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## **Migrants in a globalized world — health threats, risks and challenges: an evidence-based framework**

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## **Migrants in a globalized world – health threats, risks and challenges: an evidence-based framework**

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**Abstract:** International population mobility is an underlying factor in the emergence of public health threats and risks that must be managed globally. These risks are often related but not limited to transmissible pathogens. Mobile populations can link zones of disease emergence to low-prevalence or non-endemic areas through rapid or high-volume international movements, or both. Against this background of human movement, other global processes such as economics, trade, transportation, environment and climate change, and civil security influence the health impacts of disease emergence. Concurrently, global information systems, together with regulatory frameworks for disease surveillance and reporting, affect organizational and public awareness of events of potential public health significance. International regulations directed at disease mitigation and control have not kept pace with the growing challenges associated with the volume, speed, diversity, and disparity of modern patterns of human movement.

The thesis that human population mobility is itself a major determinant of global public health is supported in this article by review of the published literature from the perspective of determinants of health (genetics/biology, behaviour, environment, and socio-economics); population-based disease prevalence differences, existing national and international health policies and regulations, and inter-regional shifts in population demographics and health outcomes. The paper highlights some of the emerging threats and risks to public health, identifies gaps in existing frameworks to manage health issues associated with migration and suggests changes in approach to population mobility, globalization, and public health. The proposed integrated approach includes a broad spectrum of stakeholders from individual health care providers to policy makers and international organizations that are primarily involved in global health management, or are influenced by global health events.

**Key Words:** migrants, population mobility, globalization, public health, threats, risks, determinants of health

## **Introduction**

Several current emerging threats and risks exposing public health vulnerabilities are linked to global processes such as economics, trade, transportation, environment and climate change, and civil security. Many of these processes are influenced or affected by the migration and mobility of human populations. [1,2]. International migration, which is a supporting component as well as a consequence of globalization, increasingly affects health in migrant source, transit, and recipient nations [3]. The flow of populations between locations with widely different health determinants and outcomes creates situations where locally defined public health threats and risks, assume international or global relevance. This is illustrated by the rapid awareness, detection, and response to the emergence of a novel influenza A/H1N1 virus in the spring of 2009 [4,5]. Global demographic predictions indicate that the forces promoting and supporting international migration will continue to do so, and may become stronger in all regions of the world as populations attempt to move up gradients of opportunity (e.g., economic, educational, security, health) [6].

The diversity\* and nature of modern mobility and migration frequently exceed the capacities of and thereby challenge existing policies and programs designed to address migration and health. The goals of this paper are to promote a change in thinking and approach to global health issues that reflects emerging evidence and the importance of population-based factors as opposed to disease or pathogen-based regulatory frameworks that have been traditionally used. This approach

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\* “Diversity” describes the dissimilarities between host and migrant populations relevant to the determinants of health (genetics and biology, environment, behaviour, and socio-economics): “disparity” reflects the burden of inequalities at both individual and societal levels which impact on the determinants of health.

focuses on factors of human population mobility and shifting demographics that impact on health determinants and disease outcomes.

Attention in the public health community is traditionally drawn towards the potential and real impacts of infectious diseases associated with migration [7]. Common examples observed in nations that receive migrant populations include tuberculosis [8,9,10,11] and hepatitis B [12,13,14]. However, sustained migration between disparate health environments also affects the longer-term epidemiology of chronic noninfectious diseases: this has downstream impacts on health promotion, health services for disease prevention and management, and occupational health outcomes at migrant destinations. As a result of those impacts, migration has increasing influence on public health policy [15], education of health service providers [16], health system design and service delivery [17]. Examples of those influences include the need to regulate or manage the use of alternative medicines and pharmaceuticals imported by migrants, or the introduction of alternative medical procedures [18,19, 20].

In terms of public health, migration has implications for recognition of threats, and for surveillance and response capacity [21]. Migration also influences broader aspects of the “health of the public”, including the background burden of chronic or latent diseases (infectious and non-infectious), and patterns of pre-existing immunity; it also influences the use and uptake of disease prevention and health promotion interventions, and health care service utilization in general [22,23]. Ensuring that necessary information is both available and understood by diverse communities is an increasingly important aspect of public health planning and preparedness [24,25,26] in nations with large mobile populations. This was recently demonstrated by the

responses to the threat of influenza A/H1N1 importation which included quarantine, isolation or preventive interventions [27,28,29].

Traditional regulatory approaches to public health risks in the context of migration are commonly disease oriented [30] or event based [31]. Frequently those concepts assume or are based on the view that a degree of homogeneity or similarity characterizes migrant populations; they also relate to the administrative or legal status of the population. This article posits that many of the important public health aspects of migration originate from or are based on the diversity and disparity of the populations themselves and extend beyond the legal and temporal processes of changing one's residence. Addressing migration-associated health threats and risks will be more effectively accomplished if approached from this population-based framework, rather than traditional disease-based or immigration status-based views. It is proposed that the development of standardized, programmatic approaches to health and migration that are based on collective international evidence would be an effective strategic and operational approach to global health.

Failure or further delays in addressing emerging health issues associated with migration and population mobility will continue to impair the effectiveness of policies and programs designed to tackle modern global health challenges [32,33].

**Methods:** The peer-reviewed literature was accessed through electronic searchable sites (PubMed, ProMED, and others) using standard search strategies for literature related to: migrants, mobile populations and specific disease outcomes. In addition, publicly available reports from international and national organizations and agencies were accessed for information on migrants, mobile populations and health. Organizations and agencies included: The World Health Organization, International

Organization for Migration, International Labour Organization, other United Nations agencies; World Bank; Centers for Disease Control and Prevention (Atlanta, USA), European Centres for Disease Prevention and Control, The Health Protection Agency (UK), and others. In all literature or reports, population demographics, source country, reporting region, and health outcome measurements were sought. As the study involved no contact with patients or individuals or personal medical information, research ethics approval was not sought.

### **Human population mobility**

Several factors associated with human population mobility make it a significant determinant of future health threats and risks for all regions of the world. These are: the number of people on the move; and the diversity and disparity of population characteristics between source, transit and recipient destinations. Together, these factors create a significant influence on the globalization of disease threats and risks. A third factor that continues to challenge objective measurement of health outcomes in migrants is the lack of standardization in terminology that applies to mobile populations. Doing so would allow correlation and differentiation of populations based on health-risk characteristics rather than administrative categories.

### *The Demographics of Modern Migration*

Part of the growth in migration is simply due to the increase in human population [the rate of growth is no longer rising]. The global population in 1950 was estimated at approximately 2.6 billion people. The global population estimate for 2008 is 6.7 billion [34]. In 1960, it was estimated that there were 76 million international migrants [35]. Current estimates of international migrants place their numbers at nearly 200 million.

If this population were considered a national population, international migrants would be the world's fifth largest nation.

A 2006 report from the United Nations [36] showed that: 75% of all migrants resided in 30 nations; migrants constitute at least 20% of the total population of 41 nations; 60% of international migrants live in high-income economies; 30% of migrants have moved from a low-to-middle income country to a similarly economically designated nation; and 30% of migrants have moved from a low-to-middle income nation to a high-income nation ("South-to-South" migrants are about as numerous as "South-to-North" migrants). Of the nearly 200 million international migrants reported by the UN in 2005, about 20% arrived in the USA alone. These trends can be associated with profound demographic impacts on migrant source and destination countries.

These global population figures, while important in their magnitude, also reflect significant differences in the demographic and health determinants of the migrants themselves. There are millions of migrant workers who leave families behind to be supported by their financial remittances. The migrant worker population is increasingly comprised of women, particularly within Asia. These population figures also contain refugees and internally displaced populations who are seeking safe haven and security after fleeing conflict and disaster (see Table 1: Global Estimates of Migrant Populations).

Additionally, there are those populations for whom the numbers and statistics are less definitive. This refers to population movements of migrants without legal permission or authority to migrate, who enter and reside unofficially in a host country.

The clandestine nature of these unauthorized migrant<sup>1</sup> flows, including smuggling and trafficking, makes the determination of their numbers difficult and estimates inexact. The quality of the data for unauthorized migrants decreases as the migration process becomes less formally organized.

#### *Non-Standardized Use of Terminology Describing Migrants*

A major challenge in assessing the health impacts of migration has been the lack of agreed definitions and consistency in the use of terminology to describe migrant populations over time. Some migratory movements may involve international travel across formal boundaries while others, such as rural-urban [37] migration and the internal displacement of populations through conflict or disaster may remain internal national processes [38]. Each of the processes and movements can be associated with several descriptive or definitive terms that can vary over time, use, location, and legal or administrative standards. The terminology used to describe a group of migrants in one location; immigrants for example, may refer to a different migrant group in another setting. In some settings, the term “immigrant” refers only to those accepted as residents in the destination country and granted legal status to remain. In other jurisdictions, “immigrant” may be used to refer to any foreign national including those without formal legal status.

Although many health risks are associated with movement between locations with different health determinants and outcomes, many definitions of migrant populations currently are based on administrative measures such as the duration of stay. The

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<sup>1</sup> “Unauthorized migrant” is emerging as the preferred terminology for international migrants who arrive without the necessary approvals, permissions or documents (e.g., identification, citizenship cards, visas, passports, and other travel documents). Irregular migrants, undocumented migrants, and those who are smuggled or trafficked outside of their own country are included in this terminology.

UN distinguishes migrants according to duration of stay, classifying them into long-term migrants (residence in a country other than the usual place of residence for more than 12 months) and short-term migrants (a period of residence of more than 3 months but less than one year). This definition does not apply to those people travelling for business, to visit friends or relatives, to seek medical treatment, or to undertake pilgrimage [39]. This variability in the use of terminology and lack of direct descriptions related to health creates challenges in the analysis and interpretation of health outcomes associated with migration. International organizations and agencies are attempting to standardize the terminology of migration but these activities are largely based on administrative and residency principles and may not adequately reflect the health characteristics and determinants of the person or population [40].

Furthermore, many modern migration flows are temporary or reciprocal, reflecting the global integration of economic, educational, and labour markets. Such movements include populations described as temporary and seasonal workers, international students, or medical tourists, as well as the growing numbers of those with dual or multiple citizenship and right of residence. These populations, while experiencing and reflecting the health and public health influences of migration, are not systematically captured in traditional national or international immigration statistics. It has been proposed that the health aspects of migration can be better addressed through a standardized, population health-based functional approach rather than the administrative consideration of the processes of modern migration (see Table 2 - modified from reference [41]).

## **Emerging Health Threats, Risks, and Challenges Resulting from Migration**

Identifying threats related to migrant populations has been driven by historical outbreaks of transmissible infectious diseases of public health significance, such as plague and cholera. As seen in recent years with severe acute respiratory syndrome (SARS, 2003) and the 2009 influenza A/H1N1 pandemic, many national responses with regard to migrant populations tend to be traditional: based on the principles of border inspection, isolation or quarantine, and exclusion.

In migration health, identification, assessment and management of threats and risks rarely occurs “pre-event”. Examples of poorly studied health threats of potential societal and public health importance include: domestic violence against migrant women in destination locations [42,43]; the long-term impact of dietary changes [44,45] on the incidence of cardio-vascular disease [46], diabetes [47], and certain forms of cancer in foreign-born migrants and their locally born offspring [48]; or the importation of health services or pharmaceutical products [49] from less regulated environments, representing traditional but often unregulated or unmonitored patterns of self-care [50].

Efforts aimed at addressing these challenges can begin through the identification of vulnerabilities within different migrant populations. Once identified, demographic and population-based risk analysis can reveal the extent to which mobility globalizes risks for national health systems.

#### *Different Vulnerability Levels for Different Migrant Populations*

Some health factors associated with migration are simply a function of the size of the populations on the move, and can be considered as affecting all migrants. There

are specific factors associated with vulnerability, risk of illness, and adverse health outcomes that are not equally distributed across migrant groups. They may be relatively more prevalent in some migrant cohorts reflecting uneven influences of behavioural, environmental, genetic, biological, and socio-economic determinants of health [51]. Migrants originating in areas of poverty, those who are forcibly displaced by conflict or environmental calamity, those with limited educational and linguistic skills, and those who are dependent on their communities for protection (e.g. people with pre-existing health conditions, unaccompanied minors, the elderly, the young and single parent families) are at greater risk of adverse health outcomes [52]. At the same time, new arrivals who are subjected to legal, economic and/or social exclusion can be very vulnerable to contracting disease resulting from poor living environments and exploitative working conditions, including lack of access to health care and preventive services.

#### *Globalization of Health Risks*

Through a combination of genetic or biological, behavioural, environmental, and social-economic determinants of health, many global populations display major differences in the frequency and expression of poor health. The introduction of population movement into areas characterized by sustained differences in measures of population health allows for the transfer or elaboration of these characteristics between locations [53]. This is a concept with far-reaching implications for health maintenance and promotion, disease prevention, intervention and health services management, and education and training programs. In the sphere of infectious diseases, population mobility is one of the underlying factors behind the emergence and re-emergence of diseases of international public health importance as shown by communicable disease outbreaks [54]. Prevalence disparities between migrant source and destination countries can also exist for non-infectious diseases and

conditions although the direction of disparity from high to low prevalence and vice versa may vary depending on the condition being studied. As a consequence, migrant-receiving nations are sometimes required to respond to adverse health outcomes that originate beyond their jurisdiction and normal planning considerations. In addition, migrants who are subject to legal, social or economic isolation and deprivation may develop levels of ill health very different than those seen in the local or host population. Taken together evidence clearly suggests that health interventions and attempts to mitigate adverse health outcomes in migrant communities may require approaches that differ from those needed by the locally born community [55,56].

*The Impact of Migration on National Health and Disease Epidemiology*

Many economically advantaged nations have gained the benefits of long-standing and effective public health and disease-control programs. The effective control of tuberculosis in much of the high-income world means that the major remaining public health challenges presented by the disease in developed countries are related to migration [57]. In terms of non-infectious conditions and chronic diseases, programs directed at detection and treatment for malignancies (cervical, breast and colon), interventions to manage anemia and some endocrine disorders, and the significance of maternal-child health issues have resulted in the moderation of the impact of these illnesses locally. Migration from less economically advantaged areas will affect the epidemiology of diseases in “low incidence” host environments [58]. This is particularly true for diseases that occur at very low incidence levels, or which have been virtually eliminated locally.

The relationship between migration and disease epidemiology at the migrants' destination is not always negative. Differential risk and variability in adverse health outcomes may exist between migrant and host populations for a number of diseases.

Variations in prevalence may go in several directions or vary over time and across generations. The health impacts of population mobility may occur in an epidemiologically *neutral* context. Large populations of labour migrants moving within Asia or Western Europe represent situations where there may be no significant health disparities between mobile and host populations, and any significant migrant effects on health instead are related to the scale of demand for services. Finally, population mobility may result in situations where new arrivals exhibit more positive health characteristics than those observed in the host population. Examples of the latter type are observed in the context of some non-infectious or chronic diseases, such as cardiovascular diseases and eating disorders, and are described as representing the “healthy immigrant effect” [59,60]. Even this “healthy immigrant effect” concept varies depending on time, social situation, and clinical condition [61].

While pre-existing health conditions and illnesses can be associated with changes in disease patterns, the act of migration can also create new threats and health risks. Post-migration public health impacts include the consequences of ill health when newly arriving migrants experience isolation, social exclusion and/or poverty [62]. In situations where migrant communities’ access to health or social services is limited, post-arrival susceptibilities may increase, manifested by the expression of more severe or advanced disease [63].

Programs and strategies designed to promote and improve the health of migrants and mobile populations vary between nations. They often reflect national health priorities and local migration dynamics. Examples include: developing migrant-friendly clinics and hospitals [64]; ensuring that some categories of unauthorized migrants, such as those without documents, can receive care without being reported to immigration authorities [65]; providing medical care or screening guidelines

indicating the role played by mobile populations in the epidemiology of a given disease or illness [66]: and in terms of public health risk, considering migrant and mobile populations in emergency and contingency plans for disease risk mitigation [67].

### *Health System Challenges.*

Migration-associated adverse health outcomes present two sets of challenges to health systems in migrant-receiving nations. The first is the early appreciation and recognition of the diversity and disparity components of the population, which could result in significant migrant health issues. Early recognition can be achieved through effective engagement of the health services system by a health professional or the migrant. The size of the migrant population and the diversity within migrant communities and populations can mask significantly different groups with disease vulnerabilities. Health practices may differ significantly by group; particularly in health promotion strategies and approaches to disease screening between source and host nations (e.g. hypertension, diabetes in pregnancy, colon, uterine or breast cancer). These differences may also extend into infectious disease prevention and control measures, such as vaccination or outbreak response. If health indicators are gathered or recorded in terms of broad administrative classifications such as “migrant” or “place of birth”, health risks in populations such as internally displaced, refugees, or trafficked persons may be obscured.

The second set of challenges is related to access to care for migrant populations. Even with the recognition of adverse health outcomes in migrant populations, providing secure access to equitable health services for populations of migrants can be difficult. These difficulties can exist even in nations with long-standing

immigration programs. For nations that have only recently begun to deal with the growing dynamics of international migration, the difficulties can be much greater. Professional and population education, training, and orientation to societal values in health promotion and maintenance, disease prevention, and health services utilization also take time and commitment to achieve [68].

New and evolving populations of migrants and mobile populations can result in the rapid arrival and growth of large communities with diverse characteristics that include social, linguistic, cultural, and economic status; these can be associated with disparate health outcomes. Access to and utilization of health and medical services by some foreign-born communities may have a different pattern than those of the host population [69,70]. Specialized services encompassing linguistically and culturally competent providers, designed for the problems of migrants, will be required to ensure adequate health care programs and service delivery models. Similar features may need to be integrated into public health and disease control programs designed to mitigate health threats or risks [71]. This is reflected in the need to have educational and instructional information prepared in the language of migrants at an appropriate level for comprehension, and the need for translation or visual tools to deliver messages in a culturally appropriate manner [72].

Depending on location and health sector capacities these forces can affect health program design and function. Migrant-specific programs may be more effective for the migrant community but they may engender additional costs and resource demands. Additional challenges occur as a result of migrant diversity itself and can be seen in many locations when demands or needs for culturally competent health services can extend across several nationalities and ethnicities. Strategies to deal with these situations include: 1) support for acculturation and integration to allow migrants to better utilize domestic medical and health services and: 2) the provision

of migrant-specific or migrant-friendly health services [73]. National, regional and municipal differences in migrant history and demography make it unlikely that a single approach will be applicable in all venues [74]. However, modern information technology and networking does provide opportunities for the sharing and exchange of best practices and information across cultural environments [75,76].

The legal or administrative status of the migrant does affect access to services and care [77]. Migrants in an unauthorized situation and some foreign-born women [78] have been shown to have a lower utilization of health services than the local population. For example, health services may be too costly for migrants who do not have health insurance coverage. Even if linguistically appropriate health services are available and affordable, they may not be utilized due to migrants' lack of information about their rights and entitlements or out of fear of deportation [79].

#### *Limits to Traditional Responses to the Health Challenges of Migration*

Traditional approaches to health and migration frequently deal with specific diseases, primarily communicable diseases of public health significance that may be associated with the arrival of migrants [80,81]. Coordinated attempts at the international level to manage infectious diseases transmission were organized and consolidated into the International Health Regulations (IHR), recently revised in 2005 [82].

Some nations with integrated and long-standing immigration programs have systematically screened applicants for permanent residency status (immigrants) and some other classes of mobile populations (such as temporary resident applicants; including foreign students or migrant workers [83]), for a variety of health conditions and illnesses. Immigration medical screening, quarantine and isolation have been used in attempts to address the possible introduction of health threats by exclusion [84]. Major immigration-receiving nations continue to use these processes to reduce

the impact of health disparities in arriving mobile populations [85]. Important as they are from a legal and administrative perspective, programs and policies that continue to embrace responses of inspection and exclusion will be increasingly costly and ineffective in the context of modern migration and population mobility [86]. Furthermore, attempting to manage or mitigate health risks in arriving travellers, when many of the health risks may be latent or sub-clinical, without affecting international travel and commerce is operationally and logistically impractical.

Modern migration is an integral component of the broader process of globalization and is intimately linked to other non-health aspects of globalization such as global trade and economics, safety and security, the environment and climate change [87]. Population mobility underpins the labour and economic demands for human capital. It also helps mitigate the social, demographic and economic impacts of aging populations in many economically advanced nations where increased migration is required to sustain labour markets and population growth. In addition, modern migration is greater in magnitude and more diverse in health demographics than the traditional immigration process. At present many people migrate temporarily or go back and forth between their community of origin and their destination. As international migration will be an increasingly important aspect of human activity, improving the health of migrants and reducing adverse health outcomes related to migration can be expected to be a growing concern globally [88].

Some migrant-receiving nations are beginning to appreciate the impact of chronic illnesses in migrants. This includes the demand on and use of health and medical services by foreign-born populations, and the impact of lifestyle and behavioral factors on health and the health sector [89,90,91,92,93]. Standardized approaches to manage health implications associated with population mobility have been proposed, which extend beyond traditional immigration administrative processes to encompass

an integrated health framework for modern population mobility (see Table 3: Migration Health Paradigm).

## **Modernizing Strategies to Manage the Health Challenges of Migration**

### *Managing Health Threats, Risks and Challenges in a Global Context*

The need for modern and global approaches to population mobility and health is not an abstract goal. Considerable attention in the field of migrant health is devoted to the investigation and improved documentation of health indicators among migrant populations in receiving nations [94]. However, many of the health threats, risks, and challenges related to health outcomes due to migration result from factors and influences present outside of the jurisdiction and hence the direct influence, of the migrant-receiving nations [95,96]. Even in nations where long-standing immigration programs are a component of national policies, the health aspects of migration may not be addressed systematically [97] and much of the attention towards migrant health issues is only national in scope [98]. Some regional strategies have been proposed but analysis suggests that they may not be evenly applied or supported [99,100]. As a result, there is a paucity of systematic programs and policies to support the health of migrants. To improve global health management and preventive health practices, there is a need for coordinated international actions and partnerships between governments and organizations in nations of origin, transit, and destination. Studies have suggested that primary health prevention endeavors such as tuberculosis control [101] in countries of migrant origin are more economical over the longer term than traditional immigration screening programs and policies. They better address universal access in support of equity and the right to health, and have secondary preventive benefits manifested through the improvement of health indicators in migrant source countries [102].

There has been growing interest in and appreciation of efforts to address the importance of health and migration at the global level. In 2008, the WHO World Health Assembly resolved to take on the issue through its Member States by adopting a resolution on migrant health [103]. Approaching the topic through coordinated, international action will require considerable changes in many current national and regional health strategies and disease-control policies. National programs based on immigration status, nationality, the historical roles of national borders and traditional travel patterns will need to be redesigned to allow for equitable access to health services for migrants, and greater exchange of information and data to improve research into migrants' health. Threats, risks, and challenges will need to be conceptualized in terms of mobility and population dynamics, and to consider migrant origin and transit practices [104].

#### *Create Multi-Sectoral Approaches*

Migrants' health is intrinsically linked with all determinants of health but particularly the unequal distribution of socio-economic determinants including income status, housing and accommodation, education, nutrition, sanitation, and employment [105,106]. As a consequence, societal responses will be most effective if they are multidisciplinary and involve stakeholders from all relevant sectors working together to reduce adverse outcomes and improve the health of migrants.

International dialogue and activities in the field of migration are centered on the principles and policies of more effectively managing migration for the benefit of origin and recipient nations [107]. Sustaining and improving the health of migrants is a lateral issue that must be integrated into all aspects of migration management [108]. This implies integrating migration into health policies and strategies that are directly related to desired health outcomes. It implies raising awareness among healthcare providers and educators, as well as migration policy makers on how to address

health threats, risks, and challenges associated with or resulting from population mobility and disparities in health services between geographical locations.

### *Integrated Migration Health Policies*

A systematic approach to managing adverse migration health outcomes must reflect and integrate the several patchwork policies that have been evolving in many nations for more than a century to deal with situational aspects of migration. Currently, various policies exist that address the health of trafficked and smuggled migrants, labour migrants [109], those travelling for medical and religious reasons, and those applying for formal immigration. Other broader policy instruments deal with aspects of health for *bona fide* refugees and asylum seekers or refugee claimants, detained and incarcerated migrants, and those being returned or deported.

Integrated health policies that respect the rights of migrants will greatly facilitate coordinated approaches. These must be based on standardized international terminologies and principles reflecting the tools of the United Nations, international organizations, and national programs. Systematic actions that support migrant health, improve access to health services, and address the specific vulnerabilities of certain migrant populations will assist nations in developing programs to meet current and future demands [110]. These measures are in the global and national public health interest of sending and receiving communities from a social equity and equality perspective [111].

### *Prioritized Programs to Reduce Disparities Responsible for the Greatest Health Risks*

Several of the adverse health outcomes related to migration, particularly those associated with infectious diseases, are already the subject of international and in some cases global attention. Many of these diseases are being addressed through initiatives that involve international and regional programs dedicated to improving global health. They include international efforts to expand immunization (GAVI)

[112], reduce the impact of high burden diseases (TB, HIV/AIDS and malaria) [113], manage the implications of pandemic influenza [114], and improve public health responses in general (IHRs) [115]. While migration and population mobility may feature in some aspects of these endeavors, there is a paucity of integrated collective action on the migration-associated components. Integrating a migration component into these activities can facilitate the global approach to disease control and demonstrate immediate benefit for both source and recipient nations. Mobile populations are one of the means that locally arising risks can become global challenges. Mitigation programs and control strategies must encompass migration components in terms of both threat-to-risk assessment, and intervention planning. The importance of these issues has been noted during responses to global health events such as SARS (2003) and the more recent pandemic influenza (2009) event, where travel-related control measures have included screening, inspection, isolation, quarantine, and exclusion. The scale of migration and population mobility has required many of these responses to have cultural and linguistically appropriate services.

To be effective, such programs need to reflect the ongoing health impacts of migration that extend well beyond the 'immigration' process. A relatively new phenomenon in international population mobility is the number of migrants who, greatly facilitated by modern travel industry, return to their place of origin to visit relatives or friends; they are known as VFR (Visiting Friends and Relatives) travelers. Typically, VFR travelers take longer trips, stay in local homes or accommodations, eat locally prepared meals, and take fewer pre-travel precautions. Many VFR travelers return to their country of origin with children who were born at the new place of residence and lack the immunity their parents acquired prior to migration. These

migrant-related populations of VFR travellers have been identified as being associated with increased adverse health outcomes [116,117].

### *Education and Training in Health and Migration*

The processes of migration and population mobility have complex ethical, legal, administrative, and social components that relate to the health of migrant and host communities. Studies have demonstrated that the lack of familiarity with migrant health conditions or the nature of health determinants in migrant communities can negatively affect the effectiveness of care [64]. Better understanding of the nature of the health aspects of migration can prevent some adverse health outcomes in international migrants through activities that support the early detection and treatment of health problems in these populations [118].

This is accomplished through early access to and availability and affordability of health care for newly arriving migrants. Minimum standards for the provision of linguistically and culturally appropriate tools that assist in healthcare delivery [119,120] are emerging health-system requirements in some nations [121]. As the world becomes increasingly mobile and multicultural, healthcare providers in many locations will need to acquire greater capacity to understand, study and address health needs of migrant communities [122].

### **Conclusions**

Migration and international population mobility are facts of global life. The volume of mobile populations within and beyond national boundaries is bringing increasingly high numbers of diverse and disparate populations together. This may occur in areas where traditional administrative approaches to managing the migration processes cannot address the healthcare needs of the migrant populations nor the impacts these populations may have in transit, recipient and home communities.

Addressing the health needs of migrants improves migrant health, avoids stigmatization and marginalization, may reduce long-term health and social costs, protects global public health, facilitates integration, and contributes to social and economic cohesion and development.

This document posits that many of the health challenges associated with modern migration have their origins in the international and global extension of inter-regional disparities in health indicators and determinants. Mobile populations provide population bridges across these gaps in health indicators, and effectively globalize risks and negative health outcomes.

National and international policies and programs reflecting existing geo-political boundaries represent traditional approaches to dealing with health and migration but are becoming progressively ineffective in the face of migration that is growing in volume and diversity, while extending across locations with disparate health determinants and outcomes. Related to specific migrant populations or individual diseases and varying between nations, these traditional administrative approaches may not represent the most effective methods and means of meeting the current or future needs of an increasingly diverse and globalized population. The recent resolution by the WHO World Health Assembly [103] indicates that there may now be the beginning of sufficient international recognition of the importance of some of the health effects of modern population mobility [123].

Addressing migration health needs through a global lens will be best achieved with regional and global strategies that consider public health aspects previously thought to be limited to national needs. Policies, programs, and health services for migrants may still be prepared and delivered at a local and national level, but they should be based on and reflect international and global principles [124] and standards. Systematic and integrated approaches to migration health, based on global

processes and migrants' rights, represent an effective method of managing these issues.

<b>Category of migrant</b>	<b>Population estimates</b>
Regular immigrants	Annual flow of ~ 2.4 million (2005) with a stock of ~200 million [127]
International Students	~ 2.1 Million (stock in 2003) [128]
Migrant workers	~86 Million (stock in 2005) [129]
Refugees	16 million (stock in 2007) Source: United Nations High Commission for Refugees [125]
Asylum seekers or refugee claimants	650,000 (stock in 2007) [125]
Temporary – recreational or business travel	900 million per year (2007) [126]
Trafficked (across international borders)	Estimated 800,000 per year (2006) [130]
Internally displaced	51 million (stock in 2007) includes those displaced by natural disasters and conflict. [125]

**Table 2. Health influences related to phase of mobility** Modified from Ref [41]

Phase	Examples	Outcomes / Risks
Existing pre-departure influences	<ul style="list-style-type: none"> <li>- Endemic diseases</li> <li>- Level of development</li> <li>- Access to care</li> <li>- Availability of care</li> <li>- Differences in linguistic and cultural background as compared to destination</li> <li>- Possible forced or non-voluntary departure from emergency situations</li> </ul>	Departure/Arrival with health indicators of origin: <ul style="list-style-type: none"> <li>• Differing incidence and prevalence of illness</li> <li>• Differences in awareness of and use of healthcare services:               <ul style="list-style-type: none"> <li>• Preventive</li> <li>• Promotional</li> <li>• Diagnostic</li> <li>• Therapeutic</li> </ul> </li> </ul>
Influences during travel	<ul style="list-style-type: none"> <li>- Trauma (physical and mental)</li> <li>- Deprivation</li> <li>- Violence</li> <li>- Climatic exposure</li> <li>- Injury</li> </ul>	Greater prevalence of illness resulting from torture, trauma, abuse and climatic exposure <ul style="list-style-type: none"> <li>• Refugees</li> <li>• Refugee claimants or asylum seekers</li> <li>• Unauthorized migrants, including trafficked/smuggled migrants</li> </ul>

<p>Post-arrival influences</p>	<ul style="list-style-type: none"> <li>- Administrative/legal restrictions on access to services or care</li> <li>- Poverty</li> <li>- Language and cultural isolation</li> <li>- Occupational risks</li> <li>- Duration of stay at destination</li> </ul>	<p>Awareness of and access to health services by migrants may be limited by immigration status, poverty, language, culture and discrimination</p> <p>Working conditions may be associated with health risks, exploitation and abuse:</p> <ul style="list-style-type: none"> <li>• Migrant agricultural laborers</li> <li>• Commercial sex workers</li> <li>• Illegal workers</li> <li>• Trafficked migrants</li> </ul>
<p>Health influences associated with return travel</p>	<ul style="list-style-type: none"> <li>- Changed health environment at origin (health systems improvements or declines)</li> <li>- Children of foreign-born parents may have no exposure to risks present at origin</li> </ul>	<p>Introduction of disease, acquired abroad, into home country</p> <p>Populations making return journeys to place of origin (particularly children born at new destination) may be at increased risk of disease or illness:</p> <ul style="list-style-type: none"> <li>• "Visiting friends and relatives" travellers</li> <li>• Locally born children of foreign-born parents</li> <li>• Risks may return to new home after visit</li> </ul>

		or may be introduced during travel.
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<b>Factor</b>	<b>Feature</b>	<b>Implication</b>
1. Phases of migration	Pre-departure phase Transit phase Arrival phase Post-arrival phase Return phase	Each phase of the migration process contributes to a carry-over of the pre-existing and experiential influences of that phase including any trans-generational consequences of the migration
2. Prevalence gaps	Increased Neutral Decreased	Inter-regional differences in the frequency and duration of health or disease
3. Population health determinants	Socio-economics Genetics/biology Environmental Behavioural	The inter-dependent factors and measurements related to well-being, health, and life expectancy at birth
4. Policies and procedures - administrative	Local Regional International	The administrative features at each level of governance and regulation that define the policies and procedures related to migration
Perceptions of threat/risk to health	Threat identification Risk assessment Risk management <ul style="list-style-type: none"> <li>• Acceptable risk</li> <li>• Residual risk</li> <li>• Managed risk</li> </ul>	The health and civil jurisdiction identification and management of the perceived threats and real risks to health, health systems, health services, and public health

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