Impact	Service Intelligence. Outcomes Monitoring.	**Service Intelligence** Evidence gathering/data collection

	Cost effectiveness.	GPO/ATLAS (global dashboard) Databases Data exchange & sharing **Outcomes Monitoring** Research and evaluation Outcomes metrics Quality indicators Patient-Reported Outcomes **Cost effectiveness** Cost effectivity analysis
12- Pharmacy intelligence	Service Intelligence Service provision. Service development and delivery. Scope of pharmaceutical services delivered. Service needs.	Evidence gathering/data collection GPO/ATLAS (global dashboard) Databases Data exchange & sharing
13- Policy development	Practice based policies Profession Service policies Policy where pharmacists are key actors. Incentives for collaboration with other HCPs	
14- Medicines Expertise	Expert information provision to HCPs and agencies; Patient medicines education and advice includes medical devices. Empowering informal caregivers Patients Other healthcare professionals. Formulary & medicines information management.	**Empowering informal caregivers** **Patients** Advocating in communities **Patients** Health literacy Communications & counselling Cultural considerations & understanding Information for disabled patients
15- People-Centred care	Patient management and clinical services for NCDs and LTCs Cardiovascular Respiratory Diabetes Cancer Medicines management Other NCDs Prescribing and/or repeat dispensing Point of care testing Adherence Frail & vulnerable patients populations Patient Counselling	**Cardiovascular** Blood pressure monitoring Anticoagulation monitoring **Respiratory** Respiratory monitoring: asthma, COPD **Diabetes** Diabetes monitoring **Cancer** Cancer screening services **Medicines management** Managing polypharmacy Medicines & therapeutic review Monitoring of therapeutic outcomes Medicines adherence Counselling/health behaviour change **Other NCDs** Mental illness; dementia; pain; dermatology: surveillance and monitoring. **Adherence** Unit-Dose Dispensing Patient-support Programmes **Frail & vulnerable patients populations**

		Crisis, emergency & humanitarian situations Mental health and well being Age specific patient groups Communicable diseases Socio economic status Specialised needs-based care
16- Communicable & vector diseases	Managing communicable & vector borne diseases (e.g. vaccinations, shortages) Contributing to prevention strategies Preventing or slowing spread/progression Delaying onset Preventing complications Ensuring effectiveness and safety of pharmaceutical therapies Symptomatic management Prescribing and deprescribing and monitoring. Medicines optimization. Ensuring adequate training for communicable diseases. Needs based strategies for managing communicable diseases. Point of care testing and triage.	
17- Antimicrobial stewardship	Stewardship services Including tropical diseases Virology	Antimicrobial stewardship: ○ Assessment of ATB & data collection ○ % of hospital-acquired infections ○ Rate of use of antibiotics ○ Consumption of antibiotics Anticoagulation, analgesic stewardship etc
18- Access to medicines and services	Medicines supply & shortages. Access to specialised and uncommon medicines (including emergence to new/innovative therapies). Affordability & fair pricing. Workforce & education capacity. Substandard and falsified medicines. Effective scope of practice. Self-care & prevention services.	**Medicines supply & shortages** Supply chain: ○ Cold chain supply systems ○ Supply chain regulations ○ *Trained health & political leaders on medicines and supply chain integrity ○ Medicines storage/ stability ○ Standards & guidelines Medicines shortages evaluation & measurement. Risks associated with single sources of supply. *[Pharmacists' and technicians' unique role in the supply chain] **Affordability & fair pricing** Pricing policies **Substandard and falsified medicines** Falsified medicines Stability of medicines in different environmental conditions

		Effective scope of practice Prescribing Advanced capabilities and advancement of practice Specialisms & expertise in primary care settings (advanced pharmaceutical care services) Serving fragile & vulnerable communities *[Connect with PWDGs] **Self-care & prevention services** Immunisations & vaccinations Health education/health promotion Adherence Stewardship services Pharmaceutical public health policy Communicable diseases Patient education, advocacy & support. Self-care Common ailments Acute and urgent care Patient consultation services Increasing capacity of primary health care. Referral & collaborative working
19- Patient safety	Patient safety mechanisms Legislation & regulations Substandard and Falsified medicines Stewardship services	**Patient safety mechanisms** ADR reporting & monitoring of patient outcomes (clinical and health-related quality of life) (standards & guidelines). Patient safety initiatives Counselling, communication & advisory services: o Referral o medicines reviews o medicines referral care Patient engagement & advocacy Patient adherence strategies Patient support programmes **Legislation & regulations** Qualified & trained health professionals **Substandard and Falsified medicines** Substandard and Falsified medicines tracking system. **Stewardship services** Antimicrobial stewardship: o Assessment of ATB & data collection o % of hospital-acquired infections o Rate of use of antibiotics o Consumption of antibiotics Anticoagulation, analgesic stewardship etc.

20- Digital health	IT and digital health initiatives; Service configuration and digital health provision. Mobile health Digital literacy Digital enablers Access & equity Pharmacists are health data managers A global DASHBOARD of pharmacy services	**Mobile health** Self-care digital apps Patients friendly **Digital literacy** Governance issues (Data ownership, Ethics, Privacy) Pharmacists as health data managers Quality information Patient records **Digital enablers** Artificial intelligence & decision support Innovative services **Access & equity** Access to digital pharmaceutical care by patients (patient education). Access to digital health initiatives by pharmacists (equal access with all health professionals). Patient information and records (read and write).
21- Sustainable pharmacy and pharmaceuticals	Remuneration Service configuration Environment Legislation & regulation Capacity Affordability & fair pricing Supply sources	**Remuneration** Working with others. Health care provision incentives for collaboration. Payment for performance. Payment for value. **Service configuration** Service infrastructure and implementation. **Environment** Green pharmacy practice. **Legislation & regulation** Prescribing & deprescribing reform (advanced services and practice). Regulation guidance. Alignment with national guidelines/needs. *[Connect education & training for prescribing and deprescribing rights with PWDGs] **Affordability & fair pricing** Fair pricing policies. Health technology assessment of medicines to standardise prices of medicines. **Supply sources** Risks with single sources of supply.

6.7 Bias and Limitations

Although the global leadership meeting participants represented the six WHO regions and were considered highly qualified key-stakes leaders in the profession, they were only selected from FIP country members. Hence, this limitation deprived other non-member pharmacists of participation and sharing their perspectives, which might have been different based on their experience and the needs of their countries.

Moreover, participants were intentionally selected since the sampling strategy was a non-probability method that relies on the researcher's opinion when choosing participants to participate in the study. So, this would expose the study to a level of subjective bias. However, this sampling method allows the researcher to identify what information to be known and find out people who are willing to provide the most relevant and reliable data based on their knowledge and experience without the need to have a set number of participants (Etikan I. et al., 2016).

Therefore, further research is needed to overcome the bias and limitations mentioned above by conducting more consultation and consensus stages, applying different qualitative methods, and ensuring diversity among the experts in the field.

6.8 Conclusion

The distinctive format and the diversity that existed within the global meeting allowed for engaging global leaders in different pharmacy sectors. Moreover, the methodology used for the data collection and analysis methods (NGT, framework analysis) assisted in creating reliable findings. Participant feedback helped generate the content and develop the amended version of the PDGs framework (version 1), which will be used to feed directly into the next review phase.

In summary, the framework was reframed by adopting and synergising with the existing workforce goals; goals were also realigned into more individually distinct (defined) goals. A new layer of "component" for the goals was added to give each goal an overarching understanding. New goals were identified, some were included/merged into the goal descriptions/components layer and/or mechanisms of other goals, and some goals were kept the same with a slight change in the name.

For the next stage, participants will be asked to provide more in-depth feedback and elaborate on developing the content of the amended framework by adjusting and adding a more comprehensive description/components and mechanisms to the draft goals and, finally, to generate consensus on the final version of the PDGs framework.

Chapter 7: Development of the Pharmaceutical Development Goals (PDGs) framework Stage 4: Review phase

7.1 Introduction

This chapter will describe in detail the aim, objectives, and methods used in developing the PDGs framework, the findings and the final outcomes. This Stage 4 is twofold:

1) to ensure the findings of the previous consultation stage in terms of validating the content developed by the "global pharmacy leader" and analysed by the research team;

2) to generate consensus on a finalised, valid, credible version of the PDGs framework.

To generate consensus on the draft list of goals, a modified Delphi approach was used, which is a well-known technique that has been proven to achieve such an objective in qualitative research. More detail about this method was described in (Chapter 4).

Accordingly, a global leadership body Internal Reference Group (IRG) and a validation Expert Group were recruited to participate and conduct this stage. The purpose of the IRG was to review and validate the content of the amended PDGs framework that was developed previously through NGT (Chapter 6) and add more informative feedback. The task of the Validation Expert Group was to revise the inputs of the previous round, provide high-level feedback, and generate consensus on the final list of development goals. The IRG represented international pharmacy experts, including selected representatives of FIP Officers, the FIP Board of Practice, the FIP Board of Science, FIP Education, the FIP Young Pharmacists Group (YPG), and the FIP Special Interest Group (SIG). The Validation Expert Group are global experts representing pharmacist leaders across different regions worldwide and different practice domains.

7.2 Aim and objectives

The aim of this Stage 4 was to perform a review and consensus exercise to validate and agree on a systematic and integrated set of PDGs framework (version 2). The substrate for this finalised validation was the evidence-driven v1 framework developed through NGT in Chapter 6.

Accordingly, the objectives of this stage were:

1. To validate and ensure the credibility of the outcomes of the consultation with global pharmacy leaders.
2. To identify any redundancy, missing, and/or non-relevance within the v1 set of goals.

3. To incorporate high-level and multi-perspective feedback into the development of the final listing and description of global Pharmaceutical Development Goals.
4. To build and generate consensus on the final draft of the PDGs framework.

7.3 Study design

This stage aimed to extract collective knowledge from experts' perspectives and validate the previous analysis performed. So, generating consensus using the modified Delphi process provided content validity (Miller et al., 2020). Chapter 6 (Stage 3) described a large-scale NGT experiment which ultimately provided evidence for the re-design of PDGs v0. If global credibility is to be proven, then a further Delphi round of this re-designed framework was necessary in order to achieve the overarching purpose of this research project.

In this context, a purposive selective sampling technique was used to recruit participants who represented the Internal Reference Group. Representative members from the FIP are the best to reach out and ask for their feedback since they represent the professional leadership bodies from different pharmacy professional settings (practice, science, and academia/education) and ensure geographical variety.

Validation Expert Group members were also recruited. These individuals were also involved throughout the early stage of this phase and assisted with participant selection by providing a potential list of IRG individuals who have sufficient knowledge and professional expertise.

7.3.1 Sampling strategy and data collection methods

Sampling strategy and the Internal reference group requirement:

Similar to the previous study (Chapter 6), the aim of this study was to obtain reliable global input from trustworthy pharmacy experts who have wide global knowledge and experience in different sectors. Thereby, the help of the FIP was also required to recruit targeted participants in order to direct the final amendments and refine these PDGs and attain the objectives of this stage.

The Validation Expert Group helped in selecting competent representative members from the FIP to recruit the IRG. The resulting draft (version 1) from the previous study was submitted to a panel of international pharmacy experts represented by the IRG group through purposive (selective) sampling to be edited and refined using the modified Delphi method. A purposive sampling approach was employed to make sure that the group members were representative and were drawing experts from all pharmacy areas.

First, 26 participants were sent a formal invitation email to join the "Internal Reference Group" charged with reviewing the draft of the development goals via the FIP. The invitation included the PDG frame v1 accompanied by a comms package (Task briefing, project briefing, IRG feedback form) that illustrated full information on the tasks assigned and explained the aims and structure of this consultation process. IRG members were given two weeks as a deadline to complete and return the feedback since receiving the package components. During this period, two reminder emails were sent to the IRG.

The Validation Expert Group were purposively selected based on their long experience and high qualifications in the field. At the beginning of this stage, six high-level global leaders were contacted and agreed to offer their advice and feedback throughout this stage. First, they assisted in selecting the members of the IRG. Second, they were responsible for reviewing and validating the responses resulting from the previous round.

Data collection

A two-step modified Delphi method was used to establish consensus on the output from Chapter 6 (PDG frame v1). In round one, twenty-six participants were initially contacted, with twenty-two providing full feedback; this is considered adequate for content validity (Eubank et al., 2016). The IRG were asked to answer a set of structured questions to review and provide feedback on the content and the proposed list of PDGs v1. Participants were allowed to write free-text comments, including suggestions for rephrasing, merging, splitting, and adding goals and mechanisms.

The participants were asked to answer the following four essential questions (see Appendix 4):

1. *Does the listed "Description/Goal components" reflect the concept of the goal OR improve the understanding of the content of the goal? Feel free to suggest new components for the Practice goals.*
2. *Are there any further "indicators & mechanisms" ideas that need to be included to achieve the purpose of the goal? Feel free to suggest new indicators & mechanisms for the Practice goals.*
3. *Are there any terminology/language or conceptual issues unclear in the context of the overall proposed list of goals?*
4. *Please identify if there are any relevant gaps, missed points, duplication or redundancy within the goals.*

And then, they were asked to answer the following optional question:

1. *Do the Goals meet the criteria of a goal (achievable, tangible, and measurable)?*

In Delphi round two, the comments from round one were processed and incorporated into a datasheet outlining the general, specific comments on the goals, summarizing the inputs and reporting issues raised.

The Round 2 online meeting used a spreadsheet tool to directly compile and document all panellists' input. Each comment was separately processed, discussed, and then reached a consensus by all participants before moving to the next issue. The meeting moderator ensured that all participants provided input equally. The Delphi meeting outputs and data were recorded with consent.

7.4 Data management

Data handling

All outputs and responses were treated as confidential. Participants sent their responses on a standardised feedback form, and then all responses were transferred to a data sheet. The online-recording and the data sheet were only accessible to the research team and were all saved in password-protected electronic files.

Data analysis

A framework analysis method was employed to analyse the IRG input using the amended PDGs (version 1) as the coding frame. A similar outline of the framework analysis was followed to analyse the qualitative data of this chapter as in (Chapter 6).

First, the researcher generated an Excel spreadsheet matrix to compile all data received from participants into one document as so facilitate the mapping process and familiarisation with the data the researcher. Anonymity was achieved by replacing participants' names with sequence numbers (1 to 22); only the research team was aware of each participant's reference number.

Second, the coding process was conducted. As in the previous study, the amended PDGs framework was used as the pre-coding frame representing 21 pharmaceutical practice development goals as variables used to produce the initial codes. The code PDG (1, 2, 3, to 21) was used to indicate each goal.

Third, data received from the Delphi groups were analysed using the deductive technique, with text comments transcribed and stratified to the related goals. The researcher also identified and defined comments into two types: "general comments" about overall goals and "specific comments" for each goal. Noticeably, no new themes other than "1 to 21" goals were identified from the IRG data. Second textual editing and updating for the goals descriptions and mechanisms across all goals was carried out and taken from the IRG data to ensure more clarity and consistent formatting. Finally, the coding

and charting process was reviewed again by a second researcher to ascertain the credibility of coding results and reduce the risk of subjectivity.

The resulting matrix datasheet, plus the amended PDGs (of version 1), were sent to the Validation Expert Group. A critical discussion of the Delphi outputs was conducted, arguing any possibility of goal merges, further division, and editing in alignment with the data addressed in the matrix datasheet on each goal. The final acceptance of each goal was achieved, and the final PDGs framework was developed that includes 21 distinct Pharmaceutical Development Goals. The final results of this study were interpreted and will be discussed in the next section. The deviation of running a live meeting for this round instead of the conventional anonymous step helped facilitate a consecutive discussion, explore the disagreement, provide further clarifications on some raised issues, and ensure better-informed decisions.

7.5 Ethical considerations

As in the previous studies, FIP gained ethical oversight and approval for the use of data and access to listed experts for this study.

7.6 Results

7.6.1 Demographic data

The initial recruited number of IRG members (round one) was 26 participants. Out of 26, twenty-two responses were received, with a total response rate of (85%). Amongst the twenty-two participants, 13 females (59%) and nine males (41%) participated. IRG participants represented all the FIP Offices (academic, practice, science, YPG, SIG) and worked in different pharmaceutical occupations in their countries. Also, six high-level global leaders who met global experts criteria were recruited to represent the Validation Expert Group for round two. They work across different countries and practice areas worldwide. Hereby, a total of 28 participants were engaged in this study, and all selected participants ensured geographical and professional diversity.

7.6.2 Research findings (modified Delphi – Round 1 & 2) and incorporated discussion.

This section will present findings and simultaneous discussion for ease of reference.

After round 1 was completed, all IRG comments were charted to the relevant potential 21 goals. Comments were divided into two types: “General comments” about overall goals, and “Specific comment” about each goal. IRG suggested several “Mechanisms” which were also incorporated into the final version of the PDGs, where applicable. Finally, the goals descriptions & mechanisms were

edited and updated for more clarity and for consistent formatting across all goals driven from the IRG data and then reviewed and approved in plenum by the Validation Expert Group.

Type 1: General comments-about overall goals

General comments provided by the IRG mainly focused on the **measurability and indicators** of goals and on goals **formatting and structuring** (goals structuring and description). Some participants claimed that there is some confusion about the "mechanisms" and "indicators" of goals. Thereby, clear and separate definitions should be addressed to resolve this confusion. Most participants said that the description of the individual goals is incomplete and needs expansion; they suggested adding a complete, cohesive text aligned with the goals description and mechanisms to ensure building consistent formatting across all goals (see table 40).

Table 40: General Comments and Modifications from the modified-Delphi method (rounds 1&2)

	IRG comments	Validation Expert Group solution/response
Measurability and indicators		
Participant 1	"This part should clearly separate the mechanisms (or target? Like SDGs?) and indicators. Otherwise, it is really confusing". "Most goal descriptions are actually indicators or mechanisms." "Indicators required consideration how to collect/measure". "Mechanisms and indicators are totally different aspects. It might be helpful to refer to the style of SDGs targets and indicators. Measurable indicators with timeline are essential".	1- Supported removing the "indicators" as a label from the final version of the PDGs framework. 2- Indicators will be developed separately as part of the project's next step after finalizing the PDGs framework.
Participant 5	"I believe we should separate indicators from mechanism is indicators means here KPIs, If it is not this we should add KPI for monitoring".	
Participant 18	"Actually, for all of the goals, perhaps we should map the Basel Statements to the indicators and mechanisms section. These could be tangible outcomes of the work to achieve the goal as they are practice-based statements".	
Formatting and structuring		
Participant 1	"Alignment of structures of descriptions between PWDG would be helpful".	This will inherently be addressed while producing the final iteration of the PDGs framework.
Participant 3	"Format of the description should be consistent across all three sectors. Some use an active description, others just list topics, others use the passive form".	
Participant 18	"I do feel like some of the descriptions are too generic and don't provide enough information or context to understand fully".	

Participant 9	"Avoid using acronyms.", "Define abbreviations (such as CPD) at the bottom of the goal".	Acronyms have been explained, and their use will be limited.

Type 2: Specific comments- for each goal

In total, the first round of the modified-Delphi process yielded **91** comments which are very specific comments about each goal that requires to be handled separately (see table 41).

For the PDG1 (Academic Capacity): the goal received **five** comments, three of which were handled and added to "mechanisms", one comment was typos and amended, and one comment was excluded due to the irrelevant use of the term in the context.

For the PDG2 (Early career training strategy): the goal received **only two comments**. Both comments were included by amending the goal description and mechanisms based on the IRG suggestion.

For the PDG3 (Quality assurance): the goal received **seven** comments. The Validation Expert Group accepted all comments. Comments were incorporated, and some were grouped into one comment and added to the mechanisms.

For the PDG4 (Advanced and specialist development): the goal received **four** comments. All comments were accepted, expanded, and added to the mechanisms.

For the PDG5 (Competency development): the goal received **six** comments. All comments were accepted and expanded; two comments were merged into one comment.

For the PDG6 (Leadership development): the goal received **five** comments. All comments were accepted and incorporated into the mechanisms, and two comments were merged into one comment.

For the PDG7 (Advancing integrated services): the goal received **four** comments, all of which were accepted, expanded, and incorporated into the mechanisms of this goal.

For the PDG8 (Working with others): the goal received **six** comments. All of them were accepted, expanded, and incorporated into the mechanisms of this goal.

For the PDG9 (CPD strategies): the goal received **five** comments. All comments were accepted and incorporated into the mechanisms, and one was handled according to the IRG suggestion.

For the PDG10 (Equity & equality): the goal received **five** comments. All comments were accepted, some of which adjusted the description of the goal and some were incorporated into mechanisms, and two comments were merged and added to mechanisms.

For the PDG11 (Impact): the goal received **seven** comments. All comments were accepted, expanded, and included in mechanisms. Also, the title of the goal was slightly relabelled to "impact & outcomes", and the description was adjusted to reflect the intent of the goal.

For the PDG12 (Pharmacy intelligence): the goal received only **two** specific comments, which were expanded and added to mechanisms. However, the Validation group reviewed and updated the existing description and mechanisms to complete developing and generating the content of this goal.

For the PDG13 (Policy development): the goal received **four** comments. All comments were included in the description and mechanisms of the goal.

For the PDG14 (Medicine expertise): the goal received **four** comments, three of which were under the same concept, merged into one comment and added to mechanisms.

For the PDG15 (People-centred care): the goal received **seven** intensive comments. All comments were adjusted and included in the description and mechanisms of the goal.

For the PDG16 (Communicable & vector diseases): the goal received **three** comments. The validation group expanded and added suggestions to mechanisms. They also suggested a slight relabelling to the name of the goal to "Communicable disease" since the "communicable" term covers all aspects of communicable and vector-borne diseases.

For the PDG17 (Antimicrobial stewardship): the goal received **four** comments. All comments were processed and added to mechanisms.

For the PDG18 (Access to medicines & services): the goal received **four** comments. The group agreed to add "devices" to the name of the goal based on the IRG data. One comment was denied and justified by the validation group, and others were expanded and incorporated into mechanisms.

For the PDG19 (Patient safety): the goal received **five** comments. One comment was denied and justified by the validation group, and others were expanded and incorporated into mechanisms.

For the PDG20 (Digital health): the goal received only **one** comment. The validation group expanded the IRG suggestion and added to mechanisms. They also reviewed and updated the existing data to complete developing the description and mechanisms for this goal.

For the PDG21 (Sustainable pharmacy and pharmaceuticals): the goal received **one** comment, which was incorporated into mechanisms. The validation group reviewed and amended the exiting data to produce a comprehensive text that clarifies the description and mechanisms of the goal.

Table 41: Specific Comments and Modifications from the modified-Delphi method (rounds 1&2)

Goals	IRG comments	Validation Expert Group solution/response
PDG1 Academic capacity	***Participant 1*** "Developing frameworks can be an indicator. What do we aim for with the framework development?" ***Participnat5*** "we should add preceptors: In all the documents, we don't see the word preceptor even though it is a part of every member of the pharmacy profession to precept and form a new generation". ***Participant 20*** "add in the last line: interdisciplinary, resulting inter interprofessional and interdisciplinary education and training in practice". ***Participant 14*** "Add, Develop robust training performance indicators that can be utilised within training programmes across a variety of practice settings allowing for evaluation of performances and assessments". ***Participant 14*** "should the PPDG read "in-practice training" rather than the current "in practice-training"?"	1- To add developing frameworks as a "mechanism" to this goal. 2- "Training is the universal word for preceptor", so no change was made. 3- The text was added to the mechanisms as per the IRG suggestion in the final version. 4- The text was added to the mechanisms as per the IRG suggestion in the final version. 5- This typo error was amended to "in-practice training" in the final version.
PDG2 Early career training strategy	***Participant 1*** "'training infrastructures' – is it a strategy? It should be more about increasing/making sure the training opportunities/career support for early career practitioners?" ***Participant 13*** "towards Advanced Practice. Maybe describe this as the "structured journey towards advanced practice "acknowledging all the opportunities between novice practice and advanced practice. Not everyone will achieve advanced practice".	1- The goal description was edited, and mechanisms to clarify this point according to the IRG comment. 2- The description of the goals was amended according to the IRG comment.
PDG3 Quality assurance	***Participant 1*** "'Collaborative working as quality improvement'–this should go to PDG8". ***Participant 4*** "pharmaceutical practice component needs expansion – what exactly do we mean by 'workforce development'?" Needs to be more outcome orientated. ***Participant 4*** "'Oversight the Ethics and the jurisdictional role of many organisations'. I don't understand what this means". ***Participant 10*** "Missing concept of regional, national, international minimal expectations for contemporary practice by community pharmacists, hospital pharmacists, long-term care pharmacists". ***Participant12*** "Workforce development I am not sure how workforce development is related to quality improvement strategies. My initial thought on this goal is about quality assurance in pharmaceutical practice, e.g. Accreditation or standard of	1- This point was moved to the mechanisms and also iterated for goal PDG8. 2- This point was clearly addressed and expanded into the mechanisms. 3- This point was clearly clarified, edited, and added to the mechanisms. 4- This concept was expanded and incorporated into the mechanisms. 5- As mentioned in point 2, workforce development was clearly addressed and clarified in the mechanisms. Also, "Accreditation" was added to the mechanisms. 6- Expanded these points and added them to the mechanisms. 7- As mentioned in point 3, "Ethics" was expanded and added to the mechanisms.

	services/practice. Should we include accreditation?". ***Participant 6*** "Health outcomes research and evaluation; Performance indicators". ***Participant 13*** "include an emphasis on the importance of ethics and its application in all areas of pharmaceutical practice".	
PDG4 Advanced and specialist development	***Participant 1*** "This is an indicator. The goal description should be like 'support members for creating or advancing the advanced services'?" ***Participant 10*** "Practice mechanisms and indicators include board certification, residency training, CPD, and proof of attainment of competencies". ***Participant 10*** "Encourage all pharmacists to practice at the top of their license- whatever level that may be (very few pharmacists will achieve advanced practice status)". ***Participant 4 "***use 'person or people-centred services' rather than patient".	1- This was embedded within the mechanism. The group agreed that the goal description does not need to start with a verb as it completes the sentence: ***Globally, we will have...*** 2- Expanded and added this point to the mechanisms. 3- Expanded and added this point to the mechanisms. 4- Agreed to the suggestion and adjusted it to "people-centred".
PDG5 Competency development	***Participant 1*** "All in the columns are indicators". ***"Participant4*** "'Defining competence frameworks' – it's not clear to me what this means". ***Participant 15*** "I would like to add "ethics" development to that same goals and further suggested that leadership and ethics development be added to the PDGs". ***Participant10*** "Practice mechanisms and indicators could include a short course certifications (e.g. management of NCDs, vaccinations, CDs)". ***Participant 11*** "Defining competency frameworks [instead of competence]". ***Participant 12*** "Maybe a definition of "service-led competencies" is needed".	1- This content was expanded and moved to mechanisms. The group drafted a new goal description. 2- This concept was clearly defined, edited and added to mechanisms. 3- Ethics development was added to the mechanisms. 4- The suggestion was added to the mechanisms. 5- This point was cleared and incorporated, as mentioned in point 2. 6- Clearly defined and explained "service-led competencies" in the mechanisms.
PDG6 Leadership development	***Participant 4*** "Leadership is not the same as management – suggest using 'leading services' and 'leading the team' instead". ***Participant 4*** "expansion is needed. Explain service-sector leadership. Explain clinical leadership". ***Participant 8*** "Service-sector leadership is a good catch-all term that does not quite do justice to the wide and diverse roles pharmacists undertake outside the service delivery role. I think this term requires expansion". ***Participant 13*** "Include "Professional advocacy development" to allow pharmacists to effectively advocate for the profession with governments, insurers, regulators and policy makers". ***Participant 13*** "Add "Leadership in quality assurance of professional performance (one's own and team	1- The word managing was replaced with "Leading". 2- This point was clearly expanded in the mechanisms for this goal. 3- This point was clearly expanded in the mechanisms for this goal, as mentioned in point 2. 4- Expanded and added this suggestion to the mechanisms for this goal. 5- Expanded and added this suggestion to the mechanisms for this goal.

	performance) in terms of clinical and other outcomes, and in reviewing processes accordingly".	
PDG7 Advancing integrated services	***Participant 10*** "Practice goals need to include interprofessional care, transitions of care and lifespan care". ***Participant 8*** "Urgent and emergency care is covered (which includes disaster relief), but it does not totally encompass humanitarian care, which is a very different type of practice. I realize you wish to keep the statements as brief and encompassing as possible, but this is an outlier that is missed". ***Participant 10*** "Practice mechanisms need to include quality measures of outcomes of care, financial savings of care, and payment to provide care". ***Participant 20*** "add: Design, process, evaluation (patient-centred, interprofessional wise, for the healthcare system at a glance)".	1- This point was expanded and added to mechanisms. 2- This point was expanded and added to mechanisms. 3- This point was expanded and added to mechanisms. 4- This point was expanded and added to mechanisms.
PDG8 Working with others	***Participant 4*** "needs expanding on – Multidisciplinary teams – what about them? Policy formation – what is needed? ***Participant 4*** "Include "improve the health literacy of carers and patients". ***Participant 8*** "There is a missing element of collaborative practice which is working with governmental agencies to enable legislative change/development. This aspect is required to support the attainment of all of the goals". ***Participant 11*** "under "Working across interfaces & transitions of care", added "Collaboration across areas of pharmacy practice for optimal patient-centred care". ***Participant 19*** "how pharmacists contributed to determining/suggesting the pharmacotherapy of patients by collaborating with physicians may be added". ***Participant 20*** "offer of inter- and interdisciplinary programmes for workforce willing to change from practice to sciences or vice versa or associated fields (portfolio pharmacists)".	1- This concept was clarified and expanded in the goal description and mechanisms for this goal. 2- This suggestion was added to mechanisms. 3- This suggestion was added to mechanisms. 4- This suggestion was added to mechanisms. 5- This suggestion was elaborated on and added to mechanisms. 6- This suggestion was added to mechanisms.
PDG9 CPD strategies	***Participant 12*** "Continuing education opportunities in the workplace". ***Participant 13*** "Include the notion of "lifelong learning" within pharmacists' professional journey". ***Participant 10*** "Practice mechanisms and indicators include CPD requirement for renewal of licensure, registration or recognition". ***Participant 22*** "Develop online-only programmes for continuing education/training. Such a program could lead to eventual certification or credentialing".	1- This suggestion was added to mechanisms. 2- This suggestion was added to mechanisms. 3- This suggestion was added to mechanisms. 4- This suggestion was integrated with mechanisms. 5- Suggested avoiding any acronym in the name of the goal, so CPD was addressed as a "Continuing Professional Development" strategy.

	Participant9 "Define abbreviations (such as CPD) at the bottom of the goal".	
PDG10 Equity & equality	***Participant 1*** "Goal descriptions are not clear what we are aiming for and confused with indicators…I think strategy itself is not a goal; it is a tool to achieve a goal". ***Participant 13*** "all global citizens to have access to the same quality of pharmaceutical care" – This goal is impossible to achieve with socio-economic differences between populations- replace with "all global citizens to have access to highest available quality of pharmaceutical care". ***Participant 12*** "(Service) Should we include equal access of the workforce to the population/patient? "Frail & vulnerable patients populations, Should we add reproductive and maternal health". ***Participant 14*** "Under advocacy- need to not only identity but advocate for and on behalf of those under-serviced or under-utilising services". ***Participant 6*** "Suggest using underserved communities term here".	1- Edited and designed the description of the goal to complete the sentence: ***Globally, we will have...*** 2- Amended the description of the goal according to the IRG suggestion. 3- Both points were added to mechanisms. 4- This point was added to mechanisms. 5- This point was added to mechanisms, as in point 4.
PDG11 Impact	***Participant 1 "***impact' can be anything; the title "Impact "alone is not sufficient and need more description for clarity. ***Participant 11*** "Add "Practice-based research" as the first point". ***Participant 15*** "The impact of services could be linked to Health Impact Assessments (HIA), impact towards accessibility and availability of services." ***Participant 20*** "add: budget impact … cost-effectiveness, budget impact". ***Participant 5*** "Impact: it is not only cost-effectiveness: we can add cost-benefit and cost-utility". ***Participant 13*** "Use of clear evaluation processes to establish the value of outcomes of PP service delivered or PS outcome delivered". ***Participant 4*** "Cost-effectiveness is included in PPDG – why not clinical effectiveness? If this is intended under outcomes, need to explain".	1- The group agreed to expand the title and description. Accordingly, the title was relabeled to "**Impact & outcomes**". 2- The suggestion was expanded and added to mechanisms. 3- The suggestion was expanded and added to mechanisms. 4- The suggestion was expanded and added to mechanisms. 5- The suggestion was expanded and added to mechanisms. 6- The suggestion was expanded and added to mechanisms. 7- The suggestion was expanded and added to mechanisms.
PDG12 Pharmacy Intelligence	***Participant 7*** "Handling of big data generated in practice and in science". ***Participant 8*** "A missing and important aspect is that of horizon scanning – what is coming that we need to react to in advance. (As an example, we predicted the pandemic some years out – which should have enabled better preparation.) It is an intelligence tool with a different approach".	1- This point was expanded and added to mechanisms. 2- This missing point was identified, reviewed and updated to the mechanisms accordingly.
PDG13 Policy development	***Participant11*** "Use "Practice-related policies" instead of "Practice-based policies", "Add, Service implementation, integration and remuneration policies	1- Edited the description and mechanisms of the goal and addressed this suggestion. 2- Expanded and added this suggestion to mechanisms.

	Pharmacy input to broader health policies". ***Participant 6*** "Existence of emergency action plans to expand the scope of practice in force majeure". ***Participant 10*** "Practice policy indicators include the existence of practice policies in community and health system practice, country-wide practice policies and regulations, and statutory and regulatory reform that extends pharmacist practices". ***Participant 12*** "Maybe we could include evidence-based making policy in practice".	3- Expanded and added this suggestion to mechanisms. 4- Addressed this suggestion into the description of the goal.
PDG14 Medicine expertise	***Participant 11*** "Add: Promoting responsible use of medicines by mobilising medicines expertise", "Implementing high-value cognitive services to review and optimise medicines use". ***Participant 16*** "Term Medication Literacy can be included under Medicine Expertise". ***Participant13*** "include Improved Health ***Participant20*** "literacy for caregivers". mechanism/indicators: last line: information for disabled patients, why not all special patient groups?"	1- Suggestions were expanded and added to mechanisms. 2- Health literacy was expanded and embedded into mechanisms. 3- As in point 2, this point was embedded into mechanisms. 4- As previously, health literacy was expanded and embedded into mechanisms
PDG15 People-centred care	***Participant7*** "rather than list specific NCDs, I suggest going with the aspect of providing: optimization of therapy, patient monitoring, point-of-care testing, co-ordination of health-service provision for individual patients across different specialities, collaborative – protocol prescribing, medication management, patient adherence and counselling, special patient populations: vulnerable patients, orphan disease patients". ***Participant 11*** "Add to the name of PP Goal: Preventative, therapeutic & long-term conditions management. Disease prevention, patient management and clinical services for NCDs and LTCs, including Cardiovascular, Respiratory Diabetes, Cancer, Mental health Medicines management-Discard Other NCDs. Risk factor screening and assessment, including point-of-care testing, Frail & vulnerable patient populations, and Patient Counselling. Risk minimization, including coaching for lifestyle changes (smoking cessation, dietary changes, use of alcohol, etc.) Patient referral and clinical data sharing with other HCPs. Medicines management. Prescribing and/or repeat dispensing Treatment initiation and/or modification Point of care testing-Discard, Adherence improvement".	1- The suggestion was modified and added to mechanisms. 2- All suggestions of the point were incorporated into the description and mechanisms of the goal. 3- This point was expanded and added. 4- This point was expanded and added to mechanisms. 5- This point was expanded and added to mechanisms. 6- This point was expanded and added to mechanisms. 7- This point was expanded and added to mechanisms.

	Include "deprescribing" as this will become a most important part of the aged-care people-centred dynamic. ***Participant 13*** "Include "de-prescribing" as this will become a most important part of the aged-care people-centred dynamic". ***Participant 20*** "Add: special patient groups". ***Participant 10*** "Hospitalization and emergency department rates for asthma, hospital admission rates for adverse drug effects". ***Participant 14*** "Under Other NCDs- should we also have a section relating to inheritable diseases- e.g. CF, Huntington's' disease, sickle cell anaemia? Diseases whose patients are now living longer due to better healthcare. Only referencing monitoring- what about holistic practices, also related to pharmacy, such as nutrition and supplements, which we can also give advice and information about". ***Participant 18*** "one of the indicators for cancer should be "Supportive care management and provision". This is one of the areas where pharmacists excel in making sure the supportive care regimens (e.g. antiemetics) are optimized to provide the best outcome for the patient".	
PDG16 Communicable & vector diseases	***Participant 11*** "Promoting vaccination and improving delivery and vaccination coverage across the life course, Contributing to prevention strategies, including vector control, STD prevention and sexual education". ***Participant 13*** "Use learnings of mass population health episodes, e.g. Covid-19 pandemics, to make pharmacists and their practices pandemic ready". ***Participant 14*** "Giving pharmacists the tools to educate and inform patients in an appropriate and timely manner".	1- All suggestions were incorporated into mechanisms. 2- This point was addressed in mechanisms. 3- This point was expanded and addressed in mechanisms.
PDG17 Antimicrobial stewardship	***Participant 10*** "Practice goal components focus on drug resistance, community-acquired vs hospital-acquired infections, and use of antibiotics in livestock production and agriculture. Practice goal components need to include pharmacy support personnel, particularly important in underdeveloped countries". ***Participant11*** "Add: Patient counselling and education on the use of antimicrobials Clinical assessment of antimicrobial prescriptions, Prevention of non-prescribed use of antimicrobials, Promotion of adherence and optimal use of antimicrobials". ***Participant 12*** "Are we focusing on "stewardship" here because I read "anticoagulation" and "analgesic stewardship" in the indicator? If yes, I	1- The suggestion was edited and incorporated into mechanisms. 2- The suggestion was edited and incorporated into mechanisms. 3- To remove this point from mechanisms as causing confusion. 4- The same as the previous point.

	think we might need to change the goal and also define what "stewardship" means". ***Participant 16*** "I didn't understand why Anticoagulant, analgesics stewardship is required".	
PDG18 Access to medicines and services	***Participant 1*** "This goal should be under Goal 10 ', equity and equality'". ***Participant 8*** "I suggest that you have medical devices separate from medicines. These are increasing in importance and in control mechanisms and are subject to shortages". ***Participant20*** "proposal to add: all dimensions of access (e.g., trial participation) Patient counselling on access Physician counselling on access". ***Participant 4*** "Include workforce & education capacity into mechanisms".	1- The group commented on this suggestion that there is alignment between both goals, but access to medicines is a significant goal for pharmacies with expanded mechanisms. 2- Agreed on relabelling the goal's name and adding "device" to the title. 3- Suggestions were expanded and added to mechanisms. 4- The suggestion was expanded and added to mechanisms.
PDG19 Patient safety	***Participant 1*** "This goal can be under the quality assurance?" ***Participant 7*** "Professional judgement and preventive actions". ***Participant 10*** "Practice goals need to recognize medication and patient safety has both general and advanced competencies and practice". ***Participant 8*** "An additional effective mechanism for patient safety is clear and effective policy and procedures". ***Participant11*** "the following points are a repetition from those listed under Goal 17: Stewardship services….".	1- The group commented on this suggestion that there is alignment, so patient safety is added as a mechanism for quality assurance, and QA is added as a mechanism for patient safety. 2- This suggestion was expanded and added to mechanisms. 3- This suggestion was expanded and added to mechanisms. 4- This suggestion was expanded and added to mechanisms. 5- The mentioned points were removed to avoid repetition.
PDG20 Digital health	***Participant11*** "Add: Shared (electronic) health records: read and write access by pharmacists - Accessing patient data for informed counselling and management - Inputting pharmacist interventions into patient records for other HCPs to consider - Accountability for treatment outcomes derived from access to patient data. - Ethical implications of access to patient data".	1- All mentioned suggestions were expanded and added to mechanisms.
PDG21 Sustainable pharmacy and pharmaceuticals	***Participant11*** "under "Remuneration", add: Integration of pharmacist services in health care system funding, public or private".	1- The suggestion was expanded and added to mechanisms.

The researcher eliminated redundant comments and combined comments sharing similar concepts; also, the description of the goals was expanded to incorporate all free text edits suggested by the IRG, and suggestions regarding the mechanisms were also added. The re-amended draft was then developed, where the content was critically edited, validated, and reached consensus in the plenum (see table 42).

Table 42: Pharmaceutical Development Goals (output Version 2)

Pharmaceutical Practice Development Goal:	Goal Description Globally, we will have…	MECHANISMS
1- Academic capacity	Capacity for in-practice training and development linked with education providers; pathways for professional advancement from foundation training through to advanced practice and/or specialisation.	• Develop the capacity and infrastructures for teacher practitioners and in-practice education providers to support practice advancements, including the provision of specialist training. • Develop frameworks, standards, and structures for post-graduate and advanced education and training. • Develop interprofessional and interdisciplinary education and training structures integrated into practice. • Develop robust training performance indicators that can be utilised within training programmes across a variety of practice settings, allowing for evaluation of performances and assessment of competencies.
2- Early career training strategy	Training strategy and infrastructures providing structured journeys for early career pharmacy practitioners including and pharmacy support workers linked towards advanced practice and specialisation frameworks and professional recognition and certification.	• Develop structured opportunities for in-practice early-career training. • Provide career and mentorship support for early career practitioners. • Provide appropriate conditions for reconciling early-career practice and personal circumstances with education and training pathways/programmes. • Provide appropriate incentives, recognition and certification of practice development.
3- Quality assurance	Transparent, contemporary and innovative processes for the quality assessment, monitoring and improvement of services in practice.	• Define standards for practice by pharmacists and pharmacy support workforce in community, hospital and other direct patient care roles. • Develop standards-based guidance, practice support tools and self-assessment tools for the implementation and delivery of professional services that are aligned with patient, community and health system needs. • Ensure systems are in place for upholding ethical practice across all areas of pharmaceutical practice.

		• Establish mechanisms and indicators for quality improvement including collaborative working, patient safety and professional standards. • Ensure the quality and effectiveness of pharmaceutical services by assuring the education, training, performance and professional development standards that develop a workforce fit to deliver those services. • Establish mechanisms for ('real world') pragmatic and useful evidence-based service implementation and service evaluation and monitoring such as audit systems, patient feedback, health outcomes research and cost effectiveness measures.
4- Advanced and specialist development	Sector-specific competency and development frameworks and infrastructures for advanced and/or specialised pharmacy practice and people-centred services.	• Develop practice infrastructures to support advanced practice and specialisation such as board certification, residency training, continuing professional development, proof of attainment of competencies. • Establish regulatory requirements for advanced practitioners and specialists in the appropriate settings, to ensure an adequate response to patient needs and optimal integrative care. • Establish pathways and plans for the development and delivery of advanced services. • Ensure mechanisms are in place so that pharmacists and pharmacy support workers are able to practice at the top of their license. • Ensure appropriate recognition of advanced competences and specialisation, and alignment with formal career progression systems and adequate incentives (remuneration and other). • Increase capacity for specialised training and/or certification programmes.
5- Competency development	Clearly defined developmental frameworks for practitioners describing competencies linked to professional services delivered in practice.	• Use evidence-based competency frameworks that support the development of practitioners to deliver specific professional services within their scope of practice, such as medicines use review, adherence optimisation, compounding, prescribing, vaccinating or managing communicable and non-communicable diseases, to name a few.

		• Define lists of essential and advanced services delivered by pharmacists and pharmacy support workers within their scope of practice. • Define lists of competencies needed to deliver those services within specific scopes of practice. • Ensure developmental frameworks that support leadership, humanistic and ethics development of the workforce. • Support the development and training of service-led competencies through short courses, certifications and other continuing professional development opportunities.
6- Leadership development	Strategies and programmes for professional leadership which incorporates team- and collaborative performance, service development in line with local needs, and clinical leadership which demonstrates responsibility, accountability, decision-making ownership and professional autonomy.	• Promote the development of leadership skills that warrant professional autonomy and decision-making ownership, clinical responsibility and accountability for patient outcomes, as well as for economic and environmental impacts. • Promote the development of leadership in quality assurance of professional performance (one's own and team performance) and collaborative approaches to healthcare delivery and in reviewing processes accordingly. • Recognise clinical leadership as a means to enhancing quality and transforming people-centred clinical services for excellence. • Promote the development of professional advocacy skills to empower pharmacists to effectively advocate for the profession to governments, regulators, policy makers and other stakeholders, and to become themselves key decision-makers and influencers at all these levels.
7- Advancing integrated services	A people-centred and integrated health care provision that is based on an interprofessional and cross-setting seamless continuum including pharmacist-delivered professional services.	• Define clear processes and procedures for developing and delivering integrated, needs-based services in practice and across all health care settings. • Develop and implement systems for the design, delivery and evaluation of such services in primary, secondary, tertiary, and urgent and emergency care services. • Recognise that people-centred integrated quality health services are the foundation for optimal clinical, humanistic, economic and sustainable health care outcomes.

		• Clearly identify patient and population needs that support the development and delivery of pharmaceutical services that are relevant to health needs. • Ensure capacity to deliver interprofessional integrated services during humanitarian crises, disasters and emergency situations. • Ensure collaborative working with others within the pharmacy team and other health care providers especially through transitions of care and lifespan care. • Implement quality measures of all outcomes of health care, from an integrated, holistic perspective, which take into account the Person's Journey.
8- Working with others	Clearly identifiable elements of inter- and intra-professional collaboration and multi-disciplinary healthcare, delivered through cohesive and interdependent teams working across interfaces and transitions of care.	• Develop structures and systems for multidisciplinary intra- and interprofessional teams of all relevant health cadres to work together in a coordinated manner across all levels of care. This should include pharmaceutical practice for optimal people-centred care delivery in primary, secondary and tertiary health settings. • Work across interfaces and transitions of the health system (including digital interfaces) to ensure continuity of care between levels of care and care journeys through mechanisms such as appropriate communications and health data sharing, shared decision-making, shared accountability for patient outcomes, and services such as medicines reconciliation or collaborative management of long-term conditions. • Support the development of policies where pharmacists and the support workforce are key actors in collaborative practice and integrated care. • Work with stakeholders, agencies, and other health professional associations to enable legislative change and development. • Ensure engagement of patients, formal and informal caregivers and community health workers in multidisciplinary health decision making through their empowerment, improved health literacy and orientation, participation and connectivity in the team as ambassadors for their own and their communities' health. • Recognise own professional autonomy and leadership, equal responsibility and accountability with other health professionals in terms of the scope of practice.

		• Recognise collaborative practice as a quality indicator for care delivery and capacity improvement. • Develop and implement intra- and interdisciplinary programmes for workforce willing to change from practice to sciences and vice versa or develop career paths in associated fields.
9- Continuing professional development strategies	In-practice and needs-based continuing professional development (CPD) and continuing education (CE) linked to career development pathways and practice frameworks.	• Develop and implement CPD requirements for renewal of licensure, registration and/or advanced practice and specialist recognition. • Ensure the provision of continuing education opportunities in the workplace. • Recognise life-long learning within pharmacists' professional journey. • Develop online programmes for continuing education and training which lead to certification or credentialing.
10- Equity & equality	Clear strategies for equity and diversity in pharmaceutical services delivery, service access and service impact so that all people have access to quality pharmaceutical care.	• Develop and deliver pharmaceutical care services based on patient, population and health-system needs, taking into consideration diverse socio-economic and demographic needs and expectations. • Develop and implement strategies to address equal accessibility of patients and populations to services including access to medicines and medicines information pharmaceutical workforce and medicines expertise, disease prevention (including vaccination) and public health services, and digital health services. • Recognise and effectively address the social determinants of health and the specific health needs of frail, vulnerable populations, and underserved communities. • Ensure access by patients and populations to the pharmacy workforce across areas (e.g. urban and rural environments) and health care systems (e.g. both private and public). • Ensure the availability and use of service and workforce data and intelligence to understand and identify equity and equality issues and develop evidence-based policies to address them.

		• Engage patients in identifying and prioritising needs and advocate for and on behalf of those under-serviced or under-utilising services; consider acceptability of services by patients when delivering pharmaceutical care. • Recognise the importance of social accountability in delivering value-based healthcare.
11- Impact and Outcomes	Evidence of the impact of pharmaceutical services in terms of health outcomes and quality of life, improved efficiency of health systems and sustainability.	• Recognise, assess and take accountability for the societal impact of pharmaceutical services in terms of health outcomes and quality of life, improved efficiency and resilience of health systems, availability and accessibility of services, equity and equitability, and overall sustainability (economic, organisational and environmental). • Implement systems to measure and monitor service impact and outcomes that are based on agreed definitions and standards, quality and performance indicators, real-world outcomes metrics (including public and patient-reported outcomes) and other data and service assessment intelligence for all professional services, from essential to advanced and specialised. • Enable and promote practice-based research, health impact assessment and evaluation mechanisms that facilitate practitioner-led evidence generation. • Implement systems to measure cost effectiveness, including cost-effectivity analysis, cost-benefit and cost–utility analysis, and budgetary impact of pharmacists' professional services. • Promote the transparent and rigorous exchange and publication of impact assessment data for pharmaceutical services to inform practice development, policy and funding strategies at local, national and international level.
12- Pharmacy intelligence	A comprehensive national strategy to collate, share and utilise intelligence on service provision, development, delivery and needs to inform evidence-based pharmaceutical services development, policymaking and funding decisions.	• Develop agreed frameworks for the provision of professional services that include clear definitions, requirements and standards against which it becomes possible to assess service delivery and generate professional service intelligence. • Develop and implement systems for collating data and gathering and processing evidence on service delivery and availability across all jurisdictions and populations at country level.

		• Define and recognise at country level a set of minimum indicators and metrics for service intelligence. • Develop integrated databases for service delivery, workforce and science intelligence. Develop mechanisms for the rigorous and transparent exchange and sharing of service intelligence with stakeholders, partners and other professionals at local, national and international level. • Develop the capacity to utilise big data generated in practice and in science, and to perform horizon scanning, trends assessment and predictions (e.g. demographic evolution, health needs trends, pandemics and other emergencies).
13- Policy development	Clear pharmacy-led strategies to develop and implement needs- and evidence-based practice-related policies on service implementation, integration and remuneration, aligned with broader national health policies and priorities.	• Develop and implement policies and regulations through appropriate statutory and regulatory reform, that responds to patient and societal needs and extends the scope of pharmacy practice accordingly. • Use policy tools and regulations to support and shape pharmacy practice in all jurisdictions and provide adequate frameworks for service implementation, integration and remuneration. • Develop policies and mechanisms to incentivise and encourage intra- and inter-professional collaboration integrated care delivery. • Implement policy review systems that measure the validity, relevance, implementation and uptake of policies. • Develop emergency and contingency action plans to expand the scope of practice in emergency situations.
14- Medicines expertise	Strategies and systems in place on pharmaceutical expert information and advice provision to patients, formal and informal caregivers, health care professionals and relevant agencies and stakeholders.	• Provide medicines and medical devices expertise and advice to patients, formal and informal caregivers, health care professionals and relevant agencies and stakeholders to inform policymaking, clinical decision-making and prescribing practices, individual health care options and other medicines or medical devices related decisions. • Empower patients, formal and informal caregivers, and communities by increasing health literacy towards better care and self-care.

		• Utilise appropriate communication and counselling pathways and skills to provide quality and appropriate information, taking into considerations cultural and language factors and other specific care needs (e.g. people with functional diversity, migrant and refugee populations, etc). • Utilise formal resources including formularies and medicines information management systems to convey objective, evidence-based and systematically organised information about medicines and medical devices to support pharmacy practice and service delivery, as well as the practice of other healthcare professionals.
15- People-centred care	Collaborative interprofessional strategies and people-centred professional services to support the prevention, screening, clinical management and therapeutic optimisation of non-communicable diseases (NCDs) and long-terms conditions (LTCs) including cardiovascular diseases, chronic respiratory conditions (such as asthma and chronic obstructive pulmonary disease, COPD), diabetes, cancer, mental health conditions, dermatological conditions and others.	• Develop and implement structured and evidence-based disease prevention (and secondary prevention) strategies and professional services for NCDs and LTCs, that effectively address and modify or minimise risk factors. • Develop and implement structured and evidence-based strategies and professional services for community-based screening and monitoring of NCDs and LTCs and their risk factors, symptoms and clinical signs through point-of-care tests and other assessment methods like structured tools and questionnaires to identify individuals that may require further diagnostics and/or care. • Develop and implement structured systems and protocols for the referral of potential patients to other HealthCare Professionals, and for sharing clinical findings from patient screening and monitoring across the health care team and system, namely via shared access (for consultation and input) to the patient's (electronic) health records. • Develop and implement structured and evidence-based strategies and professional services for the optimisation of treatments and medicines use, to ensure optimal clinical and quality of life outcomes and resource utilisation. • Develop and implement structured and evidence-based strategies and professional services for special patient populations with long-term conditions and specific needs, such as older adults, people with functional diversity, rare disease patients, poor and vulnerable patients, illiterate patients, migrant populations, refugees and other groups.

16- Communicable diseases	Strategies and people-centred professional services for the prevention, surveillance, management and therapeutic optimisation of communicable and vector-borne diseases.	• Develop and implement structured and evidence-based disease prevention strategies and professional services for vector-borne and communicable diseases by all types of etiological agents (viruses, bacteria, fungi, parasites). • Develop and implement structures and mechanisms to contribute to overall integrated prevention health strategies that aim to prevent or slow the progression and spread of diseases and vectors. • Engage with stakeholders and policy makers to implement strategies and policies that support the delivery of vaccines by the pharmaceutical workforce. • Develop and implement clear and comprehensive strategies on readiness for dealing with and delivering urgent and emergency pharmaceutical care and services during pandemics, epidemics, and disease outbreaks. • Develop and utilise tools, resources, and expertise to educate patients and caregivers in an appropriate and timely manner on communicable and vector-borne diseases including sexual health education in the context of preventing sexually transmitted diseases.
17- Antimicrobial stewardship	Infrastructures and frameworks in place to deliver services for antimicrobial stewardship.	• Develop and implement systems and structures to deliver antimicrobial stewardship services as a coordinated programme that promotes the appropriate use of antimicrobials, improves patient outcomes and decreases the spread of infections caused by multidrug-resistant organisms. • Utilise and assess data and metrics to improve and optimise antimicrobial stewardship services. • Advocate for and support the responsible use of antimicrobials.
18- Access to medicines, devices, and services	Systems in place to optimise access to effective medicines and pharmaceutical care services through appropriate supply chains, quality standards, self-care & prevention services, and affordability and fair pricing policies.	• Develop systems and structures to ensure appropriate supply of and access to medicines and other health products (including medical devices). • Develop and implement contingency plans for shortages of medicines and medical devices.

		• Develop and implement quality standards and guidelines to ensure access to safe and effective medicines and medical devices, prevent the entry of substandard or falsified medicines in the legitimate supply chain, and ensure the stability of medicines in different environmental conditions, in addition to other safety and quality indicators. • Advocate for and contribute to the development and implementation of policies and initiatives addressing affordability and fair pricing of medicines, medical products and devices, and services that aim to ensure equitable access for all, and especially for fragile and vulnerable communities, as well as access to specialised and innovative therapies. • Ensure access to optimal treatment outcomes and promote the responsible and optimal use of medicines through the provision of appropriate pharmaceutical care, considering advanced capabilities. • Develop and implement pharmaceutical workforce and education policies to increase capacity and competence to increase access to pharmaceutical expertise in primary health care settings, in collaboration with the wider health care team and system.
19- Patient safety	Patient safety mechanisms linked to reducing medication-related harm, quality assurance processes and legislation & regulations.	• Advocate for both safer medication management systems and a culture of patient safety in health care organisations. • Encourage all health care professionals and other key stakeholders, including patients and their caregivers, managers, policy makers, and educators to consider designing/optimising services collaboratively to improve patient safety. • In collaboration with health care professionals, health care organisations, patient/consumer organisations and researchers, develop, implement and monitor indicators and tools to proactively measure patient or consumer safety in practice; the outcomes of which can be used to promote and monitor the development of a safety culture. • Initiate and support ongoing programmes to educate the public about the safe use of medications and the roles of pharmacists in this context. • Develop, implement, promote, monitor and review medication safety policies, procedures and outcomes in hospital, primary care, community and residential care

		facilities and other relevant facilities to prevent patient safety incidents and improve patient outcomes. • Ensure systems are in place for the supply of medications in times of shortages and for access to medications by patients most in need. Develop strategies to combat substandard and falsified medicines.
20- Digital health	Systems and structures in place to develop and deliver quality digital health and pharmaceutical care services through the digital literacy and utilisation of technology and digital enablers, configuration of responsive digital services to widen access and equity.	• Utilise digital enablers and new technologies such as shared electronic health records, applications, and artificial intelligence to support the delivery of innovative services and the appropriate care and decision making. • Demonstrate digital literacy and understanding of governance issues surrounding data ownership, ethics, privacy, quality information; and have policies in place to support the development of the workforce as managers of health data. • Recognise digital health as a mechanism for widening access and equity including access to digital pharmaceutical care. • Identify and understand ethical and operational implications of digital technologies, as well as the implications in terms of professional accountability for patient outcomes of expanded access to patient information, shared electronic records.
21- Sustainable in pharmacy	Policies, regulations and strategies to ensure the sustainability of the environment and minimise the impact of pharmaceuticals and pharmacy practice, but also the appropriate mechanisms to ensure the sustainability of pharmacy practice itself, through appropriate remuneration models for pharmaceutical services.	• In terms of ecological sustainability, advocate for and contribute to the development and implementation of policies and strategies that recognise, minimise and mitigate the environmental effects of pharmaceuticals and medicines-related practices. This includes the research, development, manufacturing, marketing, distribution, dispensing, use and disposal of medicines; the administrative and legislative processes regulating medicines; all aspects of pharmacy practice; and the education and training of the pharmaceutical workforce for such roles. • In terms of social, societal and economical sustainability around pharmacy services, advocate for and contribute for the value of pharmaceutical services that ensure equity in access to such services, incentivise their delivery and promote their sustainability and appropriate integration in health care system funding, public or private.

7.6.3 Summary of the findings

Following the content development and validation of the IRG and the Validation Expert Group's consensus, a final amendment to the framework was performed. The number of goals remained the same (21 goals), with a slight relabelling for some of the goals. The description and goal components layer have been expanded. A clear definition between the two terms used, which are the **"Mechanisms"** and **"Indicators"**. The "Mechanisms" are defined as the tools and structure that facilitate and support the process of transformation, whereas the "Indicators" are defined as the process of measuring and monitoring the progress of the implemented goals.

7.7 Bias and limitations

Participants were purposively selected from the FIP country members. Therefore, other qualified international key-stakes individuals were deprived of contributing and sharing their knowledge and experience based on their countries' needs, which in turn, might have influenced the course of the final results.

During the first round, four IRG experts did not provide their feedback, which may have had significantly different views from the remaining experts. During the second round, the video conference helped participants exchange their viewpoints through an open discussion, validate previous round inputs, and finally make the most appropriate decisions. However, it exposed this round to the loss of subject anonymity, wherein achieving subject anonymity can mitigate the effect of dominant individuals and limit clinging to some opinions. One more limitation to consider, the results achieved in the second round by different participants than the first round may be biased in favour of this round's experts (Eubank et al., 2016).

7.8 Conclusion

The unique modified Delphi method conducted by combining the conventional way of participants' anonymity followed by a second interactive video conference and the distinctive collaboration of two groups of purposively targeted experts and global leaders helped generate and validate credible findings.

In summary, the description and mechanisms of goals were re-edited and updated, driven from the IRG data, validated and approved by the Validation Expert Group. Some of the goals were slightly relabelled, and the final number is 21 individually distinct goals. As a final outcome, this extensive development process ensured evolving a systematic and integrated PDGs framework that will guide and monitor progress in the pharmacy profession in a global and national context.

7.9 Summary and discussion of the main findings for Part 1

Part 1 aimed to develop a systematic goals-oriented development framework to respond to the pharmaceutical development needs and meet national and global healthcare requirements.

A draft set of 13 potential PDGs was created initially as the result of the content analysis of the 2019 FIP Strategic plan and formed the basis of the proposed framework. This was followed by conducting preliminary fieldwork (Chapter 5) to explore and assess the appropriateness and acceptance of the concept of the PDGs framework. The results of the primary assessment helped focus on the different needs and priorities identified by focus group participants in their countries and guided in designing the project's further studies in a global context.

The development of the framework involved introducing global pharmacy leaders to participate in a modified nominal group technique (Chapter 6) to develop the content of the proposed framework. The initial framework analysis of this consultation stage showed a high level of overlapping and some shared commonalities between the proposed goals. This emerged the need to conduct further modifications by underpinning, embedding, and building around by the concept of the existing global Pharmaceutical Workforce Development Goals. The enhanced adjustment by the evidence led to the first iteration of the amended framework (table 39, version 1) comprising 21 discrete practice development goals, which were used in the next stage.

In the review stage (Chapter 7), a modified Delphi approach was employed by a panel of international experts and an Expert group to edit, amend, and validate the content of the framework outputs and finally generate consensus on a final set of 21 individually distinct goals.

The extensive consultation and distinctive format of the consensus and engagement methodologies undertaken helped generate a globally validated and consented set of systematic and integrated PDGs (systematic framework) for development comprising 21 discrete practice-related development goals along with their descriptions & mechanisms to shape and guide the global pharmacy practice transformation.

Each of these discrete Practice Goals defines a specific need or challenge that can be directly used to map development needs. These drivers PDGs are the foundation of a transformative framework to be used as a transnational mapping "developmental tool" to assess and map countries' needs and priorities against the PDGs to meet their national, regional, and global health demands.

The PDGs framework, with its concrete and tangible mechanisms, will be the basis for developing relevant and measurable country-level metrics to monitor and measure countries' process of transformation across different aspects (Part 2).

Thesis PART 2

For PART 2 of the research project, evidence-based indicators were developed to monitor and measure the progress of this implemented framework.

Introduction

Part 2 of the thesis aimed to develop a set of evidence-based progress indicators aligned to the 21 Pharmaceutical Development Goals developed in Part 1 that will support LONG TERM monitoring of the progress of the transformation of practice supported by the PDGs. The outcome is a set of correlated, validated transnational evidence-based indicators that will monitor PDGs' progress worldwide and support countries in the process of transformation for their workforce, education, practice and pharmaceutical science.

The aim, objectives, methods, and findings used in developing the final list of global indicators will be described. This study was conducted through the following series of stages to achieve the aim of this study.

Stage 1) is to develop the initial lists (21 lists) of proposed indicators aligned to the 21 PDGs framework. (Chapter 8)

Stage 2) is to capture data on global responses to assess the relevance and availability/ accessibility of each proposed indicator to the relevant PDG. (Chapter 9)

Stage 3) is to employ descriptive and statistical analysis approaches to develop the final set of global indicators that can be used to measure progress towards the PDGs framework developed in Part 1.

Ethical consideration

Formal ethical approval from the research ethics committee was not required, given that none of the studies conducted involved vulnerable participants or identifiable or sensitive data or protected characteristics under GDPR regulations. Also, participants engaged in this research project were voluntarily recruited with no incentives by virtue of their professional backgrounds and roles (guideline available at http://ethics.grad.ucl.ac.uk/exemptions.php).

Nevertheless, data collection approval and ethical oversight were gained from the International Pharmaceutical Federation, Executive and Board structures, and is on record.

Project Overview

Part 1: Exploratory phase for developing the Pharmaceutical Development Goals (PDGs) framework		
Stage 1: Identification of initial areas and goals		**Status - completed**
Aim, Methods, Expected outcomes	To identify priority areas for pharmaceutical development within a systematic framework of global goals for pharmacy services.	*Chapter 2:* Identification of need. *Chapter 3:* Aim, objectives, purpose. *Chapter 4:* Methods.
	1. Literature review: Reviewing the literature focused on the innovative pharmaceutical provision in a global context. 2. Content analysis of the FIP-strategic plan for the transformation and advancement of pharmaceutical practice aspect.	
	To produce a recommendation for a draft set of initial, unvalidated, PDGs (Version 0).	
Stage 2: Exploratory fieldwork: Acceptability and credibility assessment		**Status - completed**
Aim	To assess the credibility of the (Version 0) of the PDGs draft by conducting exploratory fieldwork.	*Chapter 5:* Preliminary fieldwork - focus group methods. PDG Framework v0 as output.
Methods	A focus group was conducted, followed by a qualitative analysis of the collected data.	
Expected outcomes	To get a primary assessment towards the proposed goals with suggestions and recommendations to guide the next steps.	
Development of the Pharmaceutical Development Goals (PDGs) framework		
Stage 3: Consultation stage- Development of PDGs (version 1)		**Status - completed**
Aim	To explore in-depth participants' perspectives and views on the draft list and to develop the content of the PDGs framework	*Chapter 6:* Development stage by global experts using NGT. A Steering group for guidance, oversight, facilitating participants' selection and recruitment, and strategic direction PDG Framework v1 as output.
Methods	1. Modified nominal group technique (NGT) was used by leading a leadership meeting of global pharmacy leaders. 2. Data were coded and analysed using the PDGs (version 0) as the framing code and employing the framework analysis method.	
Expected outcomes	To reframe the initial PDGs framework to PDGs (version 1).	
Stage 4: Review/consensus stage- Internal Reference Group (IRG) Review- Development of the final version of the PDGs framework		**Status - completed**
Aim	To perform a review/consensus exercise to agree and validate the content of PDGs (version 1)	*Chapter 7:* Validation and consensus (modified Delphi). A Steering group for guidance, oversight, facilitating participants' selection and recruitment, and strategic direction PDG Framework v2 as output
Method	1. A modified Delphi method was employed with international pharmacy experts from different sectors. 2. Data were coded and analysed using the PDGs (version 1) as the framing code (framework analysis method).	
Expected outcomes	To reframe the PDGs (version 1) and develop the final PDGs (version 2) framework.	

Part 2: Development of the Global FIP Development Goals Indicators		
Stage 1: Identification of the initial draft lists of global PDG INDICATORS		**Status – completed**
Aim	To identify and link measurable PDG indicators compiled from reviewing relevant literature & publications with the validated 21 Pharmaceutical Development Goals (PDGs).	*Chapter 8:* Global PDGs Indicators and metrics; An initial listing of PDG Indicators as output.
Method	1. Review international collated reports, surveys, and publications to extract all indicators included in all proposed lists of indicators. 2. Delphi method was followed to create the proposed initial lists of indicators.	
Expected outcomes	To generate the initial consensus on the development of unvalidated global indicators aligned to the 21 PDGs.	
Stage 2: Relevancy and availability/accessibility assessment of global PDG INDICATORS		**Status – completed**
Aim	To construct the validity and reliability of the proposed unvalidated PDG indicators (21 lists) in terms of the indicators' relevancy and availability/accessibility at a country level.	*Chapter 9:* Quantitative global responses from a series of online surveys linked with each PDG. A valid and correlated set of "Usable" PDG indicators as output
Method	A cross-sectional survey using online questionnaires to validate the relevancy and availability of the proposed PDG Indicators. Quantitative analysis was performed to describe and interpret the collected data. Descriptive and statistical, boxplot examination, heat maps and cross-tabulation methods.	
Expected outcomes	To determine the relevance and availability/accessibility of the proposed PDG Indicators.	
Alignment of the Global Pharmaceutical Development Goals framework to the initially generated PDGs indicators		**Status – completed**
Aim	To cluster developed "usable" indicators from Stage 2; validation and correlation of PDGs Indicators/metrics for construction of global development Dashboard.	Facilitate the construction of a data dashboard for monitoring global progress linked to the PDGs for dashboard outputs. A display of visualisation for clustering the final approved list of "Usable" indicators that can be used for the construction of a global dashboard to monitor progress, particularly in LMICs, of the global PDGs over long-term time periods.
Method	**Qualitative analysis:** An independent (deductive/inductive) coding for the proposed indicators was required by two coders using Software (NVivo). **Quantitative analysis:** Associative tests were performed to compare the individual agreement level between two coders. Kappa test, Heat maps and cross-tabulation methods.	
Expected outcomes	As a second dimension, to cluster the "usable" developed indicators under the PDG framework three principal elements (W/E, P, S) and the emerging themes.	

Chapter 8: Development of the Global FIP Development Goals Indicators Stage 1: Development of the initial draft lists of global PDGs indicators

8.1 Introduction

Thesis Part 1 described the development of a globally validated and consented set of systematic Pharmaceutical Development Goals (systematic framework) for development comprising 21 PDGs, along with their descriptions and mechanisms to shape and guide the global pharmacy practice transformation.

The FIP published the PDGs transformative framework under the FIP Development Goals[6] in 2020, transforming global pharmacy report (International Pharmaceutical Federation, 2020a). The full version of the FIP DGs framework was adopted to develop indicators to monitor and track the progress of implementation of these 21 goals across the framework elements (Workforce/Education, practice, science).

This Chapter (Part 2, stage 1) will describe the aim, objectives, and methods employed to develop the initial lists (21 lists) of progress indicators aligned to the 21 PDGs framework developed and **published** in part 1. This stage describes the conduct of a qualitative Delphi method by an Expert Group to develop the content of the proposed set of indicators and later present these unvalidated 21 PDG indicators (21 lists) to be assessed and validated from a global perspective in Stage 2.

8.2 Aim and objectives

This study (Part 2, Stage 1) of the research project aimed to identify and link measurable PDG indicators compiled from reviewing relevant literature and publications with the validated 21 Pharmaceutical Development Goals (PDGs).

The objectives of this study were:

1. To develop the initial proposed indicators lists for the 21 Pharmaceutical Development Goals by reviewing international collated reports, surveys, and publications.
2. To generate an initial consensus on the unvalidated lists of indicators that will be presented for the wider professional engagement stage by an Expert Group.

[6] **FIP DGs Framework**, published in 2020, represents a systematic and integrated Framework to guide global, regional, and national development across science, practice, and workforce/education (W/E). International Pharmaceutical Federation. (2020a). *The FIP Development Goals: Transforming global pharmacy*. https://www.fip.org/file/4793.

8.3 Study design

8.3.1 Sampling strategy and data collection methods

Expert Group-Development and validation of the initial proposed PDG indicators list.

This stage aims to establish an initial consensus on the proposed lists of PDGs indicators. Thereby, an Expert Group of international pharmacists were purposively recruited. The members of this group have a broader knowledge of this work field since they have the advantages that they were previously involved in the development of the PDG Framework.

At the initial stage, five international pharmacists were contacted and committed to participating by offering advice and feedback throughout this stage process. Later, the researcher and supervisor e-met the Expert Group to give the group a thorough project brief outlining the project's objectives, process, and main deliverables and familiarising them with the "assignment exercise" that they were charged to complete for each of the PDGs.

Data collection

A three-step anonymous Delphi method was used to reach the initial agreement of the proposed 21 lists of indicators. More details about the Delphi method are illustrated in (section 4.2.2). To conduct this stage was required to prepare two documents as primary tools to facilitate and organise the data collection of this stage.

The first document is a "Handbook list" of 127 core indicators, with their definitions, compiled from reviewing relevant literature and other international publications (FIP & WHO), Appendix 4. The purpose of this "Handbook" is to facilitate defining the core indicators in support of tracking progress towards the PDGs. Also, an Excel spreadsheet was created, including the "Handbook indicators and definitions", to help the Expert Group assign indicators against the relevant PDG. This spreadsheet was circulated separately by email to the Expert Group to undertake the assignment exercise, Appendix 5. The descriptions and mechanisms of the published PDGs report "Transforming global pharmacy" (International Pharmaceutical Federation, 2020a) were also used as a reference while creating the proposed lists of indicators.

Hereafter, the sequence of the 3-step Delphi method was as follows.

1. The Expert Group was asked by email to assign the relevancy of indicators listed against each PDG independently (ticking boxes approach).
2. The researcher created the content of the proposed lists of indicators for each PDG based on the indicators assigned by the Expert Group and by the published mechanisms of the PDGs.

3. The researcher emailed back the created lists to the Expert Group and asked for further review and feedback on the output of the first round. After amending and incorporating the Expert Group comments, the initial consensus on these proposed lists was met. The agreement was reached when the researcher received a confirmation on the lists from each Expert group member (round 3).

The Expert Group members were given one week as a deadline to complete and return their assigned tasks for each Delphi round and iteratively before each PDG event. Subsequently, each PDG and agreed indicators were formatted into a questionnaire to be used for the global professional engagement, Stage 2.

8.4 Data management

Data handling

All collected data were treated as confidential. Since this stage was done through email documents, the data spreadsheets were only accessible to the research team and were all saved in password-protected electronic files.

Data analysis

The deductive content analysis approach is used in qualitative research for examining concepts, categories, themes, or any conceptual structure in a new context. In deductive content analysis, prior theoretical knowledge is initially applied as the starting point and directed by a half-structured or structured analysis matrix. This analysis process is a systematic and flexible way for selective data reduction into manageable content categories (Kyngäs & Kaakinen, 2020).

Initially, a list of pharmacy-related core indicators was compiled by reviewing and undertaking a content analysis approach on the existing data collated from global published reports by WHO & FIP, particularly (International Pharmaceutical Federation, 2017a, 2020a). This list contained information needed to identify and link tracking progress indicators towards and align to the 21 PDGs contexts at a global level.

Afterwards, data received from the 1st round of the Delphi method were compiled into one Excel spreadsheet to facilitate tracking all Expert Group suggestions. Based on the assigned core indicators, the researcher created cohesive lists of individual indicators relevant to the context of each PDG and emailed them to the Expert Group for review. In the second Delphi round, textual editing and revising were done across the proposed indicators by the Expert Group to ensure content validity and clarity and reach an agreement.

Below is an example of how the PDG6 (leadership development) indicators were developed. First, the Expert Group individually assigned 11 indicators in line with the context of PDG6. Then, the content of the mapped indicators was amended and later merged and approved to fit the purpose of this goal (see table 43). **Appendix 6** illustrates how the remaining PDGs lists of indicators were developed based on the example above-mentioned. The final outcome of this study will be detailed in the results section (8.6).

Table 43: Example of the development of PDG6 proposed list of indicators

PDG6: Leadership Development	**Initially assigned 11**	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**The proposed list of indicators for the wider professional engagement stage**
***Good pharmacy practice guidelines (1)** **Existence of national and/or subnational good pharmacy practice guidelines	This indicator sets out information about the existence of guidance that defines good pharmacy practice. It gives an indication of the extent of oversight of the professional practice.	(1) Availability of national strategies and programmes (including tools and mentoring systems) that develop professional leadership skills, including clinical and executive leadership, scientific leadership and initial education and training for all stages of career development in the workplace
***Code of ethics (1)** **Existence of national and/or subnational code of ethics	This indicator sets out information about the existence of a code of ethics. It gives an indication of national oversight of professional standards and obligations.	
Strategies and programmes in place that develop professional leadership skills (including clinical and executive leadership) for all stages of career development, including pharmaceutical sciences and initial education and training. **(1)**	https://www.fip.org/fip-development-goal-6	
Implement mentorship programmes with experienced pharmaceutical sciences leaders in academia, industry, and regulatory bodies. **(1)**	https://www.fip.org/fip-development-goal-6	
***Competency development framework for pharmacists (2)** **Existence of national and/or subnational competency development framework for pharmacists	This indicator sets out information about the existence of a competency framework for pharmacists used for professional development and/or recognition. It gives an indication of a commitment to developing the pharmacy workforce.	(2) Existence of a national competency (development) framework across all stages for pharmacists and pharmacy technicians' development (early career and advanced practice) with leadership development at the core
***Pharmacy practice standards performance indicators (2)** **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacists.	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	
*Competency framework for pharmacy technicians **(2)** **Existence of national and/or subnational competency framework for pharmacy technicians and pharmacy support workers	This indicator sets out information about the existence of a competency framework for pharmacy technicians and pharmacy support workers used for professional development and/or recognition. It gives an indication of a commitment to developing the pharmacy workforce.	

*Pharmacy practice standards performance indicators for pharmacy technicians **(2)** **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacy technicians	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	
*Standards for pharmacists' education **(3)** **Existence of national and/or subnational standards on the content of pharmacists' education, including curriculum review	This indicator sets out information about the process of updating the curriculum for pharmacist education. The following questions should guide a response to this indicator: 1. Is there a list of knowledge, skills, and competencies to be acquired during health workforce education and training? 2. Is this list reviewed regularly?	(3) Required inclusion of leadership development training and programmes as part of the initial education and training curriculum that develop professional leadership skills (in universities)
*National strategic plan for pharmaceutical human resources **(4)** **Existence of a national strategic plan for pharmaceutical human resources	This indicator sets out information about a national strategic plan for pharmaceutical human resources. The following questions should guide a response to this indicator: 1. Do HR plans for the pharmaceutical workforce match competencies with population, health systems, and health labour market needs? 2. Do HR plans take into account efforts to scale up transformative education and training? 3. Are strategic steps taken when considering and taking into account the workforce market needs and absorptive capacities for the HR plan development?	(4) Existence of a national strategic plan for pharmaceutical workforce development to support the development of the leadership skills needed, e.g. professional autonomy and decision-making, effective communication and teamwork, as well as for economic and environmental impacts
Promote the development of leadership skills that warrant professional autonomy and decision-making ownership, clinical responsibility and accountability for patient outcomes, as well as for economic and environmental impacts. **(4)**	https://www.fip.org/fip-development-goal-6	

8.5 Ethical considerations

FIP (as the governing body) gained ethical oversight and approval for the use of data and access to listed experts for this study. The Expert Group members were provided with all the relevant information needed before starting this study. They were also informed that their participation is voluntary, and they can withdraw from the study at any time without any further consequences.

8.6 Results

8.6.1 The initial proposed 21 lists of indicators for the 21 PDGs

After the Expert Group reached a consensus, the unvalidated 21 proposed lists (165 indicators) were developed, considering all the comments and amendments suggested during the Delphi process (see table 45). The proposed developed lists are widely inclusive of different scopes of pharmacy practice, including pharmaceutical workforce capacity and education (pharmacists, technicians,

pharmaceutical scientists, pharmacy staff); practice/sector settings (community, hospital, private/public); policies and regulations-related indicators; Impact/outcomes-related indicators; competencies development indicators.

The table below (44) shows the initial numbers of the assigned indicators and then the final produced number after incorporating and amending the Expert Group comments and merging indicators under the same concept for each PDG.

Table 44: The outcome of the Delphi process

Using the Handbook list of indicators and published mechanisms of the PDGs, the Expert Group had independently and initially assigned:	That were amended and later merged to:
20 indicators for PDG1 "Academic Capacity"	**19** potential indicators
27 indicators for PDG2 "Early career training and strategies"	**12** potential indicators
29 indicators for PDG3 "Quality Assurance"	**6** potential indicators
13 indicators for PDG4 "Advanced & specialist development"	**7** potential indicators
16 indicators for PDG5 "Competency development"	**5** potential indicators
11 indicators for PDG6 "Leadership development"	**4** potential indicators
26 indicators for PDG7 "Advancing integrated services"	**8** potential indicators
14 indicators for PDG8 "Working with others"	**7** potential indicators
14 indicators for PDG9 "CPD strategies"	**6** potential indicators
6 indicators for PDG10 "Equity & equality"	**5** potential indicators
11 indicators for PDG11 "Impact & outcomes"	**5** potential indicators
29 indicators for PDG12 "Pharmacy intelligence"	**6** potential indicators
106 indicators for PDG13 "Policy development"	**6** potential indicators
13 indicators for PDG14 "Medicines expertise"	**4** potential indicators
23 indicators for PDG15 "People-centred care"	**11** potential indicators
16 indicators for PDG16 "Communicable diseases"	**10** potential indicators
23 indicators for PDG17 "Antimicrobial stewardship"	**6** potential indicators

26 indicators for PDG18 “Access to medicines, devices, & services”	**10** potential indicators
30 indicators for PDG19 “Patient safety”	**9** potential indicators
30 indicators for PDG20 “Digital Health”	**9** potential indicators
28 indicators for PDG21 “Sustainability in Pharmacy”	**10** potential indicators

Table 45: The content of proposed lists of indicators, following consensus development by the Expert Group outcomes.

PDG1: Academic Capacity
(1) Number of local/international academic pharmacists and pharmaceutical scientists positions in Faculties/Schools.
(2) Existence of national or institutional benchmarking tools (e.g. teacher training programmes) or career development programmes for academic pharmacists and pharmaceutical scientists
(3) Number of teachers/practitioners (or practice-based supervisors/preceptors/educators) employed by institutions to train student pharmacists
(4) Institutional use of simulation in initial education & training (IET) curricula
(5) Required inclusion of experiential education/training in academic curricula
(6) Required inclusion of interprofessional and interdisciplinary education and training structures in IET curricula
(7) Number of pharmacy graduates nationally (national graduate supply)
(8) Number of accredited/non-accredited schools of pharmacy nationally
(9) Ratio of private/government-funded universities
(10) Tuition fee status for student access to pharmacy programmes (e.g. self-funded, government/tax-funded, mixed model)
(11) Academic staff vacancy rates in the academic sector vs other pharmacy sectors
(12) Salary comparisons of academics with private/government/commercial pharmacy sectors
(13) Minimum period of pharmaceutical science internship programmes (if any)
(14) Minimum period of practice training/clinical internship pre-licensing (pre-registration) programmes
(15) Number of local/international academic teachers in pharmacy technician schools/institutions
(16) Number of pharmacy technicians graduating or registering nationally
(17) Number of accredited/non-accredited institutions/schools that train and educate pharmacy technicians nationally
(18) Ratio of private/government-funded technician training institutions/schools
(19) Tuition fee status for access to pharmacy technician training institutions/schools (e.g., self-funded, government/tax-funded, mixed model)
PDG2: Early career training strategy
(1) Number of local/international pharmacy graduates/ new registrants (National/International graduate supply)
(2) Number of newly licensed/registered pharmacists (segmented number by community, hospital pharmacists) who deliver pharmaceutical services for all population
(3) Number of newly licensed/registered pharmacy technicians (segmented number by community, hospital pharmacists) who deliver pharmaceutical services for all population
(4) Existence of national regulations and standards for licensing or registration of pharmacy graduates/new registrants
(5) Existence of national mandatory standards and requirements that ensure maintaining licence for all early career post-registered/licensed pharmacists, e.g. gaining CPD credits, portfolio, training programmes
(6) Availability of national strategies and mentoring programmes to monitor early-career practitioners development towards advanced practice (including clinical practice and pharmaceutical science areas across the pharmaceutical workforce), e.g. CPD, frameworks, recognition & certification, education & training programmes
(7) Existence of a national competency (development) framework for newly registered or early career pharmacists & pharmaceutical scientists
(8) Existence of national regulations and standards for licensing or registration of pharmacy technicians graduates/new registrants
(9) Existence of a national competency (development) framework for newly registered or early career pharmacy technicians (or pharmacy support staff)
(10) Availability of formal scope of practice within the licencing and/or registration of newly licensed/registered pharmacists, e.g. provision of different pharmacy services in pharmacy/hospital settings

(11) Availability of formal scope of practice within the licencing and/or registration of newly licensed/registered pharmacy technicians, e.g. provision of different pharmacy services in pharmacy/hospital settings
(12) Availability of specific training/qualifications for early career pharmacists for managing a community and hospital pharmacy that provides pharmaceutical services
PDG3: Quality Assurance
(1) Existence of national regulations & policies that ensure the quality assurance of the academic and institutional infrastructures to deliver the required needs and competency-based education and training
(2) Existence of national needs-based guidance for quality assurance of pharmacy and pharmaceutical science education and training throughout initial education and career development (advanced practice/specialisation)
(3) Existence of professional standards of practice and required competencies for maintenance of licensing and/or registration of the pharmaceutical workforce across all sectors
(4) Existence of national pharmacy practice standards or guidelines for measuring the quality of service provision in the healthcare system. These 'quality standards/guidelines' might be included within existing 'scopes of pharmacy practice' guidelines, code of ethics, competency development frameworks, pharmacy practice standards, policy development etc.
(5) Existence of evidence-based performance indicators to assess and monitor the applied pharmacy practice against the existing national standards, e.g., audit systems, patient feedback, health outcomes research, cost-effectiveness measures etc.
(6) Availability of guidance documents & tools defining quality assurance criteria for various pharmaceutical sciences areas to assure access to safe and effective medical products
PDG4: Advanced & specialist development
(1) Existence of national regulatory requirements for advanced practitioners and specialists to provide advanced services
(2) Existence of a national competency (development) framework for advanced & specialist scope of practice for pharmacists' career development beyond early career/foundation level
(3) Existence of a national strategic plan for pharmaceutical workforce development to support the development of the competency and capability of an advanced and expert pharmacist in all sectors
(4) Existence of advanced services with standards and/or guidelines for the development and delivery of these services at the practice site (community, hospital)
(5) Availability of the necessary infrastructures that assist practitioners in the development of advanced and/or specialist practice, e.g., CPD, residency training, board certification, sector-specific programmes, etc
(6) Availability of a national professional recognition system that recognises advanced practice and or specialisation
(7) Availability of an agreed definition of "advanced" and "specialist" practice
PDG5: Competency Development
(1) Institutional use of competency-based education (or learning) approach as a framework for teaching and assessment of learning
(2) Existence of national evidence-based development frameworks describing competencies needed for the pharmaceutical workforce (pharmacists, technicians, pharmaceutical scientists, etc.) for all stages and settings of professional career
(3) Existence of national evidence-based development frameworks that establish a clear link between foundation practice and advanced practice
(4) Existence of national evidence-based competency frameworks for practitioners describing advanced competencies linked to professional services delivered in practice, such as MUR, NCD/LTCs, vaccination, compounding etc
(5) Existence of national strategies and training to develop service-led competencies that provide additional new competencies to the pharmaceutical workforce through courses and programmes, certifications, CPDs
PDG6: Leadership Development
(1) Availability of national strategies and programmes (including tools and mentoring systems) that develop professional leadership skills, including clinical and executive leadership, scientific leadership and initial education and training for all stages of career development in the workplace
(2) Existence of a national competency (development) framework across all stages for pharmacists and pharmacy technicians' development (early career and advanced practice) with leadership development at the core
(3) Required inclusion of leadership development training and programmes as part of the initial education and training curriculum that develop professional leadership skills (in universities)
(4) Existence of a national strategic plan for pharmaceutical workforce development to support the development of the leadership skills needed, e.g., professional autonomy and decision-making, effective communication and teamwork, as well as for economic and environmental impacts
PDG7: Advancing integrated services
(1) Existence of national practice guidelines and quality standards to measure health care outcomes provided by integrated pharmaceutical services

(2) Availability of a system for designing, delivering and evaluating advanced services in different levels of the health system, including urgent and emergency care services
(3) Availability of people-centred integrated services that optimise the use of medicines and achieve the optimal clinical, humanistic, economic and sustainable health care outcomes
(4) Existence of advanced and integrated people-centred care as the core of Primary Care and Public Health Services, e.g., patient education & health promotion, long-term condition management, Medicines Use Reviews, point-of-care or diagnostic tests etc
(5) Number of community and hospital pharmacies that provide integrated pharmaceutical services for all populations (standardised by national population), including emergency situations
(6) Existence of systematic and integrated development of education and training based on population needs and social determinants of health for pharmaceutical workforce development, including pharmacists, educators, & trainers
(7) Existence of clear strategies and procedures to facilitate delivery of integrated and needs-based pharmaceutical care services in practice and across all health care setting
(8) Existence of national guidelines or policies that ensure all people have access to advanced pharmaceutical care services
PDG8: Working with others
(1) Inclusion of the interprofessional education (IPE) approach in the initial education and training curriculum (in universities)
(2) Existence of national education and training strategies to ensure intra- and interprofessional collaboration within the pharmaceutical workforce and other healthcare professionals across all levels of care (primary, secondary and tertiary care settings) with the focus on patient care at the core
(3) Existence of healthcare structures and facilities that facilitate interprofessional collaboration and ensure continuity of care between levels of care, e.g. collaborative management of LTCs, health data exchange, digital interfaces etc
(4) Existence of national strategies that recognise members of the pharmaceutical workforce as integral members of the multidisciplinary team, enabling collaborative practice and integrated care
(5) Existence of national strategies to actively empower patients in their own care and to engage with their multidisciplinary care team, thereby taking an active part in decision-making about their car
(6) Existence of national strategies that utilise collaborative practice as a quality indicator for care delivery and capacity improvement
(7) Availability of intra- and interdisciplinary programmes to facilitate collaboration between pharmaceutical scientists and clinical practitioners in associated fields
PDG9: Continuing professional development strategies
(1) Existence of national regulations for implementing and linking CPD as a mandatory requirement in the registration, renewal of licensure and/or advanced practice and specialist recognition for all registered/licensed pharmacists
(2) Existence of a national/international accreditation system/ body that oversights and monitors the quality of CPD provision
(3) Availability of (online/class-based) certified CPD programmes (gaining CPD credits/points) for continuing education and training in the workplace
(4) Existence of national regulations/requirements for implementing and linking CPD in the registration, and renewal of licensure for all registered/licensed pharmacy technicians and pharmacy support staff
(5) Existence of specialised CPD programmes to meet the minimum competencies and training requirements for community and hospital pharmacists throughout pharmacists' professional journey (early career, advanced practice)
(6) Existence of specialised CPD programmes to support a return to practice after career breaks or sector changes
PDG10: Equity & Equality
(1) Number of female licensed/registered pharmacists
(2) Number of actively practising pharmacists (segmented number by sectors of practice, e.g., community, hospital pharmacists, academia, pharmaceutical science, and other sectors)
(3) Existence of national legislation that ensures equity in opportunities in the workplace
(4) Number of community and hospital pharmacies that ensure equity and equality in the accessibility of patients and populations to quality pharmaceutical services in RURAL and URBAN geographic areas (standardised by population) and health care systems (e.g., both private and public)
(5) Existence of national regulations that ensure equity and equality in the access to pharmacy education and training
PDG11: Impact & Outcomes
(1) Existence of national strategies and systems to measure the impact of the pharmaceutical workforce on the health systems outcomes and health improvement
(2) Existence of evidence-based indicators or metrics to measure and monitor the impact of all pharmaceutical services on health outcomes, quality of life and improved health system efficiency

(3) Existence of national systems that analyse and monitor the impact of all pharmaceutical services in terms of availability and accessibility of services, equity and equitability, and overall sustainability
(4) Existence of evidence-based indicators or metrics to assess and monitor the pharmaceutical science outcomes delivered
(5) Existence of national monitoring and evaluation system that track and measure the performance and progress of the existing educational system and identify needs-based education programmes
PDG12: Pharmacy Intelligence
(1) Availability of a national strategy and system to collate and share pharmaceutical workforce and education data (Pharmacists, pharmaceutical scientists, technicians), including sectors of practice, career stages, age and gender distribution
(2) Availability of a system to collate and share data on pharmaceutical services delivery across different settings (hospital/community, private/public) at a country level
(3) Availability of national strategies and systems to collate, share, and utilise intelligence to develop, deliver, and improve pharmaceutical service provision, e.g., using of frameworks, standards, indicators and metrics for service intelligence
(4) Existence of a national monitoring system to identify workforce trends to enable decision-making on the deployment and supply of pharmaceutical workforce
(5) Availability of country databases and health information systems through collaboration between governments, ministries of health, national statistical offices and registrar generals (with the engagement of other key stakeholders) that are accessible and bring about improvements across the pharmaceutical workforce, practice and science
(6) Availability of a national/international system to utilise data generated in practice and science in pharmaceutical trends assessment and predictions, e.g., demographic evolution, health needs trends, pandemics and other emergencies
PDG13: Policy Development
(1) Existence of national policies and strategies to implement comprehensive needs-based professional development of the pharmaceutical workforce (e.g., pharmaceutical scientists, practitioners, technicians, etc.) across all settings and career stages
(2) Existence of national policies and strategies that apply evidence-based practice to shape and reform pharmacy practice regulations using appropriate tools and frameworks for service implementation, integration and remuneration
(3) Existence of national regulations and policies to ensure delivering interprofessional integrated services across primary, secondary and tertiary care settings
(4) Existence of a national periodic policy review system to assess the effectiveness and validity of the implemented healthcare system policies and regulations in light of the current global health policies and priorities
(5) Existence of national policies and strategies within the health system structure that ensure all people receive pharmaceutical services, including emergency situations
(6) Existence of national strategies and policies that implement science-based assessment in driving national research priorities, medicines regulations, and developing medicinal and medical products
PDG14: Medicines Expertise
(1) Number of qualified pharmacists with the necessary expertise to develop a competent workforce that can deliver quality medicines expertise in initial education and career development
(2) Availability of national competencies framework and training programmes to prepare a workforce that can develop specialised or advanced medicines expertise (i.e. specialist pharmacist and pharmaceutical scientist)
(3) Existence of strategies and systems that support the provision of medicines and medical devices expertise (quality science-based information) and advice to patients, formal and informal caregivers, and health care professionals and stakeholders
(4) Availability of appropriate tools and formal resources to facilitate and support evidence-based pharmacy practice and service delivery, e.g., formularies and medicines information management systems
PDG15: People-centred care
(1) Number of pharmaceutical facilities that provide people-centred care services for all populations (standardised by national population)
(2) Existence of national strategies that utilise people-centred care as an indicator for evaluating health system performance and quality of care, quality assurance in education, and monitoring workforce impact
(3) Existence of a national competency (development) framework across all stages for pharmacists and pharmacy technicians' development (early career and advanced practice) with people-centred care at the core
(4) The subject of "people-centred care" is included as part of the initial education and training curriculum (in universities), including in interprofessional education development
(5) Existence of a national strategic plan for pharmaceutical workforce development to support the delivery of people-centred care in practice, e.g., pharmaceutical workforce match competencies with population, health systems, education development and training, and health labour market needs

(6) Existence of national collaborative strategies that ensure people receive personalised care across primary, secondary and tertiary care settings
(7) Availability of people-centred services that improve the use of medicines and ensure optimal clinical and resource utilisation
(8) Existence of high-quality people-centred primary care as the core of Primary Care and Public Health Services, including pharmacy-delivered population health education; pharmacy-delivered health promotion activities for the population; essential public health functions
(9) Availability of community-based people-centred care services, e.g., screening and monitoring of NCDs and LTCs and their risk factors, symptoms and clinical signs through point-of-care or diagnostic tests
(10) Existence of structured referral systems within people-centred care services that facilitate coordination and continuity of care between different levels of the health system
(11) Existence of national regulations and strategies that ensure delivering professional people-centred care services in RURAL and URBAN geographic areas (standardised by population) and special patient populations with specific needs, e.g., poor and vulnerable, disabilities, and other groups
PDG16: Communicable Diseases
(1) Formal scope of practice within the licencing and/or registration of pharmacists (e.g., provision of pharmacy vaccination services; provision of antimicrobial supervision)
(2) Access to community and hospital pharmacy services indicators (Population measures per capita; urban/rural access etc.)
(3) Specific training/qualifications for managing a community and hospital pharmacy that provides communicable disease services, e.g., vaccination, TB clinic etc
(4) Mandatory quality assurance for community pharmacies (training, functional areas of the pharmacy, handling of stock and preparation of medicines, documentation systems, provision of prescription and non-prescription medicines, monitoring and screening)
(5) Existence of Clinical and Product-focused services aimed at improving the use of medicines
(6) Provision of Primary Care and Public Health Services; pharmacy delivered population health education; pharmacy delivered health promotion activities for the population
(7) Provision of point-of-care or diagnostic tests at the pharmacy
(8) Existence of community pharmacies receiving remuneration by third-party payers for communicable disease services, e.g., vaccination, TB clinic etc
(9) Recent changes in health care provision regulation (e.g., Pandemic response)
(10) Vaccination capacity measures (total vaccinations and vaccinations per pharmacy)
PDG17: Antimicrobial Stewardship
(1) Number of specialist AMS pharmaceutical workforce that provides pharmaceutical services focused on antimicrobial stewardship programme for all population (standardised by national population)
(2) Existence of national policy and guidance that regulate the prescription of Antibiotics in community/hospital pharmacies and the use of antibiotics in livestock production and agriculture
(3) Existence of a national strategic plan and training to support the development of the pharmaceutical workforce with competencies needed for antimicrobial stewardship services delivery, e.g., leadership commitment, pharmacy expertise, tracking, reporting and education
(4) Existence of national competencies framework for antimicrobial stewardship delivery across career stages
(5) Availability of the systems and necessary infrastructures that assist practitioners in delivering antimicrobial stewardship services (community and hospital settings)
(6) Existence of national evidence-based strategies that utilise data and metrics to assess the impact of antimicrobial stewardship services regarding the rational use of antibiotics, improve patient outcomes, reduce microbial resistance
PDG18: Access to medicines, devices, & services
(1) Number of community and hospital pharmacies that provide adequate pharmaceutical services, essential medicines and medical devices for all populations (standardised by national population)
(2) Number of pharmacists (segmented number by community, hospital pharmacists) who deliver pharmaceutical services and essential medicines and medical devices for all population
(3) Number of pharmacy technicians and support workforce who deliver pharmaceutical services and essential medicines and medical devices for all population
(4) Number of community and hospital pharmacies in RURAL and URBAN geographic areas (standardised by population)
(5) Availability of national guidelines or policies concerning access to medicines, pharmaceutical services, & medical devices, including speciality medicines (HIV, cancer, hepatitis C) and contingency plans for shortages of medicines and medical devices
(6) Existence of regulations/laws for prescription or non-prescription medicines that can ONLY be supplied in community/hospital pharmacies
(7) Existence of regulations/laws for non-prescription medicines, e.g., OTC, that can be supplied in non-community pharmacy outlets, or dispensaries

(8) Existence of regulations/laws concerning categories of medicines that can be obtained by patients **online** through local or abroad providers
(9) Existence of policies/laws allowing pharmaceutical wholesalers or manufacturers to deliver certain types of medicines directly to patients' homes
(10) Existence of national guideline or policy concerning the establishment or territorial distribution of new pharmacies to allow equity of access to community pharmacies
PDG19: Patient Safety
(1) Number of the pharmaceutical workforce and facilities that provide pharmaceutical services focused on patient safety improvement for all populations (standardised by national population)
(2) Number of teachers/practitioners employed by institutions to educate and train student pharmacists to enhance patient safety
(3) Inclusion of "patient safety" as part of the initial education and training curriculum (in universities), including in interprofessional education development
(4) Availability of training and sector programmes that ensure the pharmaceutical workforce receives effective education, skills and training in patient safety and medication-related harm reduction across all stages and types of Pharmacy settings
(5) Availability of training and programmes to educate the public about the safe use of medications provided by pharmacists
(6) Existence of national strategies that utilise patient safety as an indicator for evaluating health system performance and quality of care, quality assurance in education, and monitoring workforce impact
(7) Availability of national guidelines or policies concerning patient safety when accessing pharmaceutical services, e.g., use of medical devices and categories of medicines (Online, OTC, prescription & non-prescription medicines), pandemic responses, substandard and falsified medicines
(8) Existence of a national competency (development) framework across all stages for pharmacists and pharmacy technicians' development (early career and advanced practice) with patient safety at the core
(9) Existence of advanced and integrated pharmaceutical services considering patient safety as the core of the provided services to improve/optimise patient safety and prevent patient incidents
PDG20: Digital Health
(1) Existence of an accessible digital infrastructure to enable healthcare delivery of, for example, telemedicine, online health consultations, e-prescriptions, e-patient records, etc.
(2) Existence/access to national "pharmacy practice guidelines" concerning digital healthcare. These 'digital guidelines' might be included within existing 'scopes of pharmacy practice' guidelines, or code of ethics, or competency development frameworks, pharmacy practice standards, etc. This indicator is concerned with pharmacist ACCESS to any form of guidelines for technology-enabled pharmacy practice.
(3) The subject of "digital health" or technology-enabled practice is included as part of the initial education and training curriculum (in universities)
(4) Existence of specific regulations/standards regarding digital health provision (for example, pandemic responses, or manufacturing, or medicines distribution)
(5) Pharmacist access to digitally shared patient health records (or similar) in community settings.
(6) Pharmacist permissions to add or modify relevant data in shared-care patient health records ('editing rights') in community settings.
(7) Use of digital technology in health education and training delivery for pharmacy CPD (for example, CPD online platforms; online delivery of CPD)
(8) Use of digital technology in public/population health promotion activities delivered by pharmacies
(9) Public access to the digitalised or technology-enabled provision of point-of-care or diagnostic tests and other advanced diagnostic services at the pharmacy
PDG21: Sustainability in Pharmacy
(1) Number of pharmacists (segmented number by community, hospital pharmacists) who deliver pharmaceutical services for all population on a sustainable basis
(2) Number of pharmacy technicians and support workforce who deliver pharmaceutical services for all populations on a sustainable basis
(3) Number of community and hospital pharmacies that provide sustainable pharmaceutical services for all population (standardised by national population)
(4) Existence of strategies and policies related to the sustainability of the environment and minimise the impact of pharmaceuticals and pharmacy practice, e.g., appropriate drug disposal and use of medicines
(5) Sustainable workforce: Number of pharmacy graduates and schools/faculties of pharmacy nationally that ensure/maintain supplying pharmacists to the workforce
(6) Existence of a national strategic plan for pharmaceutical workforce development to deliver equitable and sustainable services, e.g., pharmaceutical workforce match competencies with population, health systems, education development, and health labour market needs

(7) Existence of specific regulations/standards to sustain medicines supply and deliver key/essential pharmaceutical care services throughout national health emergency situations.
(8) Existence of policies concerning the establishment (market entry) of new community pharmacies to allow continuous access to medicines and pharmacy services
(9) Existence of a system that shapes the type of model of remuneration, e.g., a single type of statutory or contractual model or third-party payers to remunerate community and hospital pharmacies
(10) Existence of the operating principles of the remuneration models to include the type of remuneration, e.g., margin-based remuneration (linear/regressive/fixed amount), regressive margin-based remuneration (cumulative/non-cumulative) in pharmacy/hospital pharmacies

8.7 Bias and limitations

Only five international experts were recruited to participate in the Delphi method. However, this group advised in the development process of the PDGs framework and has immersed understanding of the drivers and imperatives of this work progress. In qualitative research, the panel quality is more important than the panel number, where five to ten experts are deemed adequate for content validity (Eubank et al., 2016).

A content analysis was conducted to draft the primary pharmacy core indicators list, which is limited by the potential reductionist effect (Graneheim et al., 2017). It is possible that more pharmacy-related indicators are available and not included in the primary list. In order to mitigate this potential effect, a free-text comments option was added to the questionnaire template designed for the wider professional engagement stage (Chapter 9) to allow respondents to add any additional indicators not listed or any missing points.

8.8 Conclusions

The development of proposed PDGs indicators involved a content analysis of the relevant documents followed by a Delphi process to identify and develop potential indicators aligned to the 21 PDGs framework developed in Part 1. This led to the development of 165 unvalidated indicators (21 lists) covering different aspects of each PDG and ready for use in the next stage.

For the next stage (Chapter 9, stage 2), the outcomes of the Delphi method will be presented for wider engagement with international pharmacists working across different sectors and career stages to assess and validate the relevancy and availability/ accessibility of the proposed 21 lists.

Chapter 9: Development of the Global FIP Pharmaceutical Development Goals Indicators Stage 2: Wider Professional Engagement

9.1 Introduction

This chapter will give details of the methodologies followed to achieve the aim and objective of this stage, including study design, sampling and data collection, data analysis method, and the study findings and final outcomes.

This chapter describes the conduct of a global cross-sectional online questionnaire to assess and validate the relevancy and availability of 21 proposed lists of progress indicators mapped to the 21 PDGs framework and developed from the previous stage (Part 2, Stage 1). The findings of this stage will lead to the development of the final list of the global PDGs indicators.

9.2 Aim and objectives

This study (Part 2, Stage 2) of the research project aimed to collect data on global responses to an initial set of global indicators for the PDGs, obtained from the Chapter 8 method and to validate the wider relevancy and availability of these proposed indicators to practice for each PDG.

The objectives of this study were:
1. To validate the relevance of the proposed indicators to measure progress for the relevant PDG from a global perspective (a validity marker).
2. To ensure the availability/accessibility of these proposed indicators in different countries (a validity marker).

9.3 Study design

9.3.1 Sampling strategy and data collection

Global Professional Engagement- Relevancy and availability/accessibility assessment

Part 2, Stage 2 aims to validate the relevancy and availability/accessibility of these proposed indicators to measure developmental progress for each PDG from a global perspective. A cross-sectional survey using an anonymous online questionnaire was designed, using Chapter 8 outputs, and directed at pharmacists working at the direct point of care across all settings and career stages worldwide and global pharmacy leaders. The global pharmacy leaders are representative members from sampled national professional leadership bodies representing differing professional settings (Workforce/education, practice, science). A combination of two sampling techniques was used to fit with purpose: convenience and snowball sampling techniques.

The FIP provided an online platform for open access to 21 digital events, "Setting goals for the decade ahead", aiming to support the PDGs' global and regional implementation and provide insight into the description, direction and context for each PDG (these were held during 2021). The 21-questionnaire links were disseminated at each of these digital events. The Digital events were also live-streamed on social media (Facebook and YouTube), which facilitated and allowed more pharmacists to join the event. In addition, follow-up and invitation emails were sent to attendees of each event and FIP contact lists.

A FIP contact list was also purposively selected to identify and engage global pharmacy leaders with broad experience and knowledge of this work field and the PDGs themselves. After each digital event, the FIP contact list received a follow-up email to fill in the questionnaire.

Data collection

An online questionnaire (Appendix 5) was developed (using Qualtrics SM Software) and validated by experts in the field (the supervisor and the Expert Group). The online questionnaire comprised two pages and contained two main questions. The first page included the introduction, project background/aim, and two demography-related questions. A further section contained a link to direct the participant to the relevant PDG description for information and description (taken from the Transforming Global Pharmacy Handbook), followed by the questionnaire items. The questionnaire was designed to be completed in 5-10 minutes and was in the English language.

The closed-ended question has a twofold purpose. The first is to describe the relevance of each indicator included in the proposed list using the relevance scale *"This indicator is relevant"* or "*This indicator is not relevant*". The second is to evaluate the availability/accessibility of the data indicators in the participant's country using the Likert Scale for likelihood (*Yes/Yes, partially/ No/ I don't know*).

"How do you describe the relevance and availability/accessibility of these proposed indicators in measuring and monitoring progress with Development Goal X?"

The open-ended question aimed to cover any missing potential aspect or indicator that was not mentioned in the proposed list.

"Please add additional indicators (not listed above) that you think will effectively monitor FIP Development Goal X."

During the digital event

During each event, attendees were given informative information describing each PDG content and implementation in different contexts (workforce/education, practice, science) and highlighting the importance of measuring progress by a global panel with expertise in the relevant PDG scope. At the

end of each PDG event, a moderator, one of the "Expert Group", presented a slide with a barcode to invite attendees to fill in the questionnaire and shared the questionnaire link in the chatbox to prompt the response. A pop-up screen was also set up to display at the end of the event, including the questionnaire link. The event structure provided participants with insight into the 21 PDGs and helped them accommodate the questionnaire questions.

After the Digital Event

Automatic follow-up emails were sent out to the FIP-selected list and the attendees only, considering that they had received the necessary knowledge about the goal during the event. The survey link was shared with them to complete the survey questionnaire if they hadn't had the chance to complete it during the Digital Event.

The responders were alerted upon submission if there was an unanswered question by highlighting which questions were not answered to maximise the response rate. Still, the responders were not obliged to fill out the missing values and continue with the submission. Using a pop-up message enhances the possibility of filling out the questionnaires completely.

9.4 Data management

Data handling

Data from the series of global surveys were automatically coded and entered into the SPSS through Qualtrics Software. The data were cleaned manually and reviewed systematically to identify any missing values and errors. For the accuracy of the analysis, missing values were identified.

Data analysis

Data analysis has been conducted concurrently with the data collection to ensure the validity of the method used, optimise the data collection process, and obtain early insight into the outcomes (Schoonenboom & Johnson, 2017).

Collected demographical data were summarised using descriptive analysis (frequencies and percentages). Descriptive analysis was used on the demographical data to give a general idea of the respondents' area of practice, background and countries. Countries were grouped into world regions according to the WHO classification (see results section 9.6.1).

Collected respondents' replies to the questionnaire question regarding indicators' relevancy and availability/accessibility were summarised using descriptive analysis to convert the questionnaire responses to percentages for each PDG. Two selection criteria were set to meet a globally agreed and validated measurable indicator to monitor progress for the PDGs framework. The first criterion is the

indicator's relevancy to the area of practice, and the second is the availability/accessibility of this indicator from a global perspective.

The analysis of this stage was carried out in the following two steps:

1) The relevance of the proposed indicators was assessed by identifying all outlying indicators across the 165 proposed indicators (21 PDGs lists) _Output: generation of a relevant list of indicators to be compared with the availability/accessibility responses.
2) The Availability/Accessibility of the proposed indicators was determined by defining three thresholds (cut-off points) wherein the indicators (using the relevant indicators from step 1) are distributed and then grouping the indicators into lists of three categories (Acceptable/usable indicators, problematic indicators, and rejected indicators).

For Step 1, the analysis process was conducted via the examination of a boxplot chart to determine outliers. The SPSS software was used to detect the potential outliers values (indicators) across the relevant indicators.

For the purpose of analysis of Step 2, the four-point Likert scale used to describe the availability/accessibility of the proposed indicators was **aggregated** into three categories to ensure the results have a meaningful statistical interpretation. Therefore, the "yes" and "yes, partially" ratings were condensed into one category: "Yes", while "No" and "I don't know" ratings remained the same. Therefore, the data were re-coded as "Yes" plus "Yes, partially" = 1, "No" = 2, and "I don't know" = 3. Details of the analysis are given in the result section of this chapter.

9.5 Ethical considerations

FIP gained ethical oversight and approval for the use of data and access to listed experts for this study. The first informative page of the questionnaire stated that participation in this questionnaire is entirely anonymous, and no identifiable data is required. No force responses were used to reply to all questions other than participants' country and area of practice data. The submission of a completed questionnaire implies consent to participate. Access to the data is restricted to the researchers involved in this study, and all data were saved in password-protected electronic files. No incentives were provided to participants.

9.6 Results

9.6.1 Demographic data

Seven hundred and fifty-five participants responded to the 21 online questionnaires from different areas of practice and the six WHO regions. Academic practice accounted for the highest number of

the sample respondents with 32.58% responses, followed by the community (20.66%), hospital (17.75%), industry (6.49%), regulatory affairs (5.17%), and other areas "students, informatics, pharmacovigilance, medicine information, wholesale distributor, healthcare services, healthcare consultant, clinical Biology" with (17.75%) (see table 46).

Table 46: Distribution of responses by area of practice

Area of Practice	Total responses (count) **(N=755)**	Total responses (%)
Academia	246	32.58
Community-based pharmacist	156	20.66
Hospital-based pharmacist	134	17.75
Pharmaceutical industry pharmacist	49	6.49
Regulatory Affairs	39	5.17
Other	131	17.35

Although the relatively small number of responses, the Western Pacific and European regions were the regions with the highest response rates, with 31.52% and 22.91%, respectively. The responses from the other four regions were nearly evenly distributed (see table 47). The distribution of responses per the area of practice and six WHO regions are illustrated for each PDG individually in Appendix 8.

Table 47: Distribution of responses from the different world regions (Six WHO regions)

WHO regions	Total responses (count) **(N=755)**	Total responses (%)
African Region	90	11.92
Region of the Americas	87	11.52
South-East Asia Region	76	10.07
European Region	173	22.91
Eastern Mediterranean Region	91	12.05
Western Pacific Region	238	31.52

9.6.2 Questionnaire responses analysis

The figure below, fig 5, summarises the overall distribution of questionnaire replies in relation to the 21 PDGs events. As shown, the PDG21 (Sustainability in Pharmacy) received the highest number of responses, with 69 respondents, followed by the PDG20 (Digital Health) and PDG17 (Antimicrobial Stewardship), with 58 and 50 respondents, respectively. In comparison, the PDG10 (Equity & Equality) and PDG8 (working with others) received 12 and 19 replies only. Questionnaire responses observed a disparity in the number of replies received for each PDG due to several factors, such as the number of participants who attended each PDG event, PDG attendees' scope of interest, and time suitability for attendees (different time zones).

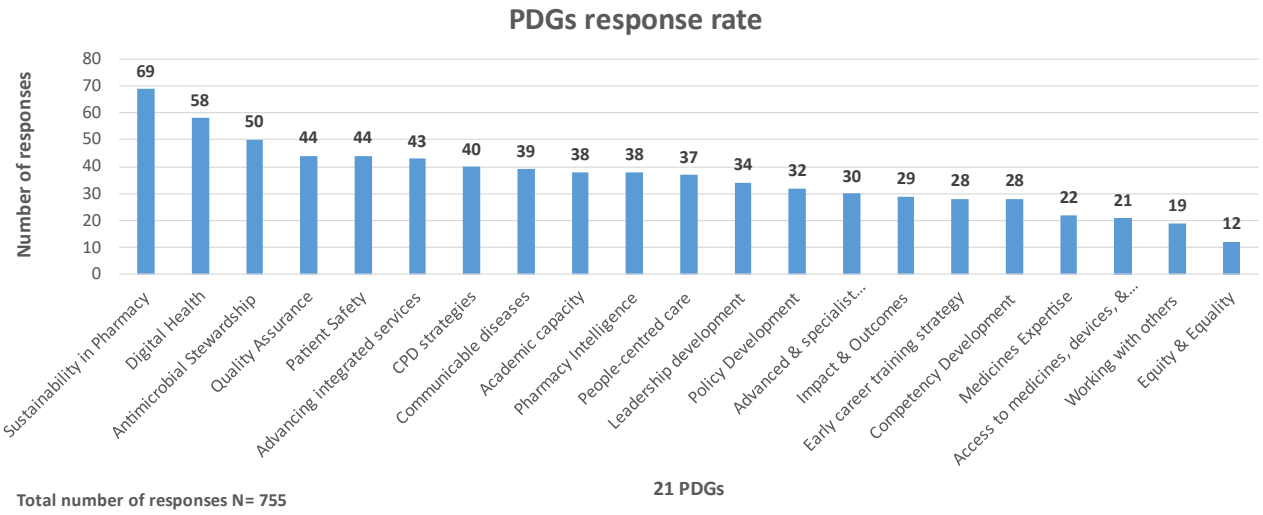


Fig. 5. PDGs indicators - Questionnaire response rate summary.

Indicators' relevancy analysis

A boxplot, descriptive statistic, was used to display the outliers data. The boxplot below, fig 6, shows that 10 PDG indicators were identified out of the range, of which seven were PDG1 indicators, one PDG10 indicator, one PDG16 indicator, and one PDG18 indicator. The diagram demonstrated that the distribution of the outliers was at the low end of the range.

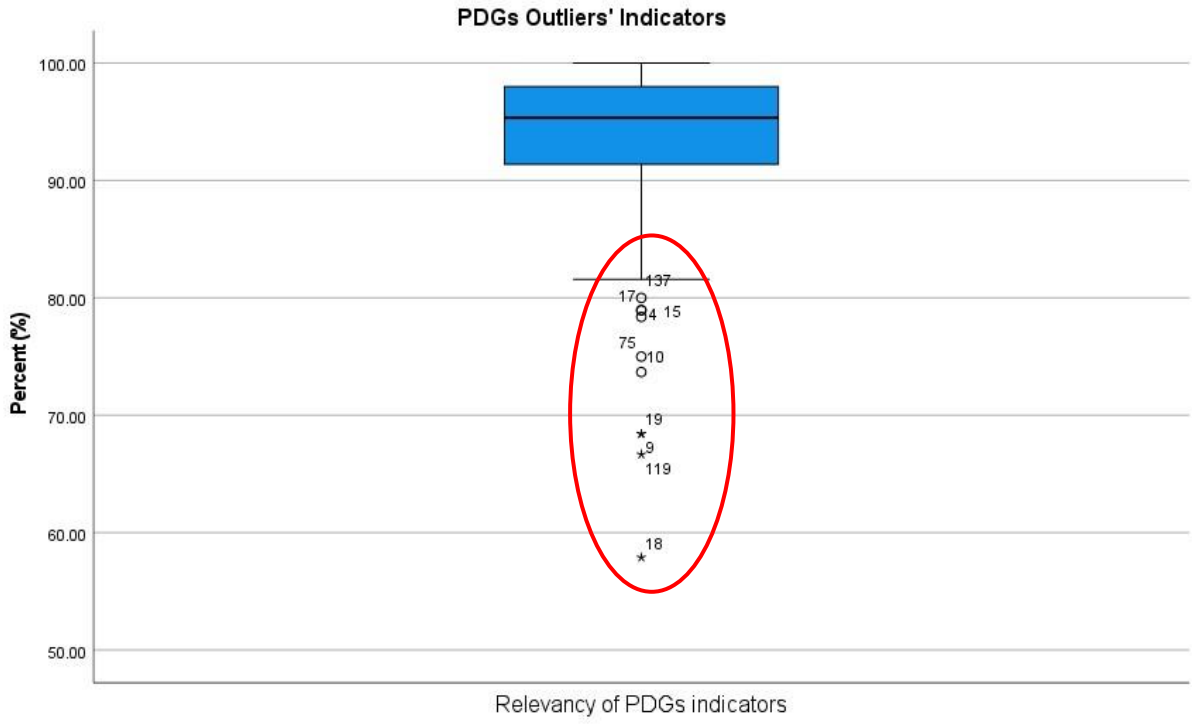


Fig. 6. Identified PDGs outliers' indicators

The **circle** (°) is an indication that an outlier is present in the data. Any data value to be **an outlier** if it lies outside of the following ranges and calculates by the formula:

- 3rd quartile + 1.5*interquartile range
- 1st quartile – 1.5*interquartile range

For this dataset, the interquartile range was calculated by taking the difference between the 75th and 25th percentile in the row labelled **Tukey's Hinges** in the output (table 48).

Table: 48 Determining the interquartile range

Percentiles								
		Percentiles						
		5	10	25	50	75	90	95
Weighted Average (Definition 1)	Relevancy_percent	78.9500	85.7100	91.3050	95.3500	98.0000	100.0000	100.0000
Tukey's Hinges	Relevancy_percent			91.3800	95.3500	98.0000		

The interquartile range is 98 – 91.30 = 6.70. Thus, any values outside of the following ranges would be considered **outliers**:

- 98 + 1.5*6.70 = **108.05**
- 91.30 – 1.5*6.70 = **81.25**

The **asterisk** (*) is an indication that an extreme outlier is present in the data. Any data value to be an **extreme outlier** if it lies outside of the following ranges and calculates by the formula:

* 3rd quartile + 3*interquartile range
* 1st quartile – 3*interquartile range

Thus, any values outside of the following ranges would be considered **extreme outliers**:

* 98 + 3*6.70 = **118.10**
* 91.30 – 3*6.70 = **71.20**

Therefore, the following indicators will be excluded, and the overall proposed list of indicators will be reduced from 165 to 155 and compared with the availability/accessibility of country responses. Table 49 lists the ten indicators whose relevancy values were outside the range calculated using the above formulas. Of note, PDGs' indicators were sequenced from 1 to 165 to facilitate tracking without any prioritisation.

Table 49: Determined Outliers indicators based on the examination of a boxplot chart across all 165 indicators

Indicators no	Indicators description	**Relevancy %**	**PDGs**

4	Institutional use of simulation in initial education & training (IET) curricula.	78.38%	PDG 1
9	Ratio of private/government-funded universities.	68.42%	PDG 1
10	Tuition fee status for student access to pharmacy programmes (e.g. self-funded, government/tax-funded, mixed model).	73.68%	PDG 1
15	Number of local/international academic teachers in pharmacy technician schools/institutions.	78.95%	PDG 1
17	Number of accredited/non-accredited institutions/schools that train and educate pharmacy technicians nationally.	78.95%	PDG 1
18	Ratio of private/government-funded technician training institutions/schools.	57.89%	PDG 1
19	Tuition fee status for access to pharmacy technician training institutions/schools (e.g. self-funded, government/tax-funded, mixed model).	68.42%	PDG 1
75	Number of female licensed/registered pharmacists.	75.00%	PDG 10
119	Existence of community pharmacies receiving remuneration by third-party payers for communicable disease services, e.g. vaccination, TB clinic etc.	66.67%	PDG 16
137	Existence of national guidelines or policies concerning the establishment or territorial distribution of new pharmacies to allow equity of access to community pharmacies.	80.00%	PDG 18

Indicators' availability/accessibility analysis

After identifying all outlying indicators across the 21 PDGs lists, only relevant indicators were compared with the country's responses regarding the indicators' availability/accessibility.

To enable use of different scales or the same scale of different point Likert styles, it required using the following equation[7] to convert the raw mean score to a percentage scale so that the whole availability/accessibility score ranges from 0% to 100% and indicates three thresholds (≥60%, 40-59%, <40%).

The converted data were then classified with percentages indicating the level of performance/usability. This categorisation was used by Liu et al. (2013) and Richardson et al. (2015) in conducting data analysis for two different systematic reviews of 79 studies and adopted for our examination of the data.

Therefore, to generally determine if an indicator is available/accessible at country levels, a cut-off was set, which classified percentages of ≥60% as indicating "Usable" indicators to be included in the

[7] For example, on a 5-point scale which ranged from good to poor, 3.5 was converted to 62.5% computed by [(3.5 _ 1)/ (5 _ 1) _ 100%]. But if a 5-point scale ranging from good to poor, it was reversed, and 3.5 was converted to 37.5% computed by [100% _ (3.5 _ 1)/ (5 _ 1) _ 100%] Liu, Y. E., Norman, I. J., & While, A. E. (2013). Nurses' attitudes towards older people: a systematic review. *Int J Nurs Stud*, *50*(9), 1271-1282. https://doi.org/10.1016/j.ijnurstu.2012.11.021

final list of accepted indicators; 40–59% indicating "Problematic" indicators to be reviewed; and <40% as "Not Usable" indicators to be excluded or rejected.

Figure 7 shows how the indicators, the output list of the relevancy analysis, were distributed under the three thresholds (indicators categorisation), wherein 114 indicators lay under the first category (Usable), 44 indicators lay under the (problematic) category, and seven indicators were rejected.

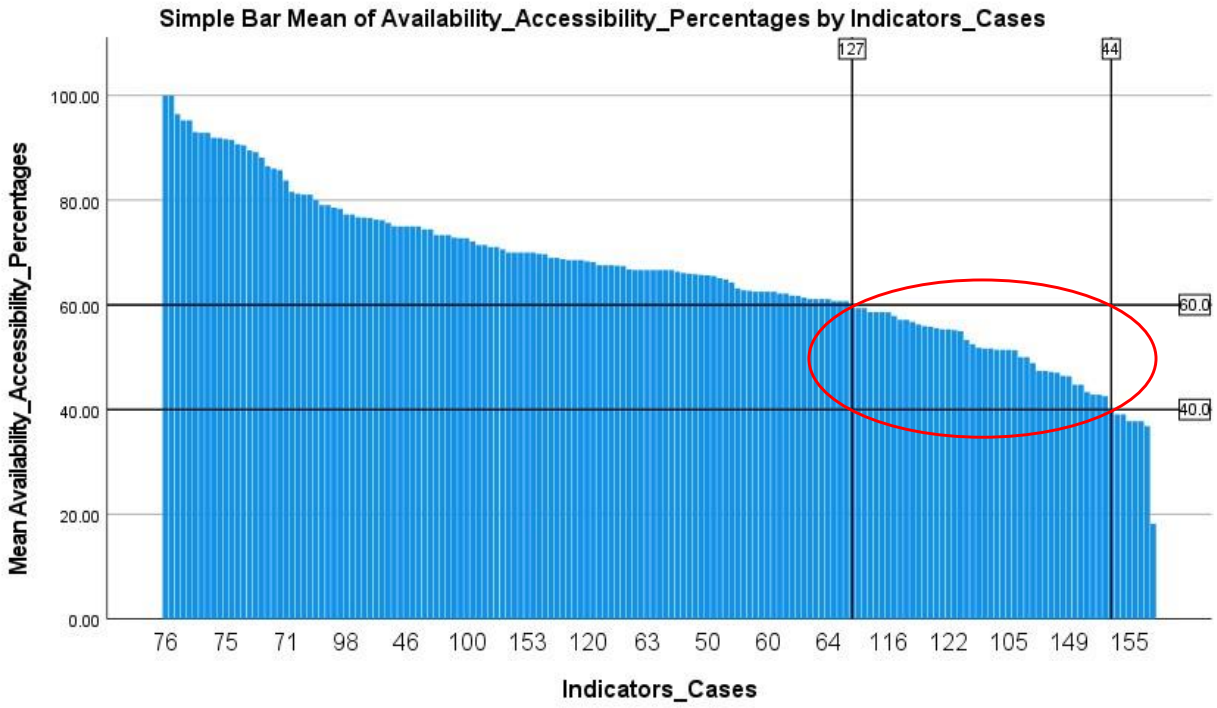


Fig. 7 Setting thresholds (cut-off points) to determine the availability/accessibility performance scale by percentages.

The final number and list of indicators were developed after meeting both criteria for global PDGs indicators and summarised in tables 50 and 51 below.

Table 50: Total number of indicators after meeting both criteria (relevancy & availability/accessibility)

Indicators categorisation	Thresholds range	
Accepted/Usable	≥ 60%	**109** indicators
Problematic	40-59%	**40** indicators
Rejected/Not usable	<40%	**16** indicators

Table 51/a: Generation of the final list of the global PDGs indicators

Accepted/usable indicators (109 indicators)		
Indicator No	**Description**	**PDGs**
1	Number of local/international academic pharmacists and pharmaceutical scientists positions in Faculties/Schools	PDG 1
2	Existence of national or institutional benchmarking tools (e.g., teacher training programmes) or career development programmes for academic pharmacists and pharmaceutical scientists	PDG 1
3	Number of teachers/practitioners (or practice-based supervisors/preceptors/educators) employed by institutions to train student pharmacists	PDG 1
5	Required inclusion of experiential education/training in academic curricula	PDG 1
6	Required inclusion of interprofessional and interdisciplinary education and training structures in IET curricula	PDG 1
7	Number of pharmacy graduates nationally (national graduate supply)	PDG 1
8	Number of accredited/non-accredited schools of pharmacy nationally	PDG 1
12	Salary comparisons of academics with private/government/commercial pharmacy sectors	PDG 1
13	Minimum period of pharmaceutical science internship programmes (if any)	PDG 1
14	Minimum period of practice training/clinical internship pre-licensing (pre-registration) programmes	PDG 1
16	Number of pharmacy technicians graduating or registering nationally	PDG 1
20	Number of local/international pharmacy graduates/ new registrants (National/International graduate supply)	PDG 2
21	Number of newly licensed/registered pharmacists (segmented number by community, hospital pharmacists) who deliver pharmaceutical services for all population	PDG 2
22	Number of newly licensed/registered pharmacy technicians (segmented number by community, hospital pharmacists) who deliver pharmaceutical services for all population	PDG 2
23	Existence of national regulations and standards for licensing or registration of pharmacy graduates/new registrants	PDG 2
24	Existence of national mandatory standards and requirements that ensure maintaining licence for all early career post-registered/licensed pharmacists, e.g., gaining CPD credits, portfolio, training programmes	PDG 2
25	Availability of national strategies and mentoring programmes to monitor early-career practitioners' development towards advanced practice (including clinical practice and pharmaceutical science areas across the pharmaceutical workforce), e.g., CPD, frameworks, recognition & certification, education & training programmes	PDG 2
26	Existence of a national competency (development) framework for newly registered or early career pharmacists & pharmaceutical scientists	PDG 2
27	Existence of national regulations and standards for licensing or registration of pharmacy technicians graduates/new registrants	PDG 2
29	Availability of formal scope of practice within the licencing and/or registration of newly licensed/registered pharmacists, e.g., provision of different pharmacy services in pharmacy/hospital settings	PDG 2
31	Availability of specific training/qualifications for early career pharmacists for managing a community and hospital pharmacy that provides pharmaceutical services	PDG 2
32	Existence of national regulations & policies that ensure the quality assurance of the academic and institutional infrastructures to deliver the required needs and competency-based education and training	PDG 3
33	Existence of national needs-based guidance for quality assurance of pharmacy and pharmaceutical science education and training throughout initial education and career development (advanced practice/specialisation)	PDG 3
34	Existence of professional standards of practice and required competencies for maintenance of licensing and/or registration of the pharmaceutical workforce across all sectors	PDG 3
35	Existence of national pharmacy practice standards or guidelines for measuring the quality of service provision in the healthcare system. These 'quality standards/guidelines' might be	PDG 3

	included within existing 'scopes of pharmacy practice' guidelines, code of ethics, competency development frameworks, pharmacy practice standards, policy development etc.	
36	Existence of evidence-based performance indicators to assess and monitor the applied pharmacy practice against the existing national standards, e.g., audit systems, patient feedback, health outcomes research, cost-effectiveness measures etc.	PDG 3
37	Availability of guidance documents & tools defining quality assurance criteria for various pharmaceutical sciences areas to assure access to safe and effective medical products	PDG 3
38	Existence of national regulatory requirements for advanced practitioners and specialists to provide advanced services	PDG 4
39	Existence of a national competency (development) framework for advanced & specialist scope of practice for pharmacists' career development beyond the early career/foundation level	PDG 4
41	Existence of advanced services with standards and/or guidelines for the development and delivery of these services at the practice site (community, hospital)	PDG 4
42	Availability of the necessary infrastructures that assist practitioners in the development of advanced and/or specialist practice, e.g., CPD, residency training, board certification, sector-specific programmes, etc	PDG 4
43	Availability of a national professional recognition system that recognises advanced practice and or specialisation	PDG 4
45	Institutional use of competency-based education (or learning) approach as a framework for teaching and assessment of learning	PDG 5
46	Existence of national evidence-based development frameworks describing competencies needed for the pharmaceutical workforce (pharmacists, technicians, pharmaceutical scientists, etc.) for all stages and settings of professional career	PDG 5
50	Availability of national strategies and programmes (including tools and mentoring systems) that develop professional leadership skills, including clinical and executive leadership, scientific leadership and initial education and training for all stages of career development in the workplace	PDG 6
52	Required inclusion of leadership development training and programmes as part of the initial education and training curriculum that develop professional leadership skills (in universities)	PDG 6
54	Existence of national practice guidelines and quality standards to measure health care outcomes provided by integrated pharmaceutical services	PDG 7
56	Availability of people-centred integrated services that optimise the use of medicines and achieve the optimal clinical, humanistic, economic and sustainable health care outcomes	PDG 7
57	Existence of advanced and integrated people-centred care as the core of Primary Care and Public Health Services, e.g., patient education & health promotion, long-term condition management, Medicines Use Reviews, point-of-care or diagnostic tests etc	PDG 7
58	Number of community and hospital pharmacies that provide integrated pharmaceutical services for all population (standardised by national population), including emergency situations	PDG 7
59	Existence of systematic and integrated development of education and training based on population needs and social determinants of health for pharmaceutical workforce development, including pharmacists, educators, & trainers	PDG 7
60	Existence of clear strategies and procedures to facilitate delivery of integrated and needs-based pharmaceutical care services in practice and across all health care setting	PDG 7
61	Existence of national guidelines or policies that ensure all people have access to advanced pharmaceutical care services	PDG 7
62	Inclusion of the interprofessional education (IPE) approach in the initial education and training curriculum (in universities)	PDG 8
63	Existence of national education and training strategies to ensure intra- and interprofessional collaboration within the pharmaceutical workforce and other healthcare professionals across all levels of care (primary, secondary and tertiary care settings) with the focus on patient care at the core	PDG 8
64	Existence of health care structures and facilities that facilitate interprofessional collaboration and ensure continuity of care between levels of care, e.g., collaborative management of LTCs, health data exchange, digital interfaces etc	PDG 8
65	Existence of national strategies that recognise members of the pharmaceutical workforce as integral members of the multidisciplinary team, enabling collaborative practice and integrated care	PDG 8

66	Existence of national strategies to actively empower patients in their own care and to engage with their multidisciplinary care team thereby taking an active part in decision making about their car	PDG 8
67	Existence of national strategies that utilise collaborative practice as a quality indicator for care delivery and capacity improvement	PDG 8
68	Availability of intra- and interdisciplinary programmes to facilitate collaboration between pharmaceutical scientists and clinical practitioners in associated fields	PDG 8
69	Existence of national regulations for implementing and linking CPD as a mandatory requirement in the registration, renewal of licensure and/or advanced practice and specialist recognition for all registered/licensed pharmacists	PDG 9
70	Existence of a national/international accreditation system/ body that oversights and monitors the quality of CPD provision	PDG 9
71	Availability of (online/class-based) certified CPD programmes (gaining CPD' credits/points) for continuing education and training in the workplace	PDG 9
72	Existence of national regulations/requirements for implementing and linking CPD in the registration, renewal of licensure for all registered/licensed pharmacy technicians and pharmacy support staff	PDG 9
73	Existence of specialised CPD programmes to meet the minimum competencies and training requirements for community and hospital pharmacists throughout pharmacists' professional journey (early career, advanced practice)	PDG 9
76	Number of actively practising pharmacists (segmented number by sectors of practice, e.g., community, hospital pharmacists, academia, pharmaceutical science, and other sectors)	PDG 10
77	Existence of national legislation that ensures equity in opportunities in the workplace	PDG 10
79	Existence of national regulations that ensure equity and equality in the access to pharmacy education and training	PDG 10
81	Existence of evidence-based indicators or metrics to measure and monitor the impact of all pharmaceutical services on health outcomes, quality of life and improved health system efficiency	PDG 11
85	Availability of a national strategy and system to collate and share pharmaceutical workforce and education data (Pharmacists, pharmaceutical scientists, technicians), including sectors of practice, career stages, age and gender distribution	PDG 12
91	Existence of national policies and strategies to implement comprehensive needs-based professional development of the pharmaceutical workforce (e.g., pharmaceutical scientists, practitioners, technicians, etc.) across all settings and career stages	PDG 13
92	Existence of national policies and strategies that apply evidence-based practice to shape and reform pharmacy practice regulations using appropriate tools and frameworks for service implementation, integration, and remuneration.	PDG 13
93	Existence of national regulations and policies to ensure delivering interprofessional integrated services across primary, secondary and tertiary care settings	PDG 13
95	Existence of national policies and strategies within the health system structure that ensure all people receive pharmaceutical services, including emergency situations	PDG 13
96	Existence of national strategies and policies that implement science-based assessment in driving national research priorities, medicines regulations, and developing medicinal and medical products	PDG 13
97	Number of qualified pharmacists with the necessary expertise to develop a competent workforce that can deliver quality medicines expertise in initial education and career development	PDG 14
98	Availability of national competencies framework and training programmes to prepare a workforce that can develop specialised or advanced medicines expertise (i.e., specialist pharmacist and pharmaceutical scientist)	PDG 14
99	Existence of strategies and systems that support the provision of medicines and medical devices expertise (quality science-based information) and advice to patients, formal and informal caregivers, and healthcare professionals and stakeholders	PDG 14
100	Availability of appropriate tools and formal resources to facilitate and support evidence-based pharmacy practice and service delivery, e.g., formularies and medicines information management systems	PDG 14
101	Number of pharmaceutical facilities that provide people-centred care services for all populations (standardised by national population)	PDG 15
102	Existence of national strategies that utilise people-centred care as an indicator for evaluating health system performance and quality of care, quality assurance in education, and monitoring workforce impact	PDG 15

103	Existence of a national competency (development) framework across all stages for pharmacists and pharmacy technicians' development (early career and advanced practice) with people-centred care at the core	PDG 15
104	The subject of "people-centred care" is included as part of the initial education and training curriculum (in universities), including in interprofessional education development	PDG 15
107	Availability of people-centred services that improve the use of medicines and ensure optimal clinical and resource utilisation	PDG 15
108	Existence of high-quality people-centred primary care as the core of Primary Care and Public Health Services, including pharmacy delivered population health education; pharmacy delivered health promotion activities for the population, essential public health functions	PDG 15
109	Availability of community-based people-centred care services, e.g., screening and monitoring of NCDs and LTCs and their risk factors, symptoms and clinical signs through point-of-care or diagnostic tests	PDG 15
113	Access to community and hospital pharmacy services indicators (Population measures per capita; urban/rural access etc.)	PDG 16
115	Mandatory quality assurance for community pharmacies (training, functional areas of the pharmacy, handling of stock and preparation of medicines, documentation systems, provision of prescription and non-prescription medicines, monitoring and screening)	PDG 16
120	Recent changes in health care provision regulation (e.g., Pandemic response)	PDG 16
123	Existence of national policy and guidance that regulate the prescription of Antibiotics in community/hospital pharmacies and the use of antibiotics in livestock production and agriculture	PDG 17
124	Existence of a national strategic plan and training to support developing the pharmaceutical workforce with competencies needed for antimicrobial stewardship services delivery, e.g., leadership commitment, pharmacy expertise, tracking, reporting and education	PDG 17
128	Number of community and hospital pharmacies that provide adequate pharmaceutical services, essential medicines and medical devices for all populations (standardised by national population)	PDG 18
129	Number of pharmacists (segmented number by community, hospital pharmacists) who deliver pharmaceutical services and essential medicines and medical devices for all population	PDG 18
130	Number of pharmacy technicians and support workforce who deliver pharmaceutical services and essential medicines and medical devices for all population	PDG 18
131	Number of community and hospital pharmacies in RURAL and URBAN geographic areas (standardised by population)	PDG 18
132	Availability of national guidelines or policies concerning access to medicines, pharmaceutical services, & medical devices, including speciality medicines (HIV, cancer, hepatitis C) and contingency plans for shortages of medicines and medical devices	PDG 18
133	Existence of regulations/laws for prescription or non-prescription medicines that can ONLY be supplied in community/hospital pharmacies	PDG 18
134	Existence of regulations/laws for non-prescription medicines, e.g., OTC, that can be supplied in non-community pharmacy outlets, or dispensaries	PDG 18
135	Existence of regulations/laws concerning categories of medicines that can be obtained by patients online through local or abroad providers	PDG 18
138	Number of the pharmaceutical workforce and facilities that provide pharmaceutical services focused on patient safety improvement for all populations (standardised by national population)	PDG 19
139	Number of teachers/practitioners employed by institutions to educate and train student pharmacists to enhance patient safety	PDG 19
140	Inclusion of "patient safety" as part of the initial education and training curriculum (in universities), including in interprofessional education development	PDG 19
141	Availability of training and sector programmes that ensure the pharmaceutical workforce receives effective education, skills and training in patient safety and medication-related harm reduction across all stages and types of Pharmacy settings	PDG 19
142	Availability of training and programmes to educate the public about the safe use of medications provided by pharmacists	PDG 19
143	Existence of national strategies that utilise patient safety as an indicator for evaluating health system performance and quality of care, quality assurance in education, and monitoring workforce impact	PDG 19

144	Availability of national guidelines or policies concerning patient safety when accessing pharmaceutical services, e.g., use of medical devices and categories of medicines (Online, OTC, prescription & non-prescription medicines), pandemic responses, substandard and falsified medicines	PDG 19
145	Existence of a national competency (development) framework across all stages for pharmacists and pharmacy technicians' development (early career and advanced practice) with patient safety at the core	PDG 19
147	Existence of an accessible digital infrastructure to enable healthcare delivery of, for example, telemedicine, online health consultations, e-prescriptions, e-patient records, etc.	PDG 20
153	Use of digital technology in health education and training delivery for pharmacy CPD (for example CPD online platforms; online delivery of CPD)	PDG 20
156	Number of pharmacists (segmented number by community, hospital pharmacists) who deliver pharmaceutical services for all population on a sustainable basis	PDG 21
157	Number of pharmacy technicians and support workforce who deliver pharmaceutical services for all populations on a sustainable basis	PDG 21
158	Number of community and hospital pharmacies that provide sustainable pharmaceutical services for all population (standardised by national population)	PDG 21
159	Existence of strategies and policies related to the sustainability of the environment and minimise the impact of pharmaceuticals and pharmacy practice, e.g., appropriate drug disposal and use of medicines	PDG 21
160	Sustainable workforce: Number of pharmacy graduates and schools/faculties of pharmacy nationally that ensure/maintain supplying pharmacists to the workforce	PDG 21
161	Existence of a national strategic plan for pharmaceutical workforce development to deliver equitable and sustainable services, e.g., pharmaceutical workforce match competencies with population, health systems, education development, and health labour market needs	PDG 21
162	Existence of specific regulations/standards to sustain medicines supply and deliver key/essential pharmaceutical care services throughout national health emergency situations.	PDG 21
163	Existence of policies concerning the establishment (market entry) of new community pharmacies to allow continuous access to medicines and pharmacy services	PDG 21
164	Existence of a system that shapes the type of model of remuneration, e.g., a single type of statutory or contractual model or third-party payers to remunerate community and hospital pharmacies	PDG 21
165	Existence of the operating principles of the remuneration models to include the type of remuneration, e.g., margin-based remuneration (linear/regressive/fixed amount), regressive margin-based remuneration (cumulative/non-cumulative) in pharmacy/hospital pharmacies	PDG 21

Table 51/b: Generation of the final list of the global PDGs indicators

Problematic indicators (40 indicators)		
Indicator No	**Description**	**PDGs**
11	Academic staff vacancy rates in the academic sector vs other pharmacy sectors	PDG 1
28	Existence of a national competency (development) framework for newly registered or early career pharmacy technicians (or pharmacy support staff)	PDG 2
30	Availability of formal scope of practice within the licencing and/or registration of newly licensed/registered pharmacy technicians, e.g. provision of different pharmacy services in pharmacy/hospital settings	PDG 2
40	Existence of a national strategic plan for pharmaceutical workforce development to support the development of the competency and capability of an advanced and expert pharmacists in all sectors	PDG 4
44	Availability of an agreed definition of "advanced" and "specialist" practice	PDG 4
47	Existence of national evidence-based development frameworks that establish a clear link between foundation practice and advanced practice	PDG 5
48	Existence of national evidence-based competency frameworks for practitioners describing advanced competencies linked to professional services delivered in practice, such as MUR, NCD/LTCs, vaccination, compounding etc	PDG 5
49	Existence of national strategies and training to develop service-led competencies that provide additional new competencies to the pharmaceutical workforce through courses and programmes, certifications, CPDs	PDG 5

51	Existence of a national competency (development) framework across all stages for pharmacists and pharmacy technicians' development (early career and advanced practice) with leadership development at the core	PDG 6
53	Existence of a national strategic plan for pharmaceutical workforce development to support the development of the leadership skills needed, e.g. professional autonomy and decision-making, effective communication and teamwork, as well as for economic and environmental impacts	PDG 6
55	Availability of a system for designing, delivering and evaluating advanced services in different levels of the health system, including urgent and emergency care services	PDG 7
74	Existence of specialised CPD programmes to support a return to practice after career breaks or sector changes	PDG 9
80	Existence of national strategies and systems to measure the impact of the pharmaceutical workforce on the health systems outcomes and health improvement	PDG 11
82	Existence of national systems that analyse and monitor the impact of all pharmaceutical services in terms of availability and accessibility of services, equity and equitability, and overall sustainability	PDG 11
83	Existence of evidence-based indicators or metrics to assess and monitor the pharmaceutical science outcomes delivered	PDG 11
84	Existence of national monitoring and evaluation system that track and measure the performance and progress of the existing educational system and identify needs-based education programme	PDG 11
86	Availability of a system to collate and share data on pharmaceutical services delivery across different settings (hospital/community, private/public) at a country level	PDG 12
87	Availability of national strategies and systems to collate, share, and utilise intelligence to develop, deliver, and improve pharmaceutical service provision, e.g., using of frameworks, standards, indicators and metrics for service intelligence	PDG 12
88	Existence of a national monitoring system to identify workforce trends to enable decision making on the deployment and supply of pharmaceutical workforce	PDG 12
89	Availability of country databases and health information systems through collaboration between governments, ministries of health, national statistical offices and registrar generals (with the engagement of other key stakeholders) that are accessible and bring about improvements across the pharmaceutical workforce, practice and science	PDG 12
94	Existence of a national periodic policy review system to assess the effectiveness and validity of the implemented healthcare system policies and regulations in light of the current global health policies and priorities	PDG 13
105	Existence of a national strategic plan for pharmaceutical workforce development to support the delivery of people-centred care in practice, e.g., pharmaceutical workforce match competencies with population, health systems, education development and training, and health labour market needs	PDG 15
106	Existence of national collaborative strategies that ensure people receive personalised care across primary, secondary and tertiary care settings	PDG 15
110	Existence of structured referral systems within people-centred care services that facilitate coordination and continuity of care between different levels of the health system	PDG 15
111	Existence of national regulations and strategies that ensure delivering professional people-centred care services in RURAL and URBAN geographic areas (standardised by population) and special patient populations with specific needs, e.g., poor and vulnerable, disabilities, and other groups	PDG 15
112	Formal scope of practice within the licencing and/or registration of pharmacists (e.g., provision of pharmacy vaccination services; provision of antimicrobial supervision)	PDG 16
114	Specific training/qualifications for managing a community and hospital pharmacy that provides communicable disease services, e.g. vaccination, TB clinic etc	PDG 16
116	Existence of Clinical and Product-focused services aimed at improving the use of medicines	PDG 16
117	Provision of Primary Care and Public Health Services; pharmacy delivered population health education; pharmacy delivered health promotion activities for the population	PDG 16
118	Provision of point-of-care or diagnostic tests at the pharmacy	PDG 16
121	Vaccination capacity measures (total vaccinations and vaccinations per pharmacy)	PDG 16
122	Number of specialist AMS pharmaceutical workforce that provides pharmaceutical services focused on antimicrobial stewardship programme for all population (standardised by national population)	PDG 17

125	Existence of national competencies framework for antimicrobial stewardship delivery across career stages	PDG 17
126	Availability of the systems and necessary infrastructures that assist practitioners in delivering antimicrobial stewardship services (community and hospital settings)	PDG 17
127	Existence of national evidence-based strategies that utilise data and metrics to assess the impact of antimicrobial stewardship services regarding the rational use of antibiotics, improve patient outcomes, reduce microbial resistance	PDG 17
136	Existence of policies/laws allowing pharmaceutical wholesalers or manufacturers to deliver certain types of medicines directly to patients' homes	PDG 18
146	Existence of advanced and integrated pharmaceutical services considering patient safety as the core of the provided services to improve/optimise patient safety and prevent patient incidents	PDG 19
148	Existence/access to national "pharmacy practice guidelines" concerning digital healthcare. These 'digital guidelines' might be included within existing 'scopes of pharmacy practice' guidelines, or code of ethics, or competency development frameworks, pharmacy practice standards, etc. This indicator is concerned with pharmacist ACCESS to any form of guidelines for technology-enabled pharmacy practice.	PDG 20
149	The subject of "digital health" or technology-enabled practice is included as part of the initial education and training curriculum (in universities)	PDG 20
151	Pharmacist access to digitally shared patient health records (or similar) in community settings.	PDG 20

Table 51/c: Generation of the final list of the global PDGs indicators

Rejected/not used indicators (16 indicators)		
Indicator No	**Description**	**PDGs**
4	Institutional use of simulation in initial education & training (IET) curricula	PDG 1
9	Ratio of private/government-funded universities	PDG 1
10	Tuition fee status for student access to pharmacy programmes (e.g., self-funded, government/tax-funded, mixed model)	PDG 1
15	Number of local/international academic teachers in pharmacy technician schools/institutions	PDG 1
17	Number of accredited/non-accredited institutions/schools that train and educate pharmacy technicians nationally	PDG 1
18	Ratio of private/government-funded technician training institutions/schools	PDG 1
19	Tuition fee status for access to pharmacy technician training institutions/schools (e.g., self-funded, government/tax-funded, mixed model)	PDG 1
75	Number of female licensed/registered pharmacists	PDG 10
78	Number of community and hospital pharmacies that ensure equity and equality in the accessibility of patients and populations to quality pharmaceutical services in RURAL and URBAN geographic areas (standardised by population) and health care systems (e.g., both private and public)	PDG 10
90	Availability of a national/international system to utilise data generated in practice and science in pharmaceutical trends assessment and predictions, e.g., demographic evolution, health needs trends, pandemics and other emergencies	PDG 12
119	Existence of community pharmacies receiving remuneration by third-party payers for communicable disease services, e.g., vaccination, TB clinic etc	PDG 16
137	Existence of national guidelines or policies concerning the establishment or territorial distribution of new pharmacies to allow equity of access to community pharmacies	PDG 18
150	Existence of specific regulations/standards regarding digital health provision (for example, pandemic responses, or manufacturing, or medicines distribution)	PDG 20
152	Pharmacist permissions to add or modify relevant data in shared-care patient health records ('editing rights') in community settings.	PDG 20
154	Use of digital technology in public/population health promotion activities delivered by pharmacies	PDG 20
155	Public access to the digitalised or technology-enabled provision of point-of-care or diagnostic tests and other advanced diagnostic services at the pharmacy	PDG 20

9.6.3 Evidence from the respondents from the online questionnaire

Each of the online questionnaires included a commentary box to allow participants to share their views, make any comments, or provide suggestions or missing points. The overall collected remarks were positive and reflective of the questionnaire's aim, which helped validate the proposed indicators across different cultures, practice sectors, and career stages. Some examples of the comments added which demonstrated the above are (see table 52):

Table 52: Respondents' commentary boxes answers (Positive comments)

PDG1: ***"All points are well covered."***
PDG2: ***"These indicators are indeed already relevant even if not really implemented nationally."***
PDG3: ***"Enough and very good."***
PDG4: ***"As Pharmacist in Academia, these indicators are relevant, and most of them are available in my country".***
PDG5: ***"Enough and very good."***
PDG6: ***"All proposed indicators questions are prepared wisely."***
PDG7: ***"All good, nothing I can think of at this moment."***
PDG8: ***"a high-quality project."***
PDG9: ***"I HAVE NO MORE IDEA, HONESTLY. It's alright."***
PDG10: ***"I think you have addressed many pharmacy aspects".***
PDG11: ***"Unfortunately, although many strategies related to impact, outcomes and indicators were suggested to relevant authorities, they have not been adopted."***
PDG12: ***"Nothing to add; very good."***
PDG13: ***"Entire list of INDICATORS seems highly relevant, but I am not sure about the accessibility".***
PDG14: ***"Many aspects already covered."***
PDG15: ***"I do not use these indicators in my current workplace, but I believe they are all relevant to the practice".***
PDG16: ***"No more indicators that I know; all good."***
PDG17: ***"Should monitor all the suggested indicators as often as possible."***
PDG18: ***"I think the key issue for some of these indicators is not whether there are laws allowing something to happen, but whether the services actually exist."***
PDG19: ***"These are all good indicators of process and structure."***
PDG20: ***"The vast majority of the proposed indicators relate and are relevant to the process of the "monitoring of the progress/process".***
PDG21: ***"I think all indicators have already been listed and discussed".***

Specific comments were also suggested for improvement purposes, focusing more on the pharmaceutical science aspect, incentive programmes for pharmacy services, innovation and technology, and strategic management plans. The commentaries were received from different regions and work sectors (including developed and developing countries), which reflect the perspective and needs of the responders in their areas. Some examples of the comments added which demonstrated the above are (see table 53):

Table 53: Respondents' commentary boxes answers (Specific comments)

*PDG1: **"Research grant statistics in furthering academia in pharmacy."***
*PDG2: **"It would be good to include numbers of pharmaceutical scientists in 1. In item 2, why is the focus on the hospital and community? Services are provided from other sectors, including industry and regulators".***
*PDG3: **"Skill development could be one of the indicators, and training of implementers could be another one".***
*PDG4: **"I would spilt "advanced" and "specialist" in all questions. Using Australia as an example, these questions cannot easily be answered because the two are entirely different, and we have different answers for each."***
*PDG5: **"None"***
*PDG6: **"Other plans for pharmaceutical leadership skill improvement such as innovation and strategical management for the flexible workforce."***
*PDG7: **"Integrate services should also refer to other healthcare professionals, such as nurses, physicians or social workers".***
*PDG8: **"None"***
*PDG9: **"I don't see anything here that is relevant to CPD for pharmaceutical scientists."***
*PDG10:**" Female numbers should not be prioritised over other types of equity measurements. All factors refer only to pharmacists, whereas pharmaceutical science needs to be considered as well".***
*PDG11: **"Intra network connection between pharmacies".***
*PDG12: **"There is duplication in some aspects of a number of these indicators. No one has time or resources for excessive and duplicated work. I suggest rationalisation or at least some prioritisation".***
*PDG13: **"Incentives for integration of care between healthcare professionals (is proven vital for the implementations of pharmacy services)."***
*PDG14: **"Existence of lectures on clinical development, data generation through products' lifecycle incl. how to read study reports within the curriculum".***
*PDG15: **"A key indicator you need to have is whether there is government funding for non-dispensing services for services provided by a pharmacist workforce. The wording needs to move away from community pharmacy and towards independent pharmacist practice - whether based in community pharmacy, primary care team, vaccinator team or private practice. People-centred care needs to be funded as an identifiable activity. That is the only way it can be monitored and measured for value and medicines optimisation as well as decreasing the risk of harm from medicine use. Another key indicator is measuring preventable and non-preventable harm caused by medicines: this is important to identify hotspots of harm which can be prevented".***
*PDG16: **"Alignment of national regulations with international regulations and standards (e.g. pandemics)."***
*PDG17: **"Establish a system to supervise charges in the public health units on antimicrobials and what they are prescribed for".***
*PDG18: **"Some of the indicators are objective, e.g. a number. What is urban and what is rural differs from country to country perception, and what is the international perspective?"***
*PDG19: **"Medication Errors occurrence and reporting".***
*PDG20: **"Although we should beware of having too many indicators per goal, it would be good here to have something related to digital support for new products/medical devices to encourage manufacturers to work with healthcare providers to improve the use of medical interventions/treatments".***

PDG21: ***"Clear ways to regulate and monitor the influence of marketing interests in the commercial strategies of community pharmacies. 2. Ways of regulating and monitoring compliance with ethical principles in the pharmaceutical market".***

9.6.4 Alignment of the Global Pharmaceutical Development Goals framework to the initially generated PDGs indicators

As a second dimension, the indicators have been developed in alignment with the FIP Pharmaceutical Development Goals (FIP DGs) framework and measured progress across the framework's three principal areas of development (Pharmaceutical practice, science, and workforce/education) (International Pharmaceutical Federation, 2020a). Therefore, an additional matrix coding approach was adopted to cluster and categorise indicators within this dimension, using Heat maps and cross-tabulation methods.

For further validation purposes, the set of the global PDG indicators required an independent coding of the initially developed indicators in (Chapter 8) by two coders (the researcher and external expert coder). Both coders mapped (deductively) the proposed 165 indicators under the three pre-determined elements of the PDGs framework (Workforce/Education, Practice, Science). Also, they identified (inductively) **five** emerged sub-categories (themes) across the indicators where the indicators might be grouped/categorised under these sub-categories. Qualitative data analysis software (NVivo) was used to aid the data management and coding process.

The inductive coding process produced five emerged themes: demography; and/or impact; and/or pharmaceutical services & facilities; and/or policies & regulatory systems; and/or training & professional development (table 54).

Table 54: Emerging themes from the initial proposed list of indicators

Agreed (emerged themes)	Description
Demography	Data expressed as numbers, e.g. number of pharmacists/pharmacies, pharmaceutical facilities available (universities, services)
Impact	Provision of Pharmaceutical services that support better health care and outcomes
Pharmaceutical services & facilities	Focus on the availability of pharmaceutical services, facilities & infrastructures needed
Policies & regulatory systems	Regulations and strategies as drivers to shape the structure of the system and benefit populations
Training & professional development	Focus on developing competencies and skills across all sectors and career stages

A kappa test was performed to assess the agreement level between the two coders, a measurement of the extent to which data coders assign the same code to the same variables independently. The test has a standardised value, and the result be interpreted as follows: values ≤ 0 indicating no agreement

and 0.01–0.20 as none to slight, 0.21–0.40 as fair, 0.41– 0.60 as moderate, 0.61–0.80 as substantial or good, and 0.81–1.00 as almost perfect agreement (McHugh, 2012; Vanbelle, 2017).

Level of agreement associated with the PDGs framework "Workforce/Education" element and the five emerged themes

The Kappa test was carried out to assess the two coders' agreement level in terms of mapping the initial 165 developed indicators to the PDGs framework (workforce/Education W/E) element against the **five** emerged themes. Out of 165, **80** indicators were mapped under the W/E element and the agreed themes. The Kappa value was 0.828, which indicates a high level of agreement between the two coders across the assigned variables (see table 55).

Table 55: Agreement level of PDGs framework "workforce/education" element and the emerged themes

Workforce/ Education	Demography	Impact	Policies & regulatory systems	Training & professional development	Pharmaceutical services & facilities	Total (n)	Kappa statistic (*K*)
Demography	23	0	0	0	0	23	0.828 (P<0.001)
Impact	0	6	0	0	0	6	
Policies & regulatory systems	3	1	16	2	2	24	
Training & professional development	0	0	2	24	0	26	
Pharmaceutical services & facilities	0	0	0	0	1	1	
Total	26	7	18	26	3	80	

Level of agreement associated with the PDGs framework "Practice" element and the five emerged themes

Similarly, the Kappa test was carried out to assess the two coders' agreement level in terms of mapping the initial 165 developed indicators to the PDGs framework (practice) element against the **five** emerged themes. Out of 165, **111** indicators were mapped under the practice element and the agreed themes. The Kappa value was 0.837, indicating high agreement between the coding process (see table 56).

Table 56: Agreement level of PDGs framework "practice" element and the emerged themes

Practice	Demography	Impact	Policies & regulatory systems	Training & professional development	Pharmaceutical services & facilities	Total (n)	Kappa statistic (*K*)
Demography	15	3	0	0	0	18	0.837 (P<0.001)
Impact	0	11	0	1	0	12	
Policies & regulatory systems	0	0	33	1	8	42	

Training & professional development	0	0	0	21	0	21	
Pharmaceutical services & facilities	0	1		0	17	18	
Total	15	15	33	23	25	111	

Level of agreement associated with the PDGs framework "Science" element and the five emerged themes

Similarly, the Kappa test was carried out to assess the two coders' agreement level in terms of mapping the initial 165 developed indicators to the PDGs framework (science) element against the **five** emerged themes. Out of 165, **24** indicators were mapped under the science element and the agreed themes. The Kappa value was 0.815, indicating high agreement between the coding process (see table 57).

Table 57: Agreement level of PDGs framework "science" element and the emerged themes

Science	Demography	Impact	Policies & regulatory systems	Training & professional development	Pharmaceutical services & facilities	Total (n)	Kappa statistic (*K*)
Demography	2	0	0	0	0	2	0.815 (P<0.001)
Impact	0	3	0	0	0	3	
Policies & regulatory systems	0	0	7	2	0	9	
Training & professional development	0	0	0	9	1	10	
Pharmaceutical services & facilities	0	0	0	0	0	0	
Total	2	3	7	11	1	24	

The agreement list developed by both coders was used to cluster indicators in a matrix approach to show the association pattern between the set of categorical variables (indicators, PDGs, PDGs framework elements, and the sub-categories). Two ways of coding were used to visualise data.

In this process, an additional matrix coding approach was adopted. Each indicator was mapped to the PDGs framework elements in all overlapping combinations (W/E, P, S, W/E+P, W/E+S, P+S, All) and conjointly against the 21 PDGs (see figure 8). This is the resultant matrix that was used to generate a visual display to provide insight into the indicators' associative clustering, showing the variance and highlighting missing or weaker areas of the association.

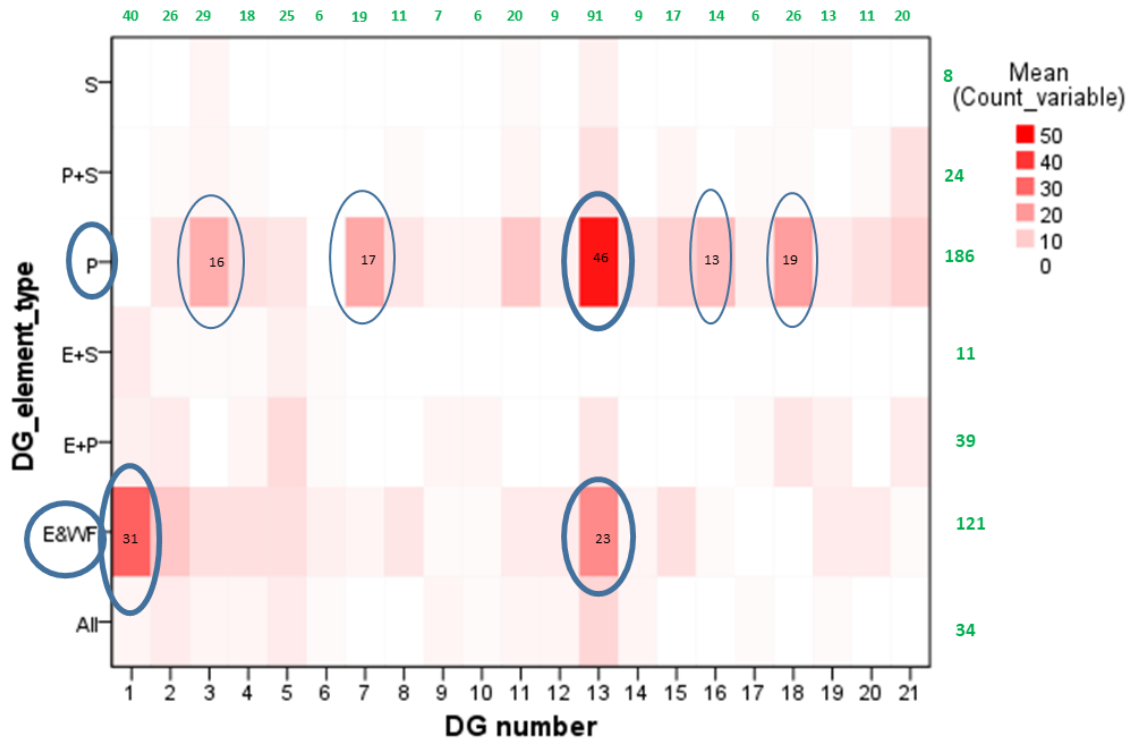


Fig. 8 Heatmap showing clustering indicators by elements (W/E, P, S)

Figure 8 shows that the practice aspect (or element) has the highest association of indicators and the highest intersection with other PDGs. The darker regions show that 186 indicators were assigned to the practice element across the 21 PDGs. The workforce & education element was assigned 121 indicators, 31 of which were mapped to PDG1 (academic capacity), and 23 were mapped to PDG13 (policy development). A few indicators were assigned to the science element, eight indicators only. Of note, the same indicator can be assigned to more than one PDG or element.

Overall, all PDGs have at least one individual practice-related indicator except for PDG1 (academic capacity) and PDG6 (leadership development). All PDGs have individual E&W indicators except for PDG17 (antimicrobial stewardship) and PDG18 (access to medicines, devices, & services). A lack of science-related indicators is clearly observed. The conjoint indicators can be seen more from PDG1 to PDG13. This coding has illustrated the variance and gap in association for the assigned indicators across the three elements (W/E, P, S) and the 21 PDGs.

The previously described mapping of each indicator to the **five** agreed themes (see Chapter 8) against the 21 PDGs is shown in figure 9.

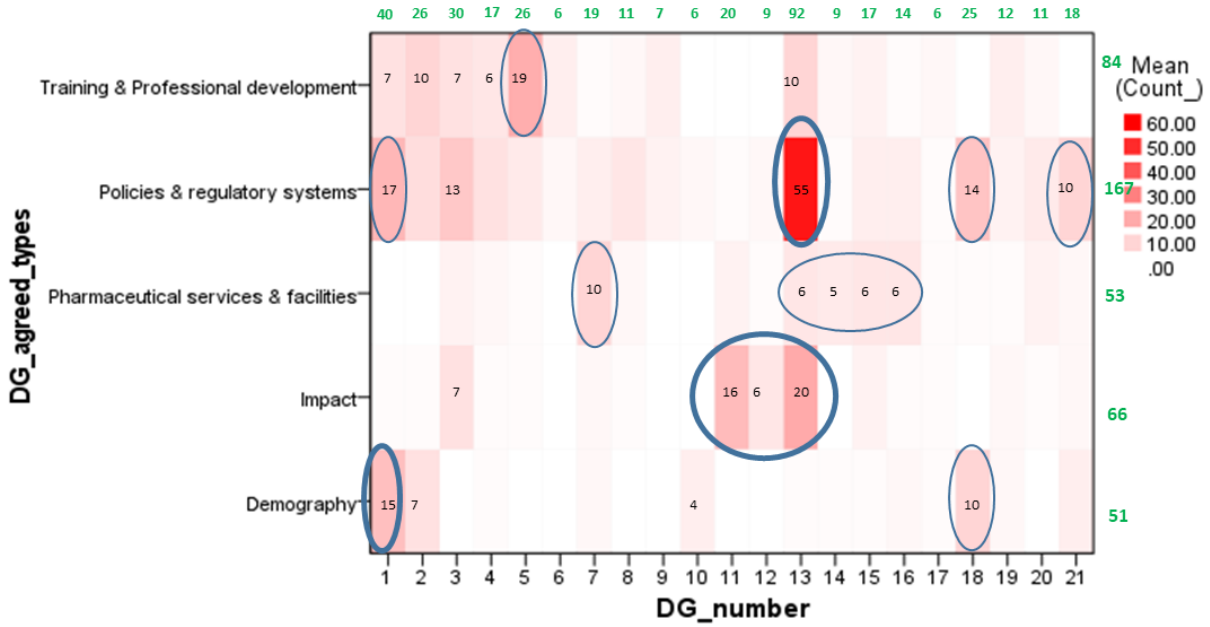


Fig. 9 Heatmap showing clustering indicators by agreed themes

Figure 9 shows that most indicators (167) are assigned to the "policies & regulatory systems" theme, followed by the "training & professional development" theme with 84 indicators, the "impact" theme with 66 indicators, "pharmaceutical services & facilities" theme with 53 indicators, and demography theme with 51 indicators across the 21 PDGs.

PDG13 (policy development) and PDG1 (academic capacity) have the highest association of indicators aligned to "Policies & regulatory systems", with 55 and 17 indicators, respectively. The darker regions can be seen from PDG1 to PDG6 (highest associated goals). PDG3, PDG11, PDG12, and PDG13 have the highest associations in terms of impact-type indicators.

Demography-type indicators are seen more in PDG1, PDG18, and PDG2. Pharmaceutical services & facilities-type indicators are more condensed with PDG7 (advancing integrated services, 10), PDG13 (policy development, 6), PDG14 (medicines expertise, 5), PDG15 (people-centred care, 6), and PDG16 (communicable diseases, 6). Of note, the same indicator can be aligned to more than one PDG or theme. Overall, most PDGs have at least one indicator assigned to the agreed themes. This coding approach has shown a more overarching picture and less variance in terms of the PDG indicator categorisation across the agreed themes and 21 PDGs. This display of visualisation was adopted for clustering the final approved list of "Usable" indicators under these agreed themes that can be used for the construction of a global data dashboard to facilitate monitoring PDGs progress, particularly in LMICs, over long-term periods (See Appendix 9).

9.6.5 Summary of the findings

The online questionnaire allowed worldwide collecting data to validate the relevancy and availability of the proposed PDGs indicators generated in the previous stage (Chapter 8). Despite the variation in the number of questionnaire responses, the responses were manifested over the six WHO regions across the 21 PDGs, with higher response rates from the Western Pacific and Europe regions.

The relevancy and availability were set as two selection criteria to meet a usable and measurable indicator. The analysis of the questionnaire responses was performed using two statistical approaches. The first is outliers detection with a Boxplot chart to identify "not relevant" indicators, which resulted in the exclusion of 10 indicators from the initially drafted list (165 indicators). The second approach is setting statistically determined thresholds for the performance level, using the outcome of the previous approach as an "input" to feed into this stage. A final list of 109 "Usable" indicators was developed after meeting both criteria and validated by pharmacists-led professional engagement in a global context.

Some principal points that indicators were presented in the 21 PDGs, with one indicator under each PDG at least. Some PDGs were with fewer indicators; for example, PDG11 (Impact & Outcomes) and PDG12 (Pharmacy Intelligence) have only **one** "Usable" indicator, and PDG17 (Antimicrobial Stewardship) and PDG20 (Digital Health) have only **two** "Usable" indicators. The analysis noticeably showed that 4/5 of PDG11, 4/6 of PDG12, 4/6 of PDG17, and 3/9 of PDG20 proposed indicators lay under the "problematic" list, indicating that these indicators are "relevant" to the context area but did not meet the second criterion, availability/accessibility assessment, in the respondents' countries.

The developed indicators were also presented in a second dimension. The PDGs indicators work in aliment with the FIP DGs Framework and track progress across the framework's three elements of development (Pharmaceutical practice, science, and workforce/education). Thus, these indicators were clustered under the three framework elements, and five sub-themes emerged using an inductive and deductive coding approach. Finally, no wording modification was required, and no similarities, commonalities, or duplications were identified across the developed indicators.

9.7 Bias and limitations

The method used for the data collection imposed some strengths and weaknesses points to this study. The online questionnaire was announced and distributed through free-access series of webinars held by the FIP for pharmacists. The webinars were streamed on a ZOOM platform and other social media

(Facebook, YouTube), which facilitated engaging individual pharmacists worldwide. However, the distribution and convenience sampling strategies employed did not allow the calculation of the response rate for this study.

English is the dominant language in most research and publications, so it was the only language used to answer the questionnaire. On the other hand, using one language might have some consequences on the response rate and the validity of the results. Some terminologies and concepts used in the English language might have different meanings and interpretations in other languages (Van Nes et al., 2010). Also, it limits the number of responders to non-English-born speakers who do not understand English very well.

The major limitation of the online questionnaire is the low participation rate relative to the number of attendees. However, this method has the advantage of reaching a diverse population at an efficient time and low cost (Nayak & K A, 2019).

The series of webinars were presented in multiple time zones to accommodate more global attendees as possible. Nevertheless, some attendees might have missed the opportunity to contribute due to the unsuitable time of the webinar to their local times. Also, the number of responders for each of the 21 questionnaires varied. Some development goals received a relatively low number of responses compared to other goals. This variation may limit the generalisability of the results due to the low representation of sector/region opinions about the relevance and knowledge of availability for the proposed indicators.

9.8 Conclusion

The data collection method (global online questionnaire) employed in Stage 2 allowed the engagement of global pharmacy leaders and international pharmacists, working across all sectors/settings and career stages, providing comprehensive insights on the data.

Moreover, the data analysis methods using two statistical methods and adopting different coding approaches helped construct the validity and reliability in terms of the relevancy and availability of indicators from a global perspective.

The development of the global PDGs indicators generated a set of correlated and validated transnational evidence-based progress indicators that will monitor PDGs' progress worldwide. Hence, there are important applications of these indicators to foster national pharmacy advancement and transformation across all aspects of the professional scope of practice (workforce/education, practice, and pharmaceutical science).

9.9 Summary and discussion of the main findings for Part 2

Part 2 aimed to develop a set of evidence-based progress indicators aligned to the 21 PDGs to measure and monitor the progress of implementation of the published PDG framework and support long-term monitoring of practice transformation nationally and globally.

The development process of the global PDGs framework indicators included a series of qualitative and quantitative research methods. First, a content analysis approach of the relevant international documents was undertaken to draft the primary pharmacy core indicators. This was followed by a Delphi process (Chapter 8) to link and develop potential indicators aligned to the 21 PDGs. The Delphi method aimed to reach an initial consensus on the proposed lists of indicators assigned by an Expert Group, which led to the development of 165 invalidated indicators (21 proposed lists) aligned to each of the 21 PDGs' different facets.

The outcomes of the Delphi method (the 21 developed lists) were used as “input” to feed into the wider pharmacists-led professional engagement stage (Chapter 9) and applied to a global cross-sectional online questionnaire to assess and validate the relevancy and availability of the 21 proposed lists of progress indicators from a global perspective.

Appropriate statistical approaches were adopted to analyse the outcome of Chapter 9 and to generate consensus on the resulting set of global indicators. The final outcome is a set of 109 “Usable” indicators generated after setting two statistical-based selection criteria for a globally valid and measurable indicator. The analysis also identified 40 problematic indicators to be reviewed in future work and 16 indicators that were rejected.

It is also worth mentioning that some PDGs, for example, PDG11 (Impact & outcomes), PDG12 (Pharmacy Intelligence), PDG17 (Antimicrobial stewardship), and PDG20 (Digital health), have fewer indicators compared to other PDGs (1 or 2) under the final "usable" list. Nevertheless, the questionnaire analysis showed that the initially proposed indicators of these goals were “relevant” to the context area of these PDGs. i.e., they met the first criterion of a measurable global indicator in terms of relevancy but did not meet the second criterion, that of availability/accessibility, in the respondents’ countries.

This could be attributed to the fact that Data and Intelligence, focus areas of PDG11, PDG12, and PDG20, are considered new emerging areas and show rapid growth in the healthcare field. However, the existence of national strategies and systems of implementation is still relatively limited, and a lack of measures to monitor service impact and health outcomes is expected.

Lai et al. (2022) and Chen et al. (2011) identified several barriers that pharmacists faced in the implementation of AMS strategies relevant to the context of these "problematic" PDG17 indicators. For example, the lack of resources relating to inadequate education and specialised AMS training for pharmacists across career stages, insufficient facilities and pharmacy services, lack of specialist AMS pharmacists, and a lack of digital information systems.

The PDGs indicators were generated in alignment with the FIP Development Goals (FIP DGs) framework; therefore, an additional matrix coding approach was adopted to map the indicators under the three principal FIP DGs elements (Workforce/education, practice, science) and clustered them into five categories to present the developed PDGs indicators as a second dimension (see table 54).

As a result, a set of correlated and validated transnational evidence-based indicators was generated that will monitor the progress of PDGs worldwide and support countries in their pharmacy advancement and transformation. The obtained list is validated with statistical evidence generated using an established approach for analysis. Notwithstanding, further studies should be conducted to test and enable the usability of PDGs indicators and the availability of data through national engagement with countries.

Chapter 10: Implications and conclusion

The advancement of pharmacy practice and effective pharmaceutical services has become imperative to face the current **global health** and **population demographic challenges** (ageing, co-morbidity and medicines complexity) to improve patient outcomes in a global context (K. Galbraith et al., 2017).

Therefore, this need was translated into this research project that sought to investigate the generation and validation of a global framework of pharmaceutical development goals and their corresponding indicators, as re-iterated in the previous chapters. The research aims and objectives were addressed, as outlined in Chapter 3 (sections 3.2, 3.3). This final chapter will pull together the conclusions of the entire work, whereas the main findings and discussion of Part 1 and Part 2 have been separately summarised and discussed at the end of each Part (sections 7.9 & 9.9). Recommendations and future work possibilities for transforming pharmacy practice based on this research will be presented, as well as the project limitations.

10.1 Implications of this research

This project is an essential next-leap global development work. As stated throughout this research project, a new paradigm has shifted the pharmacy profession towards patient-centred rather than product-centred care. In order to achieve this orientation change, it needs to transform and advance pharmacy practice and services delivery, focus more on developing highly qualified, skilful, and competent pharmacists over career stages and sectors, keep pace with global pharmaceutical innovations and technologies and ensure sustainable pharmacy practice and services (Dolovich et al., 2019; Holdford, 2018; Toklu & Hussain, 2013).

Nowadays, the use of competency and professional development frameworks to map and measure practice standards is essential and well-common in the health professions, including pharmacy (Udoh et al., 2021; Udoh et al., 2020). Evidence shows that development frameworks work and can improve and have an impact at national and global levels (Udoh et al., 2020). In the literature, numerous development frameworks were developed for the purpose of pharmaceutical workforce development and transformation nationally and globally (International Pharmaceutical Federation, 2017b; Udoh et al., 2021). For example, the PWDGs provide a framework to facilitate the systematic transformation and action planning for pharmacy workforce development nationally and globally (Kirsten Galbraith et al., 2017; Udoh et al., 2020). However, there is no universal framework that can be adopted and adapted to support and drive pharmacy practice transformation based on the global and current country's healthcare needs.

The PDGs framework was underpinned and built around by the concept of the previously published PWDGs framework (International Pharmaceutical Federation, 2017b), which was already tested and proved by several countries. Hence, the PDGs framework has shaped the roadmap for linking workforce with pharmaceutical healthcare provision. Also, the UN had developed the SDGs (United Nations, 2015), and the PDGs were also built on the same concept to ensure the alignment of these global goals to the broader global imperatives. Therefore, the goal-oriented development framework has been well-established and documented.

The content of the developed PDGs framework was supported by the evidence obtained from the global consultation and consensus stages conducted in (Chapters 5, 6, and 7). Participants discussed and agreed on the importance of having a core set of principles to be adopted as global "Goals" that reflect current global challenges and are derived from their countries' needs, which form the base for pharmacy practice advancement (Dolovich et al., 2019). Participants also considered the criteria for a practice development goal to be achievable, measurable, and tangible. The PDGs framework articulates the core "Goals" along with the strategic mechanisms that can systematically guide the national, regional, and global transformation in order to attain better and sustainable performance.

The implication of this framework is that it can be used as a mapping tool, which by its adoptable and adaptable nature, will continuously develop as the profession evolves. The development of the PDGs framework is based on outcomes of practice, having the possible applicability for educators, practitioners, scientists, policymakers, and leaders working towards advancing the pharmacy practice in their countries and worldwide. Moreover, this systematic global framework can be used for developing quality standards and structures for advanced education, research, and training integrated into practice by universities and professional leadership bodies.

The PDGs framework works as an integrated, correlated framework of drivers (goals). Nevertheless, each goal is also a discrete entity and represents a global health challenge or is a prerequisite for making progress towards effective and solid health care systems. For example, PDG19 "Patient safety" is a multifactorial, multiagency, and global health challenge and priority (WHO, 2019a), which needs competent and qualified pharmaceutical practitioners who are able to perform at their best across different practice settings and career stages (PDG2, PDG4, PDG5, PDG6, PDG14). It also needs solid infrastructures and quality management systems for service delivery (PDG3, PDG7, PDG18, PDG20).

The global PDGs framework can be a starting point for countries to adopt and adapt this transformative framework and use it as a transnational mapping developmental tool to assess and map their needs and priorities against these **GOALS** to meet their health demands over the long-term time.

Acting as a mapping tool for needs assessment and identifying national priorities, the PDGs framework can facilitate cross-country needs/gaps identification, develop regional progress roadmaps across the six regions, and compare trends globally.

At present, global consensus frameworks can guide national and international development and influence policymakers to set and reform new policies, approaches, and practices (Pokharel et al., 2019). With this, the PDGs, as a global development framework, can work as a supportive, transformative tool to guide policymakers in the interest of practice-related national strategic planning, new policies and regulations. Hence, there is an intrinsic application to reinforce transnational cooperation and enhance the professional scope of practice across all settings and sectors.

The availability of a globally validated and consented set of goals for pharmacy practice development can provide a roadmap for guidance on the expectations of practice. This will enable developing and sharing of best practice between countries while also allowing learning from the experiences of others. From a leadership perspective, it can help facilitate the formulation of standards that can become an ambition for national leadership bodies.

The concept of developing global goals accompanied by concrete indicators was inspired by the UN SDGs. Therefore, an indicator-based approach was adopted to underpin the global tracking of the country's progress towards the PDGs (Hák et al., 2016). As mentioned earlier (**Part 2, Chapter 8**), the full version of the FIP DGs framework (International Pharmaceutical Federation, 2020a) was adopted to develop appropriate indicators and country-level metrics to facilitate and support transformation processes and monitor the progress of the PDGs across the workforce/education, practice, and science elements.

A globally validated and correlated set of 109 usable indicators was developed for all PDGs. The indicators include a hybrid of quantitative indicators to monitor, for example, demography/workforce capacity trends, service availability, etc., and qualitative indicators relating to policies and regulatory systems, to help understand the change in implemented systems over a longer time. Each indicator was also mapped to the three elements of the framework (W/E, P, S) and under five themes of demography, impact, policies and regulatory systems, pharmaceutical services and facilities, and training and professional development. Some indicators are relevant to more than one element and/or theme.

The benefits and implications of these indicators for countries/professional leadership bodies can be listed as follows:

1) Agencies can use this set of indicators to monitor and evaluate the progress of their programmes and services against the Goals according to the context (W/E, P, S).

2) Data on progress can help countries to make evidence-driven decisions and guide policy-making in the interests of patients' health.

3) Can provide a standardised monitoring framework to minimise transnational variability (by mapping to the Goals).

4) Likewise, this standardised measurement tool can be used to monitor trends across regions (between similar professional bodies or health systems) and across nations within the same region over time.

5) Address data gaps and identify areas not previously monitored by countries/leadership bodies.

This research can also be used to construct a global Dashboard. A global Dashboard can be described as a platform or instrument to visualise the current data available and help compare and contrast progress trends and impact across nations, regions, and worldwide over time (Bernardita, 2022). This Dashboard can serve as a quick-access global measure of development to support the LONG-TERM monitoring of the global progress of the pharmacy practice transformation supported by the PDGs, similar to the SDGs global dashboard (United Nations, 2021). The collated data can be analysed to produce quality intelligence that facilitates global monitoring for trends in pharmaceutical care, industry, education and health impact. It also helps identify global gaps and challenges with specific DGs or areas of development, such as PDG10 (equity and equality) and PDG18 (access to medicines, services, and devices), to widen and guide equitable access for all in alignment with the UHC agenda.

The process recommended for monitoring and tracking PDGs progress and trends

As mentioned above, the developed package of developmental tools, including the PDG framework and associated indicators, can provide a roadmap aligned with the national and global priorities and guide building plans in a needs-based for improvement in alignment with the global requirements.

Figure 10 illustrates a schematic roadmap for implementing and tracking the progress of the tools with some **recommendations** to be conducted as future work to show how we can transform our pharmaceutical services and delivery to meet national and global healthcare challenges.

First, to select and prioritise Goals based on the country/professional organisation's needs and the active or ongoing national policies and programmes mapped to the PDG framework.

Second, to select the appropriate indicators to measure progress towards the prioritised goals. Indicators' selections should be synergised with the nation's existing indicators/metrics system and focused on measuring the structures, processes and outcomes. This research project developed the tools required to conduct those two steps.

Recommendations to be considered for future work

After monitoring and reviewing the progress of the selected Goals, analysing and evaluating the collected data is crucial. It will reflect the current status of the implemented systems/programmes and help decision-makers take action based on efficient measures. Therefore, developing a framework for evaluation is highly recommended for the next step. The evaluation framework can ensure that the actions and plans undertaken are appropriately implemented, have a long-lasting impact, and move towards achieving the intended needs and priorities (Bradford et al., 2019; Fynn et al., 2020).

Also, having coherent reporting systems (such as a data dashboard) for disseminating progress results is recommended and vital for documenting effective feedback from a range of stakeholders. This will establish a baseline based on evidence for continued improvement and enable formatting and presenting the results in a dashboard for data comparison to inform and drive improvement in national, regional, and global contexts over time.

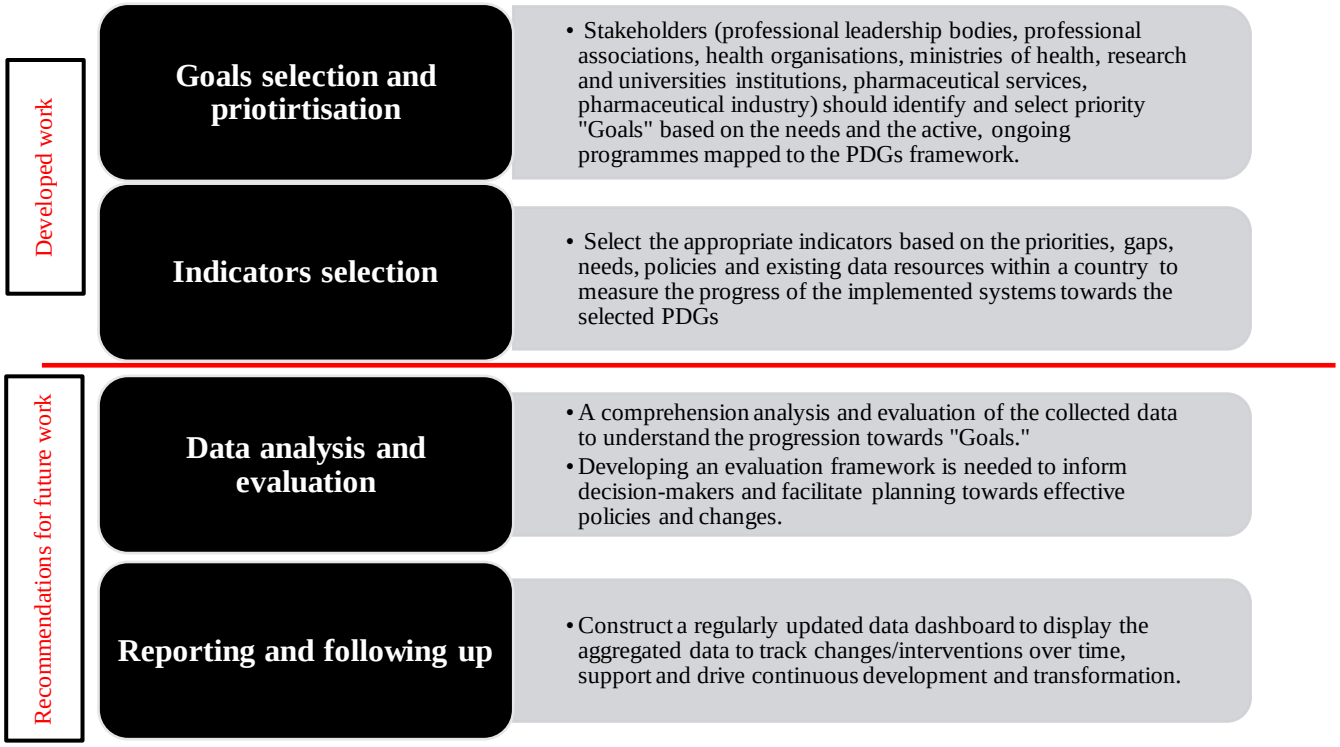


Fig. 10: The process for monitoring and tracking PDGs progress and trends

Professional leadership bodies and other professional stakeholders would have a valid and reliable tool as an asset for supporting pharmacy practice transformation. This would be a turning point in global pharmacy profession development and should form the basis for seeking further research in implementing the tool and piloting it in practice.

10.2 Project limitations

The bias and limitations of each stepwise study of this project have been portrayed at the end of each chapter. This section will summarise the general limitations of this research project.

The main limitations of this research project are the sampling strategy used throughout this project and the participants' sampling pools. The non-probability convenience, snowballing, and purposive sampling techniques were employed throughout the project's different stages, which limited the creation of an accurate representative sample of a real-life population and exposed the research to researcher bias and subjectivity. Participants of Part 1 (Chapters 5, 6, 7) were international pharmacists and global pharmacy leaders representing their national professional leadership bodies and the six WHO regions. However, all of them are FIP country members, depriving other non-member pharmacists of sharing their opinions that might differ according to their work experience and countries' needs.

For the qualitative studies in this research project, some limitations must be considered. For the global consultation and content development of the framework stage (Chapter 6), a modified NGT technique was employed. The limitations of this study could criticise the group dynamics and the potential subjectivity and domination of certain members that may restrict other participants from sharing their views freely. To overcome this risk, the researcher was keen to observe, facilitate, and make reflective notes to keep a balanced contribution by all participants to the discussion and minimise those limitations.

A modified Delphi method was used as the validation and consensus method in Chapter 7. A modified process rather than a conventional one has been proven to be a powerful and efficient method to serve the intended purposes. However, running an interactive and open group discussion and introducing a different validation group to the second round exposed this round to the potential risk of losing subject anonymity and biasing the findings in favour of this group's opinion.

The content analysis performed in Part 2 (Chapter 8) might have a reductionist effect; nevertheless, it was the most suitable method to explore and retrieve relevant information from documents. In this case, it was employed to identify and create the primary pharmacy-core indicators Handbook to further use in the subsequent development stages of the global PDG indicators. The relatively small

number of documents found following the data search was also noticeable. Nonetheless, this limitation could be attributed to the insufficient documentation of current progress at a global level rather than a deficiency in the data search performed.

In relation to the quantitative study conducted in this project (Part 2, Chapter 9), the sampling strategy used (convenience, snowballing) did not allow the calculation of the response rate of this study. Also, the calculation of the population of this study was not possible because of the use of different social media platforms to engage more pharmacists worldwide. Another criticism of this study is having a relatively low as well as variation in the responses received across the 21 PDGs due to logistical barriers, for example, time-zone suitability or English language limitations that might affect the generalisability of the findings.

The development of the global PDGs framework with relevant progress indicators was based on robust multi-method designs, qualitative and quantitative methods, method and data source triangulation approaches, a series of questionnaires, focus groups, a modified nominal group technique, and a modified Delphi process, which helped employ the strengths of one method and overcome the weaknesses of others. To summarise, the project limitations regarding the overall PDGs framework and indicators would be the sample representativeness. This project is classified as global developmental work, and the importance of capturing and including broader global insights is crucial for the applicability and implementation of the framework at national, regional, and global levels.

10.3 Innovation in this research

The project is the first of its kind to use an evidence-driven approach to develop and validate global frameworks for professional advancement. The novelty of this research is the adoption of the Theory of Change model only as a general approach to support the developmental nature of this work and guide the evidence-gathering process. The research model using an aim & objectives approach was used to construct and drive forward the innovation of the global PDGs and indicators. The employed process is considered valid because the theory has been tested and used in different areas to develop change.

The inclusivity of the global framework (goals and indicators) implies pharmacy practitioners across different practice areas and career stages that help countries map their needs and keep up with the fast-moving and dramatic shift in the pharmacy profession's health care trends and global health requirements. If the pharmacy practice world can robustly and sustainably improve and advance its practice, its impact could increase towards the benefits of patients and the profession (Dolovich et al., 2019).

One of the more significant values of this research project is the fact that the development of the frameworks was performed on a global level, with the perspectives and frameworks' content collected and gathered from international experts and global pharmacy leaders across different aspects of the profession (academics, practitioners, scientists).

This research project presents pragmatic evidence that it is possible to develop a global pharmacy development framework by analysing the existing data and health needs, validating and generating consensus on a proposed draft, and later monitoring the implementation of this framework with compatible measuring tools (indicators). The developed framework is a key resource for improving and transforming pharmacy practice and services. It can be an assessment tool to assess needs, map priorities, and measure progress nationally, regionally, and globally.

Evidence-based approaches and developmental frameworks are essential to the provision of better delivery of care (Majid et al., 2011; Udoh et al., 2020). They can act as a guide for educators, practitioners, scientists, policymakers, and leaders in their countries towards advancing the pharmacy practice in their local context.

10.4 Future work

This research has identified and developed 21 Pharmaceutical Development Goals and their corresponding indicators to lead the pharmacy profession development and advancement.

More work needs to be done to show how the published framework will effectively support pharmacy transformation in alignment with national, regional, and global health needs and trends. In 2021, the FIP launched a series of engagement events for identifying needs, gaps, and priorities and mapping them against the published framework. A sample of 49 member organisations (MOs), representing 41 countries across the six WHO regions, contributed to this comprehensive engagement initiative. The outcomes captured from this global engagement initiative showed that 16 MOs identified PDG7 (Advancing integrated services) as a priority goal for development, and 15 MOs identified PDG13 (Policy development) and PDG19 (patient safety) as priority goals for development.

As the researcher is from the Eastern Mediterranean region, this region was selected to showcase regional-level priorities. The members of the Eastern Mediterranean region selected PDG2 (Early career training strategy, PDG5 (competency development), PDG9 (CPD strategies), PDG13 (Policy development), and PDG19 (Patient safety) as their priorities areas for development based on their current national development needs and ongoing programmes (International Pharmaceutical Federation, 2022).

The results of these engagements helped identify some similarities and differences in needs and priorities between countries and enabled the drawing of some national and regional patterns against the developed goals. Validating the outcomes of the PDGs framework and creating evidence that the framework generated in this research project is adaptable to the local needs of each country.

Nevertheless, further work is necessary to compile and consolidate the national results obtained and convert them into regional time-framed action plans that fit the needs, bridge the gaps, and direct policy decision-makers of the concerned region. This consolidation work can provide an overview of the global status update for a specific time period and facilitate drawing a roadmap aligned with the health-related Sustainable Development Goals (SDG3) and achieve an effective and sustainable UHC. Continued follow-up and periodic needs assessment is needed to ensure achieving progress or identifying any emergent priorities or needs based on the evolving national or global health changes and policies.

Specific programmes for training and development may also be provided for the pharmaceutical workforce to advance their practice in areas identified according to their priorities and needs in alignment with the PDGs framework. Some training suggestions in the context of the goals; delivery of vaccination services, aligned to PDG16 (Communicable diseases); responsible use of antibiotic medicines, aligned to PDG17 (Antimicrobial stewardship); incorporating and using digital technologies, aligned to PDG20 (Digital health), leadership and competences development, related to PDG5+6 (competency and leadership development), CPD development, aligned to CPD9 (CPD strategies), and others. These programmes could decrease the training gaps within countries and accelerate progress towards attaining PDGs and supporting global health trends.

Some areas within Part 2 need a more comprehensive investigation. The analysis of the questionnaire responses in (Chapter 9) showed that the number of responses received for each PDG was varied and that the Western Pacific and European regions received the highest number of responses compared to other regions. Further work is highly recommended to reinforce the results obtained with respect to the relevancy and accessibility of indicators in the other four regions. This would increase the validity of the results and generalise the use of indicators in different regions' contexts.

The most important and necessary work to be done is the ensure the availability of the data (itself) in practice. Data availability is one of the constraints that may limit the applicability of these indicators. Further study is needed to test and enable the use of the generated indicators through engagement with a cohort of countries. It will determine what data are available and accessible and the authority

level needed to reach such data. This will ensure that the developed indicators are realistic and measurable tools and visualise related progress towards the PDGs.

Hence, global engagement to include other professional leadership bodies from non-FIP members would be useful to enhance the availability of robust evidence from these countries as well. This framework has been translated into Portuguese and Serbian languages and needs to be translated into other languages as well.

10.5 Conclusion

The research is described as an evidence-driven global developmental work aimed at designing, developing, and validating a systematic global framework of goals and corresponding indicators. The developed framework aims to shape and guide a sustainable advancement and transformation of pharmacy practice and services in national, regional, and global contexts.

The work will also enable global monitoring for trends and the development of a global dashboard, providing global insight for sharing best practice development, informing/reforming policies, and aiding advocacy for the profession over the decade ahead.

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Appendix 1: Search strategy used for the literature review

Database	Search strategy	Citations retrieved (22.12.2021)	Studies retrieved after screening of title and abstract	Search strategy	Citations retrieved (22.12.2021)	Studies retrieved after screening of title and abstract
First objective						
Mesh search via PubMed	("Noncommunicable Diseases"[Mesh]) AND "Risk Factors"[Mesh]	**554**	**2**	("Noncommunicable Diseases"[Mesh]) AND ("Financial Stress"[Mesh] OR "Cost of Illness"[Mesh])	**156**	**4**
Second objective						
Mesh search via PubMed	("Medication Therapy Management"[Mesh]) AND "Cardiovascular Diseases"[Mesh]	**324**	**4**	(("Medication Therapy Management"[Mesh]) OR " Clinical Pharmacy Services "[Mesh]) AND "Diabetes Mellitus"[Mesh]	**209**	**4**
	("Clinical Pharmacy Service"[Mesh]) AND "Cardiovascular Diseases"[Mesh]	**237**	**1 (duplicate)**			
Embase	Medication Therapy Management.mp/ **and** Cardiovascular Diseases.mp	**236**	**3 (2 duplicates)**	Medication Therapy Management.mp/ **OR** Clinical Pharmacy Service.mp/ **AND** Diabetes Mellitus.mp/ **AND** Outcomes.mp/ **AND** Cost.mp	**114**	**1**
	Clinical Pharmacy Service.mp/ and Cardiovascular Diseases.mp	**3**	**0**			
SCOPUS	Medication Therapy Management.mp/ **OR** Clinical Pharmacy	**341**	**5 duplicates**	"Medication Therapy Management" **OR** "Clinical Pharmacy Service" **AND** "Diabetes mellitus" **AND** "outcome" **OR** "IMPACT" **AND** "COST"	**16**	**2 (duplicates)**

	Service.mp/ **and** Cardiovascular Diseases.mp					
Ovid MEDLINE	Medication Therapy Management.mp/ **OR** Clinical Pharmacy Service.mp/ **and** Cardiovascular Diseases.mp	**73**	**4 (2 duplicates)**	medication therapy management.mp **OR** clinical pharmacy service.mp **AND** diabetes mellitus.mp **AND** outcome.mp OR impact.mp **AND** COST.mp	**21**	**4 (duplicates)**
				Medication Therapy Management.mp/ **OR** Clinical Pharmacy Service.mp/ **and** diabetes mellitus.mp	**209**	**7 (6 duplicates)**
PsycInfo	Medication Therapy Management.mp/ **OR** Clinical Pharmacy Service.mp/ **and** Cardiovascular Diseases.mp	**2**	**0**	Medication Therapy Management.mp/ **OR** Clinical Pharmacy Service.mp/ **and** diabetes mellitus.mp	**10**	**2 duplicates**
CINAHL Plus	Medication Therapy Management **AND** Cardiovascular Diseases	**17**	**4 (all duplicates)**	medication therapy management.mp **OR** clinical pharmacy service.mp **AND** diabetes mellitus.mp **AND** outcome.mp OR impact.mp **AND** COST.mp	**116**	**1 duplicates**
Third objective						
Mesh search via PubMed	("Benchmarking"[Mesh] OR "Quality Indicators, Health Care"[Mesh]) AND "Medication Therapy Management"[Majr]	**38**	**3**	**Ovid MEDLINE** performance indicators.mp OR quality indicators.mp AND Medication Therapy Management.mp. or medication therapy management/	**29**	**1 duplicate**
Mesh search via PubMed **Different keywords**	((("Quality Indicators, Health Care"[Mesh]) OR "Process Assessment, Health Care"[Mesh]) OR "Outcome Assessment, Health	**168**	**0**	**PsycInfo** Performance indicators.mp OR quality indicators.mp AND Medication Therapy Management.mp. or medication therapy management/	**3**	**0**

	Care"[Mesh]) AND "Medication Therapy Management"[Majr]					
Embase	performance indicators.mp OR quality indicators.mp AND Medication Therapy Management.mp. or medication therapy management/	**60**	**1 duplicate**	**SCOPUS** "Performance indicators" OR "Quality indicators" AND "medication therapy management"	**91**	**1 duplicate**

Appendix 2: Pharmaceutical Development Goals (version 0)

TABLE No

ENVELOPE 2

FIP Congress Abu Dhabi Council Meeting: Pharmaceutical Development Goals global meeting

The Draft (version 0) FIP Global Development Goals – Practice development

Clusters	Pharmaceutical Development Goals (draft)	Mechanisms & indicators
Population Needs	1. Quality assurance mechanisms, service metrics	Standards and guidelines. Monitoring key attributes.
	2. Patient Safety	Patient safety initiatives. Antimicrobial stewardship. Counselling, communication and advisory services. ADR reporting and monitoring.
	3. Medicines access and supply chain	WG supply chain. Cold chain systems. Affordability of medicines/ pricing influence. Substandard and falsified medicines.
Pharmaceutical Services	4. Prevention strategies and implementation	Preventative pharmacy services. Pharmaceutical public health policy *(smoking cessation; nutrition; lifestyle).* Vaccination. Patient information and health education.
	5. Self-care and triage	Self-care advocacy and support.

		Pharmacy as a Gateway to Care. Referral and collaborative working.
	6. LTCs/NCDs *(x4 headliners)*	Medicines and therapeutic review. Medicines-related care. Patient Management and clinical services for NCDs and LTCs.
	7. Fragile patient populations	Care of elderly and aged. Mental health and well-being, including aged related. Care of children.
	8. Medicines information	Expert information provision to HCPs and agencies. Patient medicines education and advice.
Systems	9. IP and collaborative working (& technology)	Collaborative working and multi-disciplinary teams. Prescribing rights and clinical decision making.
	10. IT and digital health initiatives	Service configuration and digital health provision.
	11. Service Intelligence	ATLAS, Observatory, MOs.
	12. Regulation and Remuneration reform	Service provision and remuneration. Drugs and medicines pricing, economic access to medicines. Prescribing reform; education & training for prescribing rights.
	13. Equity and diversity in pharmaceutical services delivery, service access and service impact.	Gender, economic equity and poverty; all global citizens to have access to the same quality of pharmaceutical care.

Feedback tool

With your group, please provide your feedback and comments next to each question.

As you address these questions, please refer to Annex 1 for a full outline of the Goals.

Questions	**Cluster 1 (NEEDS) The Goals** 1. Quality assurance mechanisms, service metrics 2. Patient safety 3. Medicines access and supply chains	**Cluster 2 (Services) The Goals** 4. Prevention strategies and implementation 5. Self-care and triage 6. LTCs/NCDs 7. Fragile patient populations 8. Medicines information	**Cluster 3 (Systems) The Goals** 9. IP and collaborative working (& technology) 10. IT & digital health initiatives 11. Service Intelligence 12. Regulation Remuneration Reform 13. Equity & diversity in pharmaceutical services delivery, service access and service impact
Please identify any relevant gaps and missed points			
Please suggest ways of monitoring and measurement – any ideas and suggestions (no limitations)			
Please list any new goals to identify – have we missed something critical?			

Appendix 3: IRG Feedback Form

FIP DGs IRG Feedback Form

Please complete and return to lina@fip.org by Monday 15 June 2020.

Your name	
Part 1: Essential Questions for IRG	
1.1 Does the listed "Description/Goal components" reflect the concept of the goal OR improve the understanding of the content of the goal? Feel free to suggest new components for the Practice goals. *Important: Please clearly indicate by number 1-21 the goal you are commenting on.*	
1.2 Are there any further "indicators & mechanisms" ideas that need to be included to achieve the purpose of the goal? Feel free to suggest new indicators & mechanisms for the Practice goals. *Important: Please clearly indicate by number 1-21 the goal you are commenting on. Indicators &*	

mechanisms are outlined in the PDGs Expanded Version document.	
1.3 Are there any terminology/language or conceptual issues unclear in the context of the overall proposed list of goals? *Feel free to provide an overall comment. If you are commenting about a specific PPDG, please clearly indicate it by number 1-21.*	
1.4 Please identify if there are any relevant gaps, missed points, duplication or redundancy within the goals.	
Part 2: Optional Questions for IRG	
2.1 Do the Goals meet the criteria of a goal (achievable, tangible, measurable)? *Important: Please clearly indicate by number 1-21 the goal you are commenting on.*	

Appendix 4: Core indicators Handbook

Summary of the Global Pharmaceutical Observatory (GPO): Core Indicators Handbook

THE indicators were compiled from reviewing relevant literature and other international publications (FIP & WHO).

*** Abbreviated name of the indicator**
**** Full name of the indicator**

Name of indicator	Definition
***Pharmacist density** **Density of pharmacists per 10,000 population	This indicator will capture information about the number of actively practising and licenced/registered pharmacists. It gives an indication of the capacity of the pharmacist workforce Total population, income level, population aged over 65 years as estimated by the World Bank
***Female Pharmacists** **Percentage of female pharmacists in active pharmacist workforce	This indictor will capture information about gender balance.
***Share of foreign-born pharmacists** **Percentage of active foreign-born pharmacists	This indicator will capture the information on pharmacists coming from abroad. It gives an indication of the reliance of a country on international supply of the workforce.
Share of newly licenced/registered foreign-born pharmacists Percentage of newly licenced/registered foreign-trained pharmacists	This indicator will capture the information on pharmacists coming from abroad. It gives an indication of the reliance of a country on international supply of the workforce.
Age distribution of pharmacists Percentage of active pharmacists in different age groups	This indicator will capture information about the percentage of active pharmacists per age group and whether e.g. there is over-representation in one age group e.g. larger number of pharmacists close to retirement. Age groups considered are <35, 35-60 and >60
Pharmacist distribution by sector of practice Percentage of pharmacists employed by sector type	This indicator will capture information about how the pharmacist workforce is deployed: the percentage of pharmacists employed in each sector.
Licencing/regulation of pharmacists Existence of legal requirement of national and/or subnational licencing or registration of pharmacists	This indicator captures information about the existence of regulation of pharmacists. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for licensing or registration of pharmacists been established? 2. Are national and/or subnational mechanisms for licensing or registration of pharmacists compulsory? 3. Are there national and/or subnational mechanisms for licensing or registration of pharmacists that are not compulsory?
Maintenance of licencing or registration Existence of legal requirement of national and/or subnational standard for maintaining licence or registration of pharmacists	This indicator captures information about the existence of a process for pharmacists to maintain registration/license. The following questions should guide a response to this indicator: 1. Are there existing national and/or subnational systems for continuing professional development/continuing education (CPD/CE)? 2. If national and/or subnational systems for CPD/CE exist, are they compulsory?

	3. If compulsory, are they linked to re-licensure/maintenance of registration?
Good pharmacy practice guidelines Existence of national and/or subnational good pharmacy practice guidelines	This indicator sets out information about the existence of guidance that defines good pharmacy practice. It gives an indication of the extent of oversight of professional practice.
Code of ethics Existence of national and/or subnational code of ethics	This indicator sets out information about the existence of a code of ethics. It gives an indication of national oversight of professional standards and obligations.
Competency development framework for pharmacists Existence of national and/or subnational competency development framework for pharmacists	This indicator sets out information about the existence of a competency framework for pharmacists used for professional development and/or recognition. It gives an indication of commitment to developing the pharmacy workforce.
Pharmacy practice standards performance indicators Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacists.	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.
Pharmacy technician density Density of pharmacy technician workforce per 10,000 population	This indicator will capture information about the capacity of the pharmacy technician workforce. Total population, income level, as estimated by the World Bank
Licencing/registration of pharmacy technicians Existence of legal requirement of national and/or subnational licencing or registration of pharmacy technicians	This indicator captures information about the existence of regulation of pharmacy technicians. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for licensing or registration of pharmacists been established? 2. Are national and/or subnational mechanisms for licensing or registration of pharmacists compulsory? 3. Are there national and/or subnational mechanisms for licensing or registration of pharmacists that are not compulsory?
Maintenance of registration/licencing for pharmacy technicians Existence of legal requirement of national and/or subnational standard for maintaining licence or registration of pharmacy technicians	This indicator captures information about the existence of a process for pharmacy technicians to maintain registration/licence. The following questions should guide a response to this indicator: 1. Are there existing national and/or subnational systems for continuing professional development/continuing education (CPD/CE)? 2. If national and/or subnational systems for CPD/CE exist, are they compulsory? 3. If compulsory, are they linked to re-licensure/maintenance of registration?
Competency framework for pharmacy technicians Existence of national and/or subnational competency framework for pharmacy technicians and pharmacy support workers	This indicator sets out information about the existence of a competency framework for pharmacy technicians and pharmacy support workers used for professional development and/or recognition. It gives an indication of commitment to developing the pharmacy workforce.

Pharmacy practice standards performance indicators for pharmacy technicians Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacy technicians	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.
Pharmacy education capacity: pharmacy graduates' density Density of pharmacy graduates per 1 million population	This indicator sets out information about the number of students graduating from a school of pharmacy and therefore potentially supplying the pharmacist workforce.
Pharmacy education capacity: pharmacy schools' density Density of pharmacy schools per 1 million population	This indicator sets out information about the number of accredited pharmacy education and training institutions and therefore capacity to supply pharmacists to the workforce.
Duration of education for pharmacists Existence of national minimum period of full-time undergraduate education for pharmacists (excluding internship)	Duration of pharmacist education is the number of years required to complete a full curriculum for the pharmacist education programme. It gives an indication of the lag time for supplying new pharmacists into the workforce.
Duration of full-time experiential learning to become licensed/registered as a pharmacist (e.g. internship) Existence of national minimum period of full-time experiential learning to become licensed/registered as a pharmacist (e.g. internship)	Duration of pharmacist education is the number of years required to complete the experiential learning part of their training. It gives an indication of the lag time for supplying new pharmacists into the workforce.
Accreditation requirements of schools of pharmacy Existence of national accreditation requirements for schools of pharmacy	This indicator sets out information about the regulation of pharmacy education. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for accreditation of schools of pharmacy and their programmes been established? 2. Are national and/or subnational mechanisms for accreditation of schools of pharmacy and their programmes compulsory? 3. Are there national and/or subnational mechanisms for accreditation of schools of pharmacy that are not compulsory?
Standards for pharmacists' education Existence of national and/or subnational standards on the content of pharmacists' education including curriculum review	This indicator sets out information about the process of updating the curriculum for pharmacist education. The following questions should guide a response to this indicator: 1. Is there a list of knowledge, skills and competencies to be acquired during health workforce education and training? 2. Is this list reviewed regularly?
National strategic plan for pharmaceutical human resources Existence of national strategic plan for pharmaceutical human resources	This indicator sets out information about a national strategic plan for pharmaceutical human resources. The following questions should guide a response to this indicator: 1. Do HR plans for the pharmaceutical workforce match competencies with population, health systems, and health labour market needs? 2. Do HR plans take into account efforts to scale up transformative education and training?

	3. Are strategic steps taken when considering and taking into account the workforce market needs and absorptive capacities for the HR plan development?
Pharmacy education capacity: pharmacy technician/pharmacy support worker schools' density Density of pharmacy technician/pharmacy support worker schools per 1 million population	This indicator sets out information about the number of accredited schools of pharmacy technician/pharmacy support worker and therefore capacity to supply this workforce.
Duration of education for pharmacy technicians Existence of national minimum period of full-time education for pharmacy technicians (excluding internship)	Duration of pharmacy technician education is the number of years required to complete a full curriculum for the education programme. It gives an indication of the lag time for supplying new pharmacy technicians into the workforce.
Duration of full-time experiential learning to become licensed/registered as a pharmacy technician (e.g. internship) Existence of national minimum period of full-time experiential learning to become licensed/registered as a pharmacy technician (e.g. internship)	Duration of pharmacy technician education is the number of years required to complete the experiential learning part of their training. It gives an indication of the lag time for supplying new pharmacy technicians into the workforce.
Accreditation requirements of schools of pharmacy technicians Existence of national accreditation requirements for institutions that educate pharmacy technicians	This indicator sets out information about the regulation of pharmacy education. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for accreditation of school of pharmacy support worker and their programmes been established? 2. Are national and/or subnational mechanisms for accreditation of pharmacy support worker and their programmes compulsory? 3. Are there national and/or subnational mechanisms for accreditation of pharmacy support worker and their programmes that are not compulsory?
Access to medicines: physical establishments Proportion of establishments where non-prescription medicines, prescription medicines, specialty medicines (HIV, cancer, hepatitis C), reimbursable prescription medicines and non-reimbursable prescription medicines can be obtained	This indicator sets out information about the types of physical establishments where categories of medicines can be obtained by patients. It gives an indication of the extent of accessibility to medicines.
Access to medicines: online Categories of medicines accessible online	This indicator sets out information about the categories of medicines that can be obtained by patients online. It gives an indication of the extent of regulation of accessibility and availability of medicines.
Access to medicines: wholesalers and manufacturers Existence of policies/laws allowing pharmaceutical wholesalers or manufacturers to deliver certain types of medicines directly to patients' homes	This indicator sets out information about whether the government or competent authority has created policies/laws allowing pharmaceutical wholesalers or manufacturers to deliver certain types of medicines directly to patients' homes. It gives an indication of the extent of the regulation of accessibility to medicines.
Access to medicines: dispensing physicians Existence of policies/laws allowing dispensing of medicines by physicians	This indicator sets out information about whether the government or competent authority has created policies/laws allowing dispensing of medicines by physicians. It gives an

	indication of the extent of accessibility to medicines particularly where there is not a pharmacy.
Number of dispensing physicians Number of dispensing physicians	This indicator sets out information about the number of dispensing physicians available. It gives an indication of the extent of accessibility to medicines particularly where there is not a pharmacy.
Access to non-prescription medicines: community pharmacy only Existence of subcategory of non-prescription medicines (NPMs) that may ONLY be dispensed by community pharmacies	This indicator sets out information about whether the government or competent authority has created policies/laws regulating a sub-category of non-prescription medicines only supplied in community pharmacies. It gives an indication of restriction of distribution and where decision-making sits with selecting medicines: joint decision making between patient and pharmacy staff or self-selection outside of the pharmacy.
Direct access to non-prescription medicines: community pharmacy Existence of availability of non-prescription medicines for self-selection at community pharmacies, i.e., displayed in a way that consumers can have direct access to them	This indicator sets out information about access to non-prescription medicines at community pharmacies. It gives an indication of patient's ability to choose medicines autonomously (though they have the option to consult pharmacy staff)
Direct access to non-prescription medicines: non-community pharmacy outlets Existence of availability of non-prescription medicines for self-selection at outlets different from community pharmacies	This indicator sets out information about access to non-prescription medicines outside of community pharmacies. It gives an indication of access to medicines and the opportunity for facilitation of self-care (if only available from a community pharmacy).
Access to medicines: foreign internet providers Existence of on-line (internet-based) sales of medicines by foreign providers	This indicator sets out information about the availability of foreign on-line medicines providers. It gives an indication of online access to medicines beyond traditional national physical and online establishments and the extent of regulation of foreign online providers.
Market share: prescription only medicines Market share (in volume and economic value) of prescription only medicines by type of outlet.	This indicator sets out information about the market share of prescription only medicines across outlets (physical, online and mail order).
Market share: non-prescription medicines Market share (in volume and economic value) of non-prescription medicines by type of outlet.	This indicator sets out information about the market share of non-prescription medicines across outlets (physical, online and mail order).
Supply of medicines: dispensing of prescription-only medicines Prescription-only medicines (POMs) dispensed as pre-packaged items (excluding compounded medicines)	This indicator sets out information about how prescription-only medicines are dispensed.
Price of medicines Existence of regulation of the price of medicines (at ex-factory price level and/or wholesale price level) by government	This indicator sets out information about regulation of the price of medicines by government.
Generic prescribing Existence of mandatory generic (non-proprietary) prescribing	This indicator sets out information about mandatory generic (non-proprietary) prescribing. It gives an indication of the possible extent of economic savings on medicines.
Generic substitution	This indicator sets out information about generic substitution. It gives an indication of the extent of the authority of pharmacies

Existence of a policy allowing generic substitution by pharmacies	to substitute and thereby contribute to economic savings on medicines.
Generic substitution not allowed Existence of a policy allowing the prescriber or the patient to disallow or deny generic substitution	This indicator sets out information about disallowing generic substitution. It gives an indication of the extent of deregulation of prescribing.
Encouraging the use of generics Measures in place to promote the use of generics	This indicator sets out information about measures to promote the use of generics. It gives an indication of the extent of policies that incentivise the use of generics with a view to generating economic savings on medicines
Market volume of generics Percentage (%) of generic medicines out of the total medicines market by volume	This indicator sets out information about the generic medicines market. It gives an indication of the impact of policies aimed at encouraging generic prescribing.
Alternative medicines reimbursement Homeopathic or herbal/traditional medicines reimbursed by third-party payers	This indicator sets out information about reimbursement of homeopathic or herbal medicines. It gives an indication of policy that supports alternative medicines.
Distribution and supply of medicines: regulatory changes Changes (completed or in process) in terms of the distribution or sales' regulation of medicines	This indicator sets out information about recent changes in the regulation of distribution or sales of medicines. It gives an indication of equity of access to medicines, patient choice and public spending (where cuts to product-based remuneration could impact on community pharmacy).
Number of community pharmacies Number of community pharmacies	This indicator sets out information about the number of community pharmacies. It gives an indication of the availability of community pharmacies.
Density of community pharmacies Density of community pharmacies per 10,000 population	This indicator will capture information about the availability of community pharmacies to a population. It gives an indication of a country's community pharmacy infrastructure as well as the accessibility of pharmacy services and medicines.
Ratio of community pharmacies to population Density of community pharmacies per 10,000 population	This indicator will capture information about the availability of community pharmacies to a population. It gives an indication of the population each community pharmacy attends to.
Density of community pharmacists Density of community pharmacists per 10,000 population	This indicator will capture information about the capacity of the community pharmacist workforce.
Ratio of community pharmacists to community pharmacies Ratio of community pharmacists per community pharmacy	This indicator will capture information about the capacity of the community pharmacist workforce within community pharmacies. It gives an indication of the adequacy of pharmacist supervision of the dispensing of medicines.
Ratio of pharmacy technicians to community pharmacies Ratio of pharmacy technicians per community pharmacy	This indicator will capture information about the capacity of the pharmacy technician workforce within community pharmacies. It also gives an indication of the balance of skill mix with pharmacists and pharmacy support workers.
Mandatory presence of community pharmacist Existence of a policy for the presence of a community pharmacist mandatory at all times	This indicator will capture information about mandatory staffing requirements of a community pharmacy. It gives an indication of the level of pharmacist supervision in a community pharmacy.
Scope of community pharmacy services Scope of community pharmacy activities and services defined by law	This indicator will capture information about mandatory services and activities to be delivered by a community pharmacy.

National training requirements for managing a community pharmacy National requirements for specific training/qualifications for managing a community pharmacy	This indicator will capture information about mandatory training requirements for managing a community pharmacy.
ePrescriptions implemented Electronic transfer of prescriptions (ePrescription) implemented	This indicator will capture information about the implementation of the electronic transfer of prescriptions.
Community pharmacy access to shared patient health record Community pharmacists have access (reading rights) to a shared patient health record	This indicator will capture information about community pharmacy access to shared patient health record. It gives an indication of integration into the multidisciplinary team.
Community pharmacy writing rights in shared patient record Community pharmacists have writing rights (i.e., permission to introduce or modify relevant data) in the shared patient record	This indicator will capture information about community pharmacy writing rights in the shared patient health record. It gives an indication of integration into the multidisciplinary team.
Recent changes in regulation Recent changes in regulation	This indicator will capture information about recent changes in community regulation or policy.
Ownership of community pharmacies restricted to pharmacists Ownership of community pharmacies restricted to pharmacists	This indicator will capture information about the regulation of community pharmacy ownership. This indicates the balance of policy towards professional accountability/autonomy versus economic policy
Forms of community pharmacy ownership Forms of community pharmacy ownership	This indicator will capture information about the different forms of community pharmacy ownership. It gives an indication of the balance of policy towards professional accountability/autonomy versus economic policy.
Location of community pharmacy in supermarket Community pharmacy can be located inside a supermarket	This indicator will capture information about a policy of establishment of community pharmacies in supermarkets. It gives an indication of accessibility to community pharmacies.
Restrictions to community pharmacy ownership Specific exclusions or restrictions to who can own a community pharmacy	This indicator will capture information about a policy of ownership of community pharmacies. It gives an indication of the extent of regulation of ownership.
Extent of community pharmacy ownership by pharmacists Owner of an independent community pharmacy allowed to own other pharmacies or branch pharmacies	This indicator will capture information about a policy of the extent of ownership of community pharmacies by a pharmacist.
Limitation of horizontal integration Horizontal integration limited is, i.e., is there a maximum number of pharmacies or branches per owner (individual or corporation)	This indicator will capture information about the existence of a policy that limits the number of community pharmacies owned by an individual or corporation. It gives an indication of the extent of market control.
Franchising arrangements of community pharmacy	This indicator will capture information about franchising arrangements in community pharmacy. It gives an indication of the existence of franchising and common branding of community pharmacy

Groups of pharmacies are independently owned, but share a common brand of a franchisor or marketing group	
Largest number of franchises Name of the largest franchises of independently owned pharmacies in terms of number of pharmacies	This indicator will capture information about franchising arrangements in community pharmacy. It gives an indication of the extent of the approach to common branding of community pharmacy.
Existence of chains of community pharmacies Existence of chains of community pharmacies (i.e., corporations owning multiple pharmacies)	This indicator will capture information the extent of ownership of community pharmacies by corporations. It gives an indication of policy balance towards economics versus professional autonomy/accountability.
Name of largest community pharmacy chain Name of the largest chains in terms of number of pharmacies	This indicator will capture information about the name of the largest community pharmacy chains.
Recent changes in regulation of community pharmacy ownership Changes (completed, in process or unsuccessful attempts) in terms of pharmacy ownership	This indicator sets out information about recent changes in the regulation of ownership of community pharmacies. It gives an indication of changes in the balance of policy between professional accountability/autonomy and economic policy.
Regulation of market entry of new community pharmacies Establishment (market entry) of new community pharmacies regulated by the state	This indicator will capture information about existence of policies about equitable and continuous access to medicines and pharmacy services.
Criteria for new community pharmacy licence Criteria state uses to issue a new community pharmacy licence	This indicator will capture information about types of criteria used to manage market entry of new community pharmacies. It gives an indication of which models are used e.g. planned distribution and/or population and/or a case-by-case basis and the extent of market regulation. It will also describe the extent of a managed distribution of community pharmacies.
Transfer of community pharmacy licences Existence of policy relating to the planned distribution of pharmacies allowing selling, inheriting or transferring of licences issued by the state	This indicator will capture information about flexibility of the policy of planned distribution of community pharmacies.
Incentivisation of community pharmacies in less populous areas State provides incentives or compensation mechanisms for pharmacies in less populous areas (with a lower turnover)	This indicator will capture information about a policy that established incentives or compensation to community pharmacies in less populous areas whose location may be important for public service but may compromise economic viability if not subsidised.
Renewal of community pharmacy licences Renewal of community pharmacy licences	This indicator will capture information about the existence of a policy for periodic review of community pharmacy licences.
Community pharmacy accessibility Accessibility of community pharmacies	This indicator will capture information about accessibility of community pharmacies to a population.
Legally defined area Minimum legally defined area (m^2) for a pharmacy to operate	This indicator captures information about minimum space requirements needed for the scope of activities of community pharmacies and the provision of professional services.
Mandatory functional areas Functional areas that are mandatory	This indicator captures information about spatial requirements for the delivery of specific professional services.

Changes in the establishment and distribution of community pharmacies Changes (completed, in process or unsuccessful) in terms of the establishment or territorial distribution of new pharmacies	This indicator sets out information about recent changes in the regulation of the establishment and distribution of community pharmacies. It gives an indication of changes in equity of access to community pharmacies.
Minimum workforce requirements Minimum workforce requirements are mandatory for community pharmacies	This indicator captures information about the competency and skill mix of a community pharmacy required by law. It gives an indication of the potential services offered and the distribution of tasks and responsibilities between pharmacists and the support workforce.
Mandatory quality assurance Mandatory quality assurance for community pharmacies	This indicator captures information about the existence of the assessment/inspection of community pharmacies against standards by a government agency. It gives an indication of the role the state plays in ensuring consistency in the quality of community pharmacies across a nation.
Regulation of opening hours Opening hours of community pharmacies	This indicator captures information about the existence of regulation of opening hours. It gives an indication of a minimum level of access to medicines and professional services.
Out of hours shifts System of mandatory duty shifts beyond normal opening hours	This indicator captures information about the regulation of the access to medicines and community pharmacy services outside normal opening hours.
Advertisement of community pharmacies Advertisement of community pharmacies	This indicator captures information about the existence of regulation of advertising of community pharmacies.
Advertisement of medicines prices Advertisement of medicines prices	This indicator captures information about the existence of regulation of advertising of medicines prices.
Clinical services aimed at improving the use of medicines Existence of clinical services aimed at improving the use of medicines	This indicator captures information about the prevalence of clinical services aimed at improving the use of medicines. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.
Product-focused services Existence of product-focused services	This indicator captures information about the prevalence of product-focused services. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.
Primary care and public health services Existence of Primary Care and Public Health Services	This indicator captures information about the prevalence of primary care and public health services. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.
Performing point-of-care or diagnostic tests at the pharmacy Existence of point-of-care or diagnostic tests at the pharmacy	This indicator captures information about the availability of point-of-care tests at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.
Harm reduction services Existence of harm reduction services	This indicator captures information about the availability of harm reduction services at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.
Advanced services and activities Existence of advanced services or activities	This indicator captures information about the availability of advanced services or activities at the pharmacy. It gives an indication of the width of the scope of practice in this area,

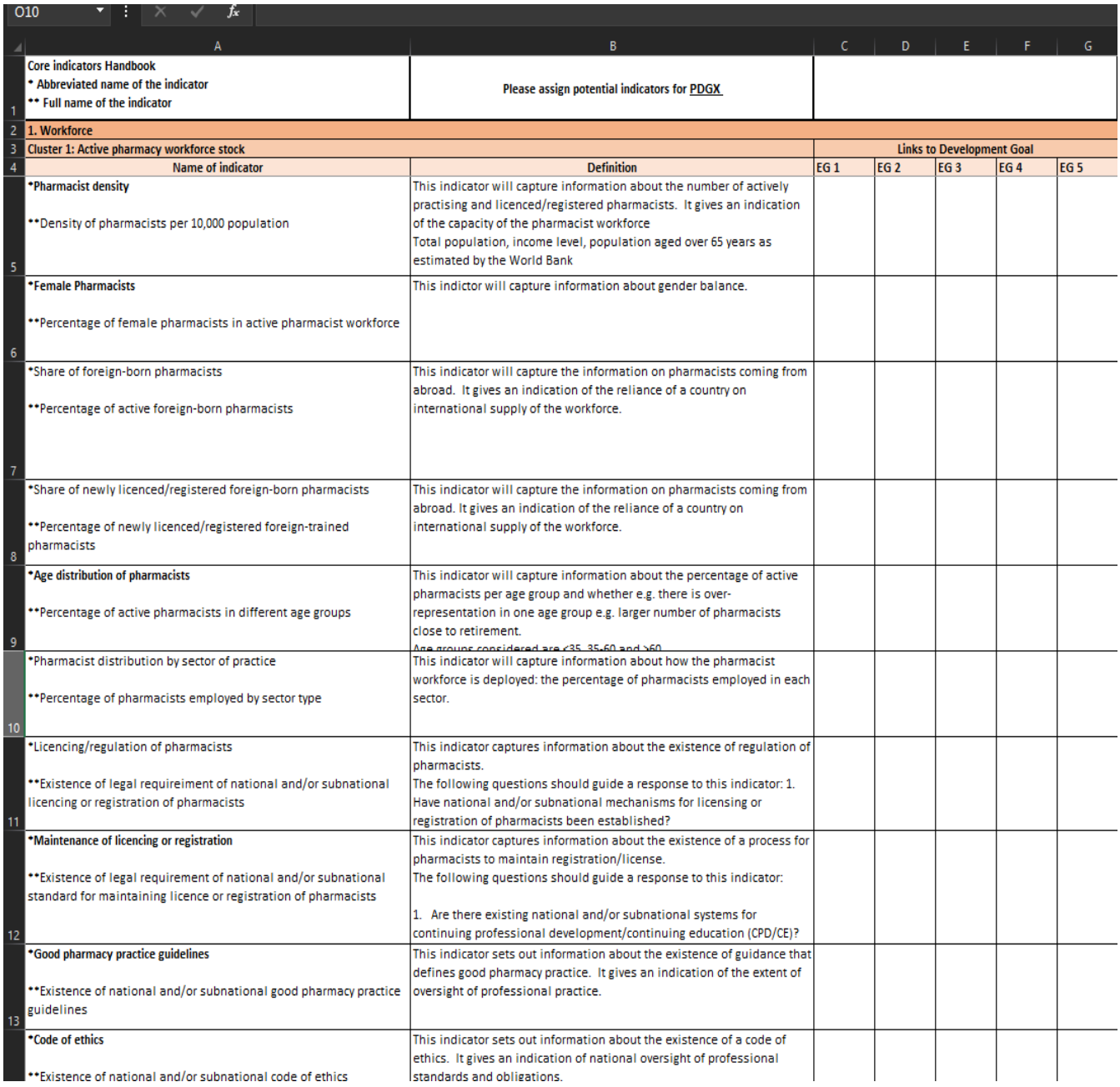
	existence of guidelines, implementation, payment methods and any recent changes.
Community Pharmacy Technician – Scope of practice Existence of a scope of practice for community pharmacy technicians	This indicator captures information about the existence of a scope of practice for community pharmacy technicians. It gives an indication of the extent of the supervision of pharmacy technicians
Community pharmacy remuneration by third party payers Existence of community pharmacies receiving remuneration by third party payers	This indicator captures information about the existence of remuneration of community pharmacy services. It gives an indication of the extent of remuneration for services.
Model of remuneration Type of model of remuneration	This indicator captures information about whether there is a single type of statutory or contractual model to remunerate community pharmacies, or multiple contractual models with multiple third-party payers whose terms may differ from each other.
Principles of remuneration Existence of principles of remuneration	This indicator captures information about the operating principles of the remuneration model. It gives an indication of the degree of reliance of the community pharmacy on the price of medicines.
Type of remuneration Type of remuneration	This indicator captures key elements of the type of remuneration. It gives an indication of the degree of reliance of the community pharmacy on the price of medicines.
Type of margin-based remuneration Type of margin-based remuneration	This indicator captures information about the type of margin-based remuneration. This gives an indicator on the impact on community pharmacies of changes in the price of medicines.
Type of regressive margin model Type of regressive margin models	This indicator captures information about the type of regressive margin-based remuneration. This gives an indicator on the impact on community pharmacies of changes in the price of medicines.
Existence of review of remuneration Remuneration of community pharmacies reviewed on a regular basis	This indicator captures information about the existence of a system of review of remuneration of community pharmacies.
Recent changes of remuneration of community pharmacies Recent changes (completed, in process or unsuccessful) in terms of the remuneration of community pharmacies	This indicator captures information about recent changes in remuneration of community pharmacies. It gives an indication of the likely level of sustainability of community pharmacies.
Number of hospital pharmacies Number of hospital pharmacies	This indicator sets out information about the number of hospital pharmacies. It gives an indication of the availability of hospital pharmacies.
Density of hospital pharmacies Density of hospital pharmacies per 100,000 population	This indicator will capture information about the availability of hospital pharmacies to a population. It gives an indication of a country's hospital pharmacy infrastructure as well as the accessibility of pharmacy services and medicines.
Density of hospital pharmacists Density of hospital pharmacists per 100,000 population	This indicator will capture information about the capacity of the hospital pharmacist workforce.
Ratio of hospital beds per hospital pharmacy Ratio of hospital beds per hospital pharmacy	This indicator captures information about the ratio of hospital beds per hospital pharmacy. It gives an indication of the size and workload of hospital pharmacies.
Ratio of hospital pharmacists per hospital pharmacy	This indicator captures information about the availability of the pharmacist workforce to serve the needs of hospitals. It gives

Ratio of hospital pharmacists per hospital pharmacy	an indication of the extent of implementation of patient-focused services.
Ratio of hospital pharmacy technicians per hospital pharmacy Ratio of hospital pharmacy technicians per hospital pharmacy	This indicator captures information about the availability of the pharmacy technician workforce to serve the needs of hospitals. When compared with the hospital pharmacist ratio it gives an indication of the extent of skill mix.
Mandatory presence of pharmacist Presence of a pharmacist at the hospital pharmacy/pharmacy department mandatory at all times	This indicator captures information about the existence of a legal requirement of the presence of a pharmacist in a hospital pharmacy at all times.
Ratio of community pharmacies to hospital pharmacies Ratio of community pharmacies per hospital pharmacy	This indicator captures information about the relative capacity to provide access to medicines and offer pharmaceutical care and other professional services in community and hospital settings.
National standards for hospital pharmacy Existence of national standards defining the scope of services of hospital pharmacies	This indicator captures information about the existence of national standards for hospital pharmacy. It gives an indication of national oversight of hospital pharmacy.
Nationally approved training requirements Existence of nationally approved training requirements for hospital pharmacists	This indicator captures information about the existence of nationally approved training requirements for hospital pharmacy across public or private organisations and the time required to complete training. This gives an indication of the existence of national oversight of the standards of practice for the hospital pharmacy workforce.
Requirements to become the director of a hospital pharmacy Existence of specific requirements to become the director of a hospital pharmacy	This indicator captures information about the existence of mandatory requirements for hospital pharmacy across public or private organisations. This gives an indication of the extent of national oversight of the standards of practice for the hospital pharmacy workforce.
Accountability of the pharmacy director/managing pharmacist Pharmacy director/managing pharmacist accountable directly to the hospital's executive director (CEO) and/or clinical director	This indicator captures information about the accountability of the pharmacy director/managing pharmacist within the hospital. It gives an indication of the visibility of pharmacy within the hospital.
Average hours hospital pharmacy open per day on weekdays Average hours per day hospital pharmacies are open on weekdays	This indicator captures information about the average hours per day are hospital pharmacies open on weekdays. It gives an indication of the availability and accessibility of the hospital pharmacy service.
Average hours hospital pharmacy open per day on weekends Average hours per day hospital pharmacies are open on weekends	This indicator captures information about the average hours per day are hospital pharmacies open on weekends. It gives an indication of the availability and accessibility of the hospital pharmacy service.
Type and availability of hospital pharmacy services Type and availability of hospital pharmacy services	This indicator captures information about the type and availability of services or activities at the hospital pharmacy. It gives an indication of the width of the scope of practice in this area and the extent of implementation of services or activities.
Pharmacy technicians' scope of practice in hospital pharmacy	This indicator captures information about the existence of a scope of practice for hospital pharmacy technicians. It gives an

Pharmacy technicians' scope of practice in hospital pharmacy	indication of the extent of the supervision of pharmacy technicians
Remuneration scale of salaries for hospital pharmacists Remuneration scale of salaries for hospital pharmacists for public/private sector	This indicator captures information about the existence of remuneration scales for hospital pharmacists across the public and/or private sector. It gives an indication of whether career progression, specialisation or performance of advanced roles in hospital pharmacy practice corresponds with a remuneration scale.
Specific remuneration for hospital pharmacies providing services to inpatients Specific pharmacy remuneration for hospital pharmacies when they provide services to inpatients	This indicator captures information about specific pharmacy remuneration for hospital pharmacies when they provide services to inpatients
Suppliers directly delivering to hospital pharmacies Suppliers which usually deliver directly to hospital pharmacies: manufacturers/wholesale/other	This indicator captures information about which suppliers delivering directly to hospital pharmacies.
Dispensing to outpatients Hospital pharmacies dispense to outpatients under specific circumstances	This indicator captures information about the circumstances in which hospital pharmacies dispense to outpatients. It gives an indication about the types of medicines dispensed.
Remuneration of hospital pharmacy services to outpatients Existence of remuneration of hospital pharmacies services to outpatients are the same to that of community pharmacies for the same type of medicines	This indicator captures information about the existence of remuneration of hospital pharmacy services to outpatients.
Components of remuneration of hospital pharmacy services to outpatients Components of remuneration of hospital pharmacy services to outpatients	This indicator captures information about the components of remuneration of hospital pharmacy service to outpatients. It captures information on whether this is a margin on the price of medicines, fixed amount, dispensing fee, professional services fee or other and gives an indication of the reliance of hospital pharmacies on the price of medicines.
Type of margin-based remuneration Type of margin-based remuneration: linear/regressive/fixed amount.	This indicator captures information about the type of margin-based remuneration. It gives an indication of the reliance of the hospital pharmacy on the prices of medicines.
Type of regressive remuneration Type of regressive remuneration: cumulative/non-cumulative	This indicator captures information about the type of margin-based remuneration. It gives an indication of the reliance of the hospital pharmacy on the prices of medicines
Co-payment arrangements for inpatients <u>Inpatients</u> have specific co-payment arrangements for the medicines received during their hospital stay	This indicator captures information about whether there are co-payment arrangement for inpatients.
Co-payment arrangements for outpatients Outpatients have specific co-payment arrangements for the medicines received during their hospital stay	This indicator captures information about whether there are co-payment arrangement for outpatients. It gives an indication if present, if they are the same as community pharmacy.
Recent changes in remuneration of hospital pharmacies	This indicator captures information about recent changes in remuneration of hospital pharmacies. It gives an indication of the likely level of sustainability of hospital pharmacies.

Recent changes (completed or in process) in terms of the remuneration of hospital pharmacies	

Appendix 5: A screenshot from the Excel spreadsheet used by the Expert Group for data collection of (Part 2, Stage 1)



	A	B	C	D	E	F	G
1	Core indicators Handbook * Abbreviated name of the indicator ** Full name of the indicator	Please assign potential indicators for PDGX					
2	1. Workforce						
3	Cluster 1: Active pharmacy workforce stock		Links to Development Goal				
4	Name of indicator	Definition	EG 1	EG 2	EG 3	EG 4	EG 5
5	*Pharmacist density **Density of pharmacists per 10,000 population	This indicator will capture information about the number of actively practising and licenced/registered pharmacists. It gives an indication of the capacity of the pharmacist workforce Total population, income level, population aged over 65 years as estimated by the World Bank					
6	*Female Pharmacists **Percentage of female pharmacists in active pharmacist workforce	This indictor will capture information about gender balance.					
7	*Share of foreign-born pharmacists **Percentage of active foreign-born pharmacists	This indicator will capture the information on pharmacists coming from abroad. It gives an indication of the reliance of a country on international supply of the workforce.					
8	*Share of newly licenced/registered foreign-born pharmacists **Percentage of newly licenced/registered foreign-trained pharmacists	This indicator will capture the information on pharmacists coming from abroad. It gives an indication of the reliance of a country on international supply of the workforce.					
9	*Age distribution of pharmacists **Percentage of active pharmacists in different age groups	This indicator will capture information about the percentage of active pharmacists per age group and whether e.g. there is over-representation in one age group e.g. larger number of pharmacists close to retirement. Age groups considered are <35, 35-60 and >60					
10	*Pharmacist distribution by sector of practice **Percentage of pharmacists employed by sector type	This indicator will capture information about how the pharmacist workforce is deployed: the percentage of pharmacists employed in each sector.					
11	*Licencing/regulation of pharmacists **Existence of legal requireiment of national and/or subnational licencing or registration of pharmacists	This indicator captures information about the existence of regulation of pharmacists. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for licensing or registration of pharmacists been established?					
12	*Maintenance of licencing or registration **Existence of legal requirement of national and/or subnational standard for maintaining licence or registration of pharmacists	This indicator captures information about the existence of a process for pharmacists to maintain registration/license. The following questions should guide a response to this indicator: 1. Are there existing national and/or subnational systems for continuing professional development/continuing education (CPD/CE)?					
13	*Good pharmacy practice guidelines **Existence of national and/or subnational good pharmacy practice guidelines	This indicator sets out information about the existence of guidance that defines good pharmacy practice. It gives an indication of the extent of oversight of professional practice.					
	*Code of ethics **Existence of national and/or subnational code of ethics	This indicator sets out information about the existence of a code of ethics. It gives an indication of national oversight of professional standards and obligations.					

Appendix 6 Illustration of the initial mapping of indicators to the 21 PDGs and how the development of 21 proposed lists of indicators after the Expert Group consensus (Part 2, Stage 1)

PDG1: Academic Capacity	Initially assigned 20	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**Proposed list of indicators for the wider professional engagement stage**
***Share of foreign-born pharmacists** **Percentage of active foreign-born pharmacists	This indicator will capture the information on pharmacists coming from abroad. It gives an indication of the reliance of a country on international supply of the workforce.	(1) Number of local/international academic pharmacists and pharmaceutical scientists positions in Faculties/Schools
***Share of newly licenced/registered foreign-born pharmacists** **Percentage of newly licenced/registered foreign-trained pharmacists	This indicator will capture the information on pharmacists coming from abroad. It gives an indication of the reliance of a country on international supply of the workforce.	(2) Existence of national or institutional benchmarking tools (eg. teacher training programmes) or career development programmes for academic pharmacists and pharmaceutical scientists
***Pharmacist distribution by sector of practice** **Percentage of pharmacists employed by sector type	This indicator will capture information about how the pharmacist workforce is deployed: the percentage of pharmacists employed in each sector.	(3) Number of teacher/practitioners (or practice-based supervisors/preceptors/educators) employed by institutions to train student pharmacists
***Licencing/regulation of pharmacists** **Existence of legal requireiment of national and/or subnational licencing or registration of pharmacists	This indicator captures information about the existence of regulation of pharmacists. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for licensing or registration of pharmacists been established? 2. Are national and/or subnational mechanisms for licensing or registration of pharmacists compulsory? 3. Are there national and/or subnational mechanisms for licensing or registration of pharmacists that are not compulsory?	(4) Insitutional use of simulation in intitial education & training (IET) curricula
***Competency development framework for pharmacists** **Existence of national and/or subnational competency development framework for pharmacists	This indicator sets out information about the existence of a competency framework for pharmacists used for professional development and/or recognition. It gives an indication of commitment to developing the pharmacy workforce.	(5) Required inclusion of experiential education/training in academic curricula
*Pharmacy practice standards performance indicators **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacists.	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	(6) Required inclusion of interprofessional and interdisciplinary education and training structures in IET curricula
***Pharmacy technician density** **Density of pharmacy technician workforce per 10,000 population	This indicator will capture information about the capacity of the pharmacy technician workforce. Total population, income level, as estimated by the World Bank	(7) Number of pharmacy graduates nationally (national graduate supply)
***Licencing/registration of pharmacy technicians** **Existence of legal requirement of national and/or subnational licencing or registration of pharmacy technicians	This indicator captures information about the existence of regulation of pharmacy technicians. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for licensing or registration of pharmacists been	(8) Number of accredited/non-accreditated schools of pharmacy nationally

	established? 2. Are national and/or subnational mechanisms for licensing or registration of pharmacists compulsory? 3. Are there national and/or subnational mechanisms for licensing or registration of pharmacists that are not compulsory?	
***Competency framework for pharmacy technicians** **Existence of national and/or subnational competency framework for pharmacy technicians and pharmacy support workers	This indicator sets out information about the existence of a competency framework for pharmacy technicians and pharmacy support workers used for professional development and/or recognition. It gives an indication of commitment to developing the pharmacy workforce.	(9) Ratio of private/government funded universities
*Pharmacy practice standards performance indicators for pharmacy technicians **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacy technicians	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	(10) Tuition fee status for student access to pharmacy programmes (e.g. self-funded, government/tax funded, mixed model)
***Pharmacy education capacity: pharmacy graduates' density** **Density of pharmacy graduates per 1 million population	This indicator sets out information about the number of students graduating from a school of pharmacy and therefore potentially supplying the pharmacist workforce.	(11) Academic staff vacancy rates in academic sector vs other pharmacy sectors
***Pharmacy education capacity: pharmacy schools' density** **Density of pharmacy schools per 1 million population	This indicator sets out information about the number of accredited pharmacy education and training institutions and therefore capacity to supply pharmacists to the workforce.	(12) Salary comparisons of academics with private/government/commercial pharmacy sectors
***Duration of education for pharmacists** **Existence of national minimum period of full-time undergraduate education for pharmacists (excluding internship)	Duration of pharmacist education is the number of years required to complete a full curriculum for the pharmacist education programme. It gives an indication of the lag time for supplying new pharmacists into the workforce.	(13) Minimum period of pharmaceutical science internship programmes (if any)
*Duration of full-time experiential learning to become licensed/registered as a pharmacist (e.g. internship) **Existence of national minimum period of full-time experiential learning to become licensed/registered as a pharmacist (e.g. internship)	Duration of pharmacist education is the number of years required to complete the experiential learning part of their training. It gives an indication of the lag time for supplying new pharmacists into the workforce.	(14) Minimum period of practice training/clinical internship pre-licensing (pre-registration) programmes
***Accreditation requirements of schools of pharmacy** **Existence of national accreditation requirements for schools of pharmacy	This indicator sets out information about the regulation of pharmacy education. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for accreditation of schools of pharmacy and their programmes been established? 2. Are national and/or subnational mechanisms for accreditation of schools of pharmacy and their programmes compulsory? 3. Are there national and/or subnational mechanisms for accreditation of schools of pharmacy that are not compulsory?	(15) Number of local/international academic teachers in pharmacy technician schools/institutions
***Standards for pharmacists' education** **Existence of national and/or subnational standards on the content of pharmacists' education including curriculum review	This indicator sets out information about the process of updating the curriculum for pharmacist education. The following questions should guide a response to this indicator: 1. Is there a list of knowledge, skills and competencies to be acquired during health	(16) Number of pharmacy technicians graduating or registering nationally

	workforce education and training? 2. Is this list reviewed regularly?	
***Pharmacy education capacity: pharmacy technician/pharmacy support worker schools' density** **Density of pharmacy technician/pharmacy support worker schools per 1 million population	This indicator sets out information about the number of accredited schools of pharmacy technician/pharmacy support worker and therefore capacity to supply this workforce.	(17) Number of accredited/non-accreditated institutions/schools that train and educate pharmacy technicians nationally
***Duration of education for pharmacy technicians** **Existence of national minimum period of full-time education for pharmacy technicians (excluding internship)	Duration of pharmacy technician education is the number of years required to complete a full curriculum for the education programme. It gives an indication of the lag time for supplying new pharmacy technicians into the workforce.	(18) Ratio of private/government funded technician training institutions/schools
***Duration of full-time experiential learning to become licensed/registered as a pharmacy technician (e.g. internship)** **Existence of national minimum period of full-time experiential learning to become licensed/registered as a pharmacy technician (e.g. internship)	Duration of pharmacy technician education is the number of years required to complete the experiential learning part of their training. It gives an indication of the lag time for supplying new pharmacy technicians into the workforce.	(19) Tuition fee status for access to pharmacy technician training institutions/schools (e.g. self-funded, government/tax-funded, mixed model)
***Accreditation requirements of schools of pharmacy technicians** **Existence of national accreditation requirements for institutions that educate pharmacy technicians	This indicator sets out information about the regulation of pharmacy education. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for accreditation of school of pharmacy support worker and their programmes been established? 2. Are national and/or subnational mechanisms for accreditation of pharmacy support worker and their programmes compulsory? 3. Are there national and/or subnational mechanisms for accreditation of pharmacy support worker and their programmes that are not compulsory?	
PDG2: Early career training strategy	Initially assigned 27	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**Proposed list of indicators for the wider professional engagement stage**
***Pharmacy education capacity: pharmacy graduates' density (1)** **Density of pharmacy graduates per 1 million population	This indicator sets out information about the number of students graduating from a school of pharmacy and therefore potentially supplying the pharmacist workforce.	(1) Number of local/international pharmacy graduates/ new registrants (National/International graduate supply)
***Share of foreign-born pharmacists (1)** **Percentage of active foreign-born pharmacists	This indicator will capture the information on pharmacists coming from abroad. It gives an indication of the reliance of a country on international supply of the workforce.	
***Share of newly licenced/registered foreign-born pharmacists (1)** **Percentage of newly licenced/registered foreign-trained pharmacists	This indicator will capture the information on pharmacists coming from abroad. It gives an indication of the reliance of a country on international supply of the workforce.	
***Ratio of community pharmacists to community pharmacies (2)** **Ratio of community pharmacists per community pharmacy	This indicator will capture information about the capacity of the community pharmacist workforce within community pharmacies. It gives an indication of the adequacy of pharmacist supervision of the dispensing of medicines.	(2) Number of newly licensed/registered pharmacists (segmented number by community, hospital pharmacists) who deliver pharmaceutical services for all population

***Ratio of pharmacy technicians to community pharmacies (3)** **Ratio of pharmacy technicians per community pharmacy	This indicator will capture information about the capacity of the pharmacy technician workforce within community pharmacies. It also gives an indication of the balance of skill mix with pharmacists and pharmacy support workers.	(3) Number of newly licensed/registered pharmacy technicians (segmented number by community, hospital pharmacists) who deliver pharmaceutical services for all population
***Licencing/regulation of pharmacists (4)** **Existence of legal requireiment of national and/or subnational licencing or registration of pharmacists	This indicator captures information about the existence of regulation of pharmacists. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for licensing or registration of pharmacists been established? 2. Are national and/or subnational mechanisms for licensing or registration of pharmacists compulsory? 3. Are there national and/or subnational mechanisms for licensing or registration of pharmacists that are not compulsory?	(4) Existence of national regulations and standards for licensing or registration of pharmacy graduates/new registrants
***Maintenance of licencing or registration (5)** **Existence of legal requirement of national and/or subnational standard for maintaining licence or registration of pharmacists	This indicator captures information about the existence of a process for pharmacists to maintain registration/license. The following questions should guide a response to this indicator: 1. Are there existing national and/or subnational systems for continuing professional development/continuing education (CPD/CE)? 2. If national and/or subnational systems for CPD/CE exist, are they compulsory? 3. If compulsory, are they linked to re-licensure/maintenance of registration?	(5) Existence of national mandatory standards and requirements that ensure maintaining licence for all early career post-registered/licensed pharmacists, e.g. gaining CPD credits, portfolio, training programmes
***Good pharmacy practice guidelines (6)** **Existence of national and/or subnational good pharmacy practice guidelines	This indicator sets out information about the existence of guidance that defines good pharmacy practice. It gives an indication of the extent of oversight of professional practice.	(6) Availability of national strategies and mentoring programmes to monitor early-career practitioners development towards advanced practice (including clinical practice and pharmaceutical science areas across the pharmaceutical workforce), e.g. CPD, frameworks, recognition & certification, education & training programmes
***Code of ethics (6)** **Existence of national and/or subnational code of ethics	This indicator sets out information about the existence of a code of ethics. It gives an indication of national oversight of professional standards and obligations.	
Develop structured approaches to early career mentoring systems to support novice practitioners to engage with peers and preceptors (including clinical practice and pharmaceutical science areas across the pharmaceutical workforce). (6)	https://www.fip.org/fip-development-goal-2	
Provide appropriate incentives, recognition and certification of practice development. (6)	https://www.fip.org/fip-development-goal-2	
***National strategic plan for pharmaceutical human resources (6)** **Existence of national strategic plan for pharmaceutical human resources	This indicator sets out information about a national strategic plan for pharmaceutical human resources. The following questions should guide a response to this indicator: 1. Do HR plans for the pharmaceutical workforce match competencies with population, health systems, and health labour market needs? 2. Do HR plans take into account efforts to scale up transformative education and training? 3. Are strategic steps taken when considering and taking into account the	

	workforce market needs and absorptive capacities for the HR plan development?	
Develop early career maps and frameworks to support a seamless transition into early career practice and towards advanced practice. (6)	https://www.fip.org/fip-development-goal-2	
Foundation training infrastructures in place for the early post-registration (post-licensing) years of the pharmaceutical workforce as a basis for consolidating initial education and training and progressing the novice workforce towards advanced practice. (6)	https://www.fip.org/fip-development-goal-2	
Create clear and purposeful education and training pathways/programmes to support post-registration (post-graduation) foundation training (clinical practice and pharmaceutical science areas). (6)	https://www.fip.org/fip-development-goal-2	
***Competency development framework for pharmacists (7)** **Existence of national and/or subnational competency development framework for pharmacists	This indicator sets out information about the existence of a competency framework for pharmacists used for professional development and/or recognition. It gives an indication of commitment to developing the pharmacy workforce.	(7) Existence of a national competency (development) framework for newly registered or early career pharmacists & pharmaceutical scientists
***Pharmacy practice standards performance indicators (7)** **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacists.	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	
***Licencing/registration of pharmacy technicians (8)** **Existence of legal requirement of national and/or subnational licencing or registration of pharmacy technicians	This indicator captures information about the existence of regulation of pharmacy technicians. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for licensing or registration of pharmacists been established? 2. Are national and/or subnational mechanisms for licensing or registration of pharmacists compulsory? 3. Are there national and/or subnational mechanisms for licensing or registration of pharmacists that are not compulsory?	(8) Existence of national regulations and standards for licensing or registration of pharmacy technicians graduates/new registrants
***Competency framework for pharmacy technicians (9)** **Existence of national and/or subnational competency framework for pharmacy technicians and pharmacy support workers	This indicator sets out information about the existence of a competency framework for pharmacy technicians and pharmacy support workers used for professional development and/or recognition. It gives an indication of commitment to developing the pharmacy workforce.	(9) Existence of a national competency (development) framework for newly registered or early career pharmacy technicians (or pharmacy support staff)
***Pharmacy practice standards performance indicators for pharmacy technicians (9)** **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacy technicians	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	
***Type and availability of hospital pharmacy services (10)** **Type and availability of hospital pharmacy services	This indicator captures information about the type and availability of services or activities at the hospital pharmacy. It gives an indication of the width of the scope of practice in this area and the extent of implementation of services or activities.	(10) Availability of formal scope of practice within the licencing and/or registration of newly licensed/registered pharmacists, e.g. provision of different

		pharmacy services in pharmacy/hospital settings
***Community Pharmacy Technician – Scope of practice (11)** **Existence of a scope of practice for community pharmacy technicians	This indicator captures information about the existence of a scope of practice for community pharmacy technicians. It gives an indication of the extent of the supervision of pharmacy technicians	(11) Availability of formal scope of practice within the licencing and/or registration of newly licensed/registered pharmacy technicians , e.g. provision of different pharmacy services in pharmacy/hospital settings
***Pharmacy technicians' scope of practice in hospital pharmacy (11)** **Pharmacy technicians' scope of practice in hospital pharmacy	This indicator captures information about the existence of a scope of practice for hospital pharmacy technicians. It gives an indication of the extent of the supervision of pharmacy technicians	
***National training requirements for managing a community pharmacy (12)** **National requirements for specific training/qualifications for managing a community	This indicator will capture information about mandatory training requirements for managing a community pharmacy.	(12) Availability of specific training/qualifications for early career pharmacists for managing a community and hospital pharmacy that provides pharmaceutical services
***Minimum workforce requirements (12)** **Minimum workforce requirements are mandatory for community pharmacies	This indicator captures information about the competency and skill mix of a community pharmacy required by law. It gives an indication of the potential services offered and the distribution of tasks and responsibilities between pharmacists and the support workforce.	
***National standards for hospital pharmacy (12)** **Existence of national standards defining the scope of services of hospital pharmacies	This indicator captures information about the existence of national standards for hospital pharmacy. It gives an indication of national oversight of hospital pharmacy.	
***Nationally approved training requirements (12)** **Existence of nationally approved training requirements for hospital pharmacists (vaccinationan and oterh CDs servercies)	This indicator captures information about the existence of nationally approved training requirements for hospital pharmacy across public or private organisations and the time required to complete training. This gives an indication of the existence of national oversight of the standards of practice for the hospital pharmacy workforce.	
PDG3: Quality Assurance	Initially assigned 29 indicators	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**Proposed list of indicators for the wider professional engagement stage**
Ensure the quality of the workforce by quality assuring the continuous development and the delivery of adequate and appropriate education and training; quality assurance needs to address academic and institutional infrastructure in order to deliver the required needs and competency-based education and training	https://www.fip.org/fip-development-goal-3	1) Existence of national regulations & policies that ensure the quality assurance of the academic and institutional infrastructures to deliver the required needs and competency-based education and training
***Accreditation requirements of schools of pharmacy** **Existence of national accreditation requirements for schools of pharmacy	This indicator sets out information about the regulation of pharmacy education. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for accreditation of schools of pharmacy and their programmes been established? 2. Are national and/or subnational mechanisms for accreditation of schools of pharmacy and their programmes compulsory? 3. Are there national and/or subnational mechanisms for accreditation of schools of pharmacy that are not compulsory?	
***Accreditation requirements of schools of pharmacy technicians**	This indicator sets out information about the regulation of pharmacy education.	

**Existence of national accreditation requirements for institutions that educate pharmacy technicians	The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for accreditation of school of pharmacy support worker and their programmes been established? 2. Are national and/or subnational mechanisms for accreditation of pharmacy support worker and their programmes compulsory? 3. Are there national and/or subnational mechanisms for accreditation of pharmacy support worker and their programmes that are not compulsory?	
Establish standards-based global guidance for quality assurance of pharmacy and pharmaceutical science education in the context of local needs and practice	https://www.fip.org/fip-development-goal-3	2) Existence of national needs-based guidance for quality assurance of pharmacy and pharmaceutical science education and training throughout initial education and career development (advanced practice/specialisation)
Implement fair, effective and transparent policies and procedures for quality assurance of pharmacy and pharmaceutical science education and training.	https://www.fip.org/fip-development-goal-3	
Training strategy & and infrastructures providing structured joumeys for early career pharmacy practitioners including &and pharmacy support workers linked towards advanced practice and specialisation frameworks & and professional recognition & and certification	https://www.fip.org/fip-development-goal-3	
***Standards for pharmacists' education** **Existence of national and/or subnational standards on the content of pharmacists' education including curriculum review	This indicator sets out information about the process of updating the curriculum for pharmacist education. The following questions should guide a response to this indicator: 1. Is there a list of knowledge, skills and competencies to be acquired during health workforce education and training? 2. Is this list reviewed regularly?	
*Nationally approved training requirements **Existence of nationally approved training requirements for hospital pharmacists (vaccinationan and oterh CDs servercies)	This indicator captures information about the existence of nationally approved training requirements for hospital pharmacy across public or private organisations and the time required to complete training. This gives an indication of the existence of national oversight of the standards of practice for the hospital pharmacy workforce.	
Define standards for practice by pharmacists and pharmacy support workforce in community, hospital and other direct patient-care roles	https://www.fip.org/fip-development-goal-3	3) Existence of professional standards of practice and required competencies for maintenance of licensing and/or registration of the pharmaceutical workforce across all sectors
*Licencing/regulation of pharmacists **Existence of legal requireiment of national and/or subnational licencing or registration of pharmacists	This indicator captures information about the existence of regulation of pharmacists. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for licensing or registration of pharmacists been established? 2. Are national and/or subnational mechanisms for licensing or registration of pharmacists compulsory? 3. Are there national and/or subnational mechanisms for licensing or registration of pharmacists that are not compulsory?	
***Maintenance of licencing or registration**	This indicator captures information about the existence of a process for pharmacists to maintain registration/license.	

**Existence of legal requirement of national and/or subnational standard for maintaining licence or registration of pharmacists	The following questions should guide a response to this indicator: 1. Are there existing national and/or subnational systems for continuing professional development/continuing education (CPD/CE)? 2. If national and/or subnational systems for CPD/CE exist, are they compulsory? 3. If compulsory, are they linked to re-licensure/maintenance of registration?	
***Licencing/registration of pharmacy technicians** **Existence of legal requirement of national and/or subnational licencing or registration of pharmacy technicians	This indicator captures information about the existence of regulation of pharmacy technicians. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for licensing or registration of pharmacists been established? 2. Are national and/or subnational mechanisms for licensing or registration of pharmacists compulsory? 3. Are there national and/or subnational mechanisms for licensing or registration of pharmacists that are not compulsory?	
***Community Pharmacy Technician – Scope of practice** **Existence of a scope of practice for community pharmacy technicians	This indicator captures information about the existence of a scope of practice for community pharmacy technicians. It gives an indication of the extent of the supervision of pharmacy technicians	
***Maintenance of registration/licencing for pharmacy technicians** **Existence of legal requirement of national and/or subnational standard for maintaining licence or registration of pharmacy technicians	This indicator captures information about the existence of a process for pharmacy technicians to maintain registration/licence. The following questions should guide a response to this indicator: 1. Are there existing national and/or subnational systems for continuing professional development/continuing education (CPD/CE)? 2. If national and/or subnational systems for CPD/CE exist, are they compulsory? 3. If compulsory, are they linked to re-licensure/maintenance of registration?	
***Mandatory presence of community pharmacist** **Existence of a policy for the presence of a community pharmacist mandatory at all times	This indicator will capture information about mandatory staffing requirements of a community pharmacy. It gives an indication of the level of pharmacist supervision in a community pharmacy.	
***Minimum workforce requirements** **Minimum workforce requirements are mandatory for community pharmacies	This indicator captures information about the competency and skill mix of a community pharmacy required by law. It gives an indication of the potential services offered and the distribution of tasks and responsibilities between pharmacists and the support workforce.	
Develop standards-based guidance, practice-support tools and self-assessment tools for the implementation and delivery of professional services that are aligned with patient-, community- and health-system-needs	https://www.fip.org/fip-development-goal-3	4) Existence of national pharmacy practice standards or guidelines for measuring the quality of service provision in the healthcare system. These 'quality standards/guidelines' might be included within existing 'scopes of pharmacy practice' guidelines, code of ethics,
Ensure systems are in place for upholding ethical practice across all areas of pharmaceutical practice	https://www.fip.org/fip-development-goal-3	

***Good pharmacy practice guidelines** **Existence of national and/or subnational good pharmacy practice guidelines	This indicator sets out information about the existence of guidance that defines good pharmacy practice. It gives an indication of the extent of oversight of professional practice.	competency development frameworks, pharmacy practice standards, policy development etc.
***Code of ethics** **Existence of national and/or subnational code of ethics	This indicator sets out information about the existence of a code of ethics. It gives an indication of national oversight of professional standards and obligations.	
***Competency framework for pharmacy technicians** **Existence of national and/or subnational competency framework for pharmacy technicians and pharmacy support workers	This indicator sets out information about the existence of a competency framework for pharmacy technicians and pharmacy support workers used for professional development and/or recognition. It gives an indication of commitment to developing the pharmacy workforce.	
***Pharmacy practice standards performance indicators for pharmacy technicians** **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacy technicians	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	
*Mandatory quality assurance **Mandatory quality assurance for community pharmacies	This indicator captures information about the existence of the assessment/inspection of community pharmacies against standards by a government agency. It gives an indication of the role the state plays in ensuring consistency in the quality of community pharmacies across a nation.	
Establish mechanisms and indicators for quality improvement including collaborative working, patient safety and professional standards	https://www.fip.org/fip-development-goal-3	5) Existence of evidence-based performance indicators to assess and monitor the applied pharmacy practice against the existing national standards, e.g. audit systems, patient feedback, health outcomes research, cost-effectiveness measures etc.
Establish mechanisms for ('real world') pragmatic and useful evidence-based service implementation and service evaluation and monitoring such as audit systems, patient feedback, health outcomes research and cost effectiveness measures	https://www.fip.org/fip-development-goal-3	
***Pharmacy practice standards performance indicators** **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacists.	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	
***National standards for hospital pharmacy** **Existence of national standards defining the scope of services of hospital pharmacies	This indicator captures information about the existence of national standards for hospital pharmacy. It gives an indication of national oversight of hospital pharmacy.	
Develop tools to improve knowledge of national regulatory requirements for medical products	https://www.fip.org/fip-development-goal-3	6) Availability of guidance documents & tools defining quality assurance criteria for various pharmaceutical sciences areas to assure access to safe and effective medical products
Collaborate with global and regional stakeholders to develop mechanisms aimed at reducing substandard and falsified medical products	https://www.fip.org/fip-development-goal-3	
PDG4: Advanced & specialist development	Initially assigned 13	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**Proposed list of indicators for the wider professional engagement stage**
*Good pharmacy practice guidelines (1)	This indicator sets out information about the existence of guidance that defines good	(1) Existence of national regulatory requirements for

**Existence of national and/or subnational good pharmacy practice guidelines	pharmacy practice. It gives an indication of the extent of oversight of professional practice.	advanced practitioners and specialists to provide advanced services
*Code of ethics (1) **Existence of national and/or subnational code of ethics	This indicator sets out information about the existence of a code of ethics. It gives an indication of national oversight of professional standards and obligations.	
Establish regulatory requirements for advanced practitioners and specialists in the appropriate settings, to ensure an adequate response to patient needs and optimal integrative care. (1)	Goal 4 - FIP - International Pharmaceutical Federation	
***Competency development framework for pharmacists (2)** **Existence of national and/or subnational competency development framework for pharmacists	This indicator sets out information about the existence of a competency framework for pharmacists used for professional development and/or recognition. It gives an indication of commitment to developing the pharmacy workforce.	(2) Existence of a national competency (development) framework for advanced & specialist scope of practice for pharmacists' career development beyond early career/foundation level
***Pharmacy practice standards performance indicators (2)** **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacists.	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	
***National strategic plan for pharmaceutical human resources (3)** **Existence of national strategic plan for pharmaceutical human resources	This indicator sets out information about a national strategic plan for pharmaceutical human resources. The following questions should guide a response to this indicator: 1. Do HR plans for the pharmaceutical workforce match competencies with population, health systems, and health labour market needs? 2. Do HR plans take into account efforts to scale up transformative education and training? 3. Are strategic steps taken when considering and taking into account the workforce market needs and absorptive capacities for the HR plan development?	(3) Existence of a national strategic plan for pharmaceutical workforce development to support developing the competency and capability of an advanced and expert pharmacist in all sectors
Ensure competency and capability of an advanced and expert pharmacist in all sectors (including specialisations extending to industry and administration settings) for greater optimisation of complex pharmaceutical patient care. This may now include prescribing roles within a recognised scope of practice. (3)	Goal 4 - FIP - International Pharmaceutical Federation	
***Advanced services and activities (4)** **Existence of advanced services or activities	This indicator captures information about the availability of advanced services or activities at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	(4) Existence of advanced services with standards and/or guidelines for the development and delivery of these services at the practice site (community, hospital)
***National standards for hospital pharmacy (4)** **Existence of national standards defining the scope of services of hospital pharmacies	This indicator captures information about the existence of national standards for hospital pharmacy. It gives an indication of national oversight of hospital pharmacy.	
Develop practice infrastructures to support advanced practice and specialisation such as board certification, residency training, continuing professional development, proof of attainment of competencies. (5)	Goal 4 - FIP - International Pharmaceutical Federation	(5) Availability of the necessary infrastructures that assist practitioners in the development of advanced and/or specialist practice, e.g. CPD, residency

*Nationally approved training requirements (5) **Existence of nationally approved training requirements for hospital pharmacists	This indicator captures information about the existence of nationally approved training requirements for hospital pharmacy across public or private organisations and the time required to complete training. This gives an indication of the existence of national oversight of the standards of practice for the hospital pharmacy workforce.	training, board certification, sector-specific programmes, etc
Systematic use of professional recognition programmes, systems and frameworks as markers for advancement and specialisation across the workforce, including advanced pharmaceutical scientists (6)	Goal 4 - FIP - International Pharmaceutical Federation	(6) Availability of a national professional recognition system that recognises advanced practice and or specialisation
Need for a common and shared understanding of what is meant by 'specialisation' and 'advanced practice' in the context of scope of practice and the responsible use of medicines. (7)	Goal 4 - FIP - International Pharmaceutical Federation	(7) Availability of an agreed definition of "advanced" and "specialist" practice
PDG5: Competency Development	Initially assigned 17 indicators	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**Proposed list of indicators for the wider professional engagement stage**
***Standards for pharmacists' education (1)** **Existence of national and/or subnational standards on the content of pharmacists' education including curriculum review	This indicator sets out information about the process of updating the curriculum for pharmacist education. The following questions should guide a response to this indicator: 1. Is there a list of knowledge, skills and competencies to be acquired during health workforce education and training? 2. Is this list reviewed regularly?	1) Institutional use of competency-based education (or learning) approach as a framework for teaching and assessment of learning
Clear and accessible developmental frameworks describing competencies and scope of practice for all stages of professional careers. This should include leadership development frameworks for the pharmaceutical workforce. (2)	https://www.fip.org/fip-development-goal-5	2) Existence of national evidence-based development frameworks describing competencies needed for the pharmaceutical workforce (pharmacists, technicians, pharmaceutical scientists, etc.) for all stages and settings of professional career
Ensure developmental frameworks that support leadership, humanistic and ethics development of the workforce. (2)	https://www.fip.org/fip-development-goal-5	
***Code of ethics (2)** **Existence of national and/or subnational code of ethics	This indicator sets out information about the existence of a code of ethics. It gives an indication of national oversight of professional standards and obligations.	
***Competency development framework for pharmacists (2)** **Existence of national and/or subnational competency development framework for pharmacists	This indicator sets out information about the existence of a competency framework for pharmacists used for professional development and/or recognition. It gives an indication of commitment to developing the pharmacy workforce.	
***Competency framework for pharmacy technicians (2)** **Existence of national and/or subnational competency framework for pharmacy technicians and pharmacy support workers	This indicator sets out information about the existence of a competency framework for pharmacy technicians and pharmacy support workers used for professional development and/or recognition. It gives an indication of commitment to developing the pharmacy workforce.	
***Maintenance of licencing or registration (2)** **Existence of legal requirement of national and/or subnational standard for maintaining licence or registration of pharmacists	This indicator captures information about the existence of a process for pharmacists to maintain registration/license. The following questions should guide a response to this indicator: 1. Are there existing national and/or subnational systems for continuing professional development/continuing	

	education (CPD/CE)? 2. If national and/or subnational systems for CPD/CE exist, are they compulsory? 3. If compulsory, are they linked to re-licensure/maintenance of registration?	
***Pharmacy practice standards performance indicators (2)** **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacists.	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	
***Pharmacy practice standards performance indicators for pharmacy technicians (2)** **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacy technicians	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	
Framework describing competencies for all stages of professional careers in pharmaceutical sciences (2)	https://www.fip.org/fip-development-goal-5	
Define evidence-based competency frameworks for pharmaceutical scientists to effectively meet the needs in academia, industry, and regulatory bodies (2)	https://www.fip.org/fip-development-goal-5	
Evidence of clear policy that links leadership development (from early years) with competence attainment for the advancement of practice activities. (3)	https://www.fip.org/fip-development-goal-5	3) Existence of national evidence-based development frameworks that establish a clear link between foundation practice and advanced practice
Clearly defined developmental frameworks for practitioners describing competencies linked to professional services delivered in practice. (4)	https://www.fip.org/fip-development-goal-5	4) Existence of national evidence-based competency frameworks for practitioners describing advanced competencies linked to professional services delivered in practice, such as MUR, NCD/LTCs, vaccination, compounding etc
Use evidence- based competency frameworks that support the development of practitioners to deliver specific professional services within their scope of practice, such as medicines use review, adherence optimisation, compounding, prescribing, vaccinatingor managingcommunicable and non-communicable diseases, to name a few. (4)	https://www.fip.org/fip-development-goal-5	
*Community Pharmacy Technician – Scope of practice (4) **Existence of a scope of practice for community pharmacy technicians	This indicator captures information about the existence of a scope of practice for community pharmacy technicians. It gives an indication of the extent of the supervision of pharmacy technicians	
Support the development and training of service-led competencies through short courses, certifications and other continuing professional development opportunities. (5)	https://www.fip.org/fip-development-goal-5	5) Existence of national strategies and training to develop service-led competencies that provide additional new competencies to the pharmaceutical workforce through courses and programmes, certifications, CPDs
PDG7: Advancing integrated services	Initially assigned 26	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**Proposed list of indicators for the wider professional engagement stage**
***Good pharmacy practice guidelines (1)**	This indicator sets out information about the existence of guidance that defines good pharmacy practice. It gives an indication of	(1) Existence of national practice guidelines and quality standards to measure health care outcomes

**Existence of national and/or subnational good pharmacy practice guidelines	the extent of oversight of professional practice.	provided by integrated pharmaceutical services
***Code of ethics (1)** **Existence of national and/or subnational code of ethics	This indicator sets out information about the existence of a code of ethics. It gives an indication of national oversight of professional standards and obligations.	
Implement quality measures of all outcomes of health care, from an integrated, holistic perspective, which take into account the Person's Journey. (1)	Goal 7 - FIP - International Pharmaceutical Federation	
***Pharmacy practice standards performance indicators** **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacists. (1)	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	
***Scope of community pharmacy services (2)** **Scope of community pharmacy activities and services defined by law	This indicator will capture information about mandatory services and activities to be delivered by a community pharmacy.	(2) Availability of a system for designing, delivering and evaluating advanced services in different levels of the health system, including urgent and emergency care services
***Type and availability of hospital pharmacy services (2)** **Type and availability of hospital pharmacy services	This indicator captures information about the type and availability of services or activities at the hospital pharmacy. It gives an indication of the width of the scope of practice in this area and the extent of implementation of services or activities.	
Develop and implement systems for the design, delivery and evaluation of such services in primary, secondary, tertiary, and urgent and emergency care services. (2)	Goal 7 - FIP - International Pharmaceutical Federation	
***Clinical services aimed at improving the use of medicines (3)** **Existence of clinical services aimed at improving the use of medicines	This indicator captures information about the prevalence of clinical services aimed at improving the use of medicines. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	(3) Availability of people-centred integrated services that optimise the use of medicines and achieve the optimal clinical, humanistic, economic and sustainable health care outcomes
Recognise that people-centred integrated quality health services are the foundation for optimal clinical, humanistic, economic and sustainable health care outcomes. (3)	Goal 7 - FIP - International Pharmaceutical Federation	
***Advanced services and activities (3)** **Existence of advanced services or activities	This indicator captures information about the availability of advanced services or activities at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
***Primary care and public health services (4)** **Existence of Primary Care and Public Health Services	This indicator captures information about the prevalence of primary care and public health services. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	(4) Existence of advanced and integrated people-centred care as the core of Primary Care and Public Health Services, e.g. patient education & health promotion, long-term condition management, Medicines Use Reviews, point-of-care or diagnostic tests etc
***Performing point-of-care or diagnostic tests at the pharmacy (4)** **Existence of point-of-care or diagnostic tests at the pharmacy	This indicator captures information about the availability of point-of-care tests at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
*Harm reduction services (4) **Existence of harm reduction services	This indicator captures information about the availability of harm reduction services at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence	

(Health education, promotion for population)	of guidelines, implementation, payment methods and any recent changes.	
***Ratio of community pharmacies to hospital pharmacies (5)** **Ratio of community pharmacies per hospital pharmacy	This indicator captures information about the relative capacity to provide access to medicines and offer pharmaceutical care and other professional services in community and hospital settings.	(5) Number of community and hospital pharmacies that provide integrated pharmaceutical services for all population (standardised by national population), including emergency situations
Ensure capacity to deliver interprofessional integrated services during humanitarian crises, disasters and emergency situations. (5)	Goal 7 - FIP - International Pharmaceutical Federation	
A patient-centred and integrated health services foundation for workforce development, relevant to social determinants of health and needs-based approaches to workforce development. (6)	Goal 7 - FIP - International Pharmaceutical Federation	(6) Existence of systematic and integrated development of education and training based on population needs and social determinants of health for pharmaceutical workforce development, including pharmacists, educators, & trainers
Systematic development of education and training activities based on local healthcare systems, their capacity and funding. (6)		
A people-centred and integrated health care provision that is based on an interprofessional and cross-setting seamless continuum, including pharmacist-delivered professional services (7)	Goal 7 - FIP - International Pharmaceutical Federation	(7) Existence of clear strategies and procedures to facilitate delivery of integrated and needs-based pharmaceutical care services in practice and across all health care setting
Define clear processes and procedures for developing and delivering integrated, needs-based services in practice and across all health care settings. (7)		
*Access to medicines: wholesalers and manufacturers (8) **Existence of policies/laws allowing pharmaceutical wholesalers or manufacturers to deliver certain types of medicines directly to patients' homes	This indicator sets out information about whether the government or competent authority has created policies/laws allowing pharmaceutical wholesalers or manufacturers to deliver certain types of medicines directly to patients' homes. It gives an indication of the extent of the regulation of accessibility to medicines.	(8) Existence of national guidelines or policies that ensure all people have access to advanced pharmaceutical care services
***Access to medicines: dispensing physicians** **Existence of policies/laws allowing dispensing of medicines by physicians	This indicator sets out information about whether the government or competent authority has created policies/laws allowing dispensing of medicines by physicians. It gives an indication of the extent of accessibility to medicines particularly where there is not a pharmacy.	
***Number of dispensing physicians** **Number of dispensing physicians	This indicator sets out information about the number of dispensing physicians available. It gives an indication of the extent of accessibility to medicines particularly where there is not a pharmacy.	
***Access to non-prescription medicines: community pharmacy only** **Existence of subcategory of non-prescription medicines (NPMs) that may ONLY be dispensed by community pharmacies	This indicator sets out information about whether the government or competent authority has created policies/laws regulating a sub-category of non-prescription medicines only supplied in community pharmacies. It gives an indication of restriction of distribution and where decision-making sits with selecting medicines: joint decision making between patient and pharmacy staff or self-selection outside of the pharmacy.	
*Direct access to non-prescription medicines: community pharmacy **Existence of availability of non-prescription medicines for self-selection at community pharmacies, i.e.,	This indicator sets out information about access to non-prescription medicines at community pharmacies. It gives an indication of patient's ability to choose medicines autonomously (though they have the option to consult pharmacy staff)	

displayed in a way that consumers can have direct access to them (OTC)		
***Generic substitution** **Existence of a policy allowing generic substitution by pharmacies	This indicator sets out information about generic substitution. It gives an indication of the extent of the authority of pharmacies to substitute and thereby contribute to economic savings on medicines.	
***Encouraging the use of generics** **Measures in place to promote the use of generics	This indicator sets out information about measures to promote the use of generics. It gives an indication of the extent of policies that incentivise the use of generics with a view to generating economic savings on medicines	
PDG8: Working with others	Initially 14 assigned indicators	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**Proposed list of indicators for the wider professional engagement stage**
***Accreditation requirements of schools of pharmacy (1)** **Existence of national accreditation requirements for schools of pharmacy	This indicator sets out information about the regulation of pharmacy education. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for accreditation of schools of pharmacy and their programmes been established? 2. Are national and/or subnational mechanisms for accreditation of schools of pharmacy and their programmes compulsory? 3. Are there national and/or subnational mechanisms for accreditation of schools of pharmacy that are not compulsory?	1) Inclusion of the interprofessional education (IPE) approach in the initial education and training curriculum (in universities)
***Standards for pharmacists' education (1)** **Existence of national and/or subnational standards on the content of pharmacists' education including curriculum review	This indicator sets out information about the process of updating the curriculum for pharmacist education. The following questions should guide a response to this indicator: 1. Is there a list of knowledge, skills and competencies to be acquired during health workforce education and training? 2. Is this list reviewed regularly?	
***Accreditation requirements of schools of pharmacy technicians (1)** **Existence of national accreditation requirements for institutions that educate pharmacy technicians	This indicator sets out information about the regulation of pharmacy education. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for accreditation of school of pharmacy support worker and their programmes been established? 2. Are national and/or subnational mechanisms for accreditation of pharmacy support worker and their programmes compulsory? 3. Are there national and/or subnational mechanisms for accreditation of pharmacy support worker and their programmes that are not compulsory?	
Foster transdisciplinary collaboration by enabling trainees and early career researchers to work with mentors from different fields. (1)	https://www.fip.org/fip-development-goal-8	
Develop education and training strategies and programmes to ensure collaboration within the pharmaceutical workforce and training on medicines for other healthcare professionals. (2)	https://www.fip.org/fip-development-goal-8	2) Existence of national education and training strategies to ensure intra- and interprofessional collaboration within the pharmaceutical workforce and other healthcare professionals across all levels of care (primary, secondary and
Develop structures and systems for multidisciplinary intra- and interprofessional teams of all relevant health cadres to work together in a	https://www.fip.org/fip-development-goal-8	

coordinated manner across all levels of care. This should include pharmaceutical practice for optimal people-centred care delivery in primary, secondary and tertiary health settings. (2)		tertiary care settings) with the focus on patient care at the core
Work across interfaces and transitions of the health system (including digital interfaces) to ensure continuity of care between levels of care and care journeys through mechanisms such as appropriate communications and health data sharing, shared decision-making, shared accountability for patient outcomes, and services such as medicines reconciliation or collaborative management of long-term conditions. (3)	https://www.fip.org/fip-development-goal-8	3) Existence of health care structures and facilities that facilitate interprofessional collaboration and ensure continuity of care between levels of care, e.g. collaborative management of LTCs, health data exchange, digital interfaces etc
***Code of ethics (4)** **Existence of national and/or subnational code of ethics	This indicator sets out information about the existence of a code of ethics. It gives an indication of national oversight of professional standards and obligations.	4) Existence of national strategies that recognise members of the pharmaceutical workforce as integral members of the multidisciplinary team, enabling collaborative practice and integrated care
Support the development of policies where pharmacists and the support workforce are key actors in collaborative practice and integrated care. (4)	https://www.fip.org/fip-development-goal-8	
Work with stakeholders, agencies, and other health professional associations to enable legislative change and development (4)		
Ensure engagement of patients, formal and informal caregivers and community health workers in multidisciplinary health decision making through their empowerment, improved health literacy and orientation, participation and connectivity in the team as ambassadors for their own and their communities' health. (5)	https://www.fip.org/fip-development-goal-8	5) Existence of national strategies to actively empower patients in their own care and to engage with their multidisciplinary care team thereby taking an active part in decision making about their care
Recognise collaborative practice as a quality indicator for care delivery and capacity improvement. (6)	https://www.fip.org/fip-development-goal-8	6) Existence of national strategies that utilise collaborative practice as a quality indicator for care delivery and capacity improvement
Develop and implement intra- and interdisciplinary programmes for workforce willing to change from practice to sciences and vice versa or develop career paths in associated fields (7)	https://www.fip.org/fip-development-goal-8	7) Availability of intra- and interdisciplinary programmes to facilitate collaboration between pharmaceutical scientists and clinical practitioners in associated fields
Establish opportunities for pharmaceutical scientists and clinical practitioners to collaborate. (7)		
PDG9: CPD strategies	Initially 14 assigned indicators	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**Proposed list of indicators for the wider professional engagement stage**
*Licencing/regulation of pharmacists (1) **Existence of legal requireiment of national and/or subnational licencing or registration of pharmacists	This indicator captures information about the existence of regulation of pharmacists. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for licensing or registration of pharmacists been established? 2. Are national and/or subnational mechanisms for licensing or registration of pharmacists compulsory? 3. Are there national and/or subnational	1) Existence of national regulations for implementing and linking CPD as a mandatory requirement in the registration, renewal of licensure and/or advanced practice and specialist recognition for all registered/licensed pharmacists

	mechanisms for licensing or registration of pharmacists that are not compulsory?	
*Maintenance of licencing or registration (1) **Existence of legal requirement of national and/or subnational standard for maintaining licence or registration of pharmacists	This indicator captures information about the existence of a process for pharmacists to maintain registration/license. The following questions should guide a response to this indicator: 1. Are there existing national and/or subnational systems for continuing professional development/continuing education (CPD/CE)? 2. If national and/or subnational systems for CPD/CE exist, are they compulsory? 3. If compulsory, are they linked to re-licensure/maintenance of registration?	
Develop and implement CPD requirements for renewal of licensure, registration and/or advanced practice and specialist recognition. (1)	https://www.fip.org/fip-development-goal-9	
*Code of ethics (2) **Existence of national and/or subnational code of ethics	This indicator sets out information about the existence of a code of ethics. It gives an indication of national oversight of professional standards and obligations.	2) Existence of a national/international accreditation system/ body that oversights and monitors the quality of CPD provision
Ensure the provision of continuing education opportunities in the workplace. (3)	https://www.fip.org/fip-development-goal-9	(3) Availability of (online/class-based) certified CPD programmes (gaining CPD' credits/points) for continuing education and training in the workplace
*Pharmacy practice standards performance indicators (3) **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacists.	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	
Develop online programmes for continuing education and training which lead to certification or credentialing (3)	https://www.fip.org/fip-development-goal-9	
*Licencing/registration of pharmacy technicians (4) **Existence of legal requirement of national and/or subnational licencing or registration of pharmacy technicians	This indicator captures information about the existence of regulation of pharmacy technicians. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for licensing or registration of pharmacists been established? 2. Are national and/or subnational mechanisms for licensing or registration of pharmacists compulsory? 3. Are there national and/or subnational mechanisms for licensing or registration of pharmacists that are not compulsory?	4) Existence of national regulations/requirements for implementing and linking CPD in the registration, renewal of licensure for all registered/licensed pharmacy technicians and pharmacy support staff
*Maintenance of registration/licencing for pharmacy technicians (4) **Existence of legal requirement of national and/or subnational standard for maintaining licence or registration of pharmacy technicians	This indicator captures information about the existence of a process for pharmacy technicians to maintain registration/licence. The following questions should guide a response to this indicator: 1. Are there existing national and/or subnational systems for continuing professional development/continuing education (CPD/CE)? 2. If national and/or subnational systems for CPD/CE exist, are they compulsory? 3. If compulsory, are they linked to re-licensure/maintenance of registration?	

*National training requirements for managing a community pharmacy (5) **National requirements for specific training/qualifications for managing a community	This indicator will capture information about mandatory training requirements for managing a community pharmacy.	5) Existence of specialised CPD programmes to meet the minimum competencies and training requirements for community and hospital pharmacists throughout pharmacists' professional journey (early career, advanced practice)
*Minimum workforce requirements (5) **Minimum workforce requirements are mandatory for community pharmacies	This indicator captures information about the competency and skill mix of a community pharmacy required by law. It gives an indication of the potential services offered and the distribution of tasks and responsibilities between pharmacists and the support workforce.	
*National standards for hospital pharmacy (5) **Existence of national standards defining the scope of services of hospital pharmacies	This indicator captures information about the existence of national standards for hospital pharmacy. It gives an indication of national oversight of hospital pharmacy.	
*Nationally approved training requirements (5) **Existence of nationally approved training requirements for hospital pharmacists	This indicator captures information about the existence of nationally approved training requirements for hospital pharmacy across public or private organisations and the time required to complete training. This gives an indication of the existence of national oversight of the standards of practice for the hospital pharmacy workforce.	
Development of programmes to support return to practice after career breaks or sector changes. (6)	https://www.fip.org/fip-development-goal-9	6) Existence of specialised CPD programmes to support return to practice after career breaks or sector changes
PDG10: Equity & Equality	**Initially 6 assigned indicators**	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**Proposed list of indicators for the wider professional engagement stage**
*Female Pharmacists (1) **Percentage of female pharmacists in active pharmacist workforce	This indictor will capture information about gender balance.	(1) Number of female licensed/registered pharmacists
*Pharmacist distribution by sector of practice (2) **Percentage of pharmacists employed by sector type	This indicator will capture information about how the pharmacist workforce is deployed: the percentage of pharmacists employed in each sector.	(2) Number of actively practising pharmacists (segmented number by sectors of practice, e.g. community, hospital pharmacists, academia, pharmaceutical science, and other sectors)
Ensure full and effective participation and equal opportunities for leadership at all levels of decision-making in pharmaceutical environments; avoidable barriers to participation for all social categories are identified and addressed. (3)	https://FIPDG10: Equity and equality description and mechanisms	(3) Existence of national legislation that ensures equity in opportunities in the workplace
Clear strategies for equity and diversity in pharmaceutical services delivery, service access and service impact so that all people have access to quality pharmaceutical care. (4)	https://FIPDG10: Equity and equality description and mechanisms	(4) Number of community and hospital pharmacies that ensure equity and equality in the accessibility of patients and populations to quality pharmaceutical services in RURAL and URBAN geographic areas (standardised by population) and health care systems (e.g. both private and public)
Ensure access by patients and populations to the pharmacy workforce across areas (e.g. urban and rural environments) and health care systems (e.g. both private and public). (4)	https://FIPDG10: Equity and equality description and mechanisms	
4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with	https://Global Indicator Framework after 2020 review_English	(5) Existence of national regulations that ensure equity and equality in the access to pharmacy education and training

disabilities, indigenous peoples and children in vulnerable situations 4.5.1 Parity indices (female/male, rural/urban, bottom/top wealth quintile and others such as disability status, indigenous peoples and conflict-affected, as data become available) for all education indicators on this list that can be disaggregated (5)		
PDG11: Impact & Outcomes	Initially assigned 11 indicators	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**Proposed list of indicators for the wider professional engagement stage**
***Pharmacy practice standards performance indicators** **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacists.	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	Same concepts was used in DG3 Quaity Assurance indicators
***Pharmacy practice standards performance indicators for pharmacy technicians** **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacy technicians	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	
***Advanced services and activities** **Existence of advanced services or activities	This indicator captures information about the availability of advanced services or activities at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
Engagement with systems to measure the impact of the pharmaceutical workforce on health improvement and healthcare outcomes. Links with needs-based education, training and workforce planning. (1)	https://www.fip.org/fip-development-goal-11	1) Existence of national strategies and systems to measure the impact of the pharmaceutical workforce on the health systems outcomes and health improvement
Gather continuous data points to monitor the performance of the pharmaceutical workforce. (1)	https://www.fip.org/fip-development-goal-11	
Recognise, assess and take accountability for the societal impact of pharmaceutical services in terms of health outcomes and quality of life, improved efficiency and resilience of health systems, availability and accessibility of services, equity and equitability, and overall sustainability (economic, organisational and environmental). (2)	https://www.fip.org/fip-development-goal-11	2) Existence of evidence-based indicators or metrics to measure and monitor the impact of all pharmaceutical services on health outcomes, quality of life and improved health system efficiency
Implement systems to measure and monitor service impact and outcomes that are based on agreed definitions and standards, quality and performance indicators, real-world outcomes metrics (including public and patient-reported outcomes) and other data and service assessment intelligence. for all professional services, from essential to advanced and specialised. (2)	https://www.fip.org/fip-development-goal-11	
Implement systems to measure cost effectiveness, including cost-effectivity analysis, cost-benefit and cost–utility analysis, and budgetary impact of pharmacists' professional services. (2)	https://www.fip.org/fip-development-goal-11	

Enable and promote practice-based research, health impact assessment and evaluation mechanisms that facilitate practitioner-led evidence generation. (3)	https://www.fip.org/fip-development-goal-11	3) Existence of national systems that analyse and monitor the impact of all pharmaceutical services in terms of availability and accessibility of services, equity and equitability, and overall sustainability
Promote scientific research to continuously improve patient care using innovative technologies. (3)	https://www.fip.org/fip-development-goal-11	
Use of transparent evaluation processes to establish value of outcomes of pharmacy practice service delivered or pharmaceutical science outcomes delivered. (4)	https://www.fip.org/fip-development-goal-11	4) Existence of evidence-based indicators or metrics to assess and monitor the pharmaceutical science outcomes delivered
Engagement with systems to measure the impact of the pharmaceutical workforce on health improvement and healthcare outcomes. Links with needs-based education, training and workforce planning. (5)	https://www.fip.org/fip-development-goal-11	5) Existence of national monitoring and evaluation system that track and measure the performance and progress of the existing educational system and identify needs-based education programmes
PDG12: Pharmacy Intelligence	Initially assigned 29 Indicators	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**Proposed list of indicators for the wider professional engagement stage**
A national strategy and corresponding actions to collate and share workforce data and workforce planning activities (skill mixes, advanced and specialist practice, capacity). Without workforce intelligence data there can be no strategic workforce development. (1)	https://www.fip.org/fip-development-goal-12	1) Availability of a national strategy and system to collate and share pharmaceutical workforce and education data (Pharmacists, pharmaceutical scientists, technicians), including sectors of practice, career stages, age and gender distribution
***Pharmacist density (1)** **Density of pharmacists per 10,000 population	This indicator will capture information about the number of actively practising and licenced/registered pharmacists. It gives an indication of the capacity of the pharmacist workforce Total population, income level, population aged over 65 years as estimated by the World Bank	
***Female Pharmacists (1)** **Percentage of female pharmacists in active pharmacist workforce	This indictor will capture information about gender balance.	
*Share of foreign-born pharmacists (1) **Percentage of active foreign-born pharmacists	This indicator will capture the information on pharmacists coming from abroad. It gives an indication of the reliance of a country on international supply of the workforce.	
*Share of newly licenced/registered foreign-born pharmacists (1) **Percentage of newly licenced/registered foreign-trained pharmacists	This indicator will capture the information on pharmacists coming from abroad. It gives an indication of the reliance of a country on international supply of the workforce.	
***Age distribution of pharmacists (1)** **Percentage of active pharmacists in different age groups	This indicator will capture information about the percentage of active pharmacists per age group and whether e.g. there is over-representation in one age group e.g. larger number of pharmacists close to retirement. Age groups considered are <35, 35-60 and >60	
*Pharmacist distribution by sector of practice (1) **Percentage of pharmacists employed by sector type	This indicator will capture information about how the pharmacist workforce is deployed: the percentage of pharmacists employed in each sector.	
*Licencing/regulation of pharmacists (1) **Existence of legal requireiment of	This indicator captures information about the existence of regulation of pharmacists. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for licensing	

national and/or subnational licencing or registration of pharmacists	or registration of pharmacists been established? 2. Are national and/or subnational mechanisms for licensing or registration of pharmacists compulsory? 3. Are there national and/or subnational mechanisms for licensing or registration of pharmacists that are not compulsory?	
***Pharmacy technician density (1)** **Density of pharmacy technician workforce per 10,000 population	This indicator will capture information about the capacity of the pharmacy technician workforce. Total population, income level, as estimated by the World Bank	
***Pharmacy education capacity: pharmacy graduates' density (1)** **Density of pharmacy graduates per 1 million population	This indicator sets out information about the number of students graduating from a school of pharmacy and therefore potentially supplying the pharmacist workforce.	
*Number of community pharmacies (2) **Number of community pharmacies	This indicator sets out information about the number of community pharmacies. It gives an indication of the availability of community pharmacies.	2) Availability of a system to collate and share data of pharmaceutical services delivery across different settings (hospital/community, private/public) at a country level
*Density of community pharmacies (2) **Density of community pharmacies per 10,000 population	This indicator will capture information about the availability of community pharmacies to a population. It gives an indication of a country's community pharmacy infrastructure as well as the accessibility of pharmacy services and medicines.	
*Ratio of community pharmacies to population (2) **Density of community pharmacies per 10,000 population	This indicator will capture information about the availability of community pharmacies to a population. It gives an indication of the population each community pharmacy attends to.	
*Density of community pharmacists (2) **Density of community pharmacists per 10,000 population	This indicator will capture information about the capacity of the community pharmacist workforce.	
*Ratio of community pharmacists to community pharmacies (2) **Ratio of community pharmacists per community pharmacy	This indicator will capture information about the capacity of the community pharmacist workforce within community pharmacies. It gives an indication of the adequacy of pharmacist supervision of the dispensing of medicines.	
*Ratio of pharmacy technicians to community pharmacies (2) **Ratio of pharmacy technicians per community pharmacy	This indicator will capture information about the capacity of the pharmacy technician workforce within community pharmacies. It also gives an indication of the balance of skill mix with pharmacists and pharmacy support workers.	
*Number of hospital pharmacies (2) **Number of hospital pharmacies	This indicator sets out information about the number of hospital pharmacies. It gives an indication of the availability of hospital pharmacies.	
*Density of hospital pharmacies (2) **Density of hospital pharmacies per 100,000 population	This indicator will capture information about the availability of hospital pharmacies to a population. It gives an indication of a country's hospital pharmacy infrastructure as well as the accessibility of pharmacy services and medicines.	
*Density of hospital pharmacists (2) **Density of hospital pharmacists per 100,000 population	This indicator will capture information about the capacity of the hospital pharmacist workforce.	
*Ratio of hospital beds per hospital pharmacy (2) **Ratio of hospital beds per hospital pharmacy	This indicator captures information about the ratio of hospital beds per hospital pharmacy. It gives an indication of the size and workload of hospital pharmacies.	

*Ratio of hospital pharmacists per hospital pharmacy (2) **Ratio of hospital pharmacists per hospital pharmacy	This indicator captures information about the availability of the pharmacist workforce to serve the needs of hospitals. It gives an indication of the extent of implementation of patient-focused services.	
*Ratio of hospital pharmacy technicians per hospital pharmacy (2) **Ratio of hospital pharmacy technicians per hospital pharmacy	This indicator captures information about the availability of the pharmacy technician workforce to serve the needs of hospitals. When compared with the hospital pharmacist ratio it gives an indication of the extent of skill mix.	
*Ratio of community pharmacies to hospital pharmacies (2) **Ratio of community pharmacies per hospital pharmacy	This indicator captures information about the relative capacity to provide access to medicines and offer pharmaceutical care and other professional services in community and hospital settings.	
A comprehensive national strategy to collate, share and utilise intelligence on service provision, development, delivery and needs to inform evidence-based pharmaceutical services development, policymaking and funding decisions. (3)	https://www.fip.org/fip-development-goal-12	3) Availability of national strategies and systems to collate, share, and utilise intelligence to develop, deliver, and improve pharmaceutical service provision, e.g. using of frameworks, standards, indicators and metrics for service intelligence
Develop agreed frameworks for the provision of professional services that include clear definitions, requirements and standards against which it becomes possible to assess service delivery and generate professional service intelligence. (3)	https://www.fip.org/fip-development-goal-12	
Define and recognise at country level a set of minimum indicators and metrics for service intelligence. (3)	https://www.fip.org/fip-development-goal-12	
Develop monitoring systems to identify workforce trends to enable decision making on deployment and supply of pharmaceutical workforce, noting that time-lags are often present in these activities. (4)	https://www.fip.org/fip-development-goal-12	4) Existence of a national monitoring system to identify workforce trends to enable decision making on deployment and supply of pharmaceutical workforce
Develop integrated databases for service delivery, workforce and science intelligence. Develop mechanisms for the rigorous and transparent exchange and sharing of service intelligence with stakeholders, partners and other professionals at local, national and international level. (5)	https://www.fip.org/fip-development-goal-12	5) Availability of country databases and health information systems through collaboration between governments, ministries of health, national statistical offices and registrar generals (with the engagement of other key stakeholders) that are accessible and bring about improvements across the pharmaceutical workforce, practice and science
Develop the capacity to utilise big data generated in practice and in science, and to perform horizon scanning, trends assessment and predictions (e.g. demographic evolution, health needs trends, pandemics and other emergencies). (6)	https://www.fip.org/fip-development-goal-12	6) Availability of a national/international system to utilise data generated in practice and science in pharmaceutical trends assessment and predictions, e.g. demographic evolution, health needs trends, pandemics and other emergencies
PDG14: Medicines Expertise	Initially assigned 13 indicators	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**Proposed list of indicators for the wider professional engagement stage**
***Generic prescribing** **Existence of mandatory generic (non-proprietary) prescribing	This indicator sets out information about mandatory generic (non-proprietary) prescribing. It gives an indication of the	Used in other DGs

	possible extent of economic savings on medicines.	
***Generic substitution** **Existence of a policy allowing generic substitution by pharmacies	This indicator sets out information about generic substitution. It gives an indication of the extent of the authority of pharmacies to substitute and thereby contribute to economic savings on medicines.	
***Scope of community pharmacy services** **Scope of community pharmacy activities and services defined by law	This indicator will capture information about mandatory services and activities to be delivered by a community pharmacy.	
***Clinical services aimed at improving the use of medicines** **Existence of clinical services aimed at improving the use of medicines	This indicator captures information about the prevalence of clinical services aimed at improving the use of medicines. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
***Primary care and public health services** **Existence of Primary Care and Public Health Services	This indicator captures information about the prevalence of primary care and public health services. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
*Harm reduction services **Existence of harm reduction services (Health education, promotion for population)	This indicator captures information about the availability of harm reduction services at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
***Advanced services and activities** **Existence of advanced services or activities	This indicator captures information about the availability of advanced services or activities at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
Ensure academic capacity (FIP Development Goal 1 [w]) to deliver education and training to enhance medicines expertise in initial education.	https://www.fip.org/fip-development-goal-14	1) Number of qualified pharmacists with the necessary expertise to develop a competent workforce that can deliver quality medicines expertise in initial education and career development
***Standards for pharmacists' education** **Existence of national and/or subnational standards on the content of pharmacists' education including curriculum review	This indicator sets out information about the process of updating the curriculum for pharmacist education. The following questions should guide a response to this indicator: 1. Is there a list of knowledge, skills and competencies to be acquired during health workforce education and training? 2. Is this list reviewed regularly?	
***National strategic plan for pharmaceutical human resources** **Existence of national strategic plan for pharmaceutical human resources	This indicator sets out information about a national strategic plan for pharmaceutical human resources. The following questions should guide a response to this indicator: 1. Do HR plans for the pharmaceutical workforce match competencies with population, health systems, and health labour market needs? 2. Do HR plans take into account efforts to scale up transformative education and training? 3. Are strategic steps taken when considering and taking into account the workforce market needs and absorptive capacities for the HR plan development?	
Incorporate expert information and advice provision skills in early career training strategy (FIP Development	https://www.fip.org/fip-development-goal-14	2) Availability of national competencies framework and training programmes to prepare a

Goal 2 [w]) and continuing professional development strategies (FIP Development Goal 9).		workforce that can develop specialised or advanced medicines expertise (i.e. specialist pharmacist and pharmaceutical scientist)
Utilise advanced and specialist development systems and frameworks (FIP Development Goal 4 [w]) to develop medicines expertise as an advanced or specialist area for the workforce, in addition to being embedded within leadership development programmes (FIP Development Goal 6 [w]).	https://www.fip.org/fip-development-goal-14	
***Good pharmacy practice guidelines** **Existence of national and/or subnational good pharmacy practice guidelines	This indicator sets out information about the existence of guidance that defines good pharmacy practice. It gives an indication of the extent of oversight of professional practice.	
Incorporate medicines expertise competencies and skills in competency development frameworks for pharmacy (FIP Development Goal 5 [w]).	https://www.fip.org/fip-development-goal-14	
***Competency development framework for pharmacists** **Existence of national and/or subnational competency development framework for pharmacists	This indicator sets out information about the existence of a competency framework for pharmacists used for professional development and/or recognition. It gives an indication of commitment to developing the pharmacy workforce.	
Provide medicines and medical devices expertise and advice to patients, formal and informal caregivers, health care professionals and relevant agencies and stakeholders to inform policymaking, clinical decision-making and prescribing practices, individual health care options and other medicines- or medical-devices-related decisions.	https://www.fip.org/fip-development-goal-14	3) Existence of strategies and systems that support in the provision of medicines and medical devices expertise (quality science-based information) and advice to patients, formal and informal caregivers, and health care professionals and stakeholders
Empower patients, formal and informal caregivers, and communities by increasing health literacy towards better care and self-care.	https://www.fip.org/fip-development-goal-14	
Utilise appropriate communication and counselling pathways and skills to provide quality and appropriate information, taking into considerations cultural and language factors and other specific care needs (e.g. people with functional diversity, migrant and refugee populations, etc).	https://www.fip.org/fip-development-goal-14	
Encourage provision of science-based information on medicines.	https://www.fip.org/fip-development-goal-14	
Utilise formal resources including formularies and medicines information management systems to convey objective, evidence-based and systematically organised information about medicines and medical devices to support pharmacy practice and service delivery, as well as the practice of other healthcare professionals.	https://www.fip.org/fip-development-goal-14	4) Availability of appropriate tools and formal resources to facilitate and support evidence-based pharmacy practice and service delivery, e.g. formularies and medicines information management systems
PDG15: People-centred care	Initially assigned 23	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**Proposed list of indicators for the wider professional engagement stage**
***Number of community pharmacies (1)** **Number of community pharmacies	This indicator sets out information about the number of community pharmacies. It gives an indication of the availability of community pharmacies.	(1) Number of pharmaceutical facilities that provide people-centred care services for all

***Number of hospital pharmacies (1)** **Number of hospital pharmacies	This indicator sets out information about the number of hospital pharmacies. It gives an indication of the availability of hospital pharmacies.	population (standardised by national population)
*Good pharmacy practice guidelines (2) **Existence of national and/or subnational good pharmacy practice guidelines	This indicator sets out information about the existence of guidance that defines good pharmacy practice. It gives an indication of the extent of oversight of professional practice.	(2) Existence of national strategies that utilise people-centred care as an indicator for evaluating health system performance and quality of care, quality assurance in education, and monitoring workforce impact
***Code of ethics (2)** **Existence of national and/or subnational code of ethics	This indicator sets out information about the existence of a code of ethics. It gives an indication of national oversight of professional standards and obligations.	
Utilise people-centred care as an indicator for evaluating and developing quality assurance in education (FIP Development Goal 3 [w]), as well as for monitoring workforce impact (FIP Development Goal 11 [w]). (2)	Goal 15 - FIP - International Pharmaceutical Federation	
***Pharmacy practice standards performance indicators (2)** **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacists.	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	
***Competency development framework for pharmacists (3)** **Existence of national and/or subnational competency development framework for pharmacists	This indicator sets out information about the existence of a competency framework for pharmacists used for professional development and/or recognition. It gives an indication of commitment to developing the pharmacy workforce.	(3) Existence of a national competency (development) framework across all stages for pharmacists and pharmacy technicians development (early career and advanced practice) with people-centred care at the core
***Competency framework for pharmacy technicians (3)** **Existence of national and/or subnational competency framework for pharmacy technicians and pharmacy support workers	This indicator sets out information about the existence of a competency framework for pharmacy technicians and pharmacy support workers used for professional development and/or recognition. It gives an indication of commitment to developing the pharmacy workforce.	
***Pharmacy practice standards performance indicators for pharmacy technicians (3)** **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacy technicians	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	
***Standards for pharmacists' education (4)** **Existence of national and/or subnational standards on the content of pharmacists' education including curriculum review	This indicator sets out information about the process of updating the curriculum for pharmacist education. The following questions should guide a response to this indicator: 1. Is there a list of knowledge, skills and competencies to be acquired during health workforce education and training? 2. Is this list reviewed regularly?	(4) The subject of "people-centred care" is included as part of the initial education and training curriculum (in universities), including in interprofessional education development
***National strategic plan for pharmaceutical human resources (5)** **Existence of national strategic plan for pharmaceutical human resources	This indicator sets out information about a national strategic plan for pharmaceutical human resources. The following questions should guide a response to this indicator: 1. Do HR plans for the pharmaceutical workforce match competencies with population, health systems, and health labour market needs? 2. Do HR plans take into account efforts to scale up transformative education and training? 3. Are strategic steps taken when	(5) Existence of national strategic plan for pharmaceutical workforce development to support the delivery of people-centred care in practice, e.g. pharmaceutical workforce match competencies with population, health systems, education development and training, and health labour market needs

	considering and taking into account the workforce market needs and absorptive capacities for the HR plan development?	
***Scope of community pharmacy services (6)** **Scope of community pharmacy activities and services defined by law	This indicator will capture information about mandatory services and activities to be delivered by a community pharmacy.	(6) Existence of national collaborative strategies that ensure people receive personalised care across primary, secondary and tertiary care settings
***Type and availability of hospital pharmacy services (6)** **Type and availability of hospital pharmacy services	This indicator captures information about the type and availability of services or activities at the hospital pharmacy. It gives an indication of the width of the scope of practice in this area and the extent of implementation of services or activities.	
Collaborative interprofessional strategies and people-centred professional services to support the prevention, screening, clinical management and therapeutic optimisation of non-communicable diseases (NCDs) and long-terms conditions (LTCs) (6)	Goal 15 - FIP - International Pharmaceutical Federation	
***Clinical services aimed at improving the use of medicines (7)** **Existence of clinical services aimed at improving the use of medicines	This indicator captures information about the prevalence of clinical services aimed at improving the use of medicines. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	(7) Availability of people-centred services that improve the use of medicines and ensure optimal clinical and resource utilisation
***Product-focused services (7)** **Existence of product-focused services	This indicator captures information about the prevalence of product-focused services. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
Develop and implement structured and evidence-based strategies and professional services for the optimisation of treatments and medicines use, to ensure optimal clinical and quality of life outcomes and resource utilisation. (7)	Goal 15 - FIP - International Pharmaceutical Federation	
***Primary care and public health services (8)** **Existence of Primary Care and Public Health Services	This indicator captures information about the prevalence of primary care and public health services. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	(8) Existence of high-quality people-centred primary care as the core of Primary Care and Public Health Services, including pharmacy delivered population health education; pharmacy delivered health promotion activities for population; essential public health functions
***Performing point-of-care or diagnostic tests at the pharmacy (9)** **Existence of point-of-care or diagnostic tests at the pharmacy	This indicator captures information about the availability of point-of-care tests at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	(9) Availability of community-based people-centred care services, e.g. screening and monitoring of NCDs and LTCs and their risk factors, symptoms and clinical signs through point-of-care or diagnostic tests
*Advanced services and activities (9) **Existence of advanced services or activities	This indicator captures information about the availability of advanced services or activities at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
Develop and implement structured and evidence-based strategies and professional services for community-based screening and monitoring of NCDs and LTCs and their risk factors,	Goal 15 - FIP - International Pharmaceutical Federation	

symptoms and clinical signs through point-of-care tests and other assessment methods like structured tools and questionnaires to identify individuals that may require further diagnostics and/or care. (9)		
Develop and implement structured systems and protocols for the referral of potential patients to other HealthCare Professionals, and for sharing clinical findings from patient screening and monitoring across the health care team and system, namely via shared access (for consultation and input) to the patient's (electronic) health records. (10)	Goal 15 - FIP - International Pharmaceutical Federation	(10) Existence of structured referral systems within people-centred care services that facilitate coordination and continuity of care between different levels of the health system
Develop and implement structured and evidence-based strategies and professional services for special patient populations with long-term conditions and specific needs, such as older adults, people with functional diversity, rare disease patients, poor and vulnerable patients, illiterate patients, migrant populations, refugees and other groups. (11)	Goal 15 - FIP - International Pharmaceutical Federation	(11) Existence of national regulations and strategies that ensure delivering professional people-centred care services in RURAL and URBAN geographic areas (standardised by population) and special patient populations with specific needs, e.g. poor and vulnerable, disabilities, and other groups
PDG16: Antimicrobial Stewardship	Initially assigned 16	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**Proposed list of indicators for the wider professional engagement stage**
***Licencing/regulation of pharmacists** ****Existence of legal requirements of national and/or subnational licencing or registration of pharmacists (e.g. vaccination services) (1)**	**This indicator captures information about the existence of regulation of pharmacists. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for licensing or registration of pharmacists been established?** **2. Are national and/or subnational mechanisms for licensing or registration of pharmacists compulsory?** **3. Are there national and/or subnational mechanisms for licensing or registration of pharmacists that are not compulsory?**	(1) Formal scope of practice within the licencing and/or registration of pharmacists (e.g. provision of pharmacy vaccination services; provision of antimicrobial supervision)
***Density of community pharmacists** ****Density of community pharmacies per 10,000 population (2)**	**This indicator will capture information about the availability of community pharmacies to a population. It gives an indication of a country's community pharmacy infrastructure as well as the accessibility of pharmacy services and medicines.**	**(2) Access to community and hospital pharmacy services indicators (Population measures per capita; urban/rural access etc)**
***Ratio of community pharmacies to population** ****Density of community pharmacies per 10,000 population (2)**	**This indicator will capture information about the availability of community pharmacies to a population. It gives an indication of the population each community pharmacy attends to.**	
***Density of community pharmacists** ****Density of community pharmacists per 10,000 population (2)**	**This indicator will capture information about the capacity of the community pharmacist workforce.**	
***Scope of community pharmacy services** ****Scope of community pharmacy activities and services defined by law (2)**	**This indicator will capture information about mandatory services and activities to be delivered by a community pharmacy.**	
***National training requirement for managing a community pharmacy**	**This indicator will capture information about mandatory training requirements for managing a community pharmacy.**	**(3) Specific training/qualifications for managing a community and hospital pharmacy that**

****National requirements for specific training/qualifications for managing a community (vaccination, communicable diseases) (3)**		**provides communicable disease services e.g. vaccination, TB clinic etc**
***Mandatory functional areas **Functional areas that are mandatory (e.g. vaccination area) (4)**	**This indicator captures information about spatial requirements for the delivery of specific professional services.**	**(4) Mandatory quality assurance for community pharmacies (training, functional areas of the pharmacy, handling of stock and preparation of medicines, documentation systems, provision of prescription and non-prescription medicines, monitoring and screening)**
***Mandatory quality assurance **Mandatory quality assurance for community pharmacies (training, setting of the pharmacy, handling of stock and preparation of medicines, documentation systems, provision of prescription and non-prescription medicines, monitoring and screening). (4)**	**This indicator captures information about the existence of the assessment/inspection of community pharmacies against standards by a government agency. It gives an indication of the role the state plays in ensuring consistency in the quality of community pharmacies across a nation.**	
***Clinical services aimed at improving the use of medicines **Existence of clinical services aimed at improving the use of medicines (5)**	**This indicator captures information about the prevalence of clinical services aimed at improving the use of medicines. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.**	**(5) Existence of Clinical and Product-focused services aimed at improving the use of medicines**
***Product-focused services **Existence of product-focused services (5)**	**This indicator captures information about the prevalence of product-focused services. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.**	
***Primary care and public health services **Existence of Primary Care and Public Health Services (6)**	**This indicator captures information about the prevalence of primary care and public health services. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.**	**(6) Provision of Primary Care and Public Health Services; pharmacy delivered population health education; pharmacy delivered health promotion activities for population**
***Harm reduction services **Existence of harm reduction services (Health education and promotion activities for population) (6)**	**This indicator captures information about the availability of harm reduction services at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.**	
***Performing point-of-care or diagnostic tests at the pharmacy **Existence of point-of-care or diagnostic tests at the pharmacy (7)**	**This indicator captures information about the availability of point-of-care tests at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.**	**(7) Provision of point-of-care or diagnostic tests at the pharmacy**
***Community pharmacy remuneration by third party payers **Existence of community pharmacies receiving remuneration by third party payers (8)**	**This indicator captures information about the existence of remuneration of community pharmacy services. It gives an indication of the extent of remuneration for services.**	**(8) Existence of community pharmacies receiving remuneration by third-party payers for communicable disease services e.g. vaccination, TB clinic etc**
***Recent changes in regulation **Recent changes in regulation (e.g. Pandemic response) (9)**	**This indicator will capture information about recent changes in community regulation or policy.**	**(9) Recent changes in health care provision regulation (e.g. Pandemic response)**
***Nationally approved training requirements **Existence of nationally approved training requirements for hospital pharmacists (vaccination and other communicable diseases services) (10)**	**This indicator captures information about the existence of nationally approved training requirements for hospital pharmacy across public or private organisations and the time required to complete training. This gives an indication of the existence of national oversight of the**	**(10) Vaccination capacity measures (total vaccinations and vaccinations per pharmacy)**

	standards of practice for the hospital pharmacy workforce.	
PDG17: Antimicrobial Stewardship	Initially assigned 23 indicators	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**Proposed list of indicators for the wider professional engagement stage**
***Access to medicines: dispensing physicians** **Existence of policies/laws allowing dispensing of medicines by physicians. (1)	This indicator sets out information about whether the government or competent authority has created policies/laws allowing dispensing of medicines by physicians. It gives an indication of the extent of accessibility to medicines particularly where there is not a pharmacy.	1) Number of specialist AMS pharmaceutical workforce that provides pharmaceutical services focused on antimicrobial stewardship programme for all population (standardised by national population)
***Number of dispensing physicians** **Number of dispensing physicians. (1)	This indicator sets out information about the number of dispensing physicians available. It gives an indication of the extent of accessibility to medicines particularly where there is not a pharmacy.	
***Market share: prescription only medicines** **Market share (in volume and economic value) of prescription only medicines by type of outlet. (2)	This indicator sets out information about the market share of prescription only medicines across outlets (physical, online and mail order).	2) Existence of national policy and guidance that regulate the prescription of Antibiotics in community/hospital pharmacies and the use of antibiotics in livestock production and agriculture
Market share: non-prescription medicines **Market share (in volume and economic value) of non-prescription medicines by type of outlet. (2)	This indicator sets out information about the market share of non-prescription medicines across outlets (physical, online and mail order).	
***Supply of medicines: dispensing of prescription-only medicines** **Prescription-only medicines (POMs) dispensed as pre-packaged items (excluding compounded medicines). (2)	This indicator sets out information about how prescription-only medicines are dispensed.	
***Generic substitution** **Existence of a policy allowing generic substitution by pharmacies. (2)	This indicator sets out information about generic substitution. It gives an indication of the extent of the authority of pharmacies to substitute and thereby contribute to economic savings on medicines.	
***Generic substitution not allowed** **Existence of a policy allowing the prescriber or the patient to disallow or deny generic substitution. (2)	This indicator sets out information about disallowing generic substitution. It gives an indication of the extent of deregulation of prescribing.	
***Community pharmacy writing rights in shared patient record** **Community pharmacists have writing rights (i.e., permission to introduce or modify relevant data) in the shared patient record. (2)	This indicator will capture information about community pharmacy writing rights in the shared patient health record. It gives an indication of integration into the multidisciplinary team.	
*Recent changes in regulation **Recent changes in regulation (Pandemics). (2)	This indicator will capture information about recent changes in community regulation or policy.	
Promote strategies mitigating antimicrobial resistance in community- and hospital-acquired infections and in the use of antibiotics in livestock production and agriculture. (2)	https://www.fip.org/fip-development-goal-17	
Strategies and systems in place to develop a pharmaceutical workforce prepared to deliver quality services for antimicrobial stewardship. (3)	https://www.fip.org/fip-development-goal-17	3) Existence of national strategic plan and training to support developing pharmaceutical workforce with competencies needed for antimicrobial stewardship services delivery, e.g. leadership commitment,
Enable the workforce to acquire knowledge and skills necessary in initial education (FIP Development Goal 1	https://www.fip.org/fip-development-goal-17	

[w]), early career training (FIP Development Goal 2 [w]) and continuing professional development (FIP Development Goal 9 [w]). (3)		pharmacy expertise, tracking, reporting and education
Identify competencies needed for antimicrobial stewardship services delivery and incorporate them in competency frameworks and advanced/specialist development (FIP Development Goals 4 & 5 [w]). (4)	https://www.fip.org/fip-development-goal-17	4) Existence of national competencies framework for antimicrobial stewardship delivery across career stages
Develop and implement systems and structures to deliver antimicrobial stewardship services as a coordinated programme that promotes the appropriate use of antimicrobials, improves patient outcomes and decreases the spread of infections caused by multidrug-resistant organisms. (5)	https://www.fip.org/fip-development-goal-17	5) Availability of the systems and necessary infrastructures that assist practitioners in delivering antimicrobial stewardship services (community and hospital settings)
***Advanced services and activities** **Existence of advanced services or activities. (5)	This indicator captures information about the availability of advanced services or activities at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
***Type and availability of hospital pharmacy services** **Type and availability of hospital pharmacy services. (5)	This indicator captures information about the type and availability of services or activities at the hospital pharmacy. It gives an indication of the width of the scope of practice in this area and the extent of implementation of services or activities.	
***Dispensing to outpatients** **Hospital pharmacies dispense to outpatients under specific circumstances. (5)	This indicator captures information about the circumstances in which hospital pharmacies dispense to outpatients. It gives an indication about the types of medicines dispensed.	
***Clinical services aimed at improving the use of medicines** **Existence of clinical services aimed at improving the use of medicines. (5)	This indicator captures information about the prevalence of clinical services aimed at improving the use of medicines. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
***Product-focused services** **Existence of product-focused services. (5)	This indicator captures information about the prevalence of product-focused services. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
***Primary care and public health services** **Existence of Primary Care and Public Health Services. (5)	This indicator captures information about the prevalence of primary care and public health services. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
*Harm reduction services **Existence of harm reduction services (Health education, promotion for population). (5)	This indicator captures information about the availability of harm reduction services at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
Utilise and assess data and metrics to improve and optimise antimicrobial stewardship services. (6)	https://www.fip.org/fip-development-goal-17	6) Existence of national evidence-based strategies that utilise data and metrics to assess the impact of antimicrobial stewardship services regarding the rational use of antibiotics, improve patient outcomes, reduce microbial resistance
Report research data underlining the relevance and impact of antibiotic stewardship programmes. (6)	https://www.fip.org/fip-development-goal-17	

PDG18: Access to medicines, services, and devices	Initially assigned 26 indicators	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**Proposed list of indicators for the wider professional engagement stage**
***Pharmacist density** **Density of pharmacists per 10,000 population **(1)**	This indicator will capture information about the number of actively practising and licenced/registered pharmacists. It gives an indication of the capacity of the pharmacist workforce Total population, income level, population aged over 65 years as estimated by the World Bank	(1) Number of community and hospital pharmacies that provide adequate pharmaceutical services, essential medicines and medical devices for all population (standardised by national population)
*Pharmacist distribution by sector of practice **Percentage of pharmacists employed by sector type (2) (3)	This indicator will capture information about how the pharmacist workforce is deployed: the percentage of pharmacists employed in each sector.	(2) Number of pharmacists (segmented number by community, hospital pharmacists) who deliver pharmaceutical services and essential medicines and medical devices for all population
***Good pharmacy practice guidelines** **Existence of national and/or subnational good pharmacy practice guidelines **(4)**	This indicator sets out information about the existence of guidance that defines good pharmacy practice. It gives an indication of the extent of oversight of professional practice.	(4) Number of community and hospital pharmacies in RURAL and URBAN geographic areas (standardised by population)
***Pharmacy practice standards performance indicators** **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacists. **(5)**	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	(5) Availability of national guidelines or policies concerning access to medicines, pharmaceutical services, & medical devices, including speciality medicines (HIV, cancer, hepatitis C) and contingency plans for shortages of medicines and medical devices
***Pharmacy technician density** **Density of pharmacy technician workforce per 10,000 population **(6)**	This indicator will capture information about the capacity of the pharmacy technician workforce. Total population, income level, as estimated by the World Bank	(6) Existence of regulations/laws for prescription or non-prescription medicines that can ONLY be supplied in community/hospital pharmacies
***Pharmacy practice standards performance indicators for pharmacy technicians** **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacy technicians **(7)**	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	(7) Existence of regulations/laws for non-prescription medicines, e.g. OTC that can be supplied in non-community pharmacy outlets, or dispensaries
*Access to medicines: physical establishments **Proportion of establishments where non-prescription medicines, prescription medicines, specialty medicines (HIV, cancer, hepatitis C), reimbursable prescription medicines and non-reimbursable prescription medicines can be obtained. (8)	This indicator sets out information about the types of physical establishments where categories of medicines can be obtained by patients. It gives an indication of the extent of accessibility to medicines.	(8) Existence of regulations/laws concerning categories of medicines that can be obtained by patients **online** through local or abroad providers
***Access to medicines: online** **Categories of medicines accessible online **(9)**	This indicator sets out information about the categories of medicines that can be obtained by patients online. It gives an indication of the extent of regulation of accessibility and availability of medicines.	(9) Existence of policies/laws allowing pharmaceutical wholesalers or manufacturers to deliver certain types of medicines directly to patients' homes
***Access to medicines: wholesalers and manufacturers** **Existence of policies/laws allowing pharmaceutical wholesalers or	This indicator sets out information about whether the government or competent authority has created policies/laws allowing pharmaceutical wholesalers or manufacturers to deliver certain types of medicines directly	(10)Existence of national guideline or policy concerning the establishment or territorial distribution of new pharmacies to

manufacturers to deliver certain types of medicines directly to patients' homes**. (10)**	to patients' homes. It gives an indication of the extent of the regulation of accessibility to medicines.	allow equity of access to community pharmacies
***Access to non-prescription medicines: community pharmacy only** **Existence of subcategory of non-prescription medicines (NPMs) that may ONLY be dispensed by community pharmacies**. (10)**	This indicator sets out information about whether the government or competent authority has created policies/laws regulating a sub-category of non-prescription medicines only supplied in community pharmacies. It gives an indication of restriction of distribution and where decision-making sits with selecting medicines: joint decision making between patient and pharmacy staff or self-selection outside of the pharmacy.	
*Direct access to non-prescription medicines: community pharmacy **Existence of availability of non-prescription medicines for self-selection at community pharmacies, i.e., displayed in a way that consumers can have direct access to them (OTC). (10)	This indicator sets out information about access to non-prescription medicines at community pharmacies. It gives an indication of patient's ability to choose medicines autonomously (though they have the option to consult pharmacy staff)	
***Direct access to non-prescription medicines: non-community pharmacy outlets** **Existence of availability of non-prescription medicines for self-selection at outlets different from community pharmacies**. (10)**	This indicator sets out information about access to non-prescription medicines outside of community pharmacies. It gives an indication of access to medicines and the opportunity for facilitation of self-care (if only available from a community pharmacy).	
***Access to medicines: foreign internet providers** **Existence of on-line (internet-based) sales of medicines by foreign providers**. (10)**	This indicator sets out information about the availability of foreign on-line medicines providers. It gives an indication of online access to medicines beyond traditional national physical and online establishments and the extent of regulation of foreign online providers.	
***Number of community pharmacies** **Number of community pharmacies**. (10)**	This indicator sets out information about the number of community pharmacies. It gives an indication of the availability of community pharmacies.	
*Density of community pharmacies **Density of community pharmacies per 10,000 population. (10)	This indicator will capture information about the availability of community pharmacies to a population. It gives an indication of a country's community pharmacy infrastructure as well as the accessibility of pharmacy services and medicines.	
*Ratio of community pharmacies to population **Density of community pharmacies per 10,000 population. (10)	This indicator will capture information about the availability of community pharmacies to a population. It gives an indication of the population each community pharmacy attends to.	
***Ratio of community pharmacists to community pharmacies** **Ratio of community pharmacists per community pharmacy**. (10)**	This indicator will capture information about the capacity of the community pharmacist workforce within community pharmacies. It gives an indication of the adequacy of pharmacist supervision of the dispensing of medicines.	
***Ratio of pharmacy technicians to community pharmacies** **Ratio of pharmacy technicians per community pharmacy**. (10)**	This indicator will capture information about the capacity of the pharmacy technician workforce within community pharmacies. It also gives an indication of the balance of skill mix with pharmacists and pharmacy support workers.	
***Community pharmacy accessibility** **Accessibility of community pharmacies**. (10)**	This indicator will capture information about accessibility of community pharmacies to a population.	
***Changes in the establishment and distribution of community**	This indicator sets out information about recent changes in the regulation of the	

pharmacies **Changes (completed, in process or unsuccessful) in terms of the establishment or territorial distribution of new pharmacies**. (10)**	establishment and distribution of community pharmacies. It gives an indication of changes in equity of access to community pharmacies.	
***Number of hospital pharmacies** **Number of hospital pharmacies**. (10)**	This indicator sets out information about the number of hospital pharmacies. It gives an indication of the availability of hospital pharmacies.	
***Density of hospital pharmacies** **Density of hospital pharmacies per 100,000 population. **(10)**	This indicator will capture information about the availability of hospital pharmacies to a population. It gives an indication of a country's hospital pharmacy infrastructure as well as the accessibility of pharmacy services and medicines.	
***Density of hospital pharmacists** **Density of hospital pharmacists per 100,000 population. **(10)**	This indicator will capture information about the capacity of the hospital pharmacist workforce.	
***Ratio of hospital beds per hospital pharmacy** **Ratio of hospital beds per hospital pharmacy**. (10)**	This indicator captures information about the ratio of hospital beds per hospital pharmacy. It gives an indication of the size and workload of hospital pharmacies.	
***Ratio of hospital pharmacists per hospital pharmacy** **Ratio of hospital pharmacists per hospital pharmacy**. (10)**	This indicator captures information about the availability of the pharmacist workforce to serve the needs of hospitals. It gives an indication of the extent of implementation of patient-focused services.	
***Ratio of hospital pharmacy technicians per hospital pharmacy** **Ratio of hospital pharmacy technicians per hospital pharmacy**. (10)**	This indicator captures information about the availability of the pharmacy technician workforce to serve the needs of hospitals. When compared with the hospital pharmacist ratio it gives an indication of the extent of skill mix.	
PDG19: Patient Safety	Initially assigned 30	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**Proposed list of indicators for the wider professional engagement stage**
***Pharmacist density (1)** **Density of pharmacists per 10,000 population	This indicator will capture information about the number of actively practising and licenced/registered pharmacists. It gives an indication of the capacity of the pharmacist workforce Total population, income level, population aged over 65 years as estimated by the World Bank	(1) Number of pharmaceutical workforce and facilities that provide pharmaceutical services focused on patient safety improvement for all population (standardised by national population)
***Ratio of community pharmacists to community pharmacies (1)** **Ratio of community pharmacists per community pharmacy	This indicator will capture information about the capacity of the community pharmacist workforce within community pharmacies. It gives an indication of the adequacy of pharmacist supervision of the dispensing of medicines.	
***Ratio of pharmacy technicians to community pharmacies (1)** **Ratio of pharmacy technicians per community pharmacy	This indicator will capture information about the capacity of the pharmacy technician workforce within community pharmacies. It also gives an indication of the balance of skill mix with pharmacists and pharmacy support workers.	
***Ratio of hospital pharmacists per hospital pharmacy (1)** **Ratio of hospital pharmacists per hospital pharmacy	This indicator captures information about the availability of the pharmacist workforce to serve the needs of hospitals. It gives an indication of the extent of implementation of patient-focused services.	
***Ratio of hospital pharmacy technicians per hospital pharmacy (1)**	This indicator captures information about the availability of the pharmacy technician workforce to serve the needs of hospitals. When compared with the hospital pharmacist	

**Ratio of hospital pharmacy technicians per hospital pharmacy	ratio it gives an indication of the extent of skill mix.	
***Ratio of community pharmacies to hospital pharmacies (1)** **Ratio of community pharmacies per hospital pharmacy	This indicator captures information about the relative capacity to provide access to medicines and offer pharmaceutical care and other professional services in community and hospital settings.	
Ensure academic capacity (FIP Development Goal 1 [w]) to deliver education and training to enhance patient safety mechanisms. (2)	Goal 19 - FIP - International Pharmaceutical Federation	(2) Number of teachers/practitioners employed by institutions to educate and train student pharmacists to enhance patient safety
***Standards for pharmacists' education (3)** **Existence of national and/or subnational standards on the content of pharmacists' education including curriculum review	This indicator sets out information about the process of updating the curriculum for pharmacist education. The following questions should guide a response to this indicator: 1. Is there a list of knowledge, skills and competencies to be acquired during health workforce education and training? 2. Is this list reviewed regularly?	(3) Inclusion of "patient safety" as part of the initial education and training curriculum (in universities), including in interprofessional education development
***Licencing/regulation of pharmacists (4)** **Existence of legal requireiment of national and/or subnational licencing or registration of pharmacists	This indicator captures information about the existence of regulation of pharmacists. The following questions should guide a response to this indicator: 1. Have national and/or subnational mechanisms for licensing or registration of pharmacists been established? 2. Are national and/or subnational mechanisms for licensing or registration of pharmacists compulsory? 3. Are there national and/or subnational mechanisms for licensing or registration of pharmacists that are not compulsory?	(4) Availability of training and sector programmes that ensure the pharmaceutical workforce receives effective education, skills and training in patient safety and medication-related harm reduction across all stages and types of Pharmacy settings
***Maintenance of licencing or registration (4)** **Existence of legal requirement of national and/or subnational standard for maintaining licence or registration of pharmacists	This indicator captures information about the existence of a process for pharmacists to maintain registration/license. The following questions should guide a response to this indicator: 1. Are there existing national and/or subnational systems for continuing professional development/continuing education (CPD/CE)? 2. If national and/or subnational systems for CPD/CE exist, are they compulsory? 3. If compulsory, are they linked to re-licensure/maintenance of registration?	
***National standards for hospital pharmacy (4)** **Existence of national standards defining the scope of services of hospital pharmacies	This indicator captures information about the existence of national standards for hospital pharmacy. It gives an indication of national oversight of hospital pharmacy.	
***Pharmacy technicians' scope of practice in hospital pharmacy (4)** **Pharmacy technicians' scope of practice in hospital pharmacy	This indicator captures information about the existence of a scope of practice for hospital pharmacy technicians. It gives an indication of the extent of the supervision of pharmacy technicians	
Initiate and support ongoing programmes to educate the public about the safe use of medications and the roles of pharmacists in this context. (5)	Goal 19 - FIP - International Pharmaceutical Federation	(5) Availability of training and programmes to educate the public about the safe use of medications provided by pharmacists
***Good pharmacy practice guidelines (6)** **Existence of national and/or	This indicator sets out information about the existence of guidance that defines good pharmacy practice. It gives an indication of the extent of oversight of professional practice.	(6) Existence of national strategies that utilise **patient safety** as an indicator for evaluating health system performance and quality of care,

subnational good pharmacy practice guidelines		quality assurance in education, and monitoring workforce impact
***Code of ethics (6)** **Existence of national and/or subnational code of ethics	This indicator sets out information about the existence of a code of ethics. It gives an indication of national oversight of professional standards and obligations.	
***Pharmacy practice standards performance indicators (6)** **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacists.	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	
In collaboration with health care professionals, health care organisations, patient/consumer organisations and researchers, develop, implement and monitor indicators and tools to proactively measure patient or consumer safety in practice; the outcomes of which can be used to promote and monitor the development of a safety culture. (6)	Goal 19 - FIP - International Pharmaceutical Federation	
***Mandatory quality assurance (6)** **Mandatory quality assurance for community pharmacies	This indicator captures information about the existence of the assessment/inspection of community pharmacies against standards by a government agency. It gives an indication of the role the state plays in ensuring consistency in the quality of community pharmacies across a nation.	
***Access to medicines: physical establishments (7)** **Proportion of establishments where non-prescription medicines, prescription medicines, specialty medicines (HIV, cancer, hepatitis C), reimbursable prescription medicines and non-reimbursable prescription medicines can be obtained	This indicator sets out information about the types of physical establishments where categories of medicines can be obtained by patients. It gives an indication of the extent of accessibility to medicines.	(7) Availability of national guidelines or policies concerning patient safety when accessing pharmaceutical services, e.g. use of medical devices and categories of medicines (Online, OTC, prescription & non-prescription medicines), pandemic responses, substandard and falsified medicines
***Access to medicines: online (7)** **Categories of medicines accessible online	This indicator sets out information about the categories of medicines that can be obtained by patients online. It gives an indication of the extent of regulation of accessibility and availability of medicines.	
***Access to medicines: foreign internet providers (7)** **Existence of on-line (internet-based) sales of medicines by foreign providers	This indicator sets out information about the availability of foreign on-line medicines providers. It gives an indication of online access to medicines beyond traditional national physical and online establishments and the extent of regulation of foreign online providers.	
***Supply of medicines: dispensing of prescription-only medicines (7)** **Prescription-only medicines (POMs) dispensed as pre-packaged items (excluding compounded medicines)	This indicator sets out information about how prescription-only medicines are dispensed.	
***Mandatory presence of community pharmacist (7)** **Existence of a policy for the presence of a community pharmacist mandatory at all times	This indicator will capture information about mandatory staffing requirements of a community pharmacy. It gives an indication of the level of pharmacist supervision in a community pharmacy.	
Ensure systems are in place for the supply of medications in times of shortages and for access to medications by patients most in need. Develop	Goal 19 - FIP - International Pharmaceutical Federation	

strategies to combat substandard and falsified medicines. (7)		
***Minimum workforce requirements (8)** **Minimum workforce requirements are mandatory for community pharmacies	This indicator captures information about the competency and skill mix of a community pharmacy required by law. It gives an indication of the potential services offered and the distribution of tasks and responsibilities between pharmacists and the support workforce.	(8) Existence of a national competency (development) framework across all stages for pharmacists and pharmacy technicians development (early career and advanced practice) with **patient safety** at the core
Incorporate patient safety and medication-related harm reduction in competencies and skills in competency development frameworks for pharmacy (FIP Development Goal 5 [w]). (8)	Goal 19 - FIP - International Pharmaceutical Federation	
***Clinical services aimed at improving the use of medicines (9)** **Existence of clinical services aimed at improving the use of medicines	This indicator captures information about the prevalence of clinical services aimed at improving the use of medicines. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	(9) Existence of advanced and integrated pharmaceutical services considering patient safety as the core of the provided services to improve/optimise patient safety and prevent patient incidents
*Primary care and public health services (9) **Existence of Primary Care and Public Health Services	This indicator captures information about the prevalence of primary care and public health services. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
*Performing point-of-care or diagnostic tests at the pharmacy (9) **Existence of point-of-care or diagnostic tests at the pharmacy	This indicator captures information about the availability of point-of-care tests at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
*Harm reduction services (9) **Existence of harm reduction services (Health education, promotion for population)	This indicator captures information about the availability of harm reduction services at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
PDG20 Digital Health	Initially assigned 30	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**Proposed list of indicators for the wider professional engagement stage**
*Number of community pharmacies **Number of community pharmacies (1)	This indicator sets out information about the number of community pharmacies. It gives an indication of the availability of community pharmacies.	(1) Existence of an accessible digital infrastructure to enable healthcare delivery of, for example, tele-medicine, online health consultations, e-prescriptions, e-patient records, etc.
*Community pharmacy accessibility **Accessibility of community pharmacies (1)	This indicator will capture information about accessibility of community pharmacies to a population.	
*ePrescriptions implemented **Electronic transfer of prescriptions (ePrescription) implemented (1)	This indicator will capture information about the implementation of the electronic transfer of prescriptions.	
*Regulation of opening hours **Opening hours of community pharmacies (1)	This indicator captures information about the existence of regulation of opening hours. It gives an indication of a minimum level of access to medicines and professional services.	
*Scope of community pharmacy services **Scope of community pharmacy activities and services defined by law (2)	This indicator will capture information about mandatory services and activities to be delivered by a community pharmacy.	(2) Existence/access to national "pharmacy practice guidelines" concerning digital healthcare. These 'digital guidelines' might be included within existing 'scopes of pharmacy practice' guidelines, or codes of ethics, or competency development frameworks, pharmacy practice
*Good pharmacy practice guidelines **Existence of national and/or	This indicator sets out information about the existence of guidance that defines good pharmacy practice. It gives an indication of	

subnational good pharmacy practice guidelines (2)	the extent of oversight of professional practice.	standards, etc. This indicator is concerned with pharmacist ACCESS to any form of guidelines for technology-enabled pharmacy practice.
*Code of ethics **Existence of national and/or subnational code of ethics (2)	This indicator sets out information about the existence of a code of ethics. It gives an indication of national oversight of professional standards and obligations.	
*Competency development framework for pharmacists **Existence of national and/or subnational competency development framework for pharmacists (2)	This indicator sets out information about the existence of a competency framework for pharmacists used for professional development and/or recognition. It gives an indication of commitment to developing the pharmacy workforce.	
*Pharmacy practice standards performance indicators **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacists. (2)	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	
*Competency framework for pharmacy technicians **Existence of national and/or subnational competency framework for pharmacy technicians and pharmacy support workers. (2)	This indicator sets out information about the existence of a competency framework for pharmacy technicians and pharmacy support workers used for professional development and/or recognition. It gives an indication of commitment to developing the pharmacy workforce.	
*Pharmacy practice standards performance indicators for pharmacy technicians **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacy technicians. (2)	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	
*Standards for pharmacists' education **Existence of national and/or subnational standards on the content of pharmacists' education including curriculum review (3)	This indicator sets out information about the process of updating the curriculum for pharmacist education. The following questions should guide a response to this indicator: 1. Is there a list of knowledge, skills and competencies to be acquired during health workforce education and training? 2. Is this list reviewed regularly?	(3) The subject of "digital health" or technology-enabled practice is included as part of the initial education and training curriculum (in universities)
*Nationally approved training requirements **Existence of nationally approved training requirements for hospital pharmacists (3)	This indicator captures information about the existence of nationally approved training requirements for hospital pharmacy across public or private organisations and the time required to complete training. This gives an indication of the existence of national oversight of the standards of practice for the hospital pharmacy workforce.	
*Minimum workforce requirements **Minimum workforce requirements are mandatory for community pharmacies (3)	This indicator captures information about the competency and skill mix of a community pharmacy required by law. It gives an indication of the potential services offered and the distribution of tasks and responsibilities between pharmacists and the support workforce.	
*Access to medicines: online **Categories of medicines accessible online (4)	This indicator sets out information about the categories of medicines that can be obtained by patients online. It gives an indication of the extent of regulation of accessibility and availability of medicines.	(4) Existence of specific regulations/standards regarding digital health provision (for example, pandemic responses, or manufacturing, or medicines distribution)
*Access to medicines: foreign internet providers	This indicator sets out information about the availability of foreign on-line medicines providers. It gives an indication of online access to medicines beyond traditional national physical and online establishments	

**Existence of on-line (internet-based) sales of medicines by foreign providers (4)	and the extent of regulation of foreign online providers.	
*Access to medicines: wholesalers and manufacturers **Existence of policies/laws allowing pharmaceutical wholesalers or manufacturers to deliver certain types of medicines directly to patients' homes (4)	This indicator sets out information about whether the government or competent authority has created policies/laws allowing pharmaceutical wholesalers or manufacturers to deliver certain types of medicines directly to patients' homes. It gives an indication of the extent of the regulation of accessibility to medicines.	
*Distribution and supply of medicines: regulatory changes **Changes (completed or in process) in terms of the distribution or sales' regulation of medicines (4)	This indicator sets out information about recent changes in the regulation of distribution or sales of medicines. It gives an indication of equity of access to medicines, patient choice and public spending (where cuts to product-based remuneration could impact on community pharmacy).	
*Community pharmacy access to shared patient health record **Community pharmacists have access (reading rights) to a shared patient health record (5)	This indicator will capture information about community pharmacy access to shared patient health record. It gives an indication of integration into the multidisciplinary team.	(5) Pharmacist access to digital shared patient health records (or similar) in community settings.
*Community pharmacy writing rights in shared patient record **Community pharmacists have writing rights (i.e., permission to introduce or modify relevant data) in the shared patient record (6)	This indicator will capture information about community pharmacy writing rights in the shared patient health record. It gives an indication of integration into the multidisciplinary team.	(6) Pharmacist permissions to add or modify relevant data in shared-care patient health records ('editing rights') in community settings.
*National standards for hospital pharmacy **Existence of national standards defining the scope of services of hospital pharmacies (7)	This indicator captures information about the existence of national standards for hospital pharmacy. It gives an indication of national oversight of hospital pharmacy.	(7) Use of digital technology in health education and training delivery for pharmacy CPD (for example CPD online platforms; online delivery of CPD)
*Type and availability of hospital pharmacy services **Type and availability of hospital pharmacy services (7)	This indicator captures information about the type and availability of services or activities at the hospital pharmacy. It gives an indication of the width of the scope of practice in this area and the extent of implementation of services or activities.	
*Pharmacy technicians' scope of practice in hospital pharmacy **Pharmacy technicians' scope of practice in hospital pharmacy (7)	This indicator captures information about the existence of a scope of practice for hospital pharmacy technicians. It gives an indication of the extent of the supervision of pharmacy technicians	
*Recent changes in regulation **Recent changes in regulation (Pandeamic) (7)	This indicator will capture information about recent changes in community regulation or policy.	
*Primary care and public health services **Existence of Primary Care and Public Health Services	This indicator captures information about the prevalence of primary care and public health services. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	(8) Use of digital technology in public/population health promotion activities delivered by pharmacies
*Harm reduction services **Existence of harm reduction services (Health education, promotion for population)	This indicator captures information about the availability of harm reduction services at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
*Clinical services aimed at improving the use of medicines **Existence of clinical services aimed at improving the use of medicines (9)	This indicator captures information about the prevalence of clinical services aimed at improving the use of medicines. It gives an indication of the width of the scope of practice in this area, existence of guidelines,	(9) Public access to digitalised or technology-enabled provision of point-of-care or diagnostic tests and other advanced diagnostic services at the pharmacy

	implementation, payment methods and any recent changes.	
*Product-focused services **Existence of product-focused services (9)	This indicator captures information about the prevalence of product-focused services. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
*Performing point-of-care or diagnostic tests at the pharmacy **Existence of point-of-care or diagnostic tests at the pharmacy (9)	This indicator captures information about the availability of point-of-care tests at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
*Advanced services and activities **Existence of advanced services or activities (9)	This indicator captures information about the availability of advanced services or activities at the pharmacy. It gives an indication of the width of the scope of practice in this area, existence of guidelines, implementation, payment methods and any recent changes.	
DG21: Sustainability in Pharmacy	Initially assigned 28	
Original indicators from the Handbook and PDGs mechanisms	**Definition**	**Proposed list of indicators for the wider professional engagement stage**
*Pharmacist density **Density of pharmacists per 10,000 population (1)	This indicator will capture information about the number of actively practising and licenced/registered pharmacists. It gives an indication of the capacity of the pharmacist workforce Total population, income level, population aged over 65 years as estimated by the World Bank	(1) Number of pharmacists (segmented number by community, hospital pharmacists) who deliver pharmaceutical services for all population on a sustainable basis (2) Number of pharmacy technicians and support workforce who deliver pharmaceutical services for all population on a sustainable basis
*Pharmacist distribution by sector of practice **Percentage of pharmacists employed by sector type (1)	This indicator will capture information about how the pharmacist workforce is deployed: the percentage of pharmacists employed in each sector.	(3) Number of community and hospital pharmacies that provide sustainable pharmaceutical services for all population (standardised by national population)
*Good pharmacy practice guidelines **Existence of national and/or subnational good pharmacy practice guidelines (4)	This indicator sets out information about the existence of guidance that defines good pharmacy practice. It gives an indication of the extent of oversight of professional practice.	(4) Existence of strategies and policies related to the sustainability of the environment and minimise the impact of pharmaceuticals and pharmacy practice, e.g. appropriate drug disposal and use of medicines
*Pharmacy practice standards performance indicators **Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacists. (4)	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an indication of national oversight of practice performance.	(5) Sustainable workforce: Number of pharmacy graduates and schools/faculties of pharmacy nationally that ensure/maintain supplying pharmacists to the workforce
*Pharmacy technician density **Density of pharmacy technician workforce per 10,000 population (1)	This indicator will capture information about the capacity of the pharmacy technician workforce. Total population, income level, as estimated by the World Bank	(6) Existence of national strategic plan for pharmaceutical workforce development to deliver equitable and sustainable services, e.g. pharmaceutical workforce match competencies with population, health systems, education development, and health labour market needs
*Pharmacy practice standards performance indicators for pharmacy technicians	This indicator sets out information about the existence of performance indicators for the assessment of pharmacy practice against national or subnational standards. It gives an	(7) Existence of specific regulations/standards to sustain medicines supply and deliver key/essential pharmaceutical care

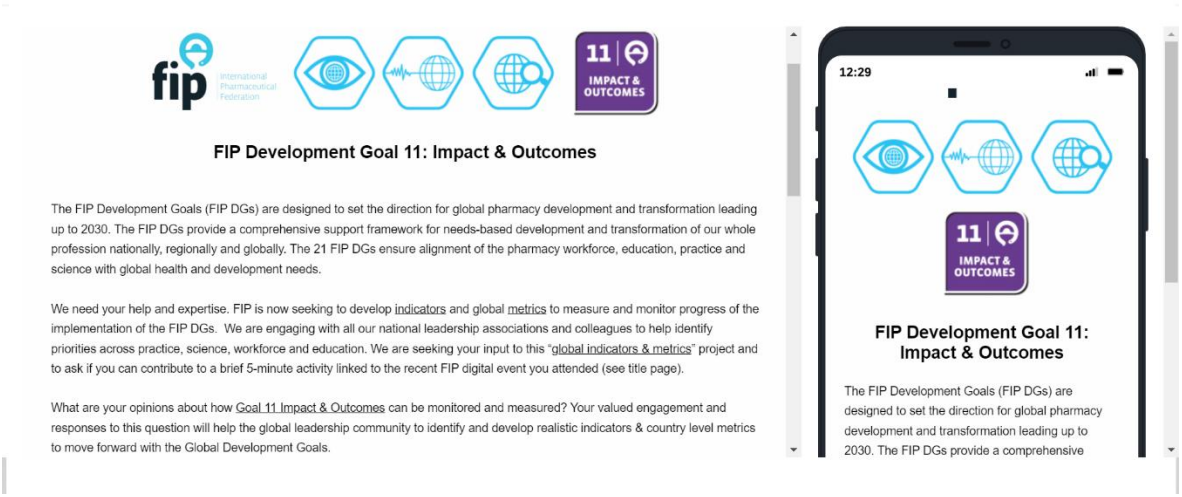
**Existence of national and/or subnational performance indicators for pharmacy practice standards for pharmacy technicians (3)	indication of national oversight of practice performance.	services throughout national health emergency situations.
*Pharmacy education capacity: pharmacy graduates' density **Density of pharmacy graduates per 1 million population (4)	This indicator sets out information about the number of students graduating from a school of pharmacy and therefore potentially supplying the pharmacist workforce.	(8) Existence of policies concerning the establishment (market entry) of new community pharmacies to allow continuous access to medicines and pharmacy services
*Pharmacy education capacity: pharmacy schools' density **Density of pharmacy schools per 1 million population (4)	This indicator sets out information about the number of accredited pharmacy education and training institutions and therefore capacity to supply pharmacists to the workforce.	(9) Existence of a system that shapes the type of model of remuneration, e.g. a single type of statutory or contractual model or third-party payers to remunerate community and hospital pharmacies
*National strategic plan for pharmaceutical human resources **Existence of national strategic plan for pharmaceutical human resources (6)	This indicator sets out information about a national strategic plan for pharmaceutical human resources. The following questions should guide a response to this indicator: 1. Do HR plans for the pharmaceutical workforce match competencies with population, health systems, and health labour market needs? 2. Do HR plans take into account efforts to scale up transformative education and training? 3. Are strategic steps taken when considering and taking into account the workforce market needs and absorptive capacities for the HR plan development?	(10) Existence of the operating principles of the remuneration models to include the type of remuneration, e.g. margin-based remuneration (linear/regressive/fixed amount), regressive margin-based remuneration (cumulative/non-cumulative) in pharmacy/hospital pharmacies
*Number of community pharmacies **Number of community pharmacies (2)	This indicator sets out information about the number of community pharmacies. It gives an indication of the availability of community pharmacies.	
*Recent changes in regulation **Recent changes in regulation (Pandeamic) (7)	This indicator will capture information about recent changes in community regulation or policy.	
*Regulation of market entry of new community pharmacies **Establishment (market entry) of new community pharmacies regulated by the state (6)	This indicator will capture information about existence of policies about equitable and continuous access to medicines and pharmacy services.	
*Minimum workforce requirements **Minimum workforce requirements are mandatory for community pharmacies (6)	This indicator captures information about the competency and skill mix of a community pharmacy required by law. It gives an indication of the potential services offered and the distribution of tasks and responsibilities between pharmacists and the support workforce.	
*Model of remuneration **Type of model of remuneration (9)	This indicator captures information about whether there is a single type of statutory or contractual model to remunerate community pharmacies, or multiple contractual models with multiple third-party payers whose terms may differ from each other.	
*Principles of remuneration **Existence of principles of remuneration (10)	This indicator captures information about the operating principles of the remuneration model. It gives an indication of the degree of reliance of the community pharmacy on the price of medicines.	
*Type of remuneration **Type of remuneration (9)	This indicator captures key elements of the type of remuneration. It gives an indication of the degree of reliance	

	of the community pharmacy on the price of medicines.	
*Type of margin-based remuneration **Type of margin-based remuneration (10)	This indicator captures information about the type of margin-based remuneration. This gives an indicator on the impact on community pharmacies of changes in the price of medicines.	
*Type of regressive margin model **Type of regressive margin models (10)	This indicator captures information about the type of regressive margin-based remuneration. This gives an indicator on the impact on community pharmacies of changes in the price of medicines.	
*Existence of review of remuneration **Remuneration of community pharmacies reviewed on a regular basis (10)	This indicator captures information about the existence of a system of review of remuneration of community pharmacies.	
*Recent changes of remuneration of community pharmacies **Recent changes (completed, in process or unsuccessful) in terms of the remuneration of community pharmacies (10)	This indicator captures information about recent changes in remuneration of community pharmacies. It gives an indication of the likely level of sustainability of community pharmacies.	
*Number of hospital pharmacies **Number of hospital pharmacies (3)	This indicator sets out information about the number of hospital pharmacies. It gives an indication of the availability of hospital pharmacies.	
*Density of hospital pharmacists **Density of hospital pharmacists per 100,000 population (1)	This indicator will capture information about the capacity of the hospital pharmacist workforce.	
*Remuneration scale of salaries for hospital pharmacists **Remuneration scale of salaries for hospital pharmacists for public/private sector (10)	This indicator captures information about the existence of remuneration scales for hospital pharmacists across the public and/or private sector. It gives an indication of whether career progression, specialisation or performance of advanced roles in hospital pharmacy practice corresponds with a remuneration scale.	
*Specific remuneration for hospital pharmacies providing services to inpatients **Specific pharmacy remuneration for hospital pharmacies when they provide services to inpatients (10)	This indicator captures information about specific pharmacy remuneration for hospital pharmacies when they provide services to inpatients	
*Remuneration of hospital pharmacy services to outpatients **Existence of remuneration of hospital pharmacies services to outpatients are the same to that of community pharmacies for the same type of medicines (10)	This indicator captures information about the existence of remuneration of hospital pharmacy services to outpatients.	
*Components of remuneration of hospital pharmacy services to outpatients **Components of remuneration of hospital pharmacy services to outpatients (10)	This indicator captures information about the components of remuneration of hospital pharmacy service to outpatients. It captures information on whether this is a margin on the price of medicines, fixed amount, dispensing fee, professional services fee or other and gives an indication of the reliance of hospital pharmacies on the price of medicines.	
*Type of margin-based remuneration **Type of margin-based remuneration: linear/regressive/fixed amount. (10)	This indicator captures information about the type of margin-based remuneration. It gives an indication of the reliance of the hospital pharmacy on the prices of medicines.	

*Type of regressive remuneration **Type of regressive remuneration: cumulative/non-cumulative (10)	This indicator captures information about the type of margin-based remuneration. It gives an indication of the reliance of the hospital pharmacy on the prices of medicines	

Appendix 7: Questionnaire Draft

Page 1



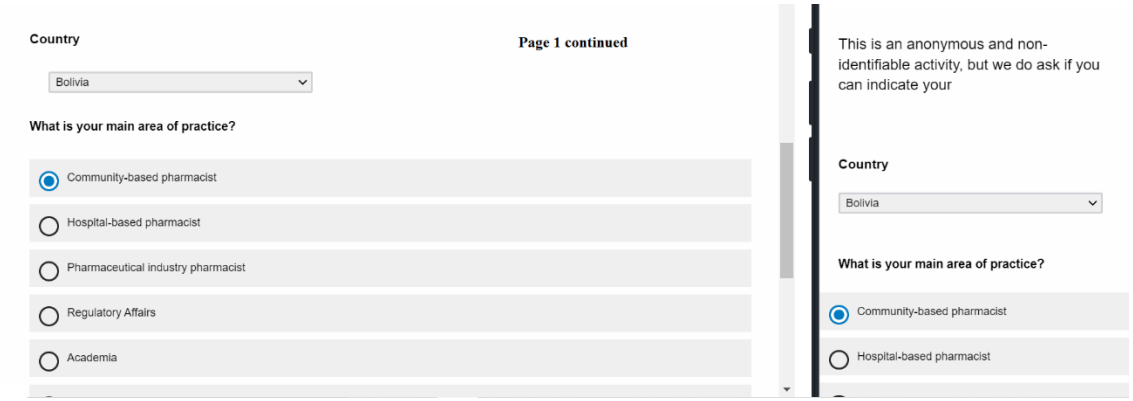
FIP Development Goal 11: Impact & Outcomes

The FIP Development Goals (FIP DGs) are designed to set the direction for global pharmacy development and transformation leading up to 2030. The FIP DGs provide a comprehensive support framework for needs-based development and transformation of our whole profession nationally, regionally and globally. The 21 FIP DGs ensure alignment of the pharmacy workforce, education, practice and science with global health and development needs.

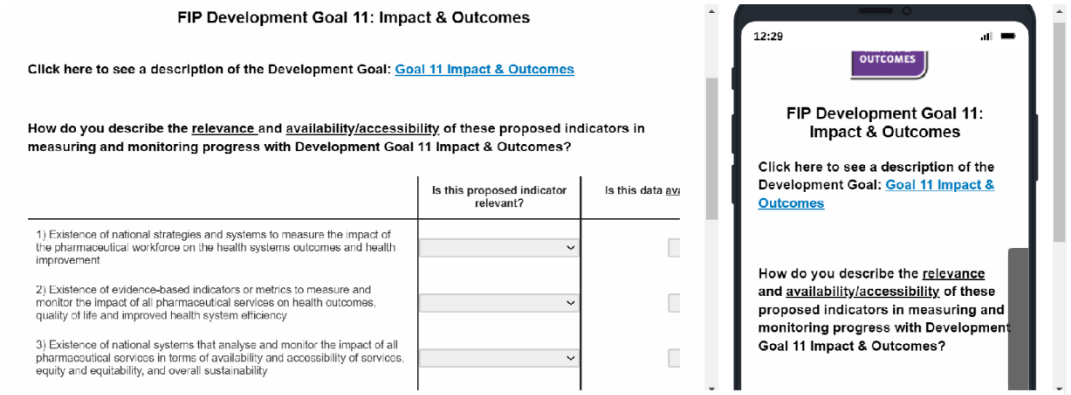
We need your help and expertise. FIP is now seeking to develop indicators and global metrics to measure and monitor progress of the implementation of the FIP DGs. We are engaging with all our national leadership associations and colleagues to help identify priorities across practice, science, workforce and education. We are seeking your input to this "global indicators & metrics" project and to ask if you can contribute to a brief 5-minute activity linked to the recent FIP digital event you attended (see title page).

What are your opinions about how Goal 11 Impact & Outcomes can be monitored and measured? Your valued engagement and responses to this question will help the global leadership community to identify and develop realistic indicators & country level metrics to move forward with the Global Development Goals.

Page 1 continued



Page 2



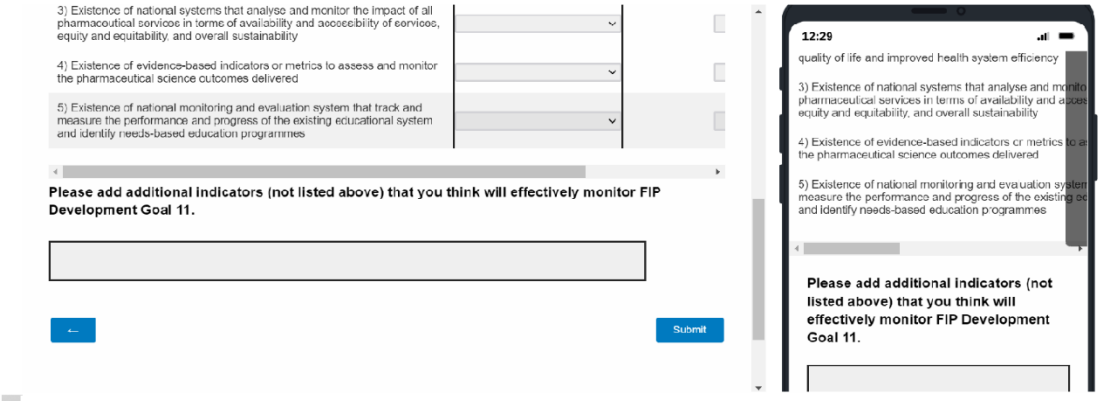
FIP Development Goal 11: Impact & Outcomes

Click here to see a description of the Development Goal: Goal 11 Impact & Outcomes

How do you describe the relevance and availability/accessibility of these proposed indicators in measuring and monitoring progress with Development Goal 11 Impact & Outcomes?

	Is this proposed indicator relevant?	Is this data av
1) Existence of national strategies and systems to measure the impact of the pharmaceutical workforce on the health systems outcomes and health improvement		
2) Existence of evidence-based indicators or metrics to measure and monitor the impact of all pharmaceutical services on health outcomes, quality of life and improved health system efficiency		
3) Existence of national systems that analyse and monitor the impact of all pharmaceutical services in terms of availability and accessibility of services, equity and equitability, and overall sustainability		

Page 2 continued



3) Existence of national systems that analyse and monitor the impact of all pharmaceutical services in terms of availability and accessibility of services, equity and equitability, and overall sustainability

4) Existence of evidence-based indicators or metrics to assess and monitor the pharmaceutical science outcomes delivered

5) Existence of national monitoring and evaluation system that track and measure the performance and progress of the existing educational system and identify needs-based education programmes

Please add additional indicators (not listed above) that you think will effectively monitor FIP Development Goal 11.

←

Submit

FIP Development Goal 11: Impact & Outcomes

THANK YOU for your time and energy.
Your response has been recorded.

Appendix 8: Distribution of responses per area of practice and WHO regions for the 21 PDGs individually

PDG1 Academic capacity (N=28)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	18.42%	African	5 (Cote d'Ivoire, Kenya, Nigeria)	13.16%
Hospital	10.53%	Americas	5 (Canada, USA)	13.16%
Industry	10.53%	South-East Asia	5 (India, Malaysia)	13.16%
Regulatory Affairs	2.63%	European	10 (Armenia, Croatia, Montenegro, Netherlands, Portugal, Turkey, UK)	26.32%
Academia	42.11%	Eastern Mediterranean	4 (Kuwait, Lebanon)	10.53%
Other	15.79%	Western Pacific	9 (Australia, Philippine)	23.68%
PDG2 Early career training strategy (N=38)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	10.71%	African	3 (Nigeria, Zimbabwe)	10.71%
Hospital	25.00%	Americas	2 (Columbia, USA)	7.14%
Industry	10.71%	South-East Asia	4 (Indonesia, Sri Lanka)	14.26%
Regulatory Affairs	0.00%	European	4 (Portugal, Turkey, UK)	14.26%
Academia	35.71%	Eastern Mediterranean	2 (Kuwait)	7.14%
Other	17.86%	Western Pacific	12 (Philippine)	42.86%
PDG3 Quality Assurance (N=44)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	20.45%	African	6 (Cameroon, Nigeria, Zambia)	13.64%
Hospital	15.91%	Americas	4 (Canada, USA, Anglo-Caribbean/West Indians countries)	9.09%
Industry	9.09%	South-East Asia	4 (India, Indonesia, Sri Lanka)	9.09%
Regulatory Affairs	9.09%	European	7 (Denmark, France, Ireland, Portugal, Romania, UK)	15.91%
Academia	36.36%	Eastern Mediterranean	7 (Jordan, Kuwait, Lebanon, Pakistan, Qatar, UAE)	15.91%
Other	9.09%	Western Pacific	15 (Australia, Philippines)	34.09%
PDG4 Advanced & specialist development (N=30)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	13.33%	African	2 (Nigeria)	6.66%
Hospital	23.33%	Americas	6 (Brazil, USA)	20%
Industry	10.00%	South-East Asia	-	-
Regulatory Affairs	3.33%	European	12 (Albania, Croatia, Ireland, Portugal, Romania, Spain, UK)	40%
Academia	40.00%	Eastern Mediterranean	3 (Jordan, Kuwait, Pakistan)	10%
Other	10.00%	Western Pacific	6 (Australia, Philippine)	20%
PDG5 Competency Development (N=28)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	14.29%	African	2 (Nigeria, Zambia)	7.14%
Hospital	3.57%	Americas	3 (Brazil, Canada, USA)	10.71%
Industry	3.57%	South-East Asia	2 (Indonesia, Nepal)	7.14%
Regulatory Affairs	7.14%	European	7 (Armenia, Bosnia, Croatia, Portugal, Turkey, UK)	25.00%

Academia	35.71%	Eastern Mediterranean	6 (Jordan, Kuwait, Lebanon, Morocco)	21.43%
Other	35.71%	Western Pacific	7 (Australia, Philippines)	25.00%
PDG6 Leadership Development (N=34)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	23.53%	African	3 (Nigeria, South Africa, Zimbabwe)	8.82%
Hospital	20.59%	Americas	3 (Colombia, USA, Uruguay)	8.82%
Industry	2.94%	South-East Asia	2 (India)	5.88%
Regulatory Affairs	0.00%	European	6 (Portugal, Spain, Turkey, UK)	17.65%
Academia	38.24%	Eastern Mediterranean	4 (Afghanistan, Jordan, Kuwait, Lebanon)	11.76%
Other	14.71%	Western Pacific	14 (Australia, Hong Kong SAR (China), Philippine, Taiwan (China))	41.18%
PDG7 Advancing integrated services (N=43)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	20.93%	African	5 (Ghana, Kenya, Nigeria, South Africa)	11.63%
Hospital	23.26%	Americas	1 (Venezuela)	2.33%
Industry	6.98%	South-East Asia	12 (India, Indonesia, Sri Lanka)	27.91%
Regulatory Affairs	0.00%	European	6 (Armenia, Ireland, Slovakia (Slovak Republic), Spain, UK)	13.95%
Academia	30.23%	Eastern Mediterranean	1 (Kuwait)	2.33%
Other	18.60%	Western Pacific	14 (Australia, Philippine, Taiwan (China)	32.56%
PDG8 Working with others (N=19)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	15.79%	African	6 (Nigeria, South Africa)	31.58%
Hospital	21.05%	Americas	2 (Canada, USA,)	10.53%
Industry	5.26%	South-East Asia	3 (Indonesia, Sri Lanka)	15.88%
Regulatory Affairs	0.00%	European	3 (Armenia, Kosovo, Portugal)	15.88%
Academia	21.05%	Eastern Mediterranean	2 (Kuwait, Lebanon)	10.53%
Other	36.84%	Western Pacific	3 (Singapore, Philippines)	15.88%
PDG9 CPD Strategies (N=40)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	25.00%	African	4 (Ghana, Kenya, Zimbabwe, South Africa)	10.00%
Hospital	10.00%	Americas	4 (Brazil, Canada, USA)	10.00%
Industry	7.50%	South-East Asia	4 (India)	10.00%
Regulatory Affairs	7.50%	European	9 (Croatia, Denmark, France, Montenegro, Portugal, Turkey, UK)	22.50%
Academia	40.00%	Eastern Mediterranean	2 (Jordan, Kuwait)	5.00%
Other	10.00%	Western Pacific	17 (Australia, New Zealand, Philippines)	42.50%
PDG10 Equity & Equality (N=12)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	25.00%	African	-	-
Hospital	0.00%	Americas	3 (Canada, Costa Rica)	25%
Industry	8.33%	South-East Asia	1 (India)	8.33%
Regulatory Affairs	16.67%	European	3 (Ireland, Portugal, UK)	25%
Academia	33.33%	Eastern Mediterranean	1 (Kuwait)	8.33%
Other	16.67%	Western Pacific	4 (Australia, Philippine)	33.33%
PDG11 Impact & Outcomes (N=29)				

Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	27.59%	African	2 (Nigeria, Rwanda)	6.90%
Hospital	13.79%	Americas	3 (Argentina, Canada, Costa Rica)	10.34%
Industry	6.90%	South-East Asia	-	-
Regulatory Affairs	0.00%	European	8 (Cyprus, Denmark, Germany, Ireland, Portugal, Spain, UK)	27.59%
Academia	41.38%	Eastern Mediterranean	12 (Egypt, Jordan, Pakistan, Lebanon)	41.40%
Other	10.34%	Western Pacific	3 (Japan, Philippines)	10.34%
PDG12 Pharmacy Intelligence (N=38)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	13.16%	African	3 (Sierra Leon, Zimbabwe)	7.89%
Hospital	23.68%	Americas	6 (Canada, Costa Rica, Peru, USA, Uruguay)	15.80%
Industry	10.53%	South-East Asia	6 (India, Indonesia, Malaysia)	15.80%
Regulatory Affairs	7.89%	European	6 (Armenia, Denmark, Ireland, Portugal, UK)	15.80%
Academia	23.68%	Eastern Mediterranean	5 (Kuwait, Lebanon, Pakistan)	13.16%
Other	21.05%	Western Pacific	12 (Australia, Japan, Philippines)	31.58%
PDG13 Policy Development (N=32)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	15.63%	African	6 (Cameroon, Cape Verde, Nigeria)	18.75%
Hospital	21.88%	Americas	4 (Canada, Costa Rica, USA)	12.5%
Industry	3.13%	South-East Asia	4 (India, Indonesia, Thailand)	12.5%
Regulatory Affairs	9.38%	European	6 (Denmark, Finland, Ireland, Portugal)	18.75%
Academia	37.50%	Eastern Mediterranean	4 (Kuwait, Lebanon, Pakistan)	12.5%
Other	12.50%	Western Pacific	8 (Philippines)	25.00%
PDG14 Medicines Expertise (N=22)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	27.27%	African	4 (Ghana, Kenya, Nigeria, South Africa)	18.18%
Hospital	22.73%	Americas	1 (Argentina)	4.55%
Industry	13.64%	South-East Asia	-	-
Regulatory Affairs	0.00%	European	3 (Germany, Portugal, UK)	13.64%
Academia	22.73%	Eastern Mediterranean	3 (Iran, Kuwait, Lebanon)	13.64%
Other	13.64%	Western Pacific	10 (Australia, Philippines, Singapore)	45.45%
PDG15 People-centred care (N=37)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	13.51%	African	4 (Cote d'Ivoire, Nigeria, South Africa, Zimbabwe)	10.81%
Hospital	27.03%	Americas	2 (Canada, USA)	5.41%
Industry	8.11%	South-East Asia	2 (India, Indonesia)	5.41%
Regulatory Affairs	5.41%	European	9 (France, Kosovo, Portugal, Switzerland, UK)	24.32%
Academia	21.62%	Eastern Mediterranean	4 (Jordan, Kuwait, Lebanon)	10.81%
Other	24.32%	Western Pacific	16 (Australia, New Zealand, Philippines, Taiwan)	43.24%
PDG16 Communicable diseases (N=39)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	33.33%	African	6 (South Africa, Nigeria)	15.38 %
Hospital	12.82%	Americas	3 (Colombia, Canada)	7.69 %

Industry	5.13%	South-East Asia	3 (India)	7.69 %
Regulatory Affairs	2.56%	European	11 (North Macedonia, UK, Portugal, France, Ireland, Sweden, Croatia)	28.21 %
Academia	30.77%	Eastern Mediterranean	3 (Kuwait, UAE, Jordan)	7.69 %
Other	15.38%	Western Pacific	12 (Australia, Philippine, Singapore, Malaysia)	30.77 %
PDG17 Antimicrobial Stewardship (N=50)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	18.00%	African	10 (Ghana, Nigeria, Kenya, Rwanda, Sierra Leone, South Africa)	20%
Hospital	30.00%	Americas	1 (Canada)	2%
Industry	2.00%	South-East Asia	5 (India, Indonesia, Thailand)	10%
Regulatory Affairs	2.00%	European	7 (Germany, Ireland, Portugal, UK)	14%
Academia	26.00%	Eastern Mediterranean	3 (Lebanon, Morocco, Pakistan)	6%
Other	22.00%	Western Pacific	22 (Australia, Philippines)	44%
PDG18 Access to medicines, devices, & services (N=21)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	14.29%	African	3 (South Africa, Nigeria)	14.29%
Hospital	4.76%	Americas	4 (Canada, USA)	19.05%
Industry	9.52%	South-East Asia	-	-
Regulatory Affairs	14.29%	European	11 (France, Germany, Ireland, Portugal, Slovenia, UK)	52.38%
Academia	47.62%	Eastern Mediterranean	2 (Kuwait, Lebanon)	9.52%
Other	9.52%	Western Pacific	1 (Australia)	4.76%
PDG19 Patient Safety (N=44)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	4.55%	African	-	-
Hospital	20.45%	Americas	11 (Canada, Colombia, Mexico, USA)	25%
Industry	6.82%	South-East Asia	6 (India, Indonesia, Thailand)	13.63%
Regulatory Affairs	6.82%	European	8 (Denmark, Ireland, Portugal, Turkey, UK)	18.18%
Academia	31.82%	Eastern Mediterranean	7 (Kuwait, Lebanon, Pakistan)	15.91%
Other	29.55%	Western Pacific	10 (Australia, Philippines)	22.73%
PDG20 Digital Health (N=58)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	24.14%	African	8 (Uganda, Kenya, Nigeria, Zimbabwe)	13.79%
Hospital	8.62%	Americas	9 (Argentina, Brazil, Colombia, Peru, Canada, USA, Uruguay)	15.52%
Industry	1.72%	South-East Asia	3 (India, Indonesia)	5.17%
Regulatory Affairs	13.79%	European	22 (Armenia, Croatia, Denmark, Ireland, Netherlands, Portugal, Serbia, Sweden, Turkey, UK)	37.93%
Academia	34.48%	Eastern Mediterranean	4 (Kuwait, UAE, Jordan)	6.90%
Other	17.24%	Western Pacific	11 (Australia, Philippine)	18.97%
PDG21 Sustainability in Pharmacy (N=69)				
Area of Practice	Responses (%)	World regions	Sample size (n)	Percentage of total sample (%)
Community	37.68%	African	8 (Kenya, Nigeria, Rwanda, South Africa)	11.60%
Hospital	18.84%	Americas	4 (Brazil, Canada, Costa Rica, Mexico, USA)	5.80%
Industry	4.35%	South-East Asia	4 (India, Malaysia)	5.80%

Regulatory Affairs	2.90%	European	15 (Armenia, Denmark, Finland, France, Germany, Ireland,, North Macedonia (Republic of), Portugal, Russian Federation, UK)	21.74%
Academia	24.64%	Eastern Mediterranean	6 (Afghanistan, Pakistan, Kuwait, Lebanon, UAE)	8.70%
Other	11.59%	Western Pacific	32 (Australia, Philippines, Singapore)	46.38%

Appendix 9: Clustering of the final "Usable "list of indicators by agreed themes

PDGs/Themes	Demography	Impact	Policies & regulatory systems	Training & professional Development	Pharmaceutical services & facilities
PDG1	1) Number of local/international academic pharmacists and pharmaceutical scientists positions in Faculties/Schools. 3) Number of teacher/practitioners (or practice-based supervisors/preceptors/educators) employed by institutions to train student pharmacists. 7) Number of pharmacy graduates nationally (national graduate supply). 8) Number of accredited /non-accredited schools of pharmacy nationally. 16) Number of pharmacy technicians graduating or registering nationally.	-	5) Required inclusion of experiential education/training in academic curricula. 6) Required inclusion of interprofessional and interdisciplinary education and training structures in IET curricula. 12) Salary comparisons of academics with private/government/commercial pharmacy sectors. 13) Minimum period of pharmaceutical science internship programmes (if any). 14) Minimum period of practice training/clinical internship pre-licensing (pre-registration) programmes.	2) Existence of national or institutional benchmarking tools (e.g. teacher training programmes) or career development programmes for academic pharmacists and pharmaceutical scientists 13) Minimum period of pharmaceutical science internship programmes (if any). 14) Minimum period of practice training/clinical internship pre-licensing (pre-registration) programmes	-
PDG2	20) Number of local/international pharmacy graduates/ new registrants (National/International graduate supply). 21) Number of newly licensed/registered pharmacists (segmented number by community, hospital pharmacists) who deliver pharmaceutical services for all population. 22) Number of newly licensed/registered pharmacy technicians (segmented number by	-	23) Existence of national regulations and standards for licensing or registration of pharmacy graduates/new registrants. 24) Existence of national mandatory standards and requirements that ensure maintaining licence for all early career post-registered/licensed pharmacists, e.g. gaining CPD credits, portfolio, training programmes. 27) Existence of national regulations and standards for licensing or	25) Availability of national strategies and mentoring programmes to monitor early-career practitioners development towards advanced practice (including clinical practice and pharmaceutical science areas across the pharmaceutical	-

	community, hospital pharmacists) who deliver pharmaceutical services for all population.		registration of pharmacy technicians graduates/new registrants. 29) Availability of formal scope of practice within the licencing and/or registration of newly licensed/registered pharmacists, e.g. provision of different pharmacy services in pharmacy/hospital settings. 31) Availability of specific training/qualifications for early career pharmacists for managing a community and hospital pharmacy that provides pharmaceutical services.	workforce), e.g. CPD, frameworks, recognition & certification, education & training programmes. 26) Existence of a national competency (development) framework for newly registered or early career pharmacists & pharmaceutical scientists.	
PDG3	-	35) Existence of national pharmacy practice standards or guidelines for measuring the quality of service provision in the healthcare system. These 'quality standards/guidelines' might be included within existing 'scopes of pharmacy practice' guidelines, code of ethics, competency development frameworks, pharmacy practice standards, policy development etc. 36) Existence of evidence-based performance indicators to assess and monitor the applied pharmacy practice against the existing national standards, e.g. audit systems, patient feedback, health outcomes research,	32) Existence of national regulations & policies that ensure the quality assurance of the academic and institutional infrastructures to deliver the required needs and competency-based education and training. 33) Existence of national needs-based guidance for quality assurance of pharmacy and pharmaceutical science education and training throughout initial education and career development (advanced practice/specialisation). 34) Existence of professional standards of practice and required competencies for maintenance of licensing and/or registration of the pharmaceutical workforce across all sectors. 35) Existence of national pharmacy practice standards or guidelines for measuring the quality of service provision in the healthcare system. These 'quality standards/guidelines' might be included within existing 'scopes of pharmacy practice'	-	-

		cost-effectiveness measures etc.	guidelines, code of ethics, competency development frameworks, pharmacy practice standards, policy development etc. 37) Availability of guidance documents & tools defining quality assurance criteria for various pharmaceutical sciences areas to assure access to safe and effective medical products.		
PDG4	-	-	38) Existence of national regulatory requirements for advanced practitioners and specialists to provide advanced services 43) Availability of a national professional recognition system that recognises advanced practice and or specialisation.	39) Existence of a national competency (development) framework for advanced & specialist scope of practice for pharmacists' career development beyond early career/foundation level	41) Existence of advanced services with standards and/or guidelines for the development and delivery of these services at the practice site (community, hospital). 42) Availability of the necessary infrastructures that assist practitioners in the development of advanced and/or specialist practice, e.g. CPD, residency training, board certification, sector-specific programmes, etc.
PDG5	-	-	-	45) Institutional use of competency-based education (or learning) approach as a framework for teaching and assessment of learning. 46) Existence of national evidence-based development frameworks describing competencies needed	-

				for the pharmaceutical workforce (pharmacists, technicians, pharmaceutical scientists, etc.) for all stages and settings of professional career.	
PDG6	-	-	52) Required inclusion of leadership development training and programmes as part of the initial education and training curriculum that develop professional leadership skills (in universities).	50) Availability of national strategies and programmes (including tools and mentoring systems) that develop professional leadership skills, including clinical and executive leadership, scientific leadership and initial education and training for all stages of career development in the workplace.	-
PDG7	58) Number of community and hospital pharmacies that provide integrated pharmaceutical services for all population (standardised by national population), including emergency situations.	54) Existence of national practice guidelines and quality standards to measure health care outcomes provided by integrated pharmaceutical services	60) Existence of clear strategies and procedures to facilitate delivery of integrated and needs-based pharmaceutical care services in practice and across all health care setting. 61) Existence of national guidelines or policies that ensure all people have access to advanced pharmaceutical care services.	59) Existence of systematic and integrated development of education and training based on population needs and social determinants of health for pharmaceutical workforce development, including pharmacists, educators, & trainers.	56) Availability of people-centred integrated services that optimise the use of medicines and achieve the optimal clinical, humanistic, economic and sustainable health care outcomes. 57) Existence of advanced and integrated people-centred care as the core of Primary Care and Public Health Services, e.g. patient education & health promotion, long-term condition management, Medicines Use Reviews,

					point-of-care or diagnostic tests etc
PDG8		67) Existence of national strategies that utilise collaborative practice as a quality indicator for care delivery and capacity improvement.	62) Inclusion of the interprofessional education (IPE) approach in the initial education and training curriculum (in universities). 65) Existence of national strategies that recognise members of the pharmaceutical workforce as integral members of the multidisciplinary team, enabling collaborative practice and integrated care. 66) Existence of national strategies to actively empower patients in their own care and to engage with their multidisciplinary care team thereby taking an active part in decision making about their car. 67) Existence of national strategies that utilise collaborative practice as a quality indicator for care delivery and capacity improvement	63) Existence of national education and training strategies to ensure intra- and interprofessional collaboration within the pharmaceutical workforce and other healthcare professionals across all levels of care (primary, secondary and tertiary care settings) with the focus on patient care at the core. 68) Availability of intra- and interdisciplinary programmes to facilitate collaboration between pharmaceutical scientists and clinical practitioners in associated fields.	64) Existence of health care structures and facilities that facilitate interprofessional collaboration and ensure continuity of care between levels of care, e.g. collaborative management of LTCs, health data exchange, digital interfaces etc.
PDG9	-	-	69) Existence of national regulations for implementing and linking CPD as a mandatory requirement in the registration, renewal of licensure and/or advanced practice and specialist recognition for all registered/licensed pharmacists. 70) Existence of a national/international accreditation system/ body that oversights and monitors the quality of CPD provision. 72) Existence of national regulations/requirements for	71) Availability of (online/class-based) certified CPD programmes (gaining CPD' credits/points) for continuing education and training in the workplace. 73) Existence of specialised CPD programmes to meet the minimum competencies and training requirements	-

			implementing and linking CPD in the registration, renewal of licensure for all registered/licensed pharmacy technicians and pharmacy support staff.	for community and hospital pharmacists throughout pharmacists' professional journey (early career, advanced practice)	
PDG10	76) Number of actively practising pharmacists (segmented number by sectors of practice, e.g. community, hospital pharmacists, academia, pharmaceutical science, and other sectors)	-	77) Existence of national legislation that ensures equity in opportunities in the workplace. 79) Existence of national regulations that ensure equity and equality in the access to pharmacy education and training.	-	-
PDG11	-	81) Existence of evidence-based indicators or metrics to measure and monitor the impact of all pharmaceutical services on health outcomes, quality of life and improved health system efficiency.	-	-	-
PDG12	-	85) Availability of a national strategy and system to collate and share pharmaceutical workforce and education data (Pharmacists, pharmaceutical scientists, technicians), including sectors of practice, career stages, age and gender distribution	85) Availability of a national strategy and system to collate and share pharmaceutical workforce and education data (Pharmacists, pharmaceutical scientists, technicians), including sectors of practice, career stages, age and gender distribution	-	-
PDG13	-	-	91) Existence of national policies and strategies to implement comprehensive needs-based professional development of the pharmaceutical workforce (e.g. pharmaceutical scientists, practitioners, technicians, etc.) across all settings and career stages.	-	-

			92) Existence of national policies and strategies that apply evidence-based practice to shape and reform pharmacy practice regulations using appropriate tools and frameworks for service implementation, integration and remuneration. 93) Existence of national regulations and policies to ensure delivering interprofessional integrated services across primary, secondary and tertiary care settings. 95) Existence of national policies and strategies within the health system structure that ensure all people receive the pharmaceutical services, including emergency situations. 96) Existence of national strategies and policies that implement science-based assessment in driving national research priorities, medicines regulations, and developing medicinal and medical products.		
PDG14	97) Number of qualified pharmacists with the necessary expertise to develop a competent workforce that can deliver quality medicines expertise in initial education and career development	-	-	98) Availability of national competencies framework and training programmes to prepare a workforce that can develop specialised or advanced medicines expertise (i.e. specialist pharmacist and pharmaceutical scientist).	99) Existence of strategies and systems that support in the provision of medicines and medical devices expertise (quality science-based information) and advice to patients, formal and informal caregivers, and health care professionals and stakeholders 100) Availability of appropriate tools and formal resources to facilitate and support evidence-based pharmacy practice and

					service delivery, e.g. formularies and medicines information management systems.
PDG15	101) Number of pharmaceutical facilities that provide people-centred care services for all population (standardised by national population).	102) Existence of national strategies that utilise people-centred care as an indicator for evaluating health system performance and quality of care, quality assurance in education, and monitoring workforce impact. 107) Availability of people-centred services that improve the use of medicines and ensure optimal clinical and resource utilization.	104) The subject of "people-centred care" is included as part of the initial education and training curriculum (in universities), including in interprofessional education development.	103) Existence of a national competency (development) framework across all stages for pharmacists and pharmacy technicians development (early career and advanced practice) with people-centred care at the core. 104) The subject of "people-centred care" is included as part of the initial education and training curriculum (in universities), including in interprofessional education development.	107) Availability of people-centred services that improve the use of medicines and ensure optimal clinical and resource utilization. 108) Existence of high-quality people-centred primary care as the core of Primary Care and Public Health Services, including pharmacy delivered population health education; pharmacy delivered health promotion activities for population; essential public health functions. 109) Availability of community-based people-centred care services, e.g. screening and monitoring of NCDs and LTCs and their risk factors, symptoms and clinical signs through point-of-care or diagnostic tests.
PDG16	113) Access to community and hospital pharmacy services indicators (Population measures per capita; urban/rural access etc).	-	115) Mandatory quality assurance for community pharmacies (training, functional areas of the pharmacy, handling of stock and preparation of medicines, documentation systems, provision of prescription and non-prescription medicines, monitoring and screening).	-	-

			120) Recent changes in health care provision regulation (e.g. Pandemic response).		
PDG17	-	-	123) Existence of national policy and guidance that regulate the prescription of Antibiotics in community/hospital pharmacies and the use of antibiotics in livestock production and agriculture.	124) Existence of national strategic plan and training to support developing pharmaceutical workforce with competencies needed for antimicrobial stewardship services delivery, e.g. leadership commitment, pharmacy expertise, tracking, reporting and education.	-
PDG18	128) Number of community and hospital pharmacies that provide adequate pharmaceutical services, essential medicines and medical devices for all population (standardised by national population). 129) Number of pharmacists (segmented number by community, hospital pharmacists) who deliver pharmaceutical services and essential medicines and medical devices for all population. 130) Number of pharmacy technicians and support workforce who deliver pharmaceutical services and essential medicines and medical devices for all population. 131) Number of community and hospital pharmacies in RURAL and URBAN geographic areas (standardised by population).	-	132) Availability of national guidelines or policies concerning access to medicines, pharmaceutical services, & medical devices, including speciality medicines (HIV, cancer, hepatitis C) and contingency plans for shortages of medicines and medical devices. 133) Existence of regulations/laws for prescription or non-prescription medicines that can ONLY be supplied in community/hospital pharmacies. 134) Existence of regulations/laws for non-prescription medicines, e.g. OTC that can be supplied in non-community pharmacy outlets, or dispensaries. 135) Existence of regulations/laws concerning categories of medicines that can be obtained by patients online through local or abroad providers.	-	-

PDG19	138) Number of pharmaceutical workforce and facilities that provide pharmaceutical services focused on patient safety improvement for all population (standardised by national population). 139) Number of teachers/practitioners employed by institutions to educate and train student pharmacists to enhance patient safety.	143) Existence of national strategies that utilise patient safety as an indicator for evaluating health system performance and quality of care, quality assurance in education, and monitoring workforce impact.	140) Inclusion of "patient safety" as part of the initial education and training curriculum (in universities), including in interprofessional education development. 144) Availability of national guidelines or policies concerning patient safety when accessing pharmaceutical services, e.g. use of medical devices and categories of medicines (Online, OTC, prescription & non-prescription medicines), pandemic responses, substandard and falsified medicines.	140) Inclusion of "patient safety" as part of the initial education and training curriculum (in universities), including in interprofessional education development. 141) Availability of training and sector programmes that ensure the pharmaceutical workforce receives effective education, skills and training in patient safety and medication-related harm reduction across all stages and types of Pharmacy settings. 142) Availability of training and programmes to educate the public about the safe use of medications provided by pharmacists. 145) Existence of a national competency (development) framework across all stages for pharmacists and pharmacy technicians development (early career and advanced practice) with patient safety at the core.	

PDG20				153) Use of digital technology in health education and training delivery for pharmacy CPD (for example CPD online platforms; online delivery of CPD).	147) Existence of an accessible digital infrastructure to enable healthcare delivery of, for example, tele-medicine, online health consultations, e-prescriptions, e-patient records, etc.
PDG21	156) Number of pharmacists (segmented number by community, hospital pharmacists) who deliver pharmaceutical services for all population on a sustainable basis. 157) Number of pharmacy technicians and support workforce who deliver pharmaceutical services for all population on a sustainable basis. 158) Number of community and hospital pharmacies that provide sustainable pharmaceutical services for all population (standardised by national population). 160) Sustainable workforce: Number of pharmacy graduates and schools/faculties of pharmacy nationally that ensure/maintain supplying pharmacists to the workforce.	159) Existence of strategies and policies related to the sustainability of the environment and minimise the impact of pharmaceuticals and pharmacy practice, e.g. appropriate drug disposal and use of medicines. 161) Existence of national strategic plan for pharmaceutical workforce development to deliver equitable and sustainable services, e.g. pharmaceutical workforce match competencies with population, health systems, education development, and health labour market needs.	159) Existence of strategies and policies related to the sustainability of the environment and minimise the impact of pharmaceuticals and pharmacy practice, e.g. appropriate drug disposal and use of medicines. 162) Existence of specific regulations/standards to sustain medicines supply and deliver key/essential pharmaceutical care services throughout national health emergency situations. 163) Existence of policies concerning the establishment (market entry) of new community pharmacies to allow continuous access to medicines and pharmacy services. 164) Existence of a system that shapes the type of model of remuneration, e.g. a single type of statutory or contractual model or third-party payers to remunerate community and hospital pharmacies. 165) Existence of the operating principles of the remuneration models to include the type of remuneration, e.g. margin-based remuneration (linear/regressive/fixed amount), regressive margin-based remuneration (cumulative/non-	-	161) Existence of national strategic plan for pharmaceutical workforce development to deliver equitable and sustainable services, e.g. pharmaceutical workforce match competencies with population, health systems, education development, and health labour market needs.

[redacted]			cumulative) in pharmacy/hospital pharmacies.		