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Capacity strengthening through pre-migration tuberculosis screening programmes: Immigration and Refugee Health Working Group (IRHWG) experiences

Authors and affiliations:

Paul Douglas[1], Drew L. Posey[2], Dominik Zenner[3], John Robson[4], Ibrahim Abubakar[5], George Giovinazzo[6]

[1] Health Services and Policy Division, Department of Immigration and Border Protection, Sydney, Australia

[2] Division of Global Migration and Quarantine, Centers for Disease Control and Prevention, Atlanta, Georgia, USA

[3] Centre of Infectious Disease Surveillance and Control, Public Health England and Institute of Global Health University College, London, UK

[4] Service Design and Performance, Immigration New Zealand, Wellington, New Zealand

[5] Institute for Global Health, University College London, London, UK

[6] Immigration, Refugees and Citizenship Canada, Migration Health Branch, Ottawa, Ontario, Canada

Corresponding author:

Dr. Paul Douglas, Health Policy and Performance, Department of Immigration and Border Protection, GPO Box 9984 Sydney, NSW, Australia 2001. E-mail: paul.douglas@border.gov.au

The findings and conclusions in this report are those of the author(s) and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Abstract:

Effective tuberculosis (TB) prevention and care for migrants requires population health-based approaches that consider the relationship between migration and health as a progressive, interactive process influenced by many variables and addressed as far upstream in the process as possible. By including capacity building in source countries, pre-migration medical screening has the potential to become an integral component of public health promotion and infection and disease prevention in migrant-receiving nations while simultaneously increasing capabilities in countries of origin.

This article describes the collaborative experiences of five countries, (Australia, Canada, New Zealand, United Kingdom, and United States of America, members of the Immigration and Refugee Health Working Group [IRHWG]), with similar pre-migration screening programmes for TB that are mandated. Qualitative examples of capacity building through IRHWG programs are provided. Combined, the IRHWG member countries screen approximately 2 million persons overseas yearly. Large-scale pre-entry screening programmes undertaken by IRHWG countries require building additional capacity for healthcare providers, radiology facilities, and laboratories. This has resulted in significant improvements in laboratory and treatment capacity, providing availability of these facilities for national public health programmes.

As long as global health disparities and disease prevalence differentials exist, national public health programmes and policies in migrant-receiving nations will continue to be challenged to manage diseases prevalent in these migrating populations. National tuberculosis programmes and regulatory systems alone will be unable to achieve TB elimination. The management of health issues resulting from population mobility will require an integration of national and global health initiatives, which, as demonstrated here, can be supported through capacity-building endeavours of pre-migration screening programmes.

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Introduction

The Immigration and Refugee Health Working Group (IRHWG) is a partnership of member states that gathers government officials from Australia, Canada, New Zealand (NZ), the United Kingdom (UK) and the United States of America (USA) on a regular basis for information exchange, agreement, and cooperation, with the common goal of optimising international best practices for screening and treatment of prospective migrants and effective management of communicable health risks, and the overriding priority of protecting public health. The group is not a legally constituted body, but rather a consultative forum that seeks to enhance the health security of migrants and receiving countries, the health services provided to migrants, and tuberculosis (TB) prevention and care globally. The purpose of this manuscript is to describe the screening programmes, provide qualitative examples of capacity building that have occurred through these requirements, and highlight how this capacity can be used to benefit broader management efforts.

All five countries have pre-migration screening programmes for TB that are mandated through legislation. These programmes have been in place in some countries for many years: Australia and NZ from 1901 and 1899, respectively, and Canada since 1869.[1] In the UK, pre-migration screening replaced port-of-entry screening in 2014, following a successful pilot in 15 high-incidence TB countries.[2,3]

These pre-migration TB screening programmes are administered by various agencies within the different IRHWG countries and include the Department of Immigration and Border Protection (DIBP) in Australia; Immigration, Refugees and Citizenship Canada (IRCC); Immigration New Zealand (INZ); UK Home Office and Public Health England; and, in the USA, the Centers for Disease Control and Prevention (CDC). The purpose of these programmes is similar: to prevent importation of certain communicable diseases. All five countries screen for infectious TB (George Giovinazzo, personal communication).[4-8] Australia and the USA also have a requirement to screen for latent *Mycobacterium tuberculosis* infection (LTBI) in which children (2-11 years of age [Australia] or 2-14 years of age [USA]) receive a tuberculin skin test (TST) or interferon gamma release assay (IGRA) if they are examined in a country with an elevated rate of tuberculosis (≥40 per 100,000 for Australia, ≥20 per 100,000 for USA); treatment for LTBI is provided after arrival to the receiving country. For Australia, Canada, and New Zealand, there is also a legislative requirement to avoid excessive health system costs.

Together, the IRHWG partners screen approximately 2 million immigrants (applicants for permanent entry), refugees, and long-term visitors (individuals planning temporary stays for ≥6 months such as international workers and international students) overseas prior to travel annually. While the source countries vary among the five partners, the dominant caseloads come from Asia, with India, China, Philippines, and Vietnam frequently in the top five.[9-11] These countries are all classified by the World Health Organization (WHO) as high-burden countries for TB.[12]

Administration of pre-migration health assessment programmes

Examinations of applicants bound for the five countries are performed through similar and consistent processes by "panel physicians," licensed physicians in the countries of origin that have agreements with the government departments of the country of destination to undertake this activity. These agreements may be formal and written (United States), letter only (Australia, Canada, and NZ), or a contract (UK, for whom the physicians are also listed in legislation).

Panel clinics, often shared between these partner countries, are numerous, with more than 800 sites in over 170 countries. Four of the five countries provides to panel physicians its individual Technical Instructions, which stipulate how the examination should be performed,[13-16] Canada requires its panel physicians to adopt standards set by the National Tuberculosis Programs within each country augmented with WHO tuberculosis treatment recommendations and latest Canadian standards (George Giovinazzo, personal communication). Historically, each country undertakes monitoring and oversight activities of its networks and provides specific education and training of panel physicians. More recently, collaborative efforts by the five countries, through shared expertise, have developed a non-binding set of common specifications providing a standard approach to screening and management of TB for panel physicians[17].

Not all migrants are screened for TB. Policies vary among the different countries, balancing the need to protect public health and the practicalities of screening all people considered to have a high TB risk. Other considerations in developing screening policies include the length and purpose of the visit and concerns that the cost of screening may act as a barrier to those seeking entry.

Australia, Canada, New Zealand, and the United States screen all refugees relocating to their countries and all permanent migrants irrespective of TB incidence in the country of origin. Australia, Canada, and NZ also undertake pre-migration screening for those coming for temporary stays of 6 months or longer from countries with a WHO-estimated TB incidence of greater than 40 per 100,000. The UK screens all refugees relocating to its country, all permanent migrants, and those coming for temporary stays of 6 months or longer from countries with a WHO-estimated TB incidence[12] of greater than 40 per 100,000 (Table 1).

All five countries now have tuberculosis screening requirements that include a culture-based algorithm for TB disease screening. If applicants have symptoms or signs of TB, or if the chest X-ray has indications consistent with TB disease, the Technical Instructions require mycobacterial cultures and drug-susceptibility testing.[13-17] In addition, for some of the destination countries that mandate treatment, these cases are required to be treated according to American Thoracic Society (ATS) / CDC / Infectious Diseases Society of America (IDSA) treatment guidelines,[13,18] with all doses of treatment delivered as directly observed therapy (DOT) while others require treatment according to in-country, WHO, or their respective IRHWG country's standards (Canada, unpublished requirements).[14-17]

Effectiveness of pre-migration screening in reducing imported TB cases

The diagnostic rates among countries vary. This is assumed to be due to different cohorts migrating, although further research is required to verify. However, all identify large numbers of cases of TB disease through the pre-migration screening process, preventing diagnoses of TB disease after arrival and assisting in TB prevention and care.[19-24] For the USA in 2014, U.S. panel physicians conducted examinations for 631,100 migrants. Of these, 1,450 were diagnosed with TB (rate 230 per 100,000), 1,135 had positive cultures, and 802 of those with positive cultures had negative sputum smears (unpublished CDC data). In 2014, the yield for the UK was 159 per 100,000 (unpublished UK data) while Australia screened 530,801 migrants and diagnosed TB at a rate of 80 per 100,000 (unpublished Australia data). Canada estimates their rate of detection was 194 per 100,000 while New Zealand estimates panel physicians performed 120,000 examinations (Table 1).

The effectiveness has also been demonstrated with respect to detection of drug-resistant TB, which would not be detected in the absence of rigorous screening programmes relying on culture and drug susceptibility testing. Through the U.S. screening program in 2014, 44 migrants were diagnosed with multidrug-resistant tuberculosis (MDR TB) and one was diagnosed with extensively drug-resistant tuberculosis (XDR TB; CDC, unpublished data, Table 1). Similarly, the UK screening programme also detected a number of drug-resistant cases; between 2007 and 2015, about 1.7% of TB isolates were MDR, 3.4% were polyresistant to first-line drugs, and about 8.6% isoniazid-monoresistant.[22]

For the USA, from 2007-2013, CDC implemented new Technical Instructions requiring cultures and DOT; these requirements remain in place.[13] This resulted in additional cases of TB being diagnosed overseas and coincided with reductions in U.S. TB cases diagnosed within the first year after arrival.[19-20] The gains in overseas diagnoses coincided with an almost equivalent drop in domestic TB cases diagnosed in migrants within 1 year of arrival to the United States.[20] In the UK, the number of prevalent pulmonary TB cases (notified in the UK within 1 year of entry) has decreased dramatically with increasing detection rates overseas.[10,22] In Australia, previous research estimates have suggested that, without pre-migration screening in place, the incidence rate in Australia would be more than 30% higher than it currently is.[21] In Canada, in 2014, the number of active pulmonary TB cases detected in migration screening was more than 570. If these clients had entered Canada without being screened, this would have led to at least a 40% increase in the number of active pulmonary TB cases in Canada (published and unpublished data, PHAC and IRCC). The effectiveness of these pre-migration screening programmes was significantly enhanced through the capacity building endeavours outlined below.

Capacity Building

To deliver large-scale pre-entry screening programmes requires building additional capacity for panel clinics, radiology facilities, and laboratories. Accomplishing this comes via three specific processes, dependent on current infrastructure or capacity in countries of origin. The first was the implementation and strengthening of pre-migration programmes by building on existing infrastructure. The second was to leverage specifically targeted priorities to develop programmes in countries of origin as part of a broader aid strategy or to deliver completely new infrastructure to support the sustainability of the screening programs. The third was to build partnerships in-country and engage in strengthening national TB programmes.

These capacity-building approaches have resulted in numerous improvements in laboratory (Figure 1) and treatment capabilities, especially since many countries lacked adequate mycobacterial culture capacity; drug-susceptibility testing (DST) capacity, either by molecular or phenotypic testing; drug availability; or DOT infrastructure. The availability of these laboratory and treatment facilities for national programmes and broader engagement with private sector providers has substantially increased the capacity for TB management in many countries.

Increases in laboratory capacity

As outlined in Table 2, new laboratories with TB (liquid) culture capacity have been developed in many countries and laboratories in several countries were greatly expanded. In addition to cultures, many are also performing first-line DST and some are performing second-line DST. Many laboratories also now have access to molecular tests, including Hain Lifescience's GenoType® MTBDR *plus* assay and Cepheid Xpert® MTB/RIF assay.

Greater individualised treatment and DOT

TB treatment for pre-entry screening is carried out in the countries of origin and all countries with designated screening sites must have at least one location that provides treatment according to international standards in which every dose is delivered as DOT. For TB cases that

may be more difficult to treat, panel physicians for the USA and Australia have access to clinical experts within the destination countries. Access to external TB experts increases the level of knowledge for physicians managing TB cases in the sender countries.

Training and education of panel site personnel

All receiving countries help train panel clinics' medical and administration staff on TB, and contribute to an annual panel physicians' training summit carried out in collaboration with the International Panel Physicians Association (IPPA), a non-governmental organization serving as a professional association for panel physicians. Beginning in 2013, these summits have had approximately 300 panel physician and staff and consular staff attendees yearly. In addition to learning from each of the IRHWG countries, panel physicians and their staff learn from international TB experts through lectures and interactive workshops. IRHWG is further supporting e-learning training activities, including webinars conducted by CDC since 2010 and a joint IRWHG webinar on radiology in 2013. In addition, CDC and DIBP have been carrying out smaller regional training events since 2008 and 2010, respectively, which are each attended by 30-50 panel physicians.

As well as direct teaching activities, capacity building also occurs through broader processes such as provision of tools for patient education (e.g., CDC posters on sputum collection, radiography books for staff education); assistance in development of local operating procedures (especially for sputum collection); or, more directly, through quality assurance visits by IRHWG staff to approximately 50-60 countries per year or through IPPA peer-to-peer site visits, at which panel physicians and staff receive lessons specific to their local environment and network with other panel physician colleagues. As a group, the IRHWG countries conduct site visits each year to large and small volume panel sites in the Americas, Europe, Middle East, Africa, and Asia. Since 2014, IPPA has been conducting peer-to-peer site visits to three countries per year that IRWHG was not able to visit.

Linkages between screening programs and in-country TB providers

In addition to developing laboratory and treatment infrastructure, a key element specifically of the CDC's programme is to build linkages between the screening programmes and in-country TB providers. Through these linkages, panel physicians have relationships with other in-country TB providers such that progammes for IRHWG-bound populations would also benefit in-country management efforts. Australia and New Zealand have more recently targeted similar, jointly managed strategies within the South Pacific region. While IRWHG lacks data on the number of specimens or number of non-migrating persons that receive treatment through a panel physician-local institution linkage, there is a large breadth of examples of these types of linkages.

U.S. panel physicians have achieved some notable partnership agreements. In the Americas, Consultorios de Visa (CDV), a panel site in the Dominican Republic, established a public-private partnership with the National Tuberculosis Program (NTP) in which CDV provides training to NTP staff on radiology interpretation and mentorship for NTP efforts in two prisons. Moreover, the laboratory used by CDV, Laboratorio Referencia, provides training to NTP staff as well. In Mexico, two panel physician sites in Ciudad Juarez, Clinica Medica Internacional and Servicios

Medicos de la Frontera, collaborate on a laboratory that also performs sputum testing for other TB programmes serving the binational population along the U.S.-Mexico border. Laboratories supporting IRHWG programs in Chengdu and Shenyang, China, also perform testing for the community.

In Africa, the International Organization for Migration (IOM), which serves as the screening provider for the majority of refugees resettled by IRHWG countries, has collaborated with the Kenya NTP through establishment of a DOT site in Eastleigh, a neighbourhood in Nairobi, and the IOM laboratory in Nairobi also processes specimens for the NTP. This IOM laboratory is a key service provider assisting the Nigerian NTP in Abuja by providing second-line DST for cases identified as rifampicin-resistant in the NTP laboratory by Xpert MTB/RIF, as well as the principal laboratory supporting the diagnosis and treatment of MDR TB cases in refugees that migrated from Somalia to the Dadaab refugee camp.[25] IOM has also worked to provide assistance with sputum smear testing in South Sudan. In addition to its work in Africa, IOM has been identified as lead coordinator to assist national TB programmes in rolling out screening programmes for migrant and refugee groups in Lebanon and Jordan.

Within Asia, for several years, IRHWG countries have been receiving Bhutanese refugees located in several camps in the eastern part of Nepal where the NTP has limited infrastructure. In order to ensure appropriate diagnosis and treatment of TB among the resettling population, USA and Canada provided funding for IOM to partner with the Association of Medical Doctors, a non-governmental organisation in the region, to provide access to cultures, DST, and DOT for the camp population.

New Zealand and Australia have targeted the current TB 'hot spots' within the South Pacific and Southeast Asian regions, principally through aid programmes. One example from INZ in the South Pacific is in Vanuatu, where TB diagnosis and screening have been strengthened. Additionally, introduction of electronic reporting of chest X-rays by radiologists elsewhere in the region has resulted in building knowledge and capacity in local clinicians who have not had access to this expertise in the past.

Discussion

This analysis helps demonstrate that, because the number of panel physician is large in many high-TB-incidence source countries, IRHWG countries are uniquely positioned to have their investments in screening programmes also contribute to local prevention and treatment efforts through development of relationships with TB controllers, sharing laboratory capacity, and co-managing TB cases where DOT capacity is scarce.[11] This means that a strategy to develop infrastructure in IRHWG screening programmes also has the potential to have an impact domestically for each IRHWG country, as well as contribute to global TB efforts.[26] Because many of these examples are in countries with both a high TB incidence and low levels of TB infrastructure, as we have demonstrated, this collaborative effort has catalysed laboratory and treatment infrastructure or training and education activities that may not have otherwise been possible. Programme efficiency and effectiveness could be further enhanced for IRHWG through pooling resources such as laboratory, radiology, and examining physicians. The high standards of radiological and laboratory diagnosis required by screening countries are often in short supply in high-incidence regions. More robust TB services in high-TB-incidence regions

support TB prevention in migrants from those areas and in future host countries. Based on the evidence, it is recommended that panel physicians build relationships with the NTPs in their countries and to explore opportunities to collaborate to improve TB diagnosis and treatment in source populations.

For migrant health, in a connected global environment, borders are no longer an "edge" but a "continuum" that begins at host country and continues to after arrival in the destination country, with a series of partners and agencies within both countries of destination and origin working collaboratively, including TB screening programmes. Preventing importation of TB into low-TB-incidence countries requires an "enlightened self-interest approach" of capacity building in countries of origin.[27] Requiring rigorous overseas TB screening programmes for migration and refugee resettlement results in development of laboratory and treatment capacity.[21]

In recent decades, the number of international migrants has increased and is estimated at 244 million globally, about one in every 30 of the world's inhabitants.[28] While most of these migrate within their world region, a substantial number come to low-TB-incidence countries. Addressing TB in migrating populations is key for global TB elimination efforts under the WHO's post-2015 End TB global strategy.[29] Migrant populations face a spectrum of determinants that make them particularly vulnerable to disease, and migration itself is a social determinant of health that may increase TB-related morbidity and mortality among mobile populations.[30]

International migration, a social phenomenon caused by a variety of push and pull factors, including poverty, conflict, and, in some countries, an increasingly ageing workforce, influences the health of individuals and populations.[31-33] These migrant networks, no longer a one-way trajectory, increase ties between global and local communities,[31,33] where migration acts as a bridge across borders for people with different health profiles that inevitably have an effect on disease rates, healthcare access, and health-seeking behaviours in receiving countries.[31-35]

In lower-TB-incidence receiving countries, the health of migrants contributes to the epidemiology of TB through the importation, potential transmission, and progression of disease. International migration reduces the effects of distance and results in rapid links that have implications for preventive care.[36] This concept of transnational neighbourhoods with frequent border crossings that span hundreds or thousands of kilometres is, therefore, more important in planning TB prevention and care than the historical nature of dealing with this at a national level as if there is only a single border crossing point.[36,37]

The primary focus of panel physicians is to conduct medical examinations and comply with the requirements of the IRHWG countries. In doing so, there is a risk the physicians could operate somewhat independently of the healthcare systems of their countries. If this were to occur, the increases in TB capacity would only benefit the populations that are leaving the country. While that is still a benefit, IRHWG countries identify that with the changing patterns of migration, there is significant benefit in also preventing and treating TB more broadly in countries of origin and is committed to encouraging the panel physicians to engage with their ministries of health, national TB programmes, and other TB providers to build relationships, share epidemiologic

data, share expertise, and allow capacity built for migrant screening programmes to benefit more than IRHWG-bound populations.

Effectiveness in addressing TB among migrants requires health-based population approaches that consider the relationship between migration and health as a progressive, interactive process influenced by temporal and local variables[37] and as far upstream in the process as possible. For receiving countries, the primary intent of screening pre-migration is to achieve this "protection" as early in the process as possible, with linkage to local treatment and surveillance programmes. This creates the potential to assist the individual, as well as the country of origin, through partnerships and infrastructure that address these health needs.

This response can be described as "global public health good," defined as an intervention and service whose benefits cross borders and profit source communities.[38] The capacity-building endeavours described above that increase services at origin for all, as well as facilitating integration into the health systems at the destination are examples of global public health benefit. Pre-migration screening, in this context, has the potential to become an integral component of public health promotion and disease prevention in migrant-receiving countries,[23,35,37] while simultaneously delivering capability in country of origin.

It has been reported that migrants screened for TB disease before entry pose a negligible risk in terms of onward transmission within their receiving country,[23,32] while their individual risk remains increased. It has also been noted that policies to protect the health of migrants as well as public health will be most effective if they address the continuum of the migratory process, including pre-departure, travel, arrival at destination, and return, with health intervention opportunities existing at each stage.[31]

Addressing the pre-migration phase, TB screening programmes from Australia, Canada, NZ, USA, and the UK consistently show the effectiveness of early diagnosis and TB management in migrants.[20,39-42] These collaborative efforts have the potential to yield sizeable gains in TB mitigation for migrant- and refugee-receiving countries[11] and, through the capacity and linkages developed overseas, also provide sizeable contributions to source country TB programs.

Decades of implementation of passive case finding for TB has demonstrated the limitations of comprehensive and early detection of TB when making significant improvements in TB outcomes. Implementation of WHO strategies on TB screening released in 2013[43] can substantially reduce TB in countries of high incidence, but due to insufficient funding, global implementation is far from complete. Many countries have poor infrastructure, inadequate or outdated equipment with poor biosafety measures, and scarce of human and financial resources, leading to delays in diagnosis and treatment.[44,45] Support to these programmes has many challenges and requires investment in leadership development.[32] Systematic screening for active TB has the potential to help address these limitations,[37] and screening migrants in this respect plays a crucial role including capacity building.

Evidence suggests that domestic returns and more cost-effective outcomes could be obtained through interventions focused on disease-containment efforts in source nations, alongside pre-entry screening programmes.[27] This broader view would enhance global collaboration efforts to eliminate tuberculosis.[41]

The long-term goal in decreasing migration-related introduction of TB from high- to low-incidence countries means diminishing the prevalence of the disease in those high-incidence source locations.[11] As argued, overseas TB screening programmes for migration and refugee resettlement contribute to this through development of laboratory and treatment capacity.

The global TB epidemic can be improved by taking advantage of the motivation that drives more than one billion mobile individuals to seek a better future in today's world by utilizing pre-migration screening to prevent infectious tuberculosis from crossing borders and using screening programs as investments in sender countries[46]. Therefore, while individual country efforts in managing TB screening programmes are invaluable for reducing importation of TB, they should also be leveraged to assist with efforts within source countries.[47] Improved linkages between panel physician activities and national TB programmes within their countries benefit migrants and others in their source populations.

Concluding remarks

Health policy-making, in the context of migration, has generally been viewed either in terms of its "threats" to public health or from a rights-based approach that focuses on health hazards faced by individual migrants and the associated service challenges.[31,48] The convergence of more rigorous international protocols and growing capacity among panel physicians presents a unique opportunity to contribute to meeting elimination targets. Enhanced, synergised screening protocols across IRHWG countries enables panel physicians to meet public health standards of receiving countries while maximising programme effectiveness through capacity building and delivering the highest standards of care in the host countries. This requires all participants and stakeholders to play a proactive, strategic, and systematic role in order to link the management of TB to broader capacity-building needs.

The net result is an ongoing globalisation of health influences and indicators currently relevant at both national and global levels. As long as global health disparities and prevalence differentials exist, national health programmes and policies in migrant-receiving nations will continue to be challenged to manage diseases prevalent in these migrating populations. To be effective, the management of health issues resulting from population mobility will require an integration of national and global health initiatives, which as demonstrated here, can be supported through capacity-building endeavours of pre-migration screening programmes.

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Table 1. Pre-migration screening programs of the countries of the Immigration and Refugee Health Working Group (IRHWG)* and tuberculosis screening results for 2014.

Country	Population Screened Overseas†	Minimum TB Rate (per 100,000) for Countries Subject to Screening	Number of Examinations§	Number of TB Cases	TB Rate per 100,000 Screened
Australia	Long-term visitors‡	Any**	530,801	425	80
Canada	Long-term visitors‡	Any**	304,314	593	194
New Zealand	Long-term visitors‡	Any**	est 120,000	est 50	41
United Kingdom	Long-term visitors‡	40	233,351	369	159
United States	Immigrants and refugees§	Any	631,100	1,450	230

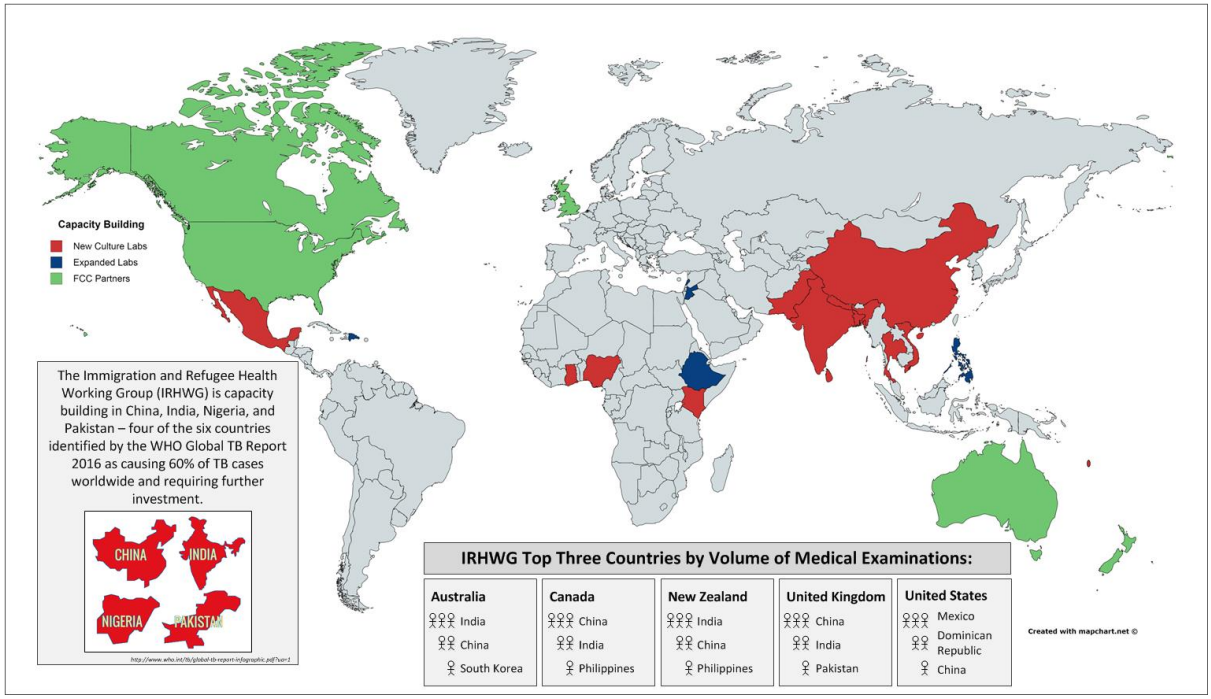
* Australia, Canada, New Zealand, United Kingdom, and United States
† Does not include persons who apply for immigration domestically
‡ Permanent immigrants, refugees, and temporary workers and students that will be in the country for ≥6 months
§ Number of examinations instead of number of individual persons screened since some may have more than one exam if they do not travel before examination expires.
** Any rate for permanent immigrants and refugees; 40 per 100,000 for temporary workers and students that will be in the country for ≥6 months.

Table 2. Capacity building through pre-migration tuberculosis (TB) screening for the countries of the Immigrant and Refugee Health Working Group (IRHWG)*.

Type of Capacity Building	Countries
New culture laboratories since 2007	Bangladesh, China, Ghana, India, Kenya, Mexico, Nepal, Nigeria, Pakistan, Sri Lanka, Thailand, Vanuatu, Vietnam, Philippines
Second-line DST† developed since 2007	China, Kenya, Nepal, Thailand, Vietnam, Nigeria
Specimen testing, training, or treatment for local TB institutions	China, Kenya, Mexico, Nigeria, South Sudan
Public-private partnerships (panel physicians providing training and education for local TB providers or assisting with importing second-line drugs)	Dominican Republic, Ethiopia, Vietnam
Engagement with global TB community –IOM Awards from Stop TB Partnership's TB REACH	Ethiopia, Thailand
Leveraging refugee programs for broader refugee source population efforts	Nepal, Kenya

* Australia, Canada, New Zealand, United Kingdom, and United States.
† Drug susceptibility testing.

Figure 1. Expanded and new laboratory capability developed through pre-migration tuberculosis screening for the countries of the Immigration and Refugee Health Working Group (IRHWG)*



* Australia, Canada, New Zealand, United Kingdom, and United States.
† World Health Organization.

Figure 2. Best practice examples of linkages between panel physicians conducting medical examinations for countries in the Immigration and Refugee Health Working Group* and in-country tuberculosis programs

Public-private partnership

Consultorios de Visa, a panel physician site in Santo Domingo, Dominican Republic, has a public-private partnership with the Dominican Republic National Tuberculosis (TB) Program (NTP). Through this partnership, the NTP provides treatment to applicants diagnosed with TB disease, while Consultorios de Visa provides training to NTP staff on digital radiology, TST, and IGRA.

Laboratory services

Among the laboratories that support these programs, some also support in-country tuberculosis programs. In Kenya, the International Organization for Migration (IOM) has developed a fully equipped, large TB laboratory service. Good collaborative relationships have been developed with the NTP in Kenya, leading the NTP to be able to also benefit from this laboratory service. Similarly, a recently developed IOM TB laboratory service in Abuja, Nigeria, is able to support the Nigerian NTP through drug-sensitivity testing for samples identified as rifampicin-resistant through the Cepheid Xpert® MTB/RIF assay. Laboratorios Medicos Especializados (LME), a laboratory in Cuidad Juarez, Mexico, performs testing for the immigrants and also for a local non-governmental organization that provides treatment to TB cases along the U.S.-Mexico border.

Treatment

In Eastleigh, Nairobi (Kenya), IOM and the Kenyan NTP collaborated to establish a new site for DOT, and IOM also acts as principle provider to manage MDR TB cases that migrated from Somalia to the Dadaab refugee camp.

* Australia, Canada, New Zealand, United Kingdom, and United States.