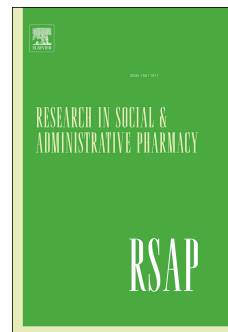# Journal Pre-proof

A comparative analysis of pharmaceutical workforce development needs across the commonwealth

Ian Bates, Devang Patel, Amy Hai Yan Chan, Victoria Rutter, Lina Bader, Sherly Meilianti, Arit Udoh

Please cite this article as: Bates I, Patel D, Chan AHY, Rutter V, Bader L, Meilianti S, Udoh A, A comparative analysis of pharmaceutical workforce development needs across the commonwealth, *Research in Social & Administrative Pharmacy* (2022), doi: https://doi.org/10.1016/j.sapharm.2022.07.010.

This is a PDF file of an article that has undergone enhancements after acceptance, such as the addition of a cover page and metadata, and formatting for readability, but it is not yet the definitive version of record. This version will undergo additional copyediting, typesetting and review before it is published in its final form, but we are providing this version to give early visibility of the article. Please note that, during the production process, errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Title page

A comparative analysis of pharmaceutical workforce development needs across the Commonwealth.

Author names and affiliations:

Ian Bates [a, c], Devang Patel [a] Amy Hai Yan Chan [a,b], Victoria Rutter [b], Lina Bader [c], Sherly Meilianti [a, c], Arit Udoh [c, d]
a UCL School of Pharmacy, 29-39 Brunswick Square, London, WC1N 1AX
b Commonwealth Pharmacists Association, 66 – 68 East Smithfield, London, E1W 1AW
c International Pharmaceutical Federation, Andries Bickerweg 5, 2517 JP The Hague, The Netherlands
d College of Medical and Dental Sciences, University of Birmingham, Edgbaston Birmingham, United Kingdom

Corresponding author:

Ian Bates, i.bates@ucl.ac.uk
UCL School of Pharmacy, 29-39 Brunswick Square, Bloomsbury, London WC1N 1AX

Abstract page

Abstract

Background

Increasing demographic healthcare challenges, such as increased life expectancy coupled with increased use of medicines for complex morbidities, point to the need for globally applicable transformative policies in health workforce development. The International Pharmaceutical Federation (FIP) has established a set of 21 Global Development Goals (FIP DGs) to strengthen pharmacy workforce and benchmark professional developmental needs.

Objective

This study aimed to identify policy directions and factors affecting pharmacy workforce development across the Commonwealth, and to examine country progress made towards implementing workforce oriented FIP DGs.

Methods

The study involved a literature review and a global survey of commonwealth countries professional leadership bodies. The literature database search included PubMed/Medline, CINAHL, Scopus and PsychINFO databases as well as the websites of the respective national pharmacy organisations of Commonwealth countries. A global survey was also conducted to assess country-level alignment with the workforce component of FIP DGs.

Results

Thirty-one articles representing 21 Commonwealth countries were included in the literature overview. The development needs identified were workforce shortages and inequitable distribution across practice areas and geographical regions, low workforce supply capacity, workforce feminisation, lack of professional recognition, limited training opportunities, low job satisfaction, high workload and attrition. The survey showed disparities in country-level progress and alignment with the FIP DGs. High-income countries in the survey sample reported alignment with most of the FIP DGs, while the low-income countries reported alignment with fewer DGs. More than two-thirds of the countries showed alignment with the FIP DGs related to academic capacity, early career training, quality assurance and advancing integrated services. About half reported alignment with the FIP DGs related to competency and leadership development, respectively, while only a third aligned with the equity and equality DG.

Conclusion

This study identified realistic pharmacy workforce developmental needs across a range of Commonwealth countries. Addressing these needs through appropriate policy interventions will be essential for increasing the pharmacy workforce capacity and assuring the delivery of high-quality pharmaceutical care and medicines expertise in these countries.

Keywords

Commonwealth pharmacy; Continuing Professional Development (CPD); International Pharmaceutical Federation (FIP); Needs Assessment; Pharmacy workforce development

3

Manuscript

Introduction

All global health systems are currently facing multiple challenges, including accessibility and capacity issues; pharmacists, however, remain the most accessible cadre of healthcare professionals in countries around the world.[1,2] As medicine experts, pharmacists play a prominent role in preventative care and population health improvement.[3–5] Although research has demonstrated that pharmaceutical care interventions enhance therapeutic outcomes, existing literature indicate that pharmacists are often underutilised as health care providers, particularly within the community.[6] The optimal coordination of health services to better utilise pharmacists' accessibility and expertise is needed to ensure that patients' medicines and pharmaceutical care needs are met.[6] Meeting these needs require the availability of appropriately trained and competent practitioners.[7] In turn, the development needs of the pharmacy workforce will need to be determined and addressed so as to assure competence and promote skills improvement. These developmental needs can be assessed through analysing the current state of the workforce and comparing these against internationally set goals or standards.

The International Pharmaceutical Federation (FIP) is a global body that represents over four million pharmacists and pharmaceutical scientists.[8] The FIP leads on the global development of the pharmacy workforce and has established a set of 21 Global Development Goals (FIP DGs) launched in 2021. These goals are aimed at strengthening the pharmacy workforce through a "series of measurable, feasible and tangible goals".[9] The FIP DGs provide a standardised basis for assessing country-level progress towards developing the pharmacy workforce and facilitate the identification of future needs. The workforce element of the 21 FIP DGs are expanded from 13 goals of the FIP Pharmaceutical Workforce Development Goals (PWDGs) launched in 2016.[9] Initial structure of the FIP PWDGs consists of three clusters: academy, professional development and system clusters. In 2018, the FIP signed a memorandum of understanding with the Commonwealth Pharmacist Association (CPA), marking the formation of an extensive global partnership.[10] The CPA provides a means of reaching pharmacists practicing in countries within the Commonwealth through the strong partnerships it has built over the years with the relevant national pharmacy organisations.[11] The FIP/CPA partnership aims to deliver a range of pharmacy workforce development projects

within the Commonwealth, focused on supporting and evaluating the progress made towards implementing the FIP DGs.[10]

The Commonwealth encompasses one third of the global population across every continent, and is a voluntary intergovernmental organisation consisting of 54 independent members states.[12] The Commonwealth member states comprise a mixed demography of economic status, and include many middle and lower income countries (LMICs).[12] There is a disproportionate shortage of health workers in LMICs, coupled with fragile health systems and a high burden of disease (see [47] *inter alia* references listed in this paper). The Commonwealth recognises the importance of health as key component of development. It aspires to achieve universal health coverage for all its citizens and development of an adequate and resilient health work force, maximising the skill set of each profession. Health research that is focused on the Commonwealth allows for a greater focus on the least developed countries as encouraged by health target 3c of the United Nations Sustainable Development Goals (SDG).[13] Investigating and contrasting workforce development needs will provide valuable information about commonalities for workforce transformation policy development. The research reported in this article was conducted collaboratively between the FIP and the CPA, focusing on the workforce element of the first thirteen FIP DGs when this study was conducted in 2019.

The aim of the study was to assess the policy factors and influences on development of the pharmacy workforce across the Commonwealth. The key objectives were to:

1. Identify the factors influencing the development of the pharmacy workforce within the Commonwealth, and

2. Examine the current state of the pharmacy workforce throughout the Commonwealth with respect to the progress made towards implementing the first thirteen FIP DGs.

Method

This study was conducted in two phases and comprised (1) a literature overview of the factors affecting the development of the pharmacy workforce within the Commonwealth, and (2) a survey of country-level progress towards implementation of the FIP DGs in the sample countries.

Phase 1: Literature overview

In the first phase of the study, relevant literature was identified through systematic searches of PubMed/Medline, CINAHL, Scopus and PsychINFO electronic databases. This was in addition to searches of the websites of the national pharmacy leadership organisations in the respective Commonwealth countries. Searches were carried out using the pre-defined keywords presented in Table A1 of the Appendix. Keywords were characterised by identifying key topic areas relevant to the objectives and selecting relevant synonyms and/or related terms. Due to the significant lack of literature surrounding the pharmacy workforce across the entire Commonwealth, searches using country specific keywords were conducted. The results obtained from database searching were screened; articles considered relevant based on title and abstract were selected for full text review. Full text articles were assessed against inclusion/exclusion criteria. Inclusion criteria were: articles reporting on the pharmacy workforce within a Commonwealth country; articles published between January 2008 (the inception of the FIP Education Directorate) and August 2021. The criteria excluded articles focused on the delivery of pharmaceutical services for specific disease states; articles published in languages other than English; articles on the pharmacy workforce in countries outside the Commonwealth; and articles focussed on the health workforce with little or no inclusion of the pharmacy workforce. The retrieved literature included primary research articles, policy documents and reports, government white papers, commentaries and perspective pieces. Articles deemed relevant from the literature search were analysed thematically using an inductive approach and conducting a line-by-line coding of the transcribed outcomes/findings that summarised the data. After conducting the coding, the researcher categorised the codes into themes which were reviewed for credibility by a second researcher.

Phase 2: Survey

In the second phase, a survey of the national pharmacy leadership organisation in the respective Commonwealth nations was conducted**.** Respondents to the survey were identified through organisations that held active memberships with the FIP and/or CPA and this included 34 Commonwealth countries. For the remaining Commonwealth nations not represented within the FIP and/or CPA, online searches were conducted to obtain the relevant pharmacy leadership organisations and contacts for the survey; contacts were asked to identify officials within the organisation to provide data and organisations were followed up on two occasions. The survey form comprised a demography and a 13-item section formatted as a self-assessment tool, or matrix, using the FIP development goal descriptors shown in Table A2 of the Appendix. The

6

respondents were asked to assess which national-level strategies, initiatives and/or programmes were in alignment with the first thirteen FIP DGs, including those currently under development. The 13 sections each comprised a dichotomous and free-text response box for respondents to indicate the specific national initiative programme or strategy available for the specified FIP DG. The survey questionnaire along with a cover letter explaining the research rationale was forwarded to contacts within the national pharmacy leadership organisations identified in the Commonwealth nations. The survey form was previously sent out in 2017, with a follow-up survey conducted between November and December 2018. Responses to the survey replies were summarised narratively, highlighting country progress towards implementing the FIP DGs.

The need for formal ethical or IRG approval was assessed. Independent review confirmed that data were not classified as confidential, patient health related, personal, or commercially sensitive for this study. However, ethical oversight and committee review was obtained from both the FIP and the CPA Executive, Governing Body and Board structures, and is on record.

Results

Phase 1 Literature overview

In total, 464 articles were identified from the literature search (Figure 1). Of this number, 242 articles were excluded with 189 full texts assessed for relevance. At the end of the literature selection process, 31 articles met the inclusion criteria. The selected literature included eight reports, 10 government white papers and 13 peer review articles that reported on pharmacy workforce development issues across 21 countries within the Commonwealth. The 21 countries are presented in Table 1, including a summary of the developmental issues identified from the included literature.

The key themes from the literature were:

Workforce availability and gender representation
A shortage of pharmacists and other support staff is a key challenge in the development and expansion of the workforce in the 21 countries represented in this review. This included shortages in absolute numbers and in the overall capacity of the pharmacy workforce in 17 of the 21 countries represented.[14–30] In contrast, an oversupply of pharmacists was reported in Canada, Australia and the United Kingdom, with imbalances in workforce distribution across

7

practice areas.[31–33] For instance, more than two-thirds of the workforce in New Zealand, Canada, Australia and the United Kingdom work in community pharmacy practice, with fewer than 10% in primary care and general practice.[31–34] Comparatively, the majority of the pharmacy workforce in Malta practice in areas not directly related to patient care, such as industry and wholesaling sector, with fewer than half in community and hospital practice.[22] Inequitable distribution also exists across geographical regions[14,23,28,35] with significant workforce shortages reported in rural and remote areas in Malaysia,[21] India,[36] Canada,[35] Australia[37,38] and Kenya.[19] Workforce shortages were more severe in the African countries represented in this review with pharmacists' density of fewer than 1 per 10,000 population reported in Nigeria,[23] Kenya,[19] Tanzania[28] and Lesotho.[20] In contrast to Nigeria where there were a majority of male pharmacists,[23] a number of countries, including Australia, New Zealand, United Kingdom, and Malaysia showed a highly feminised workforce comprising more than two-thirds of females.[21,31,33,34] The prevalence of part-time hours and the need for career breaks were key issues of concern arising from the increasing feminisation of the workforce according to national surveys in the United Kingdom and Malaysia.[21,33]

Education, training and continuing professional development

An increase in the number of undergraduate training institutions over the ten years' period covered in this review was observed in many of the countries represented. However, supply capacity remains significantly low in several countries, including in Kenya,[19] Nigeria,[23] Grenada,[17] Tanzania,[28] Pakistan,[24] Lesotho[20] and Uganda.[29] Pharmacy training institutions are also inequitably distributed across country regions, with the majority situated in urban areas[19,21,23,28] and limited numbers located in rural areas.[37] Gaps in the clinical content of the undergraduate pharmacy education curriculum were reported in Sri Lanka,[27] Pakistan[24,39] and India[18], including a shortage of appropriately qualified staff to take up faculty positions and oversee clinical training sites.[21,24] There were also limited opportunities for postgraduate training reported in India and Sri Lanka[18,27], with low rates of participation in mandatory continuing professional development activities observed in Nigeria.[23] Limited access to professional development activities in rural and remote areas is a key factor affecting pharmacists' decision to work in non-urban regions.[37] Conversely, higher rates of collaborative working, professional recognition from other members of the health team, and increased scope for expanded roles in rural areas were the key enablers reported.[35,37,38]

Workforce recruitment, retention and attrition

8

Low levels of pharmacists' recruitment into the public sector was a challenge in St. Vincent & the Grenadines,[26] Pakistan[24] and Uganda[29] with a low retention rate in the private sector reported in Tanzania and Malaysia.[21,28] Recruitment and retention of pharmacists in rural areas, primary care, and general practice was also a key issue in Australia and Canada.[35,37] While the literature indicates that workforce attrition is generally low in Tanzania, out-migration to other countries was a contributory factor to pharmacists shortages in Nigeria and Kenya.[19,23] The converse was true in the more developed countries represented in this review with in-migration of foreign trained pharmacists adding to the workforce and making up about 30% of the pharmacists in Canada,[40] 10% in Australia,[31] and 6% in United Kingdom.[33] Declining workforce participation rate was also a concern in some countries, with the reports indicating that up to 40% of the pharmacists in Nigeria [23] and 10% in New Zealand [34] were not in active practice.

Remuneration, workload and job satisfaction

Although pharmacists in the United Kingdom were generally satisfied with their jobs,[33] low levels of job satisfaction were reported in India,[18,36] Pakistan[24] and Tanzania[28] with up to a fifth of the pharmacists in Australia indicating an intention to exit the workforce within 10 years.[31] The low levels of job satisfaction were generally linked to poor remuneration, high workload and limited opportunity for promotion.[18,24,24,36] In contrast, pharmacists in rural areas in Australia reported high levels of job satisfaction that was linked to the opportunity to use their advanced skills in practice, overall recognition by other members of the health team and appropriate remuneration.[37]

Phase 2 Survey outcomes

Survey respondents were identified from the national pharmacy leadership organisations of 37 Commonwealth countries which were coded by WHO region and World Bank classification for income level. Representatives from 14 countries completed the survey (response rate of 38%). Responses were received from countries in four of the WHO regions and these were: Ghana, Kenya, Namibia, Sierra Leone, South Africa, Uganda (Africa); Australia, Fiji, Malaysia, Singapore (Western Pacific); Canada, Dominica, St Lucia (the Americas); and United Kingdom (Europe). The survey findings showed a disparity in country-level alignment with the FIP DGs. The high-income countries in the survey sample (including United Kingdom, Singapore, Australia and Canada) reported alignment with most of the FIP DGs. The low- and middle-income countries (LMICs, such as Fiji, St Lucia and Uganda) reported alignment with

one of the FIP DG while Dominica aligned with none. Figure 2 shows the number of countries in the survey reporting alignment per FIP DGs across three clusters of the 13 FIP DGs. By calculating the weighted average of goals within cluster, the country alignment from high to low is academy, professional development, and system clusters, respectively. Table 2 provides a summary of the DGs alignment per country as indicated by the respondents. The specific national-level strategies, initiatives and/or programmes reported to be in alignment with the FIP DGs within the respondent countries are outlined as follows:

DG 1 – Academic capacity

Respondents from about two-thirds (n=9, 64%) of the surveyed countries reported the existence of national-level initiatives that are aligned with the FIP DG related to academic capacity (Table 2). These initiatives were, however, lacking in Dominica, Fiji, Saint Lucia, and Uganda. The initiatives included those established to enable pharmacy students' access to leaders in pharmaceutical sciences and pharmacy practice in Australia and the United Kingdom. Leadership groups established by the professional leadership body of Australia inform the society on practice needs and advise on the development of education and related resources to support the workforce. The professional leadership body in the United Kingdom established vision for transforming the pharmacy workforce promotes access to pharmacy leaders who act as role models. Other initiatives included stakeholders' engagement activities between academic institutions, government representatives and policymakers in Singapore and Namibia that ensure that the pharmacy education curricular is needs-based and caters to the national health resource requirements.

Other initiatives involved the evaluation of education programmes and national education outcomes for pharmacy degrees in Canada and the establishment of regulatory oversight for postgraduate training in Sierra Leone. Scholarships for further training in clinical pharmacy and pharmaceutical sciences were reported in Malaysia alongside national and state level conferences that are held to encourage pharmacists to engage with research. A diploma programme aimed at building workforce capacity and advancing pharmacists' clinical expertise exists in Kenya. By implementing the diploma programme, a district hospital in Kenya increased its number of clinical pharmacists from two as reported in 2011 to thirteen as of 2017.

DG 2 – Early career training strategy

10

National-level initiatives for foundation and early career development were non-existent in three (21%) of the countries, including Dominica, Fiji and Uganda. These training infrastructures are available in Australia, the United Kingdom and Sierra Leone to support the development of newly qualified pharmacists and ensure they can deliver safe and effective pharmaceutical care. National level postgraduate, advanced diplomas and internships training programmes also exist for early career practitioners in Malaysia, Singapore and Kenya. These programmes aim to develop pharmacists' knowledge and skills early on in their careers and prepare them for their expanding job roles. Other initiatives were the Career Essentials training programme in Australia designed to support early career practitioners in developing non-clinical skills in areas such as collaboration, personal branding, motivational interviewing and emotional intelligence. In addition, the establishment of additional training requirements within accredited pharmacy sites for newly qualified pharmacists was reported in Ghana, Canada and Malaysia.

DG 3 – Quality assurance

Respondents in 10 (71%) countries reported the existence of national-level quality assurance programmes for pharmacy education (Table 2). These were, however, absent in four (29%) countries in the survey, including Dominica, Fiji, Saint Lucia, and Uganda. The pharmacy education quality assurance programmes in Singapore, Sierra Leone, Canada, Malaysia and Australia are underpinned by an established set of standards linked to local needs. The programmes are carried out by national regulatory agencies or quality assurance panels and aim to assure the quality of pharmacy education in the respective countries. Evidence-based quality indicators have been defined for these programmes in the United Kingdom. In Kenya, national standards and participant feedback are used to continually make changes to the quality assurance programmes, and this ensures that the professional skills needed by pharmacy graduates are adequately addressed in training curricula. In Ghana, these programmes also ensure that the education and training of pharmacists are carried out in accredited institutions.

DG 4 – Advanced and specialist development

National initiatives for advanced and specialist development were reported in eight (57%) countries (Table 2). These included professional recognition infrastructures for advancement as a generalist or a specialist in the United Kingdom and other credentialling and privileging pathways for pharmacists in Malaysia, Australia and Singapore. The West African Postgraduate College of Pharmacists (WAPCP) and the Ghana College of Pharmacists

(GCPharm), as well as the Pharmacy Specialist Accreditation Board (PSAB), provide a recognised pathway to specialisation and advanced practice in Ghana and Singapore, respectively. The RPS Faculty in the United Kingdom provide a roadmap for the professional recognition of pharmacists and pharmaceutical scientists in the United Kingdom. Other initiatives include the RPS Knowledge Interface Tool in the United Kingdom that enables pharmacists' access to validated knowledge components for specialists' career pathways, national qualification programmes for community pharmacists in primary care in South Africa, and advanced diplomas and disease/therapy specific certification training in Malaysia and Australia. In Namibia, advanced training qualification programmes that aim to provide a stepping stone towards specialisation are also under development in veterinary pharmacy and for industrial and regulatory practice.

DG 5 – Competency development

Competency frameworks in various stages of development and alignment with FIP DG5 were reported in eight (57%) of the surveyed countries. These included national frameworks in Australia, United Kingdom, Malaysia, Canada and Singapore and those under development in South Africa and Namibia. The frameworks comprised those containing generic competencies that are applicable to pharmacists in all practice settings and are respectively aligned with the FIP global frameworks for foundation and advanced practice. These frameworks also exist for pharmacy technicians in Singapore and United Kingdom and provide a means for defining scope of practice and identifying development needs. Further, they provide a mapping tool for the development of other role- and speciality-specific frameworks in the respective countries. The competencies defined in the frameworks for foundation pharmacy practice in United Kingdom, Australia, Malaysia and Canada are linked with the standards for pharmacy education to ensure that the training curriculum for pre-service pharmacists encompasses the required competencies for professional practice. The frameworks for advanced practice underpin the various training programmes and pathways for advancement and specialisation in the respective countries. In the United Kingdom, the advanced pharmacy framework is a key component of the RPS Faculty's professional recognition process for pharmacists and pharmaceutical scientists.

DG 6 – Leadership development

Seven countries (50%) reported the existence of national initiatives for leadership development (Table 2). These included the availability of leadership frameworks developed for use across practice settings in Australia and United Kingdom. These frameworks describe the competencies required for the development of expertise in pharmacy leadership and outline attributes that are aspirational for the workforce. National leadership programmes designed to develop pharmacists' leadership skills are also available in Malaysia, Singapore and Canada. In Singapore, these programmes are available at the organisational and health system level through the Ministry of Health Holdings and are also offered to candidates identified as having the potential to be leaders within the profession. In South Africa, leadership development programmes are integrated into both the undergraduate and postgraduate training curricula, while the professional associations in Malaysia offer leadership training workshops in Malaysia. The professional leadership body of Australia also provides mentoring and leadership development through the Ignite Leadership training programme and a Diploma in Leadership and Management.

DG 7 – Advancing integrated services

Respondents in 10 (71%) of the included countries reported the existence of national strategies for advancing integrated services (Table 2). These initiatives were not available in four countries, including Dominica, Fiji, St Lucia and Sierra Leone. Patient-centred initiatives designed to address and develop the workforce in line with shifts in healthcare systems are available in Singapore, Kenya and United Kingdom. These include integrated health services described in national policies and organisational strategies in Australia. To bridge the gap between education and practice, universities in Malaysia, Namibia, United Kingdom and Australia employ practitioners to deliver training activities and provide first-hand knowledge to students. Similarly, pharmacy students within South Africa and Malaysia take part in experiential learning at various health facilities to gain first-hand experience and knowledge from practitioners. National initiatives to increase pharmacists' involvement in health promotion activities and research are underway in Ghana. Innovative training methods that utilise videos and self/peer critiquing to train pharmacists in skills required to provide supportive care at health units are available in Uganda. The initiatives also include the provision of additional training for specific services such as vaccinations in Australia. In addition, pharmacy education providers in Malaysia routinely engage representatives from hospital, community and industrial pharmacy to ensure that the training curriculum is relevant to practice.

DG 8 – Working with others

National programmes that promote collaborative working were reported in 8 (57%) of the surveyed countries. This included elements of interprofessional training in the national pharmacy education programmes in Singapore, Namibia, Malaysia and Kenya and in some universities in Canada and Ghana. These programmes aim to develop teamwork, communication skills and collaborative working between pharmacists and other members of the health team. A national collaborative prescribing programme is available for pharmacists in Singapore, while in Australia, the pharmaceutical society's General Practice Pharmacist Education programme emphasises skills development in collaboration with general practitioners, practice nurses and other health professionals. In Malaysia, continuous professional development sessions organised by the medical association and pharmaceutical society are available with the objective of further promoting collaboration between both professions. Team-based patient care models are established in the major healthcare institutions in Singapore and Malaysia. In Namibia, undergraduate pharmacy and medical students are taught together for about half of their curricula, while in Australia, some states organise clinical knowledge events for the two student groups.

DG 9 – Continuing professional development strategies

Eight (57%) of the surveyed countries reported the existence of national continuing education programmes (Table 2). These programmes are mandatory in Malaysia and Singapore and are a requirement for retention in the pharmacy register. While the programmes also exist in South Africa, undertaking CPD is not mandatory in the country. National frameworks established to support CPD are in existence in Fiji, while in Canada, these are linked with needs from the health system perspective and provincial pharmacy association members. The professional development of pharmacists is supported within the United Kingdom, South Africa, Canada and Malaysia through the delivery of comprehensive continuing education programmes underpinned by national competency development frameworks. These programmes are linked to health system related needs and aim to support pharmacists in the development of the requisite skills essential for the delivery of safe and effective patient care.

DG 10 – Equity and equality

The majority (n=9, 64%) of the surveyed countries (Table 2) reported a lack of national initiatives for equity and equality in pharmacy, with only five (36%) indicating that these existed. The countries with these initiatives included Canada, South Africa, Namibia, Australia

14

and Ghana. The professional leadership body in Canada established a Women in Pharmacy initiative to create awareness of diversity related challenges in the workforce. This initiative also aims to engender a sense of community for women leaders within the pharmacy profession and to identify solutions for overcoming inequalities. The initiative employs evidence-based objectives obtained through research and also involves a national summit at the annual Canadian Pharmacists Conference. In Namibia, affirmative actions are in place to help reduce inequalities in employment nationally and in the admission process into pharmacy schools. The Pharmaceutical Society of South Africa offers bursaries and financial aid to undergraduate and postgraduate students from minority groups to ensure representation. In Australia, statements of position, as well as national and organisational employment policies in pharmacy, are in place in response to gender and diversity inequalities. These initiatives all exist to ensure representation and foster workforce diversity in the respective countries.

DG 11 – Impact and outcomes

National programmes that measure the impact of the pharmaceutical workforce were reported in half (n=7, 50%) of the surveyed countries (Table 2). In Malaysia, South Africa, Singapore and Australia, these programmes mainly measure impact using core metrics linked to the outcomes of pharmaceutical care delivery. The Professional Practice Group and the Pharmacy Practice Research of the professional leadership body in Canada lead the generation, dissemination and application of practice-based research evidence to optimise the role of pharmacists in medication management. The Pharmaceutical Service Delivery Division in Malaysia compile and publish evidence of impact of pharmaceutical services on a dedicated webpage that the public can view. The professional leadership body of South Africa have planned a project that aims to quantify the impact of primary care drug therapy pharmacists while national surveys to measure the impact of education on the workforce are available in Namibia. Outputs from these programmes in Canada include reports detailing evidence of positive outcomes for patients as well lower overall cost for payers and policymakers in hypertension and pharmacy expanded services.

DG 12 – Pharmacy intelligence

Eight (57%) countries reported the existence of national programmes designed to collate and share pharmacy workforce data and planning activities (Table 2). These programmes include workforce surveys carried out in collaboration with the respective national health agencies and key stakeholders in Singapore, Australia, Namibia, Malaysia and the United Kingdom. Data

15

from these surveys provide information on existing trends in pharmacy and generate evidence to support workforce planning in these countries. In Singapore, these surveys are conducted every 10 years to provide insight and engender policy development on workforce deployment and supply. Longitudinal workforce surveys in Australia allow for the development of the workforce whilst maintaining the right capacity and capability. In Canada, initiatives to address key issues related to the labour market supply of pharmacists is led by the working group of the professional leadership body, while a multistakeholder Pharmacy Workforce Planning Committee (PWPC) has been established to conduct research, develop recommendations and advise on broad workforce related issues for pharmacy. The professional leadership body in the United Kingdom launched initiative on New Medicines, Better Medicines, Better Use of Medicines initiative to promote the importance of research in supporting workforce planning. While there is evidence on the impact of the United Kingdom National Health Service (NHS) pharmacy workforce, comparable information on pharmaceutical scientists is lacking.

DG 13 – Policy development

National initiatives aligned to the FIP developmental goal 13 were available in 8 (57%) countries. The initiatives reported included needs-based post-registration training and continuing professional development activities related to emerging health needs in Ghana, Namibia, South Africa, Singapore and Canada. Others were research conducted to identify workforce development needs in South Africa and changes in the baccalaureate degree curricula to ensure that pharmacy graduates can enter practice equipped with enhanced patient care skills. In Malaysia, the development of the pharmaceutical workforce from initial education and training through advanced practice is the responsibility of several organisations, including the Pharmacy Practice and Development Division within the Ministry of Health, the professional leadership body, statutory body for quality assurance of higher education and the Pharmacy Board of Malaysia. These organisations provide input on the development of policies affecting the pharmacy workforce. Also reported were stakeholders' engagement and strategic planning sessions conducted in Singapore to obtain feedback and ensure the development of the profession through appropriate policies.

Discussion

This study is the first to examine the progress of Commonwealth countries towards achieving the FIP DGs. The objective of a needs-based approach to health human resource planning is to ensure the availability of a workforce capable of meeting population needs and future

demands.[45] In the pharmacy context, benchmarking the workforce against the FIP DGs provides a means for identifying country-specific gaps and developmental needs.[9] Addressing the identified needs will be essential for increasing the workforce's capacity. From this study, national level programmes, strategies and/or initiatives that are aligned with the FIP DGs were reported in more of the high-income countries compared to the low- and middle-income countries such as Dominica, Fiji, St Lucia, and Uganda. Although disparities in country-level progress and alignment with the FIP DGs were observed in the Commonwealth member nations represented, commonalities existed in the developmental needs identified.

The literature review in this study has identified factors influencing the pharmacy workforce development within the Commonwealth, which identified needs towards FIP DGs. For example, a shortage in the pharmacy workforce was a key developmental need identified across the member nations.[20,23,27,29,46] A lack of pharmacy practitioners negatively impacts access to essential health services, particularly as it relates to the provision of pharmaceutical care and medicines expertise.[47] Given that the observed workforce shortages were likely to become progressively dire without adequate interventions,[48] this study highlights a need for appropriate national policies and initiatives linked to the FIP DG1 (Academic Capacity), DG2 (Early career training strategy), DG12 (Pharmacy intelligence), and DG13 (Workforce policy formation). While increasing the number of pharmacy schools is an essential strategy for expanding the workforce, the low supply capacity in the countries assessed and the lag time between students' enrolment and readiness to enter the workforce suggest that additional developmental policy strategies are needed. Modelling estimates in the nursing profession indicate that workforce interventions that utilise a combination of policies to scale up productivity, increase retention and limit attrition, are more likely to be successful than increasing the number of training institutions and/or students' enrolment alone.[49] Other estimates demonstrate that increasing pharmacists' productivity via the greater incorporation of support staff and/or implementation of new technologies is likely to have a more significant impact on workforce capacity in the short term, compared to increasing the number of training institutions alone.[48] Strategies aligned with DG2 (Early career training strategy), DG4 (Advanced and specialist development) and DG5 (Competency development) and that encourage increased productivity through skills development and advanced practice are therefore needed.

Imbalances in workforce distribution across practice areas and geographical regions demonstrate the need for more efficient and equitable utilisation of the existing workforce

17

within the Commonwealth member nations. While an oversupply of pharmacists in terms of absolute numbers was more likely in the high-income countries in this study, workforce shortages due to inequitable distribution were also reported in the rural and remote areas in these as well as the low and middle income countries.[35,37] Initiatives that will address these imbalances and that are linked to DG2 (Early career training strategy), DG4 (Advanced and specialist development), DG11 (Impact and outcomes), DG12 (Pharmacy intelligence) and DG13 (Policy development) are urgently needed. These initiatives have to be capable of addressing factors such as low job satisfaction, high workload, lack of professional recognition and training opportunities that have been reported as limiting retention and contributing to workforce maldistribution and attrition, especially in the rural and remote regions within Commonwealth member states.[29,35–37] There is evidence that suggests that the provision of non-financial incentives may increase retention of health workers in these areas. [50,51] These incentives include providing opportunities for existing staff to expand their skills and upgrade their qualifications, provision of social needs such as housing, and the availability of training and defined career paths.[50,51] Evidence from Australia also indicated that situating pharmacy schools in, and enrolment of students from rural areas will benefit pharmacists' recruitment and retention in these areas. [37]

Collaborative health care practice is essential for the provision of effective and comprehensive patient care that is safe and of high quality.[52,53] Interprofessional education facilitates the availability of collaborative practice-ready practitioners that are better equipped to meet population health needs.[53]   Health care workers who are collaborative practice-ready are also better equipped to work effectively and competently within an interprofessional health team.[53] Pharmacists' involvement in interprofessional collaboration has a positive impact on health outcomes and limits prescribing errors and preventable adverse drug events in acute care settings.[54,55] Therefore, national initiatives that are linked to the DG7 (Advancing integrated services) and DG8 (Working with others) and that would encourage collaboration and interprofessional education in pharmacy are of urgent priority within the Commonwealth countries. Further, continuing professional development activities are central for maintaining competence and improving practitioners' knowledge and skills.[56,57] Several Commonwealth countries in the survey conducted in this study lacked national strategies for CPD. The introduction of CPD requirements for pharmacists and pharmacy support staff will help to ensure that the workforce is continually developing through self-directed and lifelong learning. CPD programmes and activities that are aligned with the DG 4 (Advanced and specialist

development) and DG9 (CPD strategies) are necessary for maintaining competence and enhancing skills development for advancing practice.[58] These programmes will also help prepare the pharmacy workforce for their expanding role within the health system.[58]

The adequate supply of pharmacists and support staff to meet current and future health demands is dependent on effective workforce planning, which in turn is reliant on the availability of high quality workforce data.[59] Information on workforce composition and capacity is also critical for identifying gaps and developing appropriate policies to measure impact. The development of the workforce is also dependent on coordinating efforts between various stakeholders and pharmacy sectors to ensure a greater focus is placed on the most pressing needs. However, only a few countries in the sample of this study indicated stakeholders' involvement in policy formation and advise on key issues relating to the pharmacy workforce. Consequently, strategies aligned with FIP DG 11 (Impact and outcomes), and DG12 (Pharmacy intelligence) are necessary for the progress of the workforce in these countries. In addition, rising workforce feminisation and a lack of initiatives to address gender and diversity inequalities in several of the Commonwealth countries in our sample underscores the need for strategies to curb this imbalance. Part-time work continues to be more prevalent among female pharmacists, resulting in fewer working hours compared to males.[60] Therefore, health human resource planning and forecasting in pharmacy need to account for gender differences in work patterns to assure the safe delivery of pharmaceutical services, especially in countries with increasing feminisation of the profession. Strategies that are aligned to FIP DG10 (Equity and equality) are of critical importance.

This study has some limitations. When this study was conducted, the initial FIP Development Goal policy and format only included the first 13 FIP DG workforce elements and so this study nis limited to a policy assessment of the 13 FIP DGs associated with workforce development and education. Further research into country-level alignment with the remaining DGs is required to provide a more comprehensive insight into the pharmacy workforce in the Commonwealth. Although this study's overall objective was to obtain data from all Commonwealth countries, only about half of these were represented in the sample due to a lack of contact persons and limited information available online. The methodology provides an insight into how and where leadership organisations are focussing resources, an alternative approach that uses interview qualitative data could additionally provide greater insight into decision making related to the FIP DGs; this would support further research. While the study

findings provide information on existing workforce and education trends, some caution should be applied to generalising to other countries not represented. The response rate to the survey was also an additional limitation. Despite repeat attempts made to contact appropriate representatives within the pharmacy leadership organisations in the Commonwealth countries, survey responses were received from 14 countries. Further research is, therefore, necessary to obtain information on the developmental needs of the workforce in the Commonwealth countries not represented in this study.

Conclusions

This is the first study to provide an overview of the workforce development needs across the Commonwealth using a needs-based approach and benchmarking these against the FIP DGs. This study provided valuable information about commonalities for workforce transformation policy development across the mixed demography of the Commonwealth, which could be used to inform a common global strategy. This includes the need for a multipolicy approach to workforce development, particularly in LMICs of the Commonwealth. Addressing these needs will enhance pharmacy capacity across the Commonwealth and help ensure the availability of an adequate number of pharmacy practitioners equipped with the requisite knowledge and skills to meet population health needs and future demands. This in turn will help provide an adequate and robust pharmacy workforce as part of the enhanced multidisciplinary workforce that is needed to actively support advancement of Universal Health Care across the Commonwealth and beyond.

References

1. Tsuyuki RT, Beahm NP, Okada H, Al Hamarneh YN. Pharmacists as accessible primary health care providers: Review of the evidence. *Can Pharm J CPJ*. 2018;151(1):4-5. doi:10.1177/1715163517745517

2. Manolakis PG, Skelton JB. Pharmacists' contributions to primary care in the United States collaborating to address unmet patient care needs: the emerging role for pharmacists to address the shortage of primary care providers. *Am J Pharm Educ*. 2010;74(10):S7-S7. doi:10.5688/aj7410s7

3. Strand MA, Scott DM, Undem T, Anderson G, Clarens A, Liu X. Pharmacist contributions to the ten essential services of public health in three National Association of Boards of Pharmacy regions. *J Am Pharm Assoc*. 2017;57(3):395-401. doi:10.1016/j.japh.2017.02.021

4. Blenkinsopp A, Anderson C, Armstrong M. Systematic review of the effectiveness of community pharmacy-based interventions to reduce risk behaviours and risk factors for coronary heart disease. *J Public Health Med*. 2003;25(2):144-153. doi:10.1093/pubmed/fdg030

5. Agomo C, Udoh A, Kpokiri E, Agomo JOO author C. Community pharmacists' contribution to public health: assessing the global evidence base. *Pharm J*. 2018;10(4). doi:10.1211/PJ.2018.20204556

6. Kehrer JP, Eberhart G, Wing M, Horon K. Pharmacy's role in a modern health continuum. *Can Pharm J CPJ*. 2013;146(6):321-324. doi:10.1177/1715163513506370

7. Udoh A, Ernawati DK, Akpan M, Galbraith K, Bates I. Pharmacies and primary care: a global development framework. *Bull World Health Organ*. 2020;98(11):809-811. doi:10.2471/BLT.19.248435

8. About FIP - FIP - International Pharmaceutical Federation. Accessed January 25, 2017. https://www.fip.org/?page=menu_about

9. International Pharmaceutical Federation. Pharmaceutical Workforce Development Goals. Published online 2016. https://fip.org/files/fip/PharmacyEducation/2016_report/2016-11-Education-workforce-development-goals.pdf

10. International Pharmaceutical Federation. FIP and CPA cement relations. International Pharmaceutical Federation. Published 2018. Accessed November 26, 2021. https://www.fip.org//news?news=newsitem&newsitem=265

11. Commonwealth Pharmacists Association. Strategy. Published 2021. Accessed November 26, 2021. https://commonwealthpharmacy.org/strategy/

12. The Commonwealth. Commonwealth member countries. Published 2021. Accessed May 2, 2021. https://thecommonwealth.org/member-countries

13. UN Department of Economic and Social Affairs. *Sustainable Development Goals*. United Nations; 2015. https://sdgs.un.org/goals

14. Ministry of Health, Commonwealth of the Bahamas. *Commonwealth of the Bahamas National Health Services Strategic Plan: 2010 - 2020*. Ministry of Health, the Government of the Bahamas; 2010:52. Accessed November 19, 2021. https://ufdc.ufl.edu/AA00067533/00001

15. Ministry of Health of Barbados. *Barbados Pharmaceutical Country Profile*. Pan American Health Organisation, World Health Organization and Minisitry of Health of Barbados; 2012. Accessed August 22, 2021. https://www.who.int/medicines/areas/coordination/pscp.barbados_en.pdf

16. Ministry of Health of the Commonwealth of Dominica. *Dominica Pharmaceutical Country Profile*. Pan American Health Organization, World Health Organization and Ministry of Health of the Commonwealth of Dominica; 2012. Accessed August 9, 2021. https://www.paho.org/hq/dmdocuments/2013/PHARMACEUTICAL-COUNTRY-PROFILE-DOMINICA.pdf

17. Ministry of Health of Grenada. *Grenada Pharmaceutical Country Profile*. Pan American Health Organization, World Health Organization and Ministry of Health of Grenada; 2012:109. Accessed November 28, 2020. https://www.paho.org/hq/dmdocuments/2013/PHARMACEUTICAL-COUNTRY-PROFILE-GRENADA.pdf

18. Akram Ahmad, Atique S, Balkrishnan R, Patel I. Pharmacy profession in India: current scenario and recommendations. *Indian J Pharm Educ Res*. 2014;48(3):1-4. doi:10.5530/ijper.48.3.3

19. Ministry of Health of Kenya. *Kenya Health Workforce Report: The Status of Healthcare Professionals in Kenya, 2015*. Ministry of Health of Kenya; 2015:104. Accessed November 16, 2021. https://taskforce.org/wp-content/uploads/2019/09/KHWF_2017Report_Fullreport_042317-MR-comments.pdf

20. Ministry of Health and Social Welfare of Lesotho. *Lesotho Pharmaceutical Country Profile*. Ministry of Health and Social Welfare, World Health Organization; 2011:322. Accessed November 16, 2021. https://www.who.int/medicines/areas/coordination/Lesotho_PSCPNarrativeQuestionnaire_19072011.pdf

21. World Health Organization. *Human Resources for Health Country Profiles: Malaysia*. World Health Organization, Regional Office of the Western Pacific; 2014. Accessed August 8, 2021. https://www.who.int/publications/i/item/9789290616375

22. Pharmacy Council Malta. *Pharmacy Council Malta Annual Report 2015*. Pharmacy Council Malta; 2015:18. Accessed November 19, 2021. https://deputyprimeministercms.gov.mt/en/regcounc/pharmcouncil/Documents/Annual%20report%202015.pdf

23. Ekpenyong A, Udoh A, Kpokiri E, Bates I. An analysis of pharmacy workforce capacity in Nigeria. *J Pharm Policy Pract*. 2018;11(1):20. doi:10.1186/s40545-018-0147-9

24. Khan T. Challenges to pharmacy and pharmacy practice in Pakistan. *Australas Med J*. 2011;4(4):230-235. doi:10.4066/AMJ.2011.488

25. National Department of Health. *Papua New Guinea Pharmaceutical Country Profile*. National Department of Health, World Health Organization; 2012:36. Accessed August 9, 2021. https://www.who.int/medicines/areas/coordination/final_pharmaceutical_country_profil e_png.pdf

26. Ministry of Health, Wellness and the Enviroment. *Saint Vincent and the Grenadines Pharmaceutical Country Profile*. Pan American Health Organization, World Health Organization, Ministry of Health, Wellness and the Enviroment; 2012:114. Accessed August 22, 2021. https://www.paho.org/en/documents/saint-vincent-and-grenadines-pharmaceutical-country-profile

27. Sakeena MHF, Bennett AA, McLachlan AJ. The Need to Strengthen the Role of the Pharmacist in Sri Lanka: Perspectives. *Pharm J Pharm Educ Pract*. 2019;7(2):54. doi:10.3390/pharmacy7020054

28. Ministry of Health and Social Welfare. *Assessment of the Pharmaceutical Human Resources in Tanzania and the Strategic Framework*. Ministry of Health and Social Welfare, Dar es Salaam, Tanzania; 2010. https://digicollections.net/medicinedocs/documents/s17397e/s17397e.pdf

29. Ministry of Health of the Republic of Uganda. *Annual Pharmaceutical Sector Performance Report: 2014-2015*. Ministry of Health of the Republic of Uganda; 2016:39. Accessed November 19, 2021. https://www.health.go.ug/cause/annual-pharmaceutical-sector-performance-report/

30. Ministry of Health of Trinidad and Tobago. *Trinidad and Tobago Pharmaceutical Country Profile*. Pan American Health Organization, World Health Organization and Ministry of Health of Trinidad and Tobago; 2012:114. Accessed August 22, 2021. https://www.who.int/medicines/areas/coordination/PSCP_TRT_en.pdf

31. Jackson JK, Liang J, Page AT. Analysis of the demographics and characteristics of the Australian pharmacist workforce 2013–2018: decreasing supply points to the need for a workforce strategy. *Int J Pharm Pract*. 2021;29(2):178-185. doi:10.1093/ijpp/riaa022

32. Canadian Pharmacists Association. Pharmacists in Canada. Published 2021. Accessed November 21, 2021. https://www.pharmacists.ca/pharmacy-in-canada/pharmacists-in-canada/

33. General Pharmaceutical Council. *Survey of Registered Pharmacy Professionals 2019*. General Pharmaceutical Council; 2020:279. Accessed November 19, 2021. https://www.pharmacyregulation.org/sites/default/files/document/gphc-2019-survey-pharmacy-professionals-main-report-2019.pdf

34. Pharmacy Council of New Zealand. *Workforce Demographic 2021*. Pharmacy Council of New Zealand; 2021. Accessed November 19, 2021. https://pharmacycouncil.org.nz/wp-content/uploads/2021/09/Workforce-Demographic-Report-2021-FINAL.pdf

35. Soon JA, Levine M. Rural pharmacy in Canada: pharmacist training, workforce capacity and research partnerships. *Int J Circumpolar Health*. 2011;70(4):407-418. doi:10.3402/ijch.v70i4.17845

36. Vivek J, Priya R, Shilpi R, et al. Evaluation of job satisfaction & social identity of rural Indian pharmacist. *Indian J Pharm Pract*. 2013;6(1):47-58.

37. Smith JD, White C, Roufeil L, et al. A national study into the rural and remote pharmacist workforce. *Rural Remote Health*. 2013;13(2):2214. doi:10.22605/RRH2214

38. Hays CA, Taylor SM, Glass BD. The rural pharmacy practice landscape: challenges and motivators. *J Multidiscip Healthc*. 2020;13:227-234. doi:10.2147/JMDH.S236488

39. Zeeshan Zafar M. Current pharmacists condition in Pakistan and its Ccmparison with foreign pharmacists. *Pharm Anal Acta*. 2017;08(09):1000e190. doi:10.4172/2153-2435.1000e190

40. Canadian Institute of Health Information. *Pharmacists in Canada 2020 - Data Tables*. Canadian Institute of Health Information; 2021. Accessed November 19, 2021. https://www.cihi.ca/en/pharmacists

41. Raiche T, Pammett R, Dattani S, et al. Community pharmacists' evolving role in Canadian primary health care: a vision of harmonization in a patchwork system. *Pharm Pract*. 2020;18(4):2171. doi:10.18549/PharmPract.2020.4.2171

42. Pharmacy Council of New Zealand. *Pharmacy Council of New Zealand Annual Report 2020*. Pharmacy Council of New Zealand; 2021. Accessed November 19, 2021. https://pharmacycouncil.org.nz/wp-content/uploads/2021/03/Pharmacy-Council-Annual-Report-2020-web.pdf

43. Hussain A, Malik M, Toklu HZ. A literature review: pharmaceutical care an evolving role at community pharmacies in Pakistan. *Pharmacol Pharm*. 2013;2013. doi:10.4236/pp.2013.45060

44. Ramrekha C, Ramkhelawan A, Singh R, et al. Pharmacy education in Trinidad and Tobago. *Indian J Pharm Educ Res*. 2015;49(3):168-172. doi:10.5530/IJPER.49.3.1

45. Birch S, Kephart G, Murphy GT, O'Brien-Pallas L, Alder R, MacKenzie A. Health human resources planning and the production of health: development of an extended analytical framework for needs-based health human resources planning. *J Public Health Manag Pract*. 2009;15(6):S56. doi:10.1097/PHH.0b013e3181b1ec0e

46. Pan American Health Organisation, Ministry of Health of Saint Lucia. Pharmaceutical Situation in Saint Lucia. WHO Assessment of Level II - Health Facilities Survey. Published online 2012. Accessed August 22, 2021. https://iris.paho.org/bitstream/handle/10665.2/28458/9789275116968_eng.pdf?sequence=1&isAllowed=y

47. Bates I, John C, Seegobin P, Bruno A. An analysis of the global pharmacy workforce capacity trends from 2006 to 2012. *Hum Resour Health*. 2018;16(1):3. doi:10.1186/s12960-018-0267-y

48. Tomblin Murphy G, MacKenzie A, Guy-Walker J, Walker C. Needs-based human resources for health planning in Jamaica: using simulation modelling to inform policy options for pharmacists in the public sector. *Hum Resour Health*. 2014;12:67. doi:10.1186/1478-4491-12-67

49. Tomblin Murphy G, MacKenzie A, Alder R, Birch S, Kephart G, O'Brien-Pallas L. An applied simulation model for estimating the supply of and requirements for registered nurses based on population health needs. *Policy Polit Nurs Pract*. 2009;10(4):240-251. doi:10.1177/1527154409358777

50. Yoswa M Dambisya. *A Review of Non-Financial Incentives for Health Worker Retention in East and Southern Africa*. Regional Network for Equity in Health in Eastern and Southern Africa (EQUINET), East, Central and Southern African Health Community (ECSA-HC), University of Limpopo, South Africa; 2007:72. Accessed December 30, 2021. https://www.who.int/workforcealliance/knowledge/resources/equinet_incentives/en/

51. Russell D, Mathew S, Fitts M, et al. Interventions for health workforce retention in rural and remote areas: a systematic review. *Hum Resour Health*. 2021;19(1):103. doi:10.1186/s12960-021-00643-7

52. Green BN, Johnson CD. Interprofessional collaboration in research, education, and clinical practice: working together for a better future. *J Chiropr Educ*. 2015;29(1):1-10. doi:10.7899/JCE-14-36

53. World Health Organization. *Framework for Action on Interprofessional Education & Collaborative Practice. Produced by the Health Professions Network Nursing and Midwifery Office within the Department of Human Resources for Health.*; 2010:64. Accessed December 31, 2021. https://apps.who.int/iris/bitstream/handle/10665/70185/?sequence=1

54. Kucukarslan SN, Peters M, Mlynarek M, Nafziger DA. Pharmacists on rounding teams reduce preventable adverse drug events in hospital general medicine units. *Arch Intern Med*. 2003;163(17):2014-2018. doi:10.1001/archinte.163.17.2014

55. Leape LL, Cullen DJ, Clapp MD, et al. Pharmacist participation on physician rounds and adverse drug events in the intensive care unit. *JAMA*. 1999;282(3):267-270. doi:10.1001/jama.282.3.267

56. Sarayani A, Rashidian A, Gholami K, Torkamandi H, Javadi M. Efficacy of continuing education in improving pharmacists' competencies for providing weight management service: Three-arm randomized controlled trial. *J Contin Educ Health Prof*. 2012;32(3):163-173. doi:10.1002/chp.21141

57. Chen HY, Lee TY, Huang WT, et al. The short-term impact of a continuing education program on pharmacists' knowledge and attitudes toward diabetes. *Am J Pharm Educ*. 2004;68(5):1-5. doi:10.5688/aj6805121

58. Micallef R, Kayyali R. A systematic review of models used and preferences for continuing education and continuing professional development of pharmacists. *Pharmacy*. 2019;7(4):154. doi:10.3390/pharmacy7040154

59. Bourgeault I, Simkin S, Chamberland-Rowe C. Poor health workforce planning is costly, risky and inequitable. *CMAJ*. 2019;191(42):E1147-E1148. doi:10.1503/cmaj.191241

60. Young S, LeMessurier J, Mathews M. The feminisation of the Canadian pharmacy workforce: a gender analysis of graduates from a Canadian School of Pharmacy. *Can Pharm J Rev Pharm Can*. 2012;145(4):186-190.e2. doi:10.3821/145.4.cpj186

Declaration of competing interest

No conflicts interest to declare.

Author contributions

Ian Bates (IB): Conceptualisation, Methodology, Validation, Analysis, Visualisation, Writing – Review and editing, Supervision
Devang Patel (DP): Conceptualisation, Methodology, Validation, Analysis, Investigation, Data curation, Writing – Original Draft, Visualisation, Project administration
Amy Hai Yan **Chan (AC):** Conceptualisation, Methodology, Validation, Analysis
Victoria Rutter (VR): Conceptualisation, Methodology, Validation, Analysis
Lina Bader (LB): Conceptualisation, Methodology, Validation, Analysis, Investigation, Data curation, Supervision
Sherly Meilianti (SM): Review and editing
Arit Udoh (AU): Writing – Review and editing, Validation

Table 1: Pharmacy workforce development issues within the Commonwealth

Country	Author/Year	Literature type (n)	Pharmacy workforce development issues identified
Australia	Jackson et al 2021 [31]; Hay et al 2020 [38]; Smith et al, 2013 [37]	Peer review article (3)	Inequitable distribution of pharmacists with oversupply in urban areas and shortages in rural & remotes areas; workforce attrition with up to a fifth intending to exit within 10years; declining workforce participation rate; limited professional development opportunities in rural locations
Bahamas	The Commonwealth of the Bahamas, 2010 [14]	Government white paper (1)	Inequitable distribution across geographical regions; overall workforce shortage with a density of about 4.1 per 10,000
Barbados	Ministry of Health/PAHO/WHO, 2012 [15]	Report (1)	Low density with a limited number of pharmacists employed in the public sector; no strategic plan for pharmaceutical human resource development available in the country
Canada	Canadian Pharmacists Association, 2021 [32]; Canadian Institute of Health Information, 2021 [40]; Soon & Levine, 2012 [35]; Raiche et al, 2020 [41]	Report (2), peer review article (2)	Workforce oversupply but with a comparatively smaller percentage increase in the number of pharmacists and support staff over the more recent years; inequitable distribution across the geographical region with shortages in the northern parts of the country and in rural areas; imbalance in workforce distribution across practice areas with the majority in community pharmacy practice (~ 70%)
Dominica	Ministry of Health, Commonwealth of Dominica/ PAHO/WHO, 2012 [16]	Government white paper (1)	Low workforce density with the number of pharmacy technicians four times those of pharmacists in the country; no strategic plan for pharmaceutical workforce development available in the country
Grenada	Ministry of Health Grenada/PAHO/WHO, 2012 [17]	Government white paper (1)	Workforce shortages with limited supply from schools of pharmacy; pharmacy technicians, pharmacy assistants and other support staff not recognised in the country; lack of a strategic plan for pharmaceutical human resource development in the country

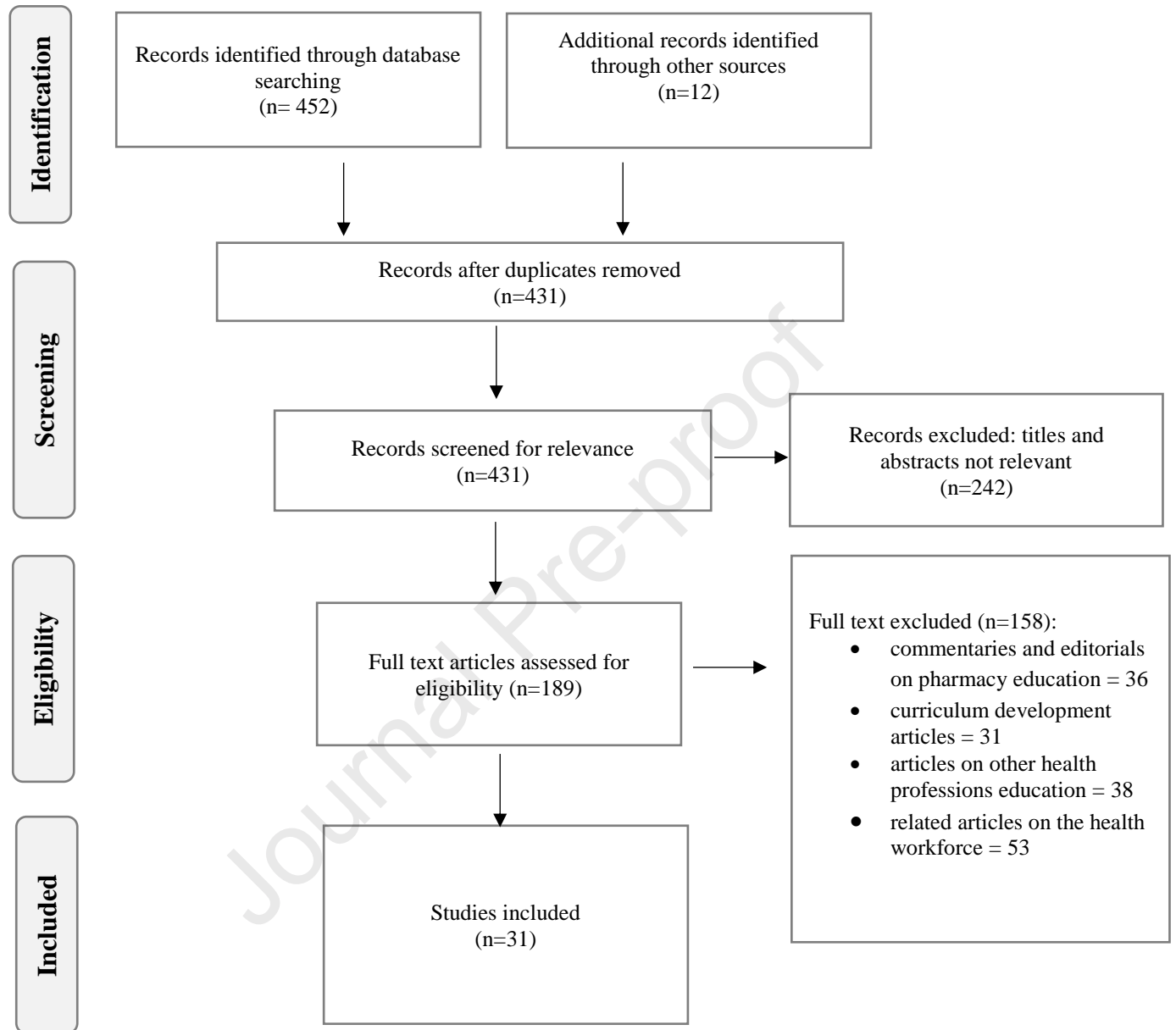| Country	Author/Year	Literature type (n)	Pharmacy workforce development issues
India	Akram et al, 2014 [18]; Vivek et al 2013 [36]	Peer review articles (2)	Lack of professional recognition; workforce shortages, particularly in academia, community and industrial practice areas with non-pharmacists more likely to undertake these roles; low levels of job satisfaction linked to poor remuneration, high workload and limited opportunities for promotion
Kenya	Ministry of Health Kenya, 2015 [19]	Government white paper (1)	Pharmacist density significantly low at less than 1 per 10,000 population with severe shortages in rural areas and maldistribution across regions; training institutions inequitably distributed in favour of urban areas; workforce attrition due to out-migration; density and training capacity of pharmaceutical technologist significantly higher than that for pharmacists
Lesotho	Ministry of Health and Social Welfare/WHO, 2011 [20]	Government white paper (1)	Workforce made up of twice as many support staff compared to pharmacists; workforce shortages with a density less than 1 per 10,000 population although there exists a strategic plan for pharmaceutical workforce planning in the country
Malaysia	WHO, 2014 [21]	Report (1)	Workforce shortages with maldistribution regionally, and between the public and private sector; up to 70% of the workforce are females potentially impacting on retention and rise in part-time hours; shortage of clinical training sites; limited numbers of qualified pharmacists with clinical expertise; high workload
Malta	Pharmacy Council of Malta, 2015 [22]	Report (1)	Feminised workforce; workforce shortages in community practice area and within the public sector; majority of pharmacists employed in areas not directly related to patient care; low workforce supply capacity
New Zealand	Pharmacy Council of New Zealand, 2021a [42] & 2021b [34]	Report (2)	Young workforce with a median age of 37 years and majority between aged 20 - 34years; feminised workforce with 66% females; inequitable distribution across regions with younger pharmacists more likely to practice in urban areas and the more experienced in rural areas; maldistribution across practice areas with more than 70% in community pharmacy and less than 1% in primary healthcare organisations and general practices

Country	Author/Year	Literature type (n)	Pharmacy workforce development issues
Nigeria	Ekpenyong et al, 2018[23]	Peer review article (1)	Low training capacity with regional maldistribution of schools of pharmacy and overall impact on pharmacists' supply; workforce shortages with inequitable distribution across regions and practice areas; low workforce participation rate with about 40% not in active practice; low rate of participation in mandatory continuing professional development
Pakistan	Khan 2011 [24]; Hussain 2013 [43]; Zafar 2017 [39]	Peer review articles (3)	Job insecurity challenges with limited openings for hospital pharmacists in the public sector; workforce shortages; low remuneration and high workload; gaps in clinical content of undergraduate curricula; lack of qualified staff to take on faculty positions; resistance and lack of recognition by other members of health team; non-recognition of community pharmacists as healthcare providers with majority of the pharmacies operating without a qualified pharmacist
Papua New Guinea	National Department of Health/WHO, 2012 [25]	Government white paper (1)	Low workforce density; lack of a strategic plan for pharmaceutical human resource development in the country
Saint Vincent & the Grenadines	Ministry of Health, Wellness and the Environment of St. Vincent & the Grenadines/PAHO/WHO, 2012 [26]	Government white paper (1)	Low numbers of pharmacists employed in the public sector, low workforce density with severe shortages in the number of pharmacy support staff
Sri Lanka	Sakeena et al, 2019 [27]	Peer review article (1)	Few numbers of pharmacists employed in hospitals; absence of qualified pharmacists in community practice; gaps in clinical content of pre-service training curriculum; limited opportunities for postgraduate clinical training in the country

29

Country	Author/Year	Literature type (n)	Pharmacy workforce development issues
Tanzania	Ministry of Health and Social Welfare, 2010 [28]	Government white paper (1)	Low workforce density with only about 3% employed in the private sector; imbalance and maldistribution across regions and practice areas; low pharmacists' supply capacity
Trinidad & Tobago	Ministry of Health, Trinidad & Tobago/PAHO/WHO 2012 [30]; Ramrekha et al 2015 [44]	Government white paper (1); peer review article (1)	Limited integration of pharmacists into primary care and clinical practice; lack of a strategic plan for pharmaceutical human resource development; workforce shortages
Uganda	Ministry of Health, 2016 [29]	Government white paper (1)	Workforce shortages with inequitable distribution particularly in rural areas; low rate of hiring into the public sector with retention and recruitment at 8% overall; low pharmacists supply capacity
United Kingdom	General Pharmaceutical Council, 2020 [33]	Report (1)	Feminised workforce with more than two-thirds being females (~ 60% female pharmacists and 88% female pharmacy technicians); About 69% of the workforce in community practice with fewer than 10% in primary care and general practice; imbalances in geographical distribution with a significant proportion of the workforce in urban areas.

Table 2: FIP development goal alignment per country

	FIP Development Goals (FIP DGs)	Country													
		UG[1]	SL[1]	KY[1]	GH[2]	DO[3]	FJ[3]	StL[3]	SA[3]	NM[3]	ML[3]	UK[4]	SP[4]	CD[4]	AU[4]
1	Academic capacity		✓	✓	✓	x	x	x	x	✓	✓	✓	✓	✓	✓
2	Early career training strategy	x	✓	✓	✓	x	x	✓	✓	✓	✓	✓	✓	✓	✓
3	Quality assurance	x	✓	✓	✓	x	x	x	✓	✓	✓	✓	✓	✓	✓
4	Advanced and specialist development	x	x	x	✓	x	x	x	✓	✓	✓	✓	✓	✓	✓
5	Competency development	x	x	x	✓	x	x	x	✓	✓	✓	✓	✓	✓	✓
6	Leadership development	x	x	x	✓	x	x	x	✓	x	✓	✓	✓	✓	✓
7	Advancing integrated services	✓	x	✓	✓	x	x	x	✓	✓	✓	✓	✓	✓	✓
8	Working with others	x	x	✓	✓	x	x	x	✓	✓	✓	x	✓	✓	✓
9	Continuing professional development strategies	x	x	x	✓	x	✓	x	x	✓	✓	✓	✓	✓	✓
10	Equity and equality	x	x	x	✓	x	x	x	✓	✓	x	x	x	✓	✓
11	Impact and outcomes	x	x	x	✓	x	x	x	✓	✓	✓	x	✓	✓	✓
12	Pharmacy intelligence	x	x	x	✓	x	x	x	✓	✓	✓	✓	✓	✓	✓
13	Policy development	x	x	x	✓	x	x	x	✓	✓	✓	✓	✓	✓	✓

Key:

FIP DGs – FIP development goals; DO – Dominica; FJ – Fiji; StL – St Lucia; UG – Uganda; SL – Sierra Leone; KY – Kenya; SA – South Africa; UK – United Kingdom; CD – Canada; ML – Malaysia; NM – Namibia; SP – Singapore; AU – Australia; GH – Ghana
[1]Low income countries; [2]Lower middle income countries; [3]Upper middle income countries; [4]High income countries

Figure 1: Literature selection (adapted from the PRISMA schematic)

Identification

Records identified through database searching
(n= 452)

Additional records identified through other sources
(n=12)

Screening

Records after duplicates removed
(n=431)

Records screened for relevance
(n=431)

Records excluded: titles and abstracts not relevant
(n=242)

Eligibility

Full text articles assessed for eligibility (n=189)

Full text excluded (n=158):
- commentaries and editorials on pharmacy education = 36
- curriculum development articles = 31
- articles on other health professions education = 38
- related articles on the health workforce = 53

Included

Studies included
(n=31)

$\overline{x}$ = weighted average of development goals in each cluster

Figure 2: Number of countries (n=14) with national-level strategies aligned to the FIP Development Goals 1 to 13 (workforce components).

Appendix 1 Table A1: Literature search terms

Pharmacy	• Pharmacist • Pharmacy • Pharmacy Workforce		
Development	• Progression • Advancement • Improvement • Growth • Development		
Commonwealth Countries	• Antigua and Barbuda • Australia • Bahamas • Bangladesh • Barbados • Belize • Botswana • Brunei Darussalam • Cameroon • Canada • Cyprus • Dominica • Fiji • Gambia • Ghana • Grenada • Guyana • Singapore • Solomon Islands • South Africa • Sri Lanka • St Kitts and Nevis • St Vincent and The Grenadines	• India • Jamaica • Kenya • Kingdom of Eswatini • Kiribati • Lesotho • Malawi • Malaysia • Maldives • Malta • Mauritius • Mozambique • Namibia • Nauru • New Zealand • Nigeria • Pakistan • Papua New Guinea • Rwanda • Saint Lucia • Samoa • Seychelles • Sierra Leone	• Tonga • Trinidad and Tobago • Tuvalu • Uganda • United Kingdom • United Republic of Tanzania • Vanuatu • Zambia

Search strategy:

1. Antigua and Barbuda OR Australia OR Bahamas OR Bangladesh OR Barbados OR Belize OR Botswana OR Brunei Darussalam OR Cameroon OR Canada OR Cyprus OR Dominica OR Fiji OR Gambia OR Ghana OR Grenada OR Guyana OR Singapore OR Solomon Islands OR South Africa OR Sri Lanka OR St Kitts and Nevis OR St Vincent and The Grenadines OR India OR Jamaica OR Kenya OR Kingdom of Eswatini OR Kiribati OR Lesotho OR Malawi OR Malaysia OR Maldives OR Malta OR Mauritius OR Mozambique OR Namibia OR Nauru OR New Zealand OR Nigeria OR Pakistan OR Papua New Guinea OR Rwanda OR Saint Lucia OR Samoa OR Seychelles OR Sierra Leone OR Tonga OR Trinidad and Tobago OR Tuvalu OR Uganda OR United Kingdom OR Tanzania OR Vanuatu OR Zambia
2. Progression OR Advancement OR Improvement OR Growth OR Development
3. Pharmacist OR Pharmacy OR Pharmacy workforce
4. 1 AND 2 AND 3

Appendix 2 Table A2: The FIP development goals 1 to 13 and their descriptors

Which of the following Pharmaceutical Workforce Development Goals (PWDGs) are in alignment with *national-level* strategies/projects for research, development and/or evaluation in pharmaceutical education currently existing, under development or planned in your country or state?

Please tick all that apply and provide a brief explanation for each of the alignment levels between the PWDG(s) and all relevant pharmaceutical education strategies).
For a full description of the PWDGs, please access the document here.

Cluster	PWDG	PWDG general description. Countries/territories and member organisations should have:	Is this PWDG aligned with any, some or all of your *national-level* strategies/ projects?	If yes, please explain which strategy/project and how.
Academy Focus on the schools, universities and education providers	**1. Academic capacity**	Engagement with pharmaceutical higher education development policies and ready access to leaders in pharmaceutical science and clinical practice in order to support supply-side workforce development agendas.	☐	
	2. Foundation training and early career development	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.	☐	

36

	3. Quality assurance	Transparent, contemporary and innovative processes for the quality assurance of needs-based education and training systems.	☐	
Professional development — Focus on the pharmaceutical workforce	**4. Advanced and specialist expert development**	Education and training infrastructures in place for the recognised advancement of the pharmaceutical workforce as a basis for enhancing patient care and health system deliverables.	☐	
	5. Competency development	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.	☐	
	6. Leadership development	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.	☐	

37

	7. Service provision and workforce education and training	A patient-centred and integrated health services foundation for workforce development, relevant to social determinants of health and needs-based approaches to workforce development.	☐	
	8. Working with others in the health care team	Clearly identifiable elements of collaborative working and interprofessional education and training which should be a feature of all workforce development programmes and policies.	☐	
Systems Focus on policy development, governmental strategy and planning, and monitoring systems	**9. Continuing professional development strategies**	All professional development activity clearly linked with needs-based health policy initiatives and pharmaceutical career development pathways.	☐	
	10. Pharmaceutical workforce gender	Clear strategies for addressing gender and diversity inequalities in pharmaceutical workforce* development, continued education and training, and career progression opportunities.	☐	

	and diversity balances		
	11. Workforce impact and effect on health improvement	Evidence of the impact of the pharmaceutical workforce within health systems and health improvement.	☐	
	12. Workforce intelligence	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.	☐	
	13. Workforce policy formation	Clear and manageable strategies to implement comprehensive needs-based development of the pharmaceutical workforce from initial education and training through to advanced practice.	☐	

Appendix 2 Table A2: The FIP development goals 1 to 13 and their descriptors

Cluster	PWDG	PWDG general description. Countries/territories and member organisations should have:	Is this PWDG aligned with any, some or all of your *national-level* strategies/ projects? If yes, please explain which strategy/project and how.
Academy Focus on the schools, universities and education providers	**1. Academic capacity**	Engagement with pharmaceutical higher education development policies and ready access to leaders in pharmaceutical science and clinical practice in order to support supply-side workforce development agendas.	
	2. Foundation training and early career development	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.	
	3. Quality assurance	Transparent, contemporary and innovative processes for the quality assurance of needs-based education and training systems.	
Professional development Focus on the pharmaceutical workforce	**4. Advanced and specialist expert development**	Education and training infrastructures in place for the recognised advancement of the pharmaceutical workforce as a basis for enhancing patient care and health system deliverables.	

	5. Competency development	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.	
	6. Leadership development	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.	
	7. Service provision, workforce education and training	A patient-centred and integrated health services foundation for workforce development, relevant to social determinants of health and needs-based approaches to workforce development.	
	8. Working with others in the health care team	Clearly identifiable elements of collaborative working and interprofessional education and training which should be a feature of all workforce development programmes and policies.	

Systems — Focus on policy development, governmental strategy and planning, and monitoring systems	**9 | ⊖** CPD STRATEGIES **9. Continuing professional development strategies**	All professional development activity clearly linked with needs-based health policy initiatives and pharmaceutical career development pathways.	
	10 | ⊖ GENDER AND DIVERSITY BALANCES **10. Pharmaceutical workforce gender and diversity balances**	Clear strategies for addressing gender and diversity inequalities in pharmaceutical workforce* development, continued education and training, and career progression opportunities.	
	11 | ⊖ WORKFORCE IMPACT **11. Workforce impact and effect on health improvement**	Evidence of the impact of the pharmaceutical workforce within health systems and health improvement.	
	12 | ⊖ WORKFORCE INTELLIGENCE **12. Workforce intelligence**	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.	

		Clear and manageable strategies to implement comprehensive needs-based development of the pharmaceutical workforce from initial education and training through to advanced practice.	
	13. Workforce policy formation		

I can confirm the following contributions:

Author contributions

Ian Bates (IB): Conceptualisation, Methodology, Validation, Analysis, Visualisation, Writing – Review and editing, Supervision
Devang Patel (DP): Conceptualisation, Methodology, Validation, Analysis, Investigation, Data curation, Writing – Original Draft, Visualisation, Project administration
Amy Hai Yan **Chan (AC):** Conceptualisation, Methodology, Validation, Analysis
Victoria Rutter (VR): Conceptualisation, Methodology, Validation, Analysis
Lina Bader (LB): Conceptualisation, Methodology, Validation, Analysis, Investigation, Data curation, Supervision
Sherly Meilianti (SM): Review and editing
Arit Udoh (AU): Writing – Review and editing, Validation

Professor Ian Bates
6 May 2022