

Urban Health Issues

Demographic trends suggest that there is an urgent need to consider the health of urban populations. Cities are becoming the predominant mode of living for the world's population. According to the United Nations, approximately 29% of the world's population lived in urban areas in 1950. By 2000, 47% lived in urban areas, and the United Nations projects that approximately 61% of the world's population will live in cities by 2030. Overall, the world's urban population is expected to grow from 2.86 billion in 2000 to 4.94 billion in 2030. As the world's urban population grows, so does the number of urban centers. The number of cities with populations of 500,000 or more grew from 447 in 1975 to 804 in 2000. In 1975, there were four megacities with populations of 10 million or more worldwide; by 2000, there were 18, and 22 are projected by 2015. Most cities are in middle to low-income countries; in 2000, middle to low income countries contained 72% of the world's cities.

Epidemiology can play a central role in studying both health and disease in the urban context and how urban characteristics may influence the health of populations. Characteristics of the urban environment that may shape population health include features of the social and physical environment and features of the urban resource infrastructure. Features of the social and physical environment and the urban resource infrastructure in turn are shaped by municipal, national, and global forces and trends.

Defining Urban Areas

One of the key challenges that faces epidemiologic inquiry about health in cities and how city characteristics influence health is that there is little consensus about the definition of *urban* and what constitutes a city. The U.S. Bureau of the Census defines an urbanized area by specifying a minimum population (50,000 people) and a particular minimum population density (1,000 people per square mile). The Census Bureau thus provides a dichotomy whereby territory, population, and housing units within specific size and density parameters are designated as urban and those that are outside those parameters are nonurban. However, there are inherent limitations to these definitions; urban areas exist in contrast to rural or simply in contrast to nonurban areas. In the 21st century, only a few cities, such as Las Vegas, exist in extreme isolation where what is not defined as city is rural. Most cities (e.g., New York City, London, Bangkok) are actually far-reaching densely populated areas, containing peri urban and suburban areas, which continue relatively uninterrupted for miles beyond the municipal city boundaries and the city center. To accommodate varying conceptions of what constitutes an urban area, alternative definitions have been developed. They vary in how they define rates of disease, risk, and protective behaviors.

The definition of *urban* also varies widely between countries. Among 228 countries for which the United Nations had data in 2000, almost half (100) include size and density as criteria, 96 include administrative definitions of *urban* (e.g., living in the capital city), 33 include functional characteristics (e.g., economic activity, available services), 24 have no definition of urban, and 12 define all (e.g., Anguilla, Bermuda, the Cayman Islands, Gibraltar, the Holy See, Hong Kong, Monaco, Nauru, Singapore) or none (e.g., Pitcairn Island, Tokelau, and Wallis and Futuna Islands) of their population as urban. Official statistics (e.g., United Nations statistics detailed

above) rely on country-specific designations and, as such, vary widely. In specific instances, definitions of *urban* in adjacent countries vary tremendously (e.g., Cambodia vs. Vietnam). Furthermore, definitions of *urban* have evolved in different ways in different countries. Therefore, global statistics are subject to country-level differences in the definition of *urban* that may be based on population density or specific urban features (e.g., proportion of agricultural workers, municipal services).

Urban ‘Exposure’ As a Determinant of Health

It may be heuristically and methodologically useful to conceptualize urban exposure in two main ways: urbanization and the urban environment. Epidemiologic inquiry can be guided by an understanding of how these different facets of urban exposure may influence population health.

Urbanization refers to the change in size, density, and heterogeneity of cities and provides a perspective for public health planning. Factors such as population mobility, segregation, and industrialization frequently accompany urbanization. More simply stated, urbanization is the process that involves the emergence and growth of cities. Thus, the process of urbanization does not depend 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 and 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, and changing racial/ethnic composition of cities.

How the dynamics of urbanization affect health can be considered with examples. An influx of impoverished peoples 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. Overtaxed sanitary systems may directly lead to rapid spread of disease, as has been the case many times in North America during the past century and as continues to be the case in the developing world today. 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 may lead to poorer health. Therefore, characteristics of urbanization—including the intensity, rate, and duration of such changes as well as the response to these changes—may have health effects on urban residents. Common mechanisms may exist through which urbanization affects health independent of the size of the city in question.

The *urban context or environment* can be defined as the specific characteristics or features of cities that influence health within a particular city. It is helpful to think of the urban environment as involving three distinct concepts: the social environment, the physical environment, and the urban resource infrastructure. The social urban environment comprises contextual factors that include social norms and attitudes, disadvantage (e.g., neighborhood socioeconomic status), and social capital (e.g., social trust, social institutions). The urban physical environment refers to the built environment, pollution, access to green space, transportation systems, and the geological and climatic conditions of the area that the city occupies. Features of the urban resource

infrastructure that influence health may include factors such as the availability of health and social services and municipal institutions (e.g., law enforcement). Features of the social and physical environment and infrastructural resources are all, in turn, shaped by municipal, national, and global forces and trends.

Studies of Health in Urban Populations

Three study designs—urban versus rural studies, interurban studies, and intra-urban studies—have been principally employed to consider both the health of urban populations and how characteristics of cities may influence the health of urban residents. Each has strengths and weaknesses, and these methods may lend themselves to addressing different questions. A multiplicity of methods, including qualitative and quantitative methods, may be employed within each of these designs.

Urban Versus Rural Studies

Urban versus rural studies typically contrast urban areas with rural areas in the same country or consider morbidity and mortality in urban versus nonurban areas. Essentially, these studies seek to determine whether morbidity and mortality due to a specific health outcome is different in specific urban areas as compared with specific nonurban areas.

Urban versus rural (or nonurban) comparisons are useful in drawing attention to particular health outcomes that may be more or less prevalent in urban areas and merit further investigation to examine the specific features of the urban (or rural) environment that are associated with that outcome. Recognizing that urban-rural comparisons are too blunt, more recent work has refined distinctions such as urban core, urban adjacent, urban nonadjacent, and rural. However, such studies are limited in their ability to identify what those factors may be and the pathways through which they affect the health of urban dwellers. Features of cities change over time, and some factors may not be conserved between cities (e.g., racial/ethnic distribution). Thus, it is not surprising that different urban-rural comparisons have provided conflicting evidence about the relative burden of disease in urban and nonurban areas. At best, these studies reveal gross estimates of the magnitude and scope of health measures in broad areas by geographical areas typically defined by size and population density.

Interurban Studies

Interurban studies typically compare health outcomes between two or more urban areas between or within countries. Such studies can simply identify differences between cities or can examine specific features of cities that influence health. Examples of the former are numerous. For example, Vermeiren, Schwab-Stone, Deboutte, Leckman, and Ruchkin (2003) have compared mental health outcomes among adolescents in New Haven (United States), Arkhangelsk (Russia), and Antwerp (Belgium), providing insights into the cross-cultural, cross-urban similarities and differences in antisocial behavior, depression, substance use, and suicide. A study of Puerto Rican injection drug users in New York City (United States) and Bayamo´a (Puerto Rico) revealed several differences between the two ethnically similar populations; injection drug users in Puerto Rico injected more frequently and had higher rates of needle

sharing as compared with their New York counterparts. The authors pointed to similarities in drug purity and differences in the onset of the crack epidemic as city level factors that influenced injector risk behaviors. When using the city as the unit of analytic interest, one implicitly assumes that city-level exposures are equally important for all residents. Studying differences in drug use risk behaviors among two cities does not permit analysis of differences in behaviors within cities because of location of residence, intra urban variability in barriers to safer behaviors, or variations in access to key services (e.g., drug treatment, needle exchange) provided to different urban residents. However, interurban studies such as the examples mentioned here can help guide municipal and state policymakers when making decisions on service provision throughout a city.

Intra-Urban Studies

Intra-urban studies typically compare health outcomes within cities and are being widely used to investigate specific features of the urban environment. These studies often focus on neighborhoods, specific geographic areas within a city that are generally administrative groupings (e.g., census tracts in Canada, subareas or suburbs in South Africa). However, it is important to note that administrative groupings may not represent residents' perceptions of their neighborhoods.

Intra-urban studies may contribute important insights into the relations between specific urban features and health outcomes. However, it may be difficult to generalize from one city to another. For instance, the relation between collective efficacy and violence may be modified by different levels of policing or differential access to illicit substances within a given city. Furthermore, it is important to consider that neighborhood residence is a function of geographical location and other types of social ties that are facilitated or necessitated by the urban environment.

Defining and Quantifying Urban Exposures

When considering a complex and broad exposure such as urbanization or the urban environment, epidemiologic inquiry may fruitfully be guided by considering the elements of urban areas that mechanistically may shape the health of urban populations. It may be useful to consider how the social environment, the physical environment, and the urban resource infrastructure may influence population health.

Social Environment

The urban social environment includes features such as social norms and attitudes, social capital, and income distribution. This list is by no means exhaustive; the further readings provide a more comprehensive look at the urban social environment.

Social norms are patterns of behaviors that are considered accepted and expected by a given society. From the perspective of urban health, the multiple levels of societal and cultural norms are important considerations when thinking about the behavior of urban dwellers. Persons within the urban environment may be influenced by the social norms of their local, geographically

defined community, with its unique physical and social structures and cultural characteristics. However, communities may not be limited to one geographic location. Persons in urban areas may also be influenced by the norms operating within the broader urban community.

Social cohesion is typically defined as the connectedness among groups and includes both the presence of strong intra-group bonds and the absence of intragroup conflict. Social capital, a related construct, is thought to provide resources for collective action. Both may be particularly important in densely populated urban areas, where social interaction shapes daily living. There is evidence that the absence of social capital is associated with negative health outcomes such as increases in mortality, poor self-rated perception of health, higher crime rates, and violence.

Income inequality is the relative distribution of income within a city or neighborhood and is typically operationalized with the Gini coefficient. Income inequality is thought to operate through material and psychosocial pathways to shape population health independently of absolute income. Income inequality has been associated with several health outcomes, including self-rated health, cardiovascular mortality, and consequences of illicit drug use. Additionally, emerging work suggests that intra-urban neighborhood income inequality is associated with adverse health outcomes.

Physical Environment

The urban physical environment refers to the built environment (e.g., green space, housing stock, transportation networks), pollution, noise, traffic congestion, and the geological and climate conditions of the area the city occupies. The built environment includes all human-made aspects of cities, including housing, transportation networks, and public amenities. Recent studies have suggested that poor quality of built environments is associated with depression, drug overdose, and physical activity. Green space (e.g., parks, esplanades, community gardens) has the potential to significantly contribute to the health of urban dwellers. Living in areas with walkable green spaces has been associated with increased longevity among elderly urban residents in Japan, independent of their age, sex, marital status, baseline functional status, and socioeconomic status.

Urban transportation systems include mass transit systems (i.e., subways, light rail, buses) as well as streets and roads. Urban transportation systems are key in the economic livelihoods of city residents as well as cities as a whole. On the other hand, there are significant health considerations for mass transit and roadways, including security and violence, noise, and exposure to pollutants. These exposures are relevant not only for transit workers but also for transit riders.

Pollution is one of the well-studied aspects of the urban physical environment. Urban dwellers are exposed to both outdoor and indoor pollutants that include heavy metals, asbestos, and a variety of volatile hydrocarbons. For example, one study conducted by Ruchirawat et al. (2005) in Bangkok (Thailand) reported high levels of benzene and polycyclic aromatic hydrocarbons among street vendors and school children sampled from traffic-congested areas as compared with monks and nuns sampled from nearby temples.

Urban Resource Infrastructure

The urban resource infrastructure can have both positive and negative effects on health. The urban infrastructure may include more explicit health-related resources such as health and social services as well as municipal structures (e.g., law enforcement), which are shaped by national and international policies (e.g., legislation and cross-border agreements).

The relation between availability of health and social services and urban living is complicated and varies between and within cities and countries. In wealthy countries, cities are often characterized by a catalog of health and social services. Even the poorest urban neighborhood often has dozens of social agencies, both government and nongovernmental, each with a distinct mission and providing different services. Many of the health successes in urban areas in the past two decades, including reductions in HIV transmission, teen pregnancy rates, tuberculosis, and childhood lead poisoning, have depended in part on the efforts of these groups. For example, social and health services may be more available in cities than in nonurban areas, contributing to better health and well-being among urban residents. Despite wider availability of social and health services in cities, many cities experience remarkable disparities in wealth between relatively proximate neighborhoods. This variance is often associated with disparities in the availability and quality of care. Low-income urban residents face significant obstacles in finding health care both in wealthy and less wealthy countries.

Municipal, National, and Global Forces and Trends

Municipal, national, and global forces and trends can shape the more proximal determinants of the health of urban populations. For example, legislation and governmental policies can have substantial influence on the health of urban dwellers. Historically, municipal regulations regarding sanitation in the 19th and 20th centuries facilitated vast improvements in population health and led to the formation of national groups dedicated to improving population health such as the American Public Health Association. A contemporary example of the power of legislation to influence health has been ongoing in New York State since the early 1970s. In 1973, the New York State Legislature, with the encouragement of then Governor Nelson Rockefeller, enacted some of the most stringent state drug laws in the United States. Characterized by mandatory minimum sentences, the Rockefeller Drug Laws have led to the incarceration of more than 100,000 drug users since their implementation. Those incarcerated under the Rockefeller Drug Laws overwhelmingly are New York City residents (78%) and Black or Hispanic (94%). Ernest Drucker (2002) estimated the potential years of life lost as a result of the Rockefeller Drug Laws to be equivalent to 8,667 deaths. Regional and global trends can affect not only urban living but also the rate and process of urbanization or deurbanization. Changes in immigration policies or policy enforcement can affect urban dwellers in a variety of ways, including, but not limited to, changes in access to key health and social services for some subpopulations, changes in community policing practices, and changes in social cohesion and levels of discrimination. Terrorist attacks in urban centers (e.g., Baghdad, Jerusalem, London, Madrid, and New York City) are associated not only with morbidity and mortality among those directly affected by the event but also with significant psychological distress for other residents of the cities. Armed conflicts have resulted in mass displacement of individuals, some of whom have fled cities for other cities, regions or countries, or camps for displaced individuals (e.g., Darfur).

Future Research

Global demographic trends suggest that urban living has become normative, and there is an urgent need to consider how urban living may influence the health of populations. Epidemiologists may fruitfully be engaged in studying how urban characteristics—including features of the social and physical environment and features of the urban resource infrastructure—can influence health and disease in the urban context. The study of urban health requires a multidisciplinary perspective that can consider different types of studies, including inter and intra-urban studies and urban-rural comparisons. Epidemiologists' work in the area can complement the work of public health practitioners, urban planners, as well as social, behavioral, clinical, and environmental health scientists in conjunction with the active participation of community residents and civic, business, and political leaders.

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