

MEGACITIES & Global Health

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Urban Health in the Context of Twenty-First-Century Megatrends

David Vlahov, RN, PhD

THE NINETEENTH CENTURY WAS the era of empires and the twentieth was the age of nation-states, but now the twenty-first is the century of the city. The megatrends of the twenty-first century primarily will be played out in cities and include demographic shifts, globalization, climate change, and health inequities. For better or worse, the predominant mode of living is urban, globalization is most concentrated in cities, and climate change arises from and affects cities. Health inequalities are expanding in cities, with poverty becoming urbanized, creating ever-increasing vulnerable populations. How cities are to be understood and managed is an immediate priority for protecting and promoting the population's health.

Demographic Shifts

Demographic shifts involve three elements: migration, fertility, and mortality. Migration involves "push-pull" factors that can be economic, cultural, political, or environmentally based. Examples of "push" factors include few opportunities, discrimination, political fears, natural disasters, and desertification. Examples of "pull" factors include job opportunities and better living conditions. These movements occur between and within countries, with the predominant pattern being short distances. Migration can even be observed in the form of daily commuting, which also has implications for the environment and health.

Throughout history, rural-to-urban migration has been a predominant pattern and is especially salient with the recognition, beginning in 2008, that for the first time in human history, the majority of the world's population now live in cities. Virtually all population growth during the next 30 years will occur in urban areas. By 2030, about 60% of humans will be urban dwellers, rising to about 75% by 2050 (Montgomery 2008).

Megacities are a highly visible example of this trend. In 1975, only five cities worldwide had 10 million or more inhabitants, of which three were in developing countries. The number will increase to 23 by 2015, all but four of them in developing countries. The growth rate of megacities in the developing world will be much higher than in the developed world (e.g., anticipated growth from 2000 to 2015 for Calcutta is 1.9%, vs New York City's 0.7%).

Urban growth is expected to occur slowly in megacities and faster in mid-sized cities (Satterthwaite 2000). By 2015, an estimated 564 cities around the world will contain 1 million or more residents. Of these, 425 will be in developing countries. Although large cities of developing countries will account for 20% of the increase in the world's population between 2000 and 2015, small cities (less than 5 million inhabitants) will account for 45% of this increase (United Nations Population Division 2000). Although megacities are the most visible examples of urban concern, they represent only about 6% of the world's urban population. These projections highlight the importance of viewing urban health as an international and global issue.

Creating healthy and sustainable cities represents a complex challenge. As a result of the need to accommodate population growth, most of the new city growth occurs through horizontal expansion of small and mid-sized cities. At face value, this trend might seem to mitigate risks associated with overcrowding, but in fact it brings health challenges as well. For example, horizontal growth requires longer commutes, which present sedentary-lifestyle and traffic-related health risks. Horizontal growth threatens land needed for food and water supply and therefore has implications for sustainability.

Other demographic shifts include fertility and mortality, which have shown a global decline. Urban settings provide female literacy and employment that changes the basis for valuation of women from bearing and raising children to being productive contributors to the family. Contraception and family planning, generally more available in cities, also contribute to this transition. Declines in

mortality have been observed with modernization and availability of preventive and curative care. One net effect of this is the aging of the population. By 2025, the global population of people older than 60 years will be 1.2 billion, double the number in 2000; this number is expected to more than double again by 2050. More prominent now in developed countries, this trend will be increasingly observed in developing countries. It will be most pronounced in cities, where most older people will live. How cities are organized and governed will shape how these challenges are managed.

Globalization

Globalization refers to processes that increase interdependence across borders, and although the phenomenon is not new, the pace and extent of it is. It is driven by advances in and the spread of technology; unprecedented flows of information; increased ability to travel; the migration of people, goods, and services; and creation or destruction of jobs and economic opportunity. All of these are first apparent in cities and can result in conditions that are positive or negative for health. Cities are also fundamental drivers of national economies, and certain cities host the markets and the national and multinational companies that dominate the global economy. If global economic and trade regimes address issues of fairness and equity, and national and urban governance are strong, the effects of globalization can be positive for the social, physical, and economic development of cities, taking advantage of the concentrations of population to provide efficient and accessible educational as well as health and social services. Globalization can also create unique conditions in cities for individuals and families to take advantage of economic development opportunities to increase their income, meet other entrepreneurs, or gain competitive advantage.

However, the early warning signals of the negative effects of globalization can too often be seen in cities with large populations of immigrants who are without employment and appropriate housing, education, and health services. Migrants might join the city's formal economy if the rules were designed to include and benefit them, but where this is not the case, they build an informal economy that creates their own form of advantage. Poor urban immigrants often develop or enter an informal economy of microenterprise that can account for up to 40% of a country's GDP, including remittances to relatives in depressed rural regions.

Globalization may have a considerable cultural impact, most profoundly in urban settings. As noted in the 2007 United Nations Population Fund Report,

Since the 1950s, rapid globalization has also been a catalyst of cultural change most strongly felt in cities. Advanced telecommunications and the influx of media from other regions of the world are at the core of the urban transition and have enormous impact on ideas, values and beliefs. Such transformations have not been as uniform or seamless as social scientists predicted. Urbanites may lose contact with traditional norms and values. They may develop new aspirations, but not always the means to realize them. This, in turn, may lead to a sense of deracination and marginalization, accompanied by crises of identity, feelings of frustration and aggressive behavior. Many people in developing countries also associate the processes of modernization and globalization with the imposition of Western values on their own cultures and resent them accordingly (United Nations Population Fund 2007, p. 25).

How cities are organized and governed will shape how these challenges are managed.

In this context, globalization can arise from and contribute to crime and terrorism in cities in a way that migrates to other cities. Criminal gangs are a special form of terrorism and they can have a global network. Although early forms of street gangs are viewed as only promoting criminal aims, in their later and more mature stage of development, such as the criminal and para-states that are now in direct conflict with the dominant international order, they develop political agendas. Criminal group formation and growth occur frequently in cities. One example is Mara Salvatrucha-13, or MS-13, formed by immigrants who fled the civil war in El Salvador in the 1980s (Bunker and Bunker 2010). The number "13" relates to the 13th letter of the alphabet, or "M," a reference to "La Eme," or the Mexican Mafia, a California-based prison gang that exercises control over MS-13 members and other street gangs whose members pay taxes in exchange for protection. This group of immigrants found discrimination, virtually no access to benefits, and little opportunity for advancement in the United States, a situation which was resolved by engaging in criminal activity. Prisons provided networking for the development of MS-13, which has operated for the past 15 years in and around Los Angeles. The gang is estimated to have several thousand members in multiple U.S. cities, as well as throughout Central America and Mexico, and is known for its brutality.

In a more classic example, cities have been the centers for the globalization of infectious diseases throughout history. Cities concentrate people and serve as transportation hubs, both of which facilitate transmission of infectious diseases. SARS, an acute viral respiratory infection caused by a coronavirus designated "SARS-CoV," is an example in recent times of a newly emerging infection that was transmitted rapidly through global transportation between major cities. The disease was first reported in Asia in February 2003, initially as an atypical pneumonia that was sometimes fatal, in the southern Chinese province of Guangdong. The presumed initial source was transmission of the virus through trade in the civet, a catlike mammal sold in "wet markets" (markets at which live animals are sold); however, human-human transmission by respiratory droplets was subsequently considered the major mechanism of transmission. Global dissemination began in February 2003 when a physician from Guangdong, China, visited Hong Kong and stayed in the Metropole Hotel. The physician subsequently came down with a respiratory illness that proved to be fatal and was later named SARS; the hotel occupants on the same floor subsequently became index cases for epidemics in Singapore, Toronto, Hong Kong, and Hanoi. The SARS epidemic ended in mid-2003 with a total of 8436 diagnosed cases (Zhou and Yan 2003).

SARS was almost exclusively an urban disease that was transmitted primarily within hospitals and households, and in the early phases of the epidemic there was great confusion about its cause, treatment, and prevention. Attempts to control the infection included airport screening, quarantines, hand hygiene, and masks. Health care workers were particularly vulnerable and accounted for approximately 10% of cases. Although airport screening was aggressive, the retrospective analysis suggested little benefit despite the enormous negative impact on tourism and global travel to the metropolitan areas that were heavily affected. Reducing person-to-person spread (e.g., hand washing, use of masks) best achieved ultimate control of the epidemic.

Climate Change

A third twenty-first-century megatrend is climate change (McMichael, Woodruff, and Hales 2006). Emissions of carbon dioxide and other greenhouse gases are projected to increase temperatures globally in the coming century. Cities generate 80% of all carbon dioxide and significant amounts of other greenhouse

gases. They contribute to climate change mainly through energy generation, vehicle use, industry, and burning of biomass as fuel. The densely built environment of cities creates an "urban heat island" effect, in which, due to absorption of heat by buildings and concrete surfaces, urban temperatures can be 3° to 4°C higher at any time than in adjacent rural areas. Increased temperatures lead to less outdoor activity and, indirectly, greater emission of greenhouse gases with air conditioning. Climate change can include temperature-related, extreme weather-related, and air pollution-related health effects. These effects include water-, food-, vector-, and rodent-borne diseases, food and water shortages, and population displacement. For example, as noted by Kjellstrom and Monge (2010), increased mortality during heat waves has been reported from many cities worldwide in the United States (Luber and McGeehin 2008), Europe (the most extreme being in France in August 2003; Pournadere et al. 2005), and developing countries (Hajat et al. 2005). In France, 15,000 people died during the 2-week heat wave in 2003, and a similar number died in other countries of central and southern Europe. Extreme-heat mortality is primarily an effect of overload on the cardiovascular system as a result of physiologic reactions to heat exposure (Parsons 2003). In addition, acute hospital admissions and emergency ambulance transport for heart disease, asthma, and acute kidney diseases increase during a period of extreme heat (Knowlton et al. 2009; Hansen et al. 2008; Kjellstrom et al. 2010).

One of the effects of increasing temperatures in cities is an increasing level of ground-level ozone, a result of motor vehicle emission interactions with solar ultraviolet radiation (Bell et al. 2007); and ozone formation is both faster in diffusion and greater in area when air temperatures increase. Ozone increases incidence and mortality of heart and lung diseases and causes respiratory distress symptoms (WHO 2006). Climate change is likely to create more extreme-weather incidents (Intergovernmental Panel on Climate Change 2007), which will cause droughts that can lead to more limited water and food supplies. Extreme-weather events can also manifest as floods and windy typhoons or hurricanes.

Cities are frequently situated on coasts and rivers, where they are vulnerable to climate-related changes in the form of rising sea levels, storm surges, and flooding. Floods can lead to landslides blocking roads and damaging houses, and both electricity and water supply. Floods have damaging health impacts that include drowning, injuries, and disruptions of health services (McMichael et al. 2003). The most vulnerable to these disruptions will be poor people and people with preexisting

chronic diseases or disabilities. The effects of flooding after Hurricane Katrina in New Orleans, Louisiana, on poor people, who lacked transport for evacuation, showed what might occur in affected urban areas (Sharkey 2007). Changes in temperature and humidity can also affect dispersion of infectious diseases. Mental health stress associated with increasing temperatures can be heightened.

Health Inequalities and Inequities in Cities

Although it is generally understood that city dwellers, on average, enjoy better health than do their rural counterparts, this may reflect the practice of aggregating data that provide an average of all urban residents—rich and poor—rather than disaggregating population groups by income or other measures of socioeconomic status. For example, in developing countries, slums without legal status are often overlooked in official reports used for projecting service coverage within cities; therefore, the slum populations are frequently uncounted, distorting the urban average. As a result, the different worlds of city dwellers and the substantial health challenges of the urban poor go overlooked. These differences in health outcomes within urban areas disaggregated by absolute or relative poverty are seen worldwide and for a wide variety of health outcomes. Likewise, differences in health outcomes are seen by geographic area—specific levels of infrastructure and services within cities. A child who lives in a slum in Kenya is far more likely to die before the age of 5 years than is his or her compatriot living in another part of the city that is not a slum (African Population and Health Research Center 2002). In 1990, life expectancy of Black men in Harlem, an urban area of concentrated disadvantage in New York City, was lower than among men in Bangladesh (McCord and Freeman 1990). An oft-quoted study from Glasgow, Scotland, shows dramatic differences in life expectancy by neighborhood, with lower-income neighborhoods approaching life expectancies in the cities of developing countries (Macintyre, McKay, and Ellaway 2005).

Inequalities in cities are projected to become worse. As noted already, half of the world's population is urban and the proportion is projected to increase, with two thirds becoming urban by 2030, and three quarters by 2050. Most of this projected growth is expected to be in urban slums. Poverty is becoming urbanized, and poor health is associated with individual and area poverty. *Health inequalities* refer to differences or disparities between groups. A related term is *health*

inequities, which refers to inequalities that can be corrected but are allowed to stand as a result of distorted power and decision-making arrangements. The typical approach to public health is to seek to improve the health of all residents, but additional efforts are needed to address the inequities that preserve inequalities in environment and health status.

As the four megatrends—globalization, demographic shifts, climate, and growing inequities—originate in, proceed through, and generate effects on cities, they create environments that are complex both to understand and to govern. A prominent feature of urban settings is that the disparities themselves are intensely local, with the rich in penthouses and the poor living on the street below. The megatrends, however, operate differentially on the poor.

The Urban Environment—The Urban Lens

It is important to have a framework for approaching urban health action. Urban health is not defined as addressing diseases unique to urban settings, but rather as the living conditions and influences on those living conditions that shape behavior and health itself. Those living conditions are not necessarily unique to cities, but the characteristics of size, density (with proximity and association), diversity, and complexity shape risk and approaches to addressing health in cities. Together, they provide an “urban lens” through which to view a variety of influences. Size provides scalability—presumably, the larger the population size, the more scalable a public health program or intervention, although program quality is a separate dimension to consider. Density is frequently thought of as synonymous with overcrowding and its related health risks; in fact, density, with adequate space per person, provides levels of proximity and association that create efficiencies of scale for opportunities and services. The trend toward urban areas with lower density may translate into less overcrowding, but comes with other risks, including greater expenditure on utilities, longer commutes, and social isolation.

Diversity refers to a mix of populations found in cities that bring social and cultural richness, but can also lead to cultural clashes (Massey 1996). Diversity necessitates tailoring interventions to meet the needs of different subpopulations; it also refers to the rich variety of services within urban settings that can provide both specialization and a greater variety of service options.

Finally, cities can be characterized by their complexity. Multiple systems interact; pluralistic political structures create competing stakeholders; cities are inextricably linked to other levels of sociopolitical organization, such as neighborhoods, metropolitan regions, and nation-states, each of which make demands and offer resources to the other levels; and local political and social forces create wide variations in the contexts in which public health programs are delivered.

The implications of size, density, diversity, and complexity, which vary between different urban areas, are that simple interventions are rarely sufficient to solve problems, programs may have unintended as well as intended outcomes, and generalization from one setting to another can be problematic. This contextual complexity requires a similar level of intervention complexity—an intersectoral governance approach that integrates different sectors within government and with business and community participation. Urban complexity also requires special attention to disaggregating data to the level of neighborhoods in order to identify and then address health inequities within urban populations.

Living Conditions as Determinants of Health

Urban living conditions describe the characteristics that shape the day-to-day lives of urban residents. They include population characteristics such as individual behavior and demographics (e.g., socioeconomic status), the urban physical environment, the social environment, and the service system. These urban characteristics can be viewed both as the “preexisting conditions”—which public health interventions seek to change—and as intermediate outcomes—the pathways by which interventions lead to improvements in health. The WHO Commission on the Social Determinants of Health acknowledged the centrality of “living conditions” in addressing health inequalities and inequities (Commission on Social Determinants 2008).

The urban physical environment includes geologic and climatic conditions of the site where the city is located, the air city dwellers breathe, the water they drink and in which they bathe, the indoor and outdoor noise they hear, the parkland inside and surrounding the city, and the built environment. The built environment includes housing, public facilities, highways, and streets. Planning and urban design may also influence water quality through runoff, eliminate or add

green space, influence motor vehicle use and accident rates, and contribute to the urban heat island. The urban infrastructure is also part of the physical environment and determines how a city provides water and energy to its citizens and how it disposes of garbage (Melosi 2000).

Urban social environment describes the structure and characteristics of relationships among people within a community. Components of the social environment include social networks, social capital, segregation, and the social support that interpersonal interactions provide. Comprehensive definitions of many of these factors are given elsewhere (Berkman and Kawachi 2000). A city's social environment can both support and damage health through a variety of pathways (Leviton, Snell, and McGinnis 2000; Freudenberg 2000; Geronimus 2000; Yen and Syme 1999). For example, social norms in densely populated urban areas can support individual or group behaviors that affect health (e.g., smoking, diet, exercise, sexual behavior; King et al. 2003). Social supports can buffer the impact of daily stressors and provide access to goods and services that influence health (e.g., housing, food, informal health care; Berkman et al. 2000).

Health and Social Services

Another important aspect to urban health is the array of health and social services available (Casey, Thiede Call, and Klingner 2001; Felt-Lisk, McHugh, and Howell 2002). Even the poorest urban neighborhood often has dozens of social agencies, each with a distinct mission and service package. Services available vary by type, mix, quantity, and quality.

A conceptual framework that provides broad categories, such as physical, social, and health care and social service environments permits us to isolate and measure seemingly discrete factors that affect urban populations. In reality, the effects of the physical, social, and service environments are more difficult to separate. For example, decent shelter that comes with land security and tenure provides people with a home, security for their belongings, safety for their families, a place to strengthen their social relations and networks, a place for local trading and service provision, and a means of accessing basic services.

Municipal government, markets, and civil society influence living conditions. Municipal government influences the health of urban populations by providing services, regulating activities that affect health, and setting the parameters for

urban development; it has the capacity to modify the urban physical and social environments and to deliver or oversee the delivery of public health, health care, and social services. Government activities in many sectors affect health, including those in public education, public transportation, recreation, public safety, criminal justice, welfare, housing, and employment. Local, national, and global markets play a central role in shaping the conditions that determine the health of urban populations. Markets allocate housing, food, employment opportunities, medical care, and transportation and, because of privatization, increasingly play a role in education, public safety, and other sectors previously confined to the public realm. Civil society defines the space not controlled by government or the market where residents interact to achieve common goals. These in turn are shaped by national and international trends such as migration, globalization, and decentralization. For example, in many developing countries there is very little decentralization, and most decisions are made at the national level. Although living conditions affect behavior and health, it is these other influences that shape living conditions.

The depiction of these upstream factors as structures is helpful up to a point. Addressing unhealthy and unequal living environments at the local level requires multiple partners. The term *urban governance*, formerly equated with urban management, has come to be understood as both government responsibility and civic engagement. Generally, it refers to the processes by which local urban governments—in partnership with other public agencies and different segments of civil society—respond effectively to local needs in a participatory, transparent, and accountable manner (United Nations Population Fund 2007). Complex urban problems cannot be addressed with single programs or policies, but rather by applying models of healthy urban governance that provide an approach to managing an array of programs and policies. Healthy urban governance brings together multiple sectors of government, along with civil society and business, to jointly identify priorities and solidify commitments to action.

Governance

To meet the challenges that come with the megatrends and to optimize health in cities, quality of governance is a critical factor. The form of government of individual cities, especially megacities and national capitals, is often defined by

national policy and practice. The more recent practice of decentralization of government within countries—that is, from the center to peripheral governmental bodies in regions and districts—does not always bring resources for urban management, thereby failing to consider the special needs of cities. The relationship between national or regional government and city government can be critical to the ability of cities to innovate and create systems to manage health. Such innovation is needed, because although governments have the ultimate responsibility for assuring the conditions in which their people can be as healthy as they can be, government needs partners to accomplish this.

Achieving the goal of healthy populations requires new forms of governance—the alignment of multiple interests to achieve a “shared goal” or “joined up” governance (Harpham 2009)—models that allow governmental health leaders to work effectively with their colleagues across the governmental sectors that influence health, and with nongovernmental sectors in civil society, including nongovernmental organizations, advocacy groups, business, academia, and the media. Good urban governance responds to local needs in a participatory, transparent, and accountable manner in treating current issues and planning horizons that extend beyond current needs. A number of cities have taken steps to create specific mechanisms for participatory governance to enable communities and local governments to partner in building healthier and safer cities (Montgomery 2009; Caiaffa et al. 2010). The WHO has facilitated this process through the Healthy Cities program, which includes developing political commitment to a process of achieving Health in All Policies, addressing health beyond health care (for example, by encouraging active transportation). The WHO has outlined tools to achieve Health in All Policies that include city health profiles and health impact assessments (Vlahov et al. 2010).

Summary

Cities are traditionally the economic engines for a country and increasingly are shaping the world. Urbanization encompasses the megatrends affecting global health: globalization, demographic shifts, climate change, and health inequities. Cities offer advantages and opportunities as well as threats to health for its residents. Although individual behavior shapes health and illness, the urban environment shaped by upstream influences can impact both behavior and health.

Inequities in the decision-making process of governments that exclude elements of society can preserve and maintain inequalities that impact all urban dwellers. Megacities present complexities in governance, owing to the occurrence of size, density, and diversity where inequalities and inequities are pronounced. Good urban governance that brings together the health and other sectors with authentic community participation is essential to meet these challenges and improve the health of urban populations.

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Slums, Pollution, and Ill Health: The Case of Dhaka, Bangladesh

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THE WORLD'S POPULATION IS becoming increasingly urban. According to projections by the United Nations Population Division, by the 2030 most of the developing world will contain more urban than rural dwellers (Montgomery 2008). Megacities (loosely defined as urban areas with 10 million residents) are a prominent feature of urbanization in the developing world, and two thirds of the world's megacities are located in developing countries (Cohen 2006; United Nations 2008; Saier 2007; Hossain 2008; Rasheed 2007). However, the relationship between the characteristics of megacities and the health of their residents is not always clear. Rapidly increasing populations in megacities have been linked to increased environmental pollution (terrestrial air, water, and soil quality), poor housing, high population density and crowding, and poor services such as water and sanitation. Within megacities, slum dwellers have been cited as a particularly vulnerable group. Although increased environmental pollution can plausibly be linked to adverse human health impacts, especially among slum dwellers, this relationship is confounded by the underlying poverty and lack of education of this group, which could independently lead to poor health and nutritional status.

Approximately 280 million people currently reside in megacities, and this number is likely to rise to 350 million in the coming years (Municipal Group 2004). According to Kraas, megacities are “the new phenomena of