Prologue
Bridging the Divide: Population Mobility and the Emergence of Disease

Chapter 1

Demographic and Epidemiological Perspectives of Human Movement

Yorghos Apostolopoulos, Ph.D. and
Sevil Sönmez, Ph.D.

Globalization, Mobility, and Population Health

When in the aftermath of the telegraph and radio, humans viewed the globe as "a single large village" (McLuhan, 1964), they would have never been able to even imagine the unprecedented consequences of a rapidly integrating world as a result of globalization[1] in the latter part of the 20th century and onwards. Population mobility and migration as integral parts of globalization are some of its most visible and significant dimensions. Crossborder migrants searching for employment in more affluent economies with less stringent immigration policies or internal migrants moving to different parts of a country following the relocation of a transnational manufacturing corporation in pursuit of cheaper labor illustrate the intertwined links between globalization and migration.

Over the course of human history, myths and legends of our ancestors were based on nomadic heroes such as Gilgamesh, Hercules, and Ulysses, as well as on great traveler-lecturers like Herodotus and the Arabian Ibn Battutah. In more recent history, diverse types of population mobility in the forms of exploration and survival, pilgrimage, warfare and exploitation, innate curiosity, colonization, as well as emigration and immigration have dramatically shifted following the dramatic events of two world wars, decolonization, ethnic cleansing and expulsion, collapse of the USSR, catastrophic natural disasters, and globalization (Huynen, Martens, & Hilderink, 2005; Lee, 2003). As we live in the early 21st century, we experience a world with constant movement characterized by skyrocketing flows of refugees, asylum seekers, economic immigrants, business travelers, armies, mass tourists, transport personnel, and seamen, among others. Such movement brings people from

[1] Globalization is defined as a process of closer interaction of human activity within economic, political, cultural, social, and other spheres and along spatial, temporal, and cognitive dimensions (Lee, 2003).

tropical, subtropical, and mostly isolated environments into close proximity and contact with the people of industrialized nations.

This global human diaspora in its diverse forms holds a plethora of sociocultural, political, economic, and health implications for all involved. Among others, population mobility is a potent force in disease emergence and spread and its consequences extend beyond the traveler to the populations visited and the ecosystems involved (Wilson, 1995). The collateral movement of infectious disease pathogens as a result of mobile segments of human societies has had profound effects on the course of human history. Population mobility has become the bridge between epidemiologically disparate and socially and spatially isolated regions and peoples. As a result, human mobility has been linked to disease outbreaks, epidemics, and even pandemics over the course of history: from the plague pandemic of the 14th century, the syphilis outbreak of the 15th century, the measles and smallpox spread during European colonization of the Americas in the 15th century, the human influenza epidemic in the early 20th century, the global spread of HIV/AIDS from the early 1980s onward, the West Nile virus outbreak in New York in 1999, the SARS outbreak first identified in China in late 2002, to the early signs of a potential avian influenza outbreak of the early 21st century (Weitz, 2007).

Population Mobility and Migration: An Overview

When I (first author) teach introductory demography courses, in my effort to clearly define migration and also relax my students a bit, I use the elementary but nevertheless effective example of Adam and Eve who became the world's first migrants upon leaving the Garden of Eden and explain further that, since that time, men and women have been moving around the globe, bringing disparate cultures into contact with each other. While humans have been migrating through the ages, the advent of relatively inexpensive and fast forms of ground, water, and air transportation has given migration new dimensions. Furthermore, the simultaneously occurring phenomena of rapidly declining mortality and accelerated population growth have also contributed to migration. Paradoxically, although the unprecedented migration flows of the past two decades constitute an integral part of globalization, discussions of globalization focus primarily on trade, investment, and capital flows while the movement of people is inexplicably ignored. While longstanding migratory patterns continue in new forms, new flows develop in response to economic changes, political strife, and violent conflicts. Yet, despite their diversity, there exist certain tendencies that are likely to play a major role. Foremost among these are the globalization, acceleration, differentiation, feminization, and growing politicization of migration (Castles & Miller, 2003).

Within this context, migration[2] can be seen as the process of any permanent or semi-permanent change of residence involving "detachment from the organization of activities at one place and the movement of the total round of social activities to another" (Goldscheider, 1971). Thus the most important aspect of migration is spatial by definition. In its most general form, spatial movement can be understood as a transfer from one place to another, from one social or political unit to another. This concept rests upon the understanding of space as a sort of container for a socially, politically, and economically relevant construct.

For a newcomer to social demography, population mobility and migration remain a baffling puzzle and eventually bring many questions to mind. Who is the migrant? Why do people choose to migrate? Why are there so many migrants out of such few places? Where do people migrate to? What are those forces that sustain migration? While concrete answers to several of these questions are not always possible (nor within the scope of this essay), and despite the rapid evolution of crossborder migration and population mobility, there are some concepts that many agree upon. For example, we all agree in the differentiation between forced and voluntary, temporary and permanent movements, and legal and illegal/irregular migration. These distinctions all fall under this umbrella term we include oftentimes as diverse terms and categories of migrants such as displaced persons, refugees, asylum seekers, migrant laborers, immigrants, tourists, student travelers, business travelers, military personnel, smuggled and trafficked persons, temporary visitors, pilgrims, transport personnel, and long-term temporary residents abroad (expatriates, missionaries, humanitarian workers).

In the early 21st century, the numbers of people on the move looked impressive. There were about 191 million international migrants in 2005 while over 105 million people worked legally or illegally in other countries (UN, 2006), further, there were 130 million migrant workers and 10 to 15 million undocumented migrants (ILO, 2000). The annual total of refugees reached 20.8 million in 2005 (UNHCR, 2006) and nearly four million victims of international trafficking were recorded annually (USAID, 2004). International tourist flows reached 806 million in 2006, and are expected to exceed 1.6 billion by 2020 (WTO, 2006). If this "nation of migrants and travelers" was merged into a single country, it would be the world's 10th largest nation-state (Faist, 2000).

At least half of those who migrate move from one developing country to another but not to developed countries (Faist, 2000). South-South migration flows are numerically more significant that South-North streams, and this is

[2] While there are conceptual distinctions between migration and immigration, we use the term migration somewhat loosely to refer to international migration, generally the emphasis of most essays in this volume. Further, we use the terms migration, travel, and mobility interchangeably.

even true for refugee flows, albeit for somewhat different reasons with about 96% of the world's refugees remaining in developing countries. In 1996, over half of the world's refugees and asylum seekers lived in the Middle East and South Asia—Palestinians and Afghanis constitute over 40% of the world's refuges and asylum seekers—while the top five countries from which they came (adding Iraq, Liberia, and Bosnia-Herzegovina to the aforementioned) accounted for over 60% of the total (Faist, 2000). It is also noteworthy to mention the direction of migration: six of the world's wealthiest countries—France, Germany, Italy, Japan, UK, and USA—receive about one third of the world's migrants (Faist, 2000).

A plethora of scholarship and theories and models have conceptualized and attempted to delineate the "nuts-and-bolts" of migration. In the premodern world, migration rates were comparatively very low just as birth and death rates were generally very high. The demographic transition has contributed significantly to the unleashing of migration activity, and it is reasonable to assert that a migration transition has occurred in concert with fertility and mortality transitions (Weeks, 2002). Within this context, the push-pull theory (Ravenstein, 1889) from the end of the 19th century was the pioneering effort to analyze migration, using data from the census of England. Since then, a series of major theories have offered to explain international migration, such as the neoclassical economic approach, the new household economics of migration, the dual labor market theory, world-systems theory, network theory, institutional theory, and theory of cumulative causation (Hirschman, Kasinitz, & De Wind, 1999; Massey, Arango, Hugo, Kouaouci, Pellegrino, & Taylor, 1993, 1994). A comprehensive review of this literature reveals the absence of a unifying universal theoretical approach to the study of migration. While macro and micro perspectives and levels of analysis provide answers to some of the fundamental questions, a comprehensive meso link is urgently needed to deal with the question of migration dynamics (Faist, 2000).

Population Movement and Disease Risks

While through the ages only a handful of infectious (or communicable) diseases have afflicted mankind such as influenza or the plague, in the contemporary world, a total of only six diseases—diarrhoeal diseases, HIV/AIDS, malaria, tuberculosis (TB), respiratory infections, and measles—constitute the cause of over 90% of infectious-disease related deaths (WHO, 2005). Although according to the epidemiological transition school of thought, infectious diseases were believed to be retreating, we see that not only are they making a deadly comeback but also new, killer diseases are emerging (WHO, 2005).

Most infectious diseases are preventable but their aetiology oftentimes lies outside the control of the health sector. Top among their key determining factors are: urbanization, bad housing, and poor environment; smoke from wood and other fuels; global warming; deforestation; agricultural development;

dams and irrigation schemes; poverty, malnutrition, and immunosuppression; and transportation, travel, migration, and population displacement (Olshansky, Carnes, Rogers, & Smith, 1997). Communicable diseases spread most quickly in conditions of poverty, powerlessness, and social instability. For a series of interrelated reasons—oftentimes difficult to articulate, define, and ultimately measure—demographers appear to have a greater understanding for the fertility and mortality aspects of population than they have for migration, which represents one third of the components of population change.

Even chronic diseases once thought to be unrelated to infectious diseases are now known to be the result of chronic infections. Cervical cancer, one of the most common cancers among women in the developing world, is now known to be associated with human papillomavirus infection. Both chronic and infectious HBV and HCV can cause liver cancer, and it is estimated that over 6% of the world's population is at risk, while bladder cancer can result from chronic infection with schistosomiasis. The distribution of the (aforementioned six) most lethal infections of our time is unevenly concentrated around the globe with the developing regions paying the heaviest toll (e.g., nearly 80% of people infected worldwide with HIV live in Sub-Saharan Africa). Of the global burden of disease in disability-adjusted life years (in 1999), communicable diseases account for 48.2% of all recorded cases (WHO, 2005).

As globalization poses a challenge to traditional concepts of health determinants against the contextual background of emerging and re-emerging infections, the relationship between diverse forms of population mobility in different geographies and the global spread of disease is noted by social and health scientists as well as historians (Williams, Gouws, Lurie, & Crush, 2002). Historically, transient groups of traders, sailors, laborers, refugees, sexworkers, and long-haul truckers, among others, have been recognized as a pathway for dissemination of infectious diseases (Caldwell, Caldwell, Anarfi, Ntozi, Orubuloye, Marck, Cosford, Colombo & Hollings, 1999). Trade routes between Asia and Europe brought rats carrying bubonic plague to Europe during the Middle Ages. Slave ships from West Africa to the Americas transported smallpox as well as yellow fever-carrying mosquitoes in the 16th and 17th centuries (Hays, 2000). Cholera spread from its most likely origin of India to the rest of the world through travel and trade. Epidemics of infectious disease have influenced the outcome of exploration, military expeditions, colonization, and industrial development.

Today trade routes encompass the entire globe and automobiles, cargo ships, and airplanes are much more effective transport vectors than the slow-moving caravans and sailing ships of the past. Living and non-living agents and materials capable of carrying infectious agents are inadvertently transported across vast distances in a mere matter of hours. For example, tons of fresh seafood cross international borders daily and rapidly end up on kitchen countertops, in refrigerators, in ovens, and eventually in the bodies of

humans living thousands of miles away from the fishing boats, docks, and seas, rivers, lakes, or fish farms where fish are caught.

Livelihood and survival mobility are oftentimes outcomes of uneven socioeconomic development[3]. The epidemiologically most critical types of migration in developing regions, which are predominantly poverty-driven—labor migration, forced migration, and survival sexwork—place men and women in particularly high-risk situations. Migrating populations are oftentimes faced with further poverty, discrimination and exploitation, alienation and a sense of anonymity, limited access to social and health services, separation from families and partners, and separation from the sociocultural norms that guide behavior in stable communities. Many of the underlying factors sustaining mobility, such as an unbalanced distribution of resources, unemployment, socioeconomic instability, and political unrest, are also determinants of the increased risk of migrants and their families to infectious diseases.

Organization and Themes of the Book

Although the connections between population mobility and disease are well documented, the social and behavioral mechanisms underlying this relationship remain poorly understood. There exists an inexplicable lacuna in contemporary interdisciplinary scholarship in the delineation of those contexts in which mobile populations are not only more vulnerable to disease but they can also exacerbate its spread. The international literature is rich with journal articles as well as research and policy reports bringing together prevalent issues of population, migration, and associated risks for acquisition and dissemination of infectious diseases. There exist three relevant books that make invaluable scholarly and applied contributions—*Crossing Borders: Migration, Ethnicity and AIDS* (Haour-Knipe & Rector, 1996), *Sexual Cultures and Migration in the Era of AIDS* (Herdt, 1997), and *Migration Medicine and Health* (Gushulak & MacPherson, 2006)—but with very specific scope, focus, and perspective. While all discuss the magnitude of the relationship between migration and disease, there remains a gap in efforts to provide a comprehensive umbrella to explain human migration and public health. This is what the present volume attempts to do.

For this volume, high-caliber scholars with anthropological, demographic, economic, epidemiological, geographical, historical, legal, mathematical, political, psychological, and sociological backgrounds were commissioned to author chapters on issues that cross disciplines and audiences. As a result, the book is organized along six broad but interdependent thematic units.

[3] In this essay, development goes beyond traditional, purely economic concepts; among others, key themes include economy and poverty, institutions and infrastructure, health and disease, the environment, demography, and issues regarding women and children.

The Prologue includes only Chapter 1 and delves in the broad topics under investigation—the nexus of human mobility and disease—and points to the central demographic and epidemiological themes of the book. Part I includes three chapters that address central themes pertaining to migration, health, and disease. In Chapter 2, Wilson discusses the role of human migration in shaping infectious disease distribution and patterns. She explains that humans not only carry their own collection of microbial flora but also cause the movement of other species and biological material through extensive travel and trading networks and by entering new areas and affecting environmental change with the potential to trigger new microbial threats. Wilson also touches upon social, economic, political, climatic, technological, and environmental patterns that influence microbial threats to health and their consequences. Further, she explains that infectious diseases are global in their distribution with broad ramifications involving numerous species and populations. In her conclusions, Wilson writes that the global community should identify high-risk populations and situations and improve surveillance, laboratory support and communication networks, and should work to reduce the burden of infectious diseases as well as the vulnerability to the spread of new microbial threats by beginning with basic interventions. In Chapter 3, Ioannidi-Kapolou highlights factors that contribute to migrants' poor health and limited access to health care, which in turn become barriers for their integration into the host country. Social isolation and marginalization result from the formation of distinct ethnic minorities in countries due to increasing ethnic heterogeneity. The author touches upon issues that exacerbate inequalities affecting migrant and refugee populations such as race/ethnicity, poverty, illiteracy, gender, and class—which in turn leave migrants (women in particular) vulnerable to health risks. Ioannidi-Kapolou places particular emphasis on female migrants and contends that migrant women are "triply disadvantaged" by race/ethnicity, status as a non-national, and gender inequalities and as a result, encounter higher health risks including STIs/HIV due to their vulnerability to sexual abuse and rape. The author also suggests that migration itself places women at greater risk because they may have to practice survival sex or to establish sexual partnerships in transit or at destination countries for protection or resources, or because they are trafficked into the sex sector. The author concludes by calling for greater sensitivity on the part of public-health practitioners, policy makers, educators, and researchers to the challenges that migrants and refugees experience, which are rooted in the interrelated issues of racism, xenophobia, social exclusion, poverty, and health risks. In Chapter 4, Soskolne contends that HIV/STI prevalences among migrants are shaped by interactions between the pathogen, individual behaviors, and the prevention efforts that are developed to limit impacts. She highlights the importance of social environment to migrants' adjustment and integration as well as in determining health outcomes. She adds that the value orientation and belief systems that shape behavioral patterns (including those concerning health) founded on one's social environments can break down when humans leave their own social networks. According to Soskolne,

migration should be viewed as an ongoing social process spanning space and time in which networks are developed between places of origin and destination as the microstructures are at its core. Such networks provide migration information, support and assistance at the destination country, and especially shape health behaviors. To this end, Soskolne reviews a series of theoretical and empirical perspectives to delineate the role of social networks, support, and capital in HIV/AIDS among migrants, and presents a conceptual framework of pathways that link migration, social networks, and HIV risk. This framework—anchored in epidemiological models that view emerging infectious diseases as resulting from changes in the equilibrium between agent (HIV), host (the individual), and environment—considers social networks as a central link between migration and other structural, community and individual factors, and HIV infection. The chapter stresses the importance of understanding network structures at both population and individual levels in order to characterize migrant populations, to understand disease transmission, to identify risk factors and individual risk, and to target prevention strategies effectively.

In Part II the focus turns toward labor-induced population mobility and the ways it affects health and disease diffusion. In Chapter 5, Lurie brings to the fore the importance of superstructural, structural, and environmental determinants of labor migration in migrants' elevated health susceptibility. Superstructural forces, as macrosocial, economic, and political in nature, shape the distribution of resources and opportunities. Labor migration emerges from and creates systems of economic inequality, political oppression, marginalization, and social fragmentation, all of which can render migrants at greater risk for sexual coercion, unhealthy working and living conditions, and exploitation and violence. Structural factors enforce and perpetuate systems of inequality and oppression. In fact, few governments have instituted policies protecting the legal rights of migrants and providing them with health education and services and in places where government policies formally protect the health rights of migrants, such policies are often inadequate or may not be properly implemented. Finally, the environmental conditions in which migrant laborers move, work, and live are shaped by systems of social and economic inequality and lack of legal protection precipitate overall unhealthy conditions. Migrants are subject to poor working conditions and are vulnerable to sexual exploitation, coercion, and violence from employers, host communities, and other migrants. Within this framework, Lurie presents two case studies to explore the complex association between migrant labor and health vulnerability. The first study focuses on the relationship between migration and TB in Norway and the second on the role of labor migration in the spread of HIV/AIDS in South Africa. Finally, Lurie underlines the critical importance of regional and national interventions that include the proper assessment of the health impacts of migration and greater understanding of the mechanisms behind the spread of disease through migration. In Chapter 6, Kingma and Yeager examine how and whether military personnel are vulnerable to STIs/HIV. Overall,

deployed military personnel find themselves in biological environments hostile to their immune systems, in adverse physical conditions of weather, climate, and human nutrition, and in disrupted social settings that serve as ideal breeding grounds for infectious bacteria, viruses, and parasitic organisms. Within this context, the authors examine policy and operational issues that impact the health of military personnel. Policy issues include the military workplace, which imposes heightened vulnerability to HIV infection via a transmission dynamic similar to that seen in long-distance transport workers and migrants employed in the mining sector with military installations that attract sexworkers. Command and control structures, while they include a well-developed span of control and chain of command hierarchies capable of influencing a wide range of behaviors, are difficult to affect sexual behaviors particularly during off-duty periods. The authors suggest potential adverse and accelerated impacts of military training and service on the immune system, in relation to either the susceptibility to or progression of HIV infection. Deployment and combat in HIV-endemic areas may be associated with HIV infection risks, although supported by limited empirical evidence. During complex humanitarian emergencies and peacekeeping operations, infectious diseases can thrive almost unchallenged in the emergencies created and sustained by socioeconomic and political disintegration, communal strife, and armed conflict. HIV risks are extremely important factors to consider when peacekeeping forces are sent in to sustain the peace between contending parties and to help restore public order. Troops can bring the virus home with them and they can transmit it to comrades-in-arms and civilians in the field. The authors offer a number of preventive strategies ranging from education, condom promotion and provision, STI/HIV testing and counseling to treatment, care and support. In Chapter 7, Timoshkina, Lombardo, and McDonald address the links of mobile sexwork and associated STI/HIV risks. The authors discuss the extent of trafficking and mobile sexwork and highlight data on STI/HIV prevalence rates among sexworkers and continue with a discussion on responses to STI/HIV among sexworkers that have been undertaken thus far, and what others are required. The chapter provides an overview of the changing nature of trafficking and mobile sexwork, while it elaborates on the ways mobile sexworkers are impacted by STIs/HIV. Links between growing mobility patterns and STI/HIV prevalence rates increase vulnerability of mobile sexworkers to health problems. The authors conclude with a call for urgent interventions specifically aimed at mobile sexworkers to protect not only sexworkers themselves but to help stem STI/HIV transmission to their sex contacts. Recommendations for preventive measures include confidential, culturally sensitive, and non-judgmental programs and services to address the unique needs of mobile sexworkers in STI/HIV prevention, distribution of condoms and safe sex information materials in relevant languages, substance abuse treatment and harm-reduction programs for IDU sexworkers, and general health services with an emphasis on outreach in all workplaces of migrant sexworkers. In Chapter 8, Apostolopoulos and

Sönmez place the transport sector firmly within the discourse of epidemiology, demography, sociology, and anthropology and critically review its far-reaching role in the acquisition and diffusion of communicable diseases. The primary emphasis of their review is on STIs and BBIs, including HIV, while a secondary emphasis is placed on TB, SARS, avian influenza, and malaria. The authors provide an overview of all transport modes with a particular emphasis on the role of trucking and maritime sectors in developing regions as well as of trucking in North America. This combined movement of humans and goods and services among different geographic points has an ultimate impact on the juxtaposition of various species of disparate ecosystems, which often accelerates and even facilitates disease movement from one area to another.

Part III includes two chapters that examine diverse dimensions and the ramifications of forced migration. In Chapter 9, Burkle addresses ways in which increasing global conflict, war, refugee influxes, population migration, and the political and developmental inequities of these factors influence risk to infectious diseases. He suggests that many parallel factors occur globally, which may adversely affect the capacity of public health systems to respond and protect the populations they serve. Burkle goes on to provide examples of political violence, civil war, ethnic and religious strife, and in particular, the generation of millions of refugees by forced migration—which alter the natural balance between human beings and microorganisms. Burkle argues that public health can no longer be narrowly confined to aspects of preventive healthcare but that it is increasingly understood in the context of multidisciplinary and multisectoral capacities of governance and political will, economics, judiciary, public safety, quality of public-health utilities, health security, agriculture, communication, transportation, education and training, and other capacities that allow states to functionally protect their citizens. The author further suggests that current wars, internal conflict, refugees, migration, and the consequential apprehension over the spread of infectious diseases have become a catalyst to what might be feared as the prelude to a downward trend or eventual worldwide collapse of public health as we know it. The author reminds us of those lessons that should be learned from the SARS epidemic, which must serve as the sentinel alarm for a stronger WHO with clear guidelines for improved local, national, and regional capacity to deal with disease investigation and control, particularly for migrant populations and nation-states regardless of peace, war, or conflict. In Chapter 10, Mayer examines the human ecology of disease and how the environment affects human health through examples of natural disasters and global climate change. Mayer suggests that behavior, culture, population, environment, and biology interact in a "web of causation." For example, to understand the aetiology of malaria occurrence in a particular place at a particular time, one must not only understand the vector biology, but also the distribution of population, anopheline habitats, and human behaviors that bring people into contact with the vector. Further, behaviors and the cultural underpinnings that underlie peoples' daily travel patterns, which dictate movement that makes

populations susceptible to anopheline feeding behavior, must be understood as well as political decisions that impact population behaviors. Mayer refers to the recent example of Hurricane Katrina and its implications for local and regional health conditions and notes the significance of disaster epidemiology in understanding health effects of natural disasters. With population displacement, migration may occur over long or short distances and result in large numbers of people concentrated in refugee camps, which in turn creates appropriate ecological conditions for disease transmission. The chapter continues with a discussion of the potential effects of climate change and sea-level rise on populations and touches upon some climate change scenarios that predict more significant increases in sea-level in the future—which are likely to create environmental refugees—particularly in countries below or close to sea level in developing regions. The author points out that although health effects of natural disasters are significant, health effects of planned displacement in anticipation of a "natural" event with decades of warning and planned mitigation, as well as individual psychological and collective adaptive responses are unpredictable. The author concludes by attributing resulting public-health effects from both natural hazards and global climate change to human activities themselves. More specifically, the political ecology of global climate change is related to the human modification of the earth, which indirectly causes increases in vectorborne disease in addition to sea-level rise.

Part IV includes two chapters and examines the paradox of how leisure (pleasure) travel might render human populations vulnerable to disease risks. In Chapter 11, Wickens and Sönmez present young travelers' health risk behaviors through a critical review of literature followed by examples from authors' own research studies. According to the WTO, young people (16-24 years-old) comprise the fastest growing segment of travelers, and according to CDC, 96% of all STIs occur between the ages of 15-29. Furthermore, the fastest growth rate in cases of HIV infection is found among young people traveling and on holiday. Cross-cultural research indicates that young tourists from Western countries travel farther from home than ever before, they prefer sun-and-beach holidays, and frequently include casual sex in their travel experiences. Research is presented in the chapter that suggests that hedonistic holidays are designed to stress the availability of alcohol and sex and are instrumental in influencing travelers' decisions in the selection of 'sun-and-fun' destinations. A number of studies corroborate themes of casual sex, alcohol bingeing, and how touristic spaces (e.g., beach resorts) provide young people with the ideal conditions for suspending social codes of behavior. In a study of American organized youth-travelers in Florida, significant numbers expressed intentions to get drunk, experiment sexually, and have sex with someone they met on vacation and upon returning home, about a third reported engaging in casual sex, while a majority reported irregular condom use. In another study of British travelers to Northern Greece, young tourists expressed getting a suntan, having sex, and getting drunk as common motives, strengthened by expectations of anonymity and relative freedom from social constraints. The authors conclude that young tourists not only

represent a significant risk group in terms of sexual health, but must be targeted by effective preventive strategies to positively impact their sexual choices and behaviors and to control the spread of STIs/HIV, stressing the need for an increased focus on situational and social contexts. In Chapter 12, Sönmez, Wickens, and Apostolopoulos examine sex tourism, discuss types of locations where sex tourism flourishes, and provide case studies of sex tourism destinations where STIs/HIV have become particularly problematic. Sexual interactions that carry STI/HIV risks occur between travellers and locals or other travellers; however, "sex tourism" in particular is an important vector for STI/HIV transmission and has potentially explosive ramifications for public health. By virtue of their behavioral interactions with a "core group" of efficient transmitters of STIs/HIV (sexworkers) and sex partners back in their home environments, sex tourists are particularly vulnerable for both acquiring and transmitting STIs/HIV. Consequently, sex tourists themselves become an STI/HIV core group, along with sexworkers and similar to seafarers and truckers (discussed in chapter 8). The authors discuss the growth of international tourism and present links between tourism and issues of human trafficking for purposes of sexual exploitation, *femmigration*, and child prostitution. Simultaneous globalization of tourism as leisure migration and sexual exploitation (via trafficking, sex sector, survival sex, and child prostitution) converge to fuel the growth of sex tourism. The chapter examines the sex tourist typology, the wide and free marketing of sex tourism, and also the locations where the activity is most prevalent. Further, factors that fuel the growth of child sex tourism are presented as well as international efforts to curb the activity. The health costs of sexual exploitation are presented within the context of leisure migration. Critical public health issues (e.g., global STI/HIV/AIDS rates) are linked to the relationship of transactional sex between those involved in the commercial sex industry and sex tourists. The authors conclude by presenting intervention strategies that include international efforts to combat problems of trafficking and sexual exploitation of vulnerable populations, the eradication of child sex tourism, the recognition of the abusive circumstances in which sexworkers live and work, a more concentrated focus on structural issues that cause poverty and that facilitate and support the sex sector, and the examination of the health effects of sexwork in terms of both sexworkers and clients.

The Epilogue points toward new directions in migration medicine and health. In Chapter 13, Mwambi and Zuma discuss the importance and process of examining mobility patterns and their distribution to explain the spread of existing, emerging, or re-emerging diseases via mathematical and statistical modeling and mapping. The SIR model is presented as the basic epidemic model upon which further extensions and modifications can be implemented to capture more complex disease processes. HIV/AIDS risks of migrant workers are discussed with an example from a study conducted on the effects of migration in the HIV transmission dynamics to which a mathematical model is applied in order to estimate the relative risk of infection for migrant

and non-migrant men and women from their spouse and from extramarital partners. Fitting the model to the data shows that both men and women are more likely to be infected from outside the relationship than to be infected by their spouse, whether or not the man is a migrant. Disease mapping is discussed in the context of GIS and mapping/clustering technology, which improves decision-making processes in disease surveillance and control activities. GIS is used to visualize spatial patterns in the geographical distribution of disease, usually for explorative and descriptive purposes, as well as to provide information for further studies. Three case studies are presented to illustrate the use of GIS techniques in disease mapping and control among migrants. The chapter stresses the need to develop statistical methods to enable the estimation of key parameters of a disease process and to be able to evaluate the significance of some key factors that drive epidemics such as HIV. In Chapter 14 Loue discusses international legal measures to curtail globalization of disease, particularly in light of the speed and ease with which disease can spread as a result of the increased mobility of individuals for trade, tourism, and other forms of migration. The international community has made efforts to address the risk of contagion that may be associated with migration between nations. The WHO was created under the UN system as one of the first specialized agencies to develop international rules relating to the control of infectious disease. Through a series of actions, the IHR were adopted to "ensure the maximum security against the international spread of diseases." Efforts to achieve this objective have led to the establishment of a global surveillance system for various infectious diseases, requirements for health-related capabilities at ports and airports, and have set forth provisions related to a number of diseases such as the use of isolation of suspected disease carriers at border entries. The author explains that although earlier measures to control disease transmission have decreased in favor of epidemiological surveillance and improvement of basic health services, IHR measures appear to have little effect on the global control of infectious disease. Despite increased emphasis on surveillance to curtail disease globalization, many countries have adopted exclusionary provisions that deny individuals the ability to legally cross through and into their borders. Loue discusses disagreement among commentators regarding the legality of these measures under international law and the possible violation of human rights. The chapter covers issues of international protections and restrictions related to immigrants and health as well as refugees and their access to care. In conclusion, the author advises greater cooperation across countries to prevent crossborder disease transmission. In the concluding Chapter 15, Gushulak and MacPherson examine emerging and re-emerging diseases and public-health interventions in the context of migration. Public-health interventions follow a recurrent pattern of stimulus and response, which is the result of two main factors that influence the perception of threat and the subsequent conversion to a measurable and managed risk. Two major factors that link migration and disease threat and risk are: uncertainty due to limited knowledge, experience, and understanding of the disease and real and perceived disease

outcomes such as loss of livelihoods, population displacements, security considerations, economic impacts, and death. The chapter examines more closely, the roles of disease uncertainty and outcome in developing response strategies and the current nature of mobility and interventions designed to control international disease. The discussion of migration health is broken down into "five Ps" of population mobility, prevalence gaps, process, population health, and perceptions of risk, and furthered by an examination of how the five components converge. The authors continue with a discussion of the challenges and consequences of migrant health that result from globalization and state simply that population mobility globalizes disease risk. The authors point out that in the case of HIV/AIDS, in spite of significant concern and rhetoric, actual interventions have neither affected the globalization of the disease nor significantly affected global migration. Gushulak and MacPherson suggest that as mobility continues to bridge regions with different disease prevalences, public-health endeavors or plans to mitigate or manage the risks of emerging diseases must factor in the role of population mobility. The authors conclude with a discussion of necessary health interventions, implications of public-health problems on health systems, and needed international cooperation and suggest that for future health interventions and policy development, efforts need to be multi-dimensional and resources more focused at migrant source areas than simply at new arrivals (upon their arrival).

Postscript

As a multitude of factors affect the patterns and distribution of disease, the connectedness and movement of populations undoubtedly facilitates the emergence of infectious diseases and shapes the frequency, patterns, and distribution of global infectious diseases. As population mobility and the evolution of microbes continue, so will new infections continue to emerge, and known infections to change in distribution, severity and frequency. Population migration will continue to be a potent factor in disease emergence. The combination of human mobility at unprecedented levels and profound changes in the physical environment can lead to unprecedented disease spread via multiple channels. In many instances, the use of containment or quarantine is not feasible. Research and surveillance can map the global movement and evolution of microbes and guide interventions. Interdisciplinary integration of knowledge and skills from the social, biological, and physical sciences remains an imperative need, while the focus should be system analysis and the ecosystem instead of a disease, microbe, or host.

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