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## Urbanization, Urbanicity, and Health

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**ABSTRACT** *A majority of the world's population will live in urban areas by 2007. The most rapidly urbanizing cities are in less-wealthy nations, and the pace of growth varies among regions. There are few data linking features of cities to the health of populations. We suggest a framework to guide inquiry into features of the urban environment that affect health and well-being. We consider two key dimensions: urbanization and urbanicity. Urbanization refers to change in size, density, and heterogeneity of cities. Urbanicity refers to the impact of living in urban areas at a given time. A review of the published literature suggests that most of the important factors that affect health can be considered within three broad themes: the social environment, the physical environment, and access to health and social services. The development of urban health as a discipline will need to draw on the strengths of diverse academic areas of study (e.g., ecology, epidemiology, sociology). Cross-national research may provide insights about the key features of cities and how urbanization influences population health.*

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### INTRODUCTION

The evolution of cities in the 20th century reflects changes in global and domestic political and economic fortunes.<sup>1-3</sup> The health of urban populations has changed as cities have evolved. Although there are few reliable data linking changes in urbanization to the changing health status of populations, health in cities has frequently mirrored the population movement and growth that have shaped the urban landscape. In the United States and in many of the world's wealthier countries, cities at the turn of the 20th century were plagued by infectious diseases associated with population crowding.<sup>4</sup> Epidemics of influenza, typhus, and tuberculosis killed millions of people in cities with poor sanitation and squalid living conditions.<sup>4</sup>

After a revival in the middle of the century, the fiscal crises of the 1970s were paralleled by growing disparities in the health of urban residents when compared with suburban and rural populations. Rates of infectious diseases, chronic diseases, and mental health disorders were higher among residents of cities than the general population.<sup>5-8</sup> In addition, the emerging human immunodeficiency virus (HIV) epidemic and the rise of cocaine use in the 1980s exacerbated the problems faced by urban areas and compounded the growing burden of urban disease.<sup>9-11</sup> A seminal article in the early 1990s found that the mortality rate among males in northern Manhattan, New York City, was higher than the mortality among men in Bangladesh.<sup>12</sup> In less-wealthy countries, infectious diseases (e.g., malaria) were the largest contributors to morbidity and mortality in urban areas throughout the 20th cen-

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tury.<sup>13,14</sup> However, at the end of the century, a growing urban middle class in many of these cities was accompanied by a rise in chronic diseases, resulting in a “double burden” of disease affecting many of the world’s most populous cities.<sup>15</sup>

The role that public health interventions played in the control of urban disease epidemics is well documented.<sup>4</sup> However, research about the features of modern urban areas and the facets of urban living that influence health has been relatively sparse.<sup>16</sup> During the past several decades, urban health research in North America focused on the burden of disease in inner-city areas.<sup>17,18</sup> Different academic disciplines have studied the health of marginalized groups without fully exploring the role that the urban context played both in the marginalization of the groups and in shaping the health status of these populations. For example, a large body of research about the health of drug users, particularly with respect to the spread of HIV and other infectious diseases, has explored individual risk behaviors that are important within this group, often with a limited focus on how living in cities affected these risk behaviors.<sup>19-21</sup> Other work has focused on the health of minority populations, groups that have historically been over-represented in urban areas. For example, there is a growing appreciation of the excess burden of cardiovascular disease and diabetes among urban African American populations in the United States.<sup>22,23</sup> However, relatively little work has been done that sheds light on the relation of this burden of disease to the concentration of minority groups in urban areas. The role that the urban environment plays in shaping health and disease is itself of interest. Understanding urban factors that are health risk or protective factors can capitalize on the positive aspects of health living and lead to the development of appropriate interventions and preventive measures.

We suggest a framework that can guide inquiry into the features of the urban environment that affect health and well-being. We build our framework on four observations. First, cities continue to grow, and a majority of people will be living in urban areas throughout the 21st century.<sup>24</sup> Second, although most reliable estimates of the prevalence of various health conditions suggest that the burden of disease in cities is greater than that in nonurban areas, this has not always been the case and is not a consistent observation across cities and diseases today.<sup>16</sup> Third, to understand urban health, we must shift our focus away from disease outcome toward urban exposures, namely, the characteristics of the urban context that influence health and well-being. Fourth, although in academic discourse it is frequently implied that cities have a deleterious effect on health, there are many positive aspects of urban living to take into account when considering factors that shape urban health. Most of our observations draw on the English language literature; the majority of this work pertains to North American cities. Although we extend our observations to the rest of the world whenever possible, the applicability of our framework to a global context remains to be tested and may serve to guide nascent urban health work in different countries.

### **THE GROWING PACE OF URBANIZATION**

The proportion of the global population in urban areas is growing. A recent report about growth of urban populations from the United Nations Population Division notes that, although just under half of the world’s current population lives in urban areas, nearly two thirds of the world’s population will live in urban areas within the next 30 years.<sup>24</sup> Global population growth between 2000 and 2030 will be primarily in urban areas, with 60.4 % of the world’s population expected<sup>25</sup> to be

urban (4.9 billion/8.1 billion people) by 2030 compared to 48.3% today (2.8 billion/6.0 billion in 2000). It is anticipated that a greater percentage of the world's population will live in urban areas by 2007. Most of the growth will occur in less-wealthy regions of the world (growth from 1.9 billion in 2000 to 3.9 billion in 2030) with the most rapid pace of growth expected to occur in Asia and Africa. While North America and Europe are currently the most urbanized regions, the number of urban dwellers in the least-urbanized region, Asia (1.4 billion), is already greater<sup>26,27</sup> than the urban population in North America and Europe combined (1.2 billion) in 2000.

The pace of increase in urban areas is projected to differ by initial size and region. The proportion of people living in megacities (cities with population greater than 10 million) is expected to rise from 4.3% of the global population in 2000 to 5.2% in 2015. The growth rate of megacities in the developing world will be much higher (e.g., anticipated growth for 2000–2015 for Calcutta is 1.9% vs. 0.4% for New York City). However, while large cities in developing countries will account for 20% of the increase in the world's population, small cities (less than 5 million) will account for 45% of this increase.<sup>26</sup> Thus, a growing number of relatively small cities throughout the world will contain most of the world's population in the 21st century, while a few megacities will undoubtedly face unique challenges. These projections highlight the importance of viewing urban health as an international issue.

### WHAT IS URBAN?

To characterize the unique role cities may play in shaping health, consideration of the definitions of *urban* is helpful. Although this discussion began with an assumption that readers share a common, clearly defined notion of what constitutes an urban area, there is little consensus among national and international bodies about what may be called urban. The US Bureau of the Census defines an urbanized area in the following way:

An urbanized area comprises a place and the adjacent densely settled surrounding territory that together comprise a minimum population of 50,000 people. . . . The "densely settled surrounding territory" adjacent to the place consists of territory made up of one or more contiguous blocks having a population density of at least 1,000 people per square mile.<sup>28</sup>

The Census Bureau thus provides a dichotomy by which territory, population, and housing units outside the specific size and density parameters are designated nonurban areas.

While the definition provides two useful parameters (size and density), it also raises questions. First, we may consider if urban exists in contrast to rural or simply in contrast to nonurban areas. Although it is tempting to classify urban versus nonurban dichotomously, a more nuanced appreciation of gradations of urbanicity may also be helpful. In the early 21st century, relatively few cities existed in isolation, clearly set apart from other urban areas by vast underpopulated space (e.g., Las Vegas). Most cities (e.g., New York City) are part of a far-reaching densely populated area that continues uninterrupted for miles beyond the city center. This last, more common, situation is also characterized by the growing convergence of urban and suburban areas in the United States. Over time, there has been expansion

of both populations and of features of urban living (and their consequences) in the periurban areas. For example, in many US cities, the late 1990s witnessed an out-migration of the health problems (e.g., HIV, violence, substance use) more typically associated with inner-city areas. Thus, a dichotomous definition of urban fails to recognize the periurban (frequently referred to as suburban or greater metropolitan areas) areas that may share some characteristics of cities and may have “typically urban” health conditions. A second set of questions that arises from the Census Bureau definition pertains to the absolute size and density parameters. Although a “threshold” population size facilitates demographic analyses, it is conceivable that areas with fewer than 50,000 people, particularly in sparse vast populated areas, may also share many characteristics of cities. For example, the city of Whitehorse, in the Canadian Yukon territory, has a population of fewer than 20,000 people. However, Whitehorse is the only large density of people for hundreds of miles and as such functions like a city for the surrounding area, sharing with cities issues of population density and heterogeneity.

The definition of urban also varies widely among countries. Among 228 countries for which the United Nations has data, about half use administrative definitions of urban (e.g., living in the capital city), 51 use size and density, 39 use functional characteristics (e.g., economic activity), 22 have no definition of urban, and 8 define all (e.g., Singapore) or none (e.g., Polynesian countries) of their population as urban. Official statistics (i.e., all the statistics above) rely on country-specific designations and do not use a uniform definition of urban. In specific instances, definitions of urban in adjacent countries vary tremendously (e.g., Burundi vs. Congo).<sup>24</sup> Thus, global statistics on urbanization depend on international definitional differences that may be as much a function of statistical expediency as of an effort to characterize urban as a distinct construct. Compounding these difficulties, definitions of urban have changed over time in different ways in different countries.

Thus, what we may call urban in different settings may have included city centers, periurban fringe cities, and densely populated isolated regions. Although this lack of uniform definition may hinder investigation of what is unique in urban versus nonurban living and its relation to health, it also highlights the dynamic nature of urban as a construct and the extent to which the process of urbanization in addition to the condition of being urban are important considerations. The diverse definitions of urban suggest that a core set of characteristics, driven by (although not exclusively) population size, density, heterogeneity, and distance from other such centers, are common to urban areas and shape the conditions of living within these areas. Both the process of urbanization and the conditions of urbanicity need to be understood to study urban conditions and how they affect health and well-being.

## **URBANIZATION AND URBANICITY**

We find it useful, when considering urban health, to consider urbanization and urbanicity as complementary dimensions that both shape health. Urbanization refers to the change in size, density, and heterogeneity of cities. Factors such as population mobility, segregation, and industrialization frequently accompany urbanization.<sup>29,30</sup> More simply stated, urbanization is the process that involves the emergence and growth (or decrease in size) of cities. Thus, the process of urbanization is not dependent on definition of urban per se, but rather on the dynamics of agglomeration of individuals. Although the pace of urbanization is independent of the base

size of the population, the population size/density of surrounding areas may shape the pace of urbanization. For example, urbanization may include the establishment (or destruction) of new buildings or neighborhoods, development (or removal) of transportation routes, and the in-migration and out-migration of people, which changes racial/ethnic composition. The process of urbanization gives rise to unique features of urban areas that merit separate study. How the dynamics of urbanization affect health can be considered with examples. An influx of impoverished persons to a city (e.g., immigration driven by food or work shortages in nonurban or other urban areas) in search of jobs and services may tax available infrastructure, including transportation, housing, food, water, sewage, jobs, and health care. Over-taxed sanitary systems may directly lead to spread of disease, as has been the case in North America and as continues to be the case in the developing world. Also, the population strain on available jobs may result in devaluation of hourly wage rates, higher unemployment, and changing socioeconomic status for persons previously living in a given city. This lowering of socioeconomic status can result in more limited access to health care and to poorer health. Therefore, characteristics of urbanization, including the intensity, rate, and duration of these changes, and the response to change may have health effects. Common mechanisms may exist through which urbanization affects health independent of the size of the city.

Urbanicity is complementary to urbanization. Urbanicity may be defined as the impact of living in urban areas at a given point in time. In a US comparison of urban versus suburban areas, Andrulis coined the term *urban health penalty*, which refers to a greater prevalence of health problems and risk factors in urban areas.<sup>31</sup> Thus, urbanicity refers to the presence of conditions that are particular to urban areas or present to a much greater extent than in nonurban areas. For example, the presence of substantial industrial pollution in some cities and the attendant higher prevalence of respiratory disease in these cities are both features of urbanicity. In contrast, we would characterize the changing levels of pollution as features of urbanization. Pedestrian motor vehicle injuries, homicide, and substance use are all features of urbanicity, conditions that are more common in urban areas than in nonurban areas. Population density and the presence or absence of transportation networks are also features of cities that may influence the health consequences of disasters. Therefore, the urban context of particular cities may affect health as well as modify the effect that unexpected stressors have on a city.

The urban condition at any given point in time may determine the scope of urbanization and is a strong predictor of urban conditions in the future. Urbanicity may therefore be a simple and more immediate means of studying the unique features of urban areas and their association with health. However, in an international context, the range of health problems facing urban areas in different parts of the world suggests that an exclusive focus on urbanicity may provide limited guidance in conceptualizing urban health. Therefore, the presence of particular risk factors and diseases in urban areas needs to be understood in terms of the processes that determine the prevalences observed. In the longer term, understanding the dynamic process of urban change and how urbanization changes the conditions of urbanicity is essential to the study of urban health.

### **THEMES IN URBAN HEALTH**

Themes for urban health research can be considered in different ways. Urban health thinking can be organized around characteristics that are unique to urban living. A

review of the English language peer-reviewed literature catalogued on MEDLINE between 1970 and 2002 pertaining to urban health suggests that the following topics have been among the most commonly discussed in the public health and medical literature: population growth, population density, race and ethnicity, vulnerable populations, socioeconomic status/poverty, disaster threats, crime, substance abuse, access to health care, the environment, patterns of health and social service networks, high levels and proximity of income inequality, and international differences. These topics relate to features of the urban context that affect health. These topics, particularly in the international literature, are relevant in different contexts. For example, provision of fresh water and removal of household wastes are considered among the biggest problems in rapidly growing urban areas in less-wealthy countries.<sup>32</sup> In contrast, rapid aging of the urban population, with attendant social isolation, is considered by several authors to be one of the primary problems facing urban areas in the developed world.<sup>33</sup>

The most common topics of concern that emerge from the urban health literature can be summarized in three principal themes: features of the social environment, the physical environment, and provision of health and social services. Within each of these themes, concerns regarding urbanization (e.g., aging or diversification of the population) and urbanicity (i.e., socioeconomic status, crime as conditions of urban living) remain important distinctions. We consider each of these three general themes that can frame the features of urban living and how they may affect health. We also offer a framework that may usefully distill a study of urban health that includes both the dominant themes of pressing concern and the disparate processes and conditions that shape these themes.

### **Social Environment**

The social environment refers to properties of the urban community (e.g., cultural milieu, social norms and networks, stressors) that affect individual behavior. Principal features of the urban social environment include socioeconomic status, crime and violence, the presence of marginalized populations (e.g., sex workers) with high risk behaviors, and the higher prevalence of psychological stressors that accompany increased density and diversity of cities.<sup>29,34,35</sup> These features of the social environment have been changing over the past century and have likely had a different effect on the health of urban populations.

For example, in the United States,<sup>36</sup> the absolute number of persons living in the 100 largest cities increased from 42 million to 56 million between 1950 and 2000. Nearly half of the 100 largest cities are now home to more minorities than whites, with 71 of these cities losing white residents and having a 43% increase in Hispanics. Immigration to cities continues; for example, there are 76 different languages spoken in Brooklyn, a single borough in New York City.<sup>37</sup> Therefore, the racial/ethnic composition of urban populations is changing.

While crime and violence plagued cities throughout the 1970s and the 1980s, there has been a recent decline in crime and an attendant decline in homicides.<sup>38</sup> The extent to which this decline in crime and homicides is due to aging, change in policing, economic prosperity, or specific changes in law/policies remains to be determined. The 2000 National Household Survey on Drug Abuse in the United States suggests that rates of illicit drug use in large urban areas continue to be high, and drug availability is higher in urban than in nonurban areas.<sup>39</sup>

Urban areas are then frequently characterized by growing population diversity, population size and density, and the presence of drugs and crime. Each of these

factors has complex relations to the health of urban residents. While population diversity may result in inter-racial stress, racial or ethnic segregation has been associated with poor health.<sup>40</sup> The inter-relation of some of these features, such as crime and drugs, is itself complex, suggesting that facets of the social environment interact to shape the risk environment.<sup>41</sup> Other facets of the urban social environment may have a positive role in health promotion.<sup>42</sup> For example, social support has been shown to be associated with cardiovascular disease mortality. Although social isolation is a problem in particular urban subpopulations (e.g., the elderly), other evidence suggests that urban social networks provide support with potentially substantial health benefits for urban residents.<sup>33,41</sup>

### **Physical Environment**

Relevant features of the physical environment important to urban areas include the built environment, air, water, and noise pollution. Environmental particulate matter has been associated with cardiovascular death and asthma.<sup>43</sup> Access to safe water, garbage removal, and sanitation become central issues in developing countries, where transmission of infectious diseases is a major public health problem. In developed countries, hazardous waste landfill sites may be associated with low birth weight, birth defects, and cancers.<sup>44</sup> Noise exposure may be associated with hearing impairment, hypertension, and ischemic heart disease.<sup>45</sup> Transportation, public and nonpublic, is another critical feature of the urban physical environment, both to facilitate population mobility in densely populated urban areas and to deliver emergency medical services. It has been shown that persons living in more densely populated cities have worse survival from acute cardiovascular events, perhaps due to the longer response times of emergency medical and fire services.<sup>46,47</sup> More recently, there has been intense interest in the effects on physical and mental health of the built environment and considerations of the design of public space. For example, it has been shown that physical availability of resources (e.g., healthy foods) is associated with a greater likelihood of urban residents eating balanced diets.<sup>48</sup> Also, living in older, unrenovated buildings is associated with a higher prevalence of asthma.<sup>49</sup> The extent to which physical space influences mental health and physical health needs investigation.

### **Provision of Health and Social Services**

Provision of health and social services is a theme in the study of the urban context and its influence on health is distinct from, although often related to, the social or physical environment. Particularly in the United States, much of the discussion about urban health has related to access to and availability of health and social services and to issues of health promotion. There are three principal sets of issues in this regard. First, persons of lower socioeconomic status and minorities, both over-represented in urban areas, are more likely not to have health insurance<sup>50</sup>; thus, they face barriers to care, receive poorer quality care, and disproportionately use emergency systems.<sup>51</sup> Other populations commonly present in cities who represent challenges are undocumented immigrants and transient populations. The greater prevalence of marginalized populations in cities likely results in a greater burden on available systems. In turn, social service provision, particularly for disadvantaged or marginalized populations, is often susceptible to changing municipal fiscal realities, with decreases in service coinciding with times of greater need in the urban population. Second, cities in wealthy and less-wealthy countries frequently have disparities in wealth between proximate neighborhoods. These disparities are

often associated with disparities in quality of care.<sup>52</sup> The presence of well-equipped, lucrative, practice opportunities in the same city decreases the likelihood that service providers will work in lower paid, public service clinics, particularly when these last services are taxed by limited resources and wavering political commitment. Although there is limited data on intraurban inequalities and their relation to health, the growing disparities within many cities are fertile ground for investigation.<sup>53</sup> Third, more positively, social service systems in cities often provide a far wider range of services than are available in smaller cities or in nonurban areas. Although use of these services may be limited by sparse staffing and by difficult, complicated access, their availability in cities suggests that resources may already exist in many urban contexts that can contribute to well-being. It is the interaction among availability of resources, quality of resources, the relative strain posed by high-need populations, and their accessibility (e.g., through public transportation routes) that is likely to shape urban health.

### AN URBAN HEALTH FRAMEWORK

We presented two key dimensions in the study of urban health—urbanicity and urbanization. We also discussed three principal themes that emerge as key conditions of urban living that shape health. These domains and themes can be conceptually unified in a framework that may be useful in guiding research. The Table presents a matrix that summarizes how we conceive of urban health as a discipline.

The key features of urban living (summarized as three themes: social environment, physical environment, and health and social services) exist both as prevalent phenomena (i.e., a condition of a given point in time) and as dynamic processes changing over time. For example, the prevalence of poverty in a given city today is a feature of that city that may affect the health of its residents. Out-migration, a feature of urbanization as the city evolves, is likely to affect both the prevalence of poverty (i.e., lower income residents may leave a rapidly gentrifying city or may enter a decaying city core) and the changing health status of the population (e.g., incoming wealthier residents may have better health status). Therefore, while the socioeconomic status of a city at a given point in time may be a useful indicator of a city's health, that particular socioeconomic status is conditional on the rate of change of the city's population and finances. It is also worth noting that poorer residents are more likely to have limited access to quality health care, thus illustrating the interdependence of some of the dominant themes in urban health. Similarly, fiscal policies that will affect the availability of health and social resources are also likely to affect poverty levels in a city and the resultant out- or in-migration of people. Therefore, urbanization may affect features of a city at any time, but these same features are likely to interact with or alter the processes that drive urbanization. As another example, while industrialization may increase pollution, it may

**TABLE. An urban health framework\***

	Urbanicity	Urbanization
Social environment	<i>Poverty</i>	<i>Out-migration</i>
Physical environment	<i>Pollution</i>	<i>Industrialization</i>
Health and social services	<i>Limited access to care</i>	<i>Changing fiscal policies</i>

\*Examples italicized.

also result in a wealthier urban population and in more generous social service policies (facilitated by wealthier municipal budgets). Thus, the effects of increasing pollution may be offset by better and more accessible health care.

These examples suggest the complex set of features of urban living that may shape health. The framework also provides a heuristic through which processes and conditions can be studied. This simplification may be useful in the multidisciplinary context needed to study urban health. Disciplines as diverse as ecology (e.g., urban disease dynamics, infectious disease reservoirs changing with increasing population density, etc.), anthropology (e.g., unique shaping of behaviors in the context of population pressures), psychology (e.g., population norms and mental health), sociology (e.g., concepts relating to linkages between persons living in urban areas, collective efficacy, etc.), demography (e.g., changing racial/ethnic populations), political science (e.g., macrostructural forces such as planning policies that shape the urban environment), and epidemiology (e.g., the associations between environmental pollution and respiratory disease) have all made contributions that guide our understanding of urban health. Interdisciplinary work is often hampered by the absence of a shared language and differences in methodology and parameters.

In the context of urban health, complementary disciplines are necessary to illuminate work that must take into consideration changing, inter-related processes that may best be described quantitatively or qualitatively. Community-academic partnerships also may be suited to the study of urban health. Although interurban research has much to offer, the urban context in a particular situation is ultimately local. As such, collaborations between researchers and community members may be relevant to the understanding of local context and how it shapes health. The framework offered here may help unify contributions from different disciplines into a coherent whole that may guide research and intervention in public health.

## CONCLUSION

The growing proportion of the world's population living in urban areas makes it imperative that we consider the features of urban living as determinants of health, and that a concerted research effort be dedicated to understanding how features of cities affect well-being. We outlined the key areas needed to develop urban health research as a viable discipline. We proposed a framework for urban health that ties together key domains and themes. We suggested that work on urban health involve experts from different disciplines and community-academic collaborations, and that frameworks and venues intended to enhance communication between urban health researchers are critical. We suggest that two steps may help establish urban health as a viable discipline. First, an international association of urban health researchers may be an important part of this process. Such an organization may serve to exchange perspectives, methods, data, and results arising from cross-disciplinary studies to develop an international health research agenda and to identify new ways to promote the health of urban populations. Second, urban health research can benefit from intercity comparisons within countries and from studying the urban environment between countries. Such work is needed to identify features of the urban environment that are associated with poor health and other features that may be health promoting. Cross-national work may provide insights about the features of evolving cities that will lead to better or worse health and may guide planning and intervention in the future.

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