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Urban Environmental Issues in the Developing Countries in the Clobalisation Era

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ABSTRACT

Urban living is the keystone of modern human ecology. Cities have multiplied and expanded rapidly worldwide over the past two centuries. Cities are sources of creativity and technology, and they are the engines for economic growth. However, they are also sources of poverty, inequality, and health hazards from the environment. Urban populations have long been incubators and gateways for infectious diseases. The early industrializing period of unplanned growth and I This occurred in response to environmental blight, increasing literacy, the development of democratic government, and the collective accrual of wealth. In many low income countries, this process is being slowed by the pressures and priorities of economic globalization. Beyond the traditional risks of diarrhoeal disease and respiratory infections in the urban poor and the adaptation of various vector-borne infections to urbanization, the urban environment poses various physicochemical hazards.

INTRODUCTION

Urban living is the keystone of modern human ecology. Cities have multiplied and expanded rapidly worldwide over the past two centuries-Cities are sources of creativity and technology, and they are the engines for economic growth. However, they are also sources of poverty, inequality, and health hazards from the environment. Urban populations have long been incubators and gateways for infectious diseases. The early industrializing period of unplanned growth and laissez-faire economic activity in cities in industrialized countries has been superseded by the rise of collective management of the urban environment. This occurred in response to environmental blight, increasing literacy, the development of democratic government, and the collective accrual of wealth. In many low income countries, this process is being slowed by the pressures and priorities of economic globalization. Beyond the traditional risks of diarrhoeal disease and respiratory infections in the urban poor and the adaptation of various vector-borne infections to urbanization, the urban environment poses various physicochemical hazards. These include exposure to lead, air pollution, traffic hazards, and the “urban heat island” amplification of heat waves. As the number of urban consumers and their material expectations rise and as the use of fossil fuels increases, cities contribute to the large-scale pressures on the biosphere including climate change. We must develop policies that ameliorate the existing, and usually unequally distributed, urban environmental health hazards and larger-scale environmental problems.

Introduction Homo sapiens is undergoing a radical transformation of its ecology The proportion of the world’s population living in large towns or cities has grown from around 5% to 50% over the past two centuries. Demographers estimate that by 2030 approximately two-thirds of all people will live in large towns or cities. The human population is thus becoming urbanized. In future, urban populations will have a distinctly higher proportion of older people than they do today. Urban migration reflects many things: the advent of industrialization, insecurity about the availability of food in rural areas, the search for refuge from conflict and environmental damage and the lure of jobs, amenities and stimulation. Africa, where the relation between economic development and urbanization is weaker than in other regions, is currently the least urbanized major region in the world. Nevertheless, it is also the most rapidly urbanizing region. In sub-Saharan Africa much of the rapid growth in the urban population reflects a combination of flight from rural poverty and high fertility rates in urban areas. In Latin America, in contrast, urban growth has been driven more by the pull of industrialization and economic opportunity. Hence, urban growth has slowed in Mexico City, Sa~o Paulo and Buenos Aires during the past decade of economic recession (1). Historical perspective Cities have historically been associated with the evolution of ideas of public health and practice. The modern public health revolution began in European cities in the 19th century where, under the pressures of industrialization, poverty, crowding and the breakdown of traditional ways of living, the conditions of daily life had deteriorated for most people. The economic historian Szreter argues that in England, which led the industrial revolution, rapid economic growth in the first half of the 19th century disrupted traditional structures of authority, social relationships and ideologies.

This caused urban environmental blight, the flight to the outer suburbs by the economically better off, further worsening of deprivation in inner urban areas, and increases in disease and death (2). In mid-19th century England those in the suburbs largely ignored the plight of the urban poor. The resultant policy stasis and the growing crisis of urban poverty, disease and overflowing workhouses precipitated Chadwick’s report on the conditions of workers (3). Chadwick argued that averting additional environmental degradation would remedy the social crisis more effectively than would further workhouse “relief under the provisions of the Poor Law of 1834, the law that required the unemployed poor to work for their daily subsistence.

Even so, within the prevailing laissez-faire ethos, the struggling middleclass representatives of inner urban electorates were too preoccupied with the immediacies of their own commercial survival to embrace grander urban improvement schemes. Hence, Chadwick’s centrally controlled programme to develop a network of local boards of health, established under the 1848 Public Health Act, met with widespread resistance from unsympathetic local politicians. The composite problem of economic deprivation, urban squalor and severe health inequalities was eventually remedied by devolving sanitary powers to local municipalities through the Sanitation Act of 1866 (2, 4). Over the next three decades urban authorities in England, using new sanitary technologies and public borrowing, transformed sewage and water services from private enterprises to public services. There is a contemporary relevance to this historical account: the failure of many large cities in low-income countries to implement similar changes has left them with problems of environmental blight, inadequate housing, poverty and disease.The process has been further slowed in many countries by the pressures, distortions and priorities of economic globalization. Until the

second quarter of the 20th century, the dominant cause of mortality among industrialized urban populations was infectious diseases. However, mortality from infections had begun to decline during the 19th century. McKeown attributes most of the decline in mortality after the 1850s to improvements in social and environmental factors (5). He emphasizes that improvements in food supplies and nutrition boosted biological defences against infectious diseases. He notes that better housing, safer water supplies, increasing literacy and the idea of domestic hygiene gave further protection to infants and children. Various commentators have broadly concurred with McKeown.

However, others have emphasized the important role of deliberate public health interventions including sanitary engineering, refuse disposal and vaccination (6). In France, for example, substantial gains in life expectancy emerged first in Lyon in the 1850s, then in Paris during the 1860s and 1870s (albeit more slowly), and then in Marseille around 1890; each gain was directly associated with the deliberate improvement in the supply of public water and sanitation in each of these cities (7). As industrialization intensified the general absence of air quality controls allowed pollution levels to increase in industrialized cities. Spectacular episodes of air pollution occurred during the mid- 20th century in Europe and North America, including the great London smog during the winter of 1952. These experiences ushered in new legislation, which has since led generally to a decrease in air pollution in developed countries. The various major categories of air pollutant have followed a multiphasic trajectory (7). Smoke emissions from William Blake's "dark satanic mills" of industrialized Europe began to decline in the early 20th century, and sulfur dioxide emissions declined from the middle of the century.

However, emissions of carbon dioxide and very fine particulates are still rising. The rise and fall, or "inverted U", trajectory displayed by measurements of smoke and sulfur dioxide is sometimes referred to as the "environmental Kuznets curve"; this refers to the graph described by the economist Kuznets in the 1950s of the increase and then decrease in income disparities within a country that occurred as industrialized countries grew wealthier. Not all urban environmental pollutants, however, have followed this trajectory (8). For example, household sanitation problems in western countries have been on a downwards trajectory (decreasing) since the early stages of industrialization, but carbon dioxide emissions and consumer wastes are continuing on an upward trajectory (increasing).

The current trend for these latter pollutants will, presumably, turn out to be the up slope of the longer span of the inverted U. This sequence of rise and fall in environmental contaminants is not a law of nature. In the megacities of the developing world, such as Mexico City, Sa~o Paulo and Delhi, residents often face the worst of both the traditional and modern worlds. They encounter a wide spectrum of pollution ranging from a lack of sanitation (with exposure to human excrement and unsafe drinking-water) to exposure to hazardous synthetic organic chemicals in their air, food and water. In Delhi, India, for example, the coliform count in the city's main river, the Yamuna, increases 3000-fold from the time it enters the city to the time it leaves (9). That stretch of the river also receives about 20 million litres of industrial effluent. Meanwhile, Delhi's air quality, especially in the colder months, is among the worst in the world (10). Chaplin argues that there are three reasons why a successful urban sanitation programme has not arisen in India (4).

Firstly, local government in urban areas lacks the resources and commitment to counteract problems in inner urban areas that are associated with poverty, overcrowding and haphazard urban growth. The influential middle classes and upper classes have relocated to new, leafier, suburbs. In the atmosphere of indifference both corruption and incompetence flourish.Secondly, there is no manifest political threat from the illiterate, fragmented, relatively powerless, urban poor. Thirdly, the availability of vaccinations, antibiotics and effective domestic plumbing have rendered the middle class oblivious to the environmental health hazards faced by the poor. Modern medicine and sanitary technology insulate the middle class from the threats of infectious diseases.

The three main pathways through which the urban environment impinges on human health are through the social changes that accompany urbanism and the way in which these changes alter behaviour based risks to health; the way that the physical urban environment poses various microbiological risks and risks of toxicity; and the way that the larger-scale environmental impact of modern urban populations creates wider-spread and longer-term risks to health through their disruption of the life-support systems of the biosphere. Urbanism: changes in social relationships and individual behaviour Urbanism potentiates many changes in human behaviour that affect disease risks. For example, cities are characterized by high levels of tobacco smoking, traffic injuries, fatalities and adult obesity (11).

The increase in the incidence of obesity illustrates several aspects of urban living. Among city dwellers, it reflects the combination of easier access to energy-dense processed foods and a decline in physical activity at work, at home, and recreationally. Typical urban living thus entails an imbalance in the energy budget that leads to obesity, and this greatly increases the risk of high blood pressure and type II (adult onset) diabetes (11, 12). The urban facilitation of microbial traffic, via the increased intensity and diversity of human mobility, contact and sexual behaviours, may have been critical in launching the otherwise poorly transmissible human immunodeficiency virus (HIV) in the 1980s (13). Urbanism, increased mobility and the relaxation of traditional cultural norms yield new patterns of human behaviour, including changes in sexual activities and the use of illicit drugs (14). The extensive transmission of the human immunodeficiency virus in the 1980s and 1990s owed much to the combination of new sexual freedoms, movement between urban and rural areas, and long distance travel. Similarly, reported rates of food poisoning have increased in industrialized countries during the past two decades and have almost doubled in the United Kingdom between the mid-1980s and mid-1990s (15). This probably reflects a mixof factors including increasingly long "supply lines" between production and consumption in complexurban social environments, changes in consumer behaviour and, perhaps, consistently warmer summers since the 1970s.

However, urban life also confers many health benefits. Within cities, there is readier access than in rural settings to health services, education, and financial and social services. Community life can be rich and fulfilling. The urban environment is diverse, stimulating and full of new opportunities. Individual and family mobility make it easier than in a conservative rural community to escape from oppressive social relationships. On the other hand, cities are often impersonal, alienating and sometimes menacing. Microbiological, physical and chemical hazards Large cities in the least developed countries typically combine the traditional environmental health problems of poverty, particularly respiratory and enteric infections, with those of poor quality housing and unregulated industrialization. Residents therefore are often at risk from diseases and injuries associated with poor sanitation, unsafe drinking-water, dangerous roads, polluted air, indoor air pollution and toxic wastes.

The United Nations Centre for Human Settlements has written mat "the deterioration in the built environment is sharply in evidence throughout most of urban Africa... This trend seems to have been accentuated by the effects of structural adjustment in many countries, according to which urban workers lost more than rural smallholders" (16). In developing countries infant mortality is typically four or more times higher in poorer segments of urban populations than in richer segments. There are also large differences between richer and poorer populations in the incidence of environmentally related infectious diseases such as tuberculosis, typhoid and cholera, and in exposure to local air pollution and indoor air

pollution (1). Psychosocial health problems are also related to income including depression, alcohol and drug abuse, suicide, violence and murder. In large cities everywhere, poor people are the main victims of property crime, assault, rape and murder. In response, the richer people raise higher barricades and employ more security guards.

The vulnerability of poor people then increases further because the adaptive behaviours of crime and violence are inevitable with high levels of unemployment and poverty. Poverty, then, is more than income deprivation. Urban poverty is the most important predictor of environmental health risks when its definition includes other forms of deprivation such as physical assets, political influence, access to basic services and access to social capital (17). Satterthwaite concluded that: "Although considerable progress has been made since 1990 in improving housing conditions for lowincome groups in certain cities and more effective approaches are now being more widely applied, the number of people suffering serious environmental health burdens in urban areas probably increased significantly during the 1990s — in part because urban populations continue to grow rapidly in most of Africa, Asia and Latin America, in part because of weak and ineffective urban governance, in part because of continued increases in urban poverty in many nations" (18). He argues that what is often forgotten is the contribution towards reducing poverty that is made through the health benefits gained by improving housing and providing clean water, sanitation and waste removal.

Microbiological hazards As it reshapes modern human ecology, rapid urbanization is expanding the traditional role of cities as gateways for infections. Crowding and unsanitary conditions are important amplifiers of the transmission of infectious diseases: many infectious diseases thrive where there is a lack of water, and inadequate drainage, sanitation and solid waste removal. Population movement from rural areas into cities and greater mobility within cities are bringing new opportunities for otherwise marginal and obscure microbes (19). Research in Kwa-Zulu Natal, South Africa, has shown that the vector-borne disease schistosomiasis is spreading to urban areas through the migration of the rural population to informal settlements around the cities (20).

For similar reasons, including poor sanitary facilities, filariasis, another vector-borne infection, (also known as elephantiasis and spread by a culicine mosquito that breeds in contaminated pools of water) has been spreading in towns in Recife, in north-eastern Brazil (21). Yellow fever, plague (especially in Madagascar), Lyme disease and cutaneous leishmaniasis have all become more urban in their distribution, reflecting ongoing changes in human demography and behaviour and in the environment as urbanization proceeds (22). A new concern is that as global temperatures continue to rise, which they have done over the past quarter of a century, mosquitoborne infections, such as malaria, will become more prevalent in highland cities in low-latitude countries (such as Nairobi and Harare).

Recent movements of such vector organisms and their diseases to higher altitudes may be an early response to climate change (23), although causal attribution remains difficult because of the limited evidence. Associated with this is the belief held by some climatologists that rainfall patterns will intensify as a result of global warming and more local flooding will occur, facilitating the breeding of mosquitoes and causing microbiological contamination of urban sources of drinkingwater. The advance of dengue fever in tropical and subtropical zones has been aided by the expansion in urban areas of breeding sites for the Aedes aegypti mosquito. This disease is now the most frequently occurring vector-borne infectious disease in urban areas.

The more recent spread (particularly via the international trade in used car tyres that contain mosquito eggs) of the second mosquito vector of dengue fever, Aedes albopictus, has increased the risk of infection in urban settings in several subtropical and warmer temperate zones. Physical and chemical hazards The modern urban environment combines industrialization, crowding, waste generation, and dense transport systems. This combination, compounded by the periurban poverty that surrounds many cities in developing countries and the poverty of inner urban areas in cities in the developed world, introduces many environmental health hazards (1,24).

These may be overt, as in the cases of road trauma or the increase in asthma attacks that occurs during episodes of high air pollution, or more insidious, as with exposure to environmental lead. Environmental lead exposure. In 1997, the World Bank made the phasing out of lead in petrol the top priority of its 10 main objectives for improving health and the environment (25). Exposure to lead has developed in the urban environment over many decades; the lead comes from industrial emissions, house paints and the use of leaded motor fuel (24, 26). Many high-income countries, including the United States and Australia, have recently set new, lower standards for environmental exposure to lead to protect young children. However, childhood lead poisoning—a particular hazard in the neurocognitive development of children — is an increasing problem in many low-income countries, especially in urban environments. High concentrations of lead in blood have been observed in cities such as Bangkok, Jakarta, Taipeh, Santiago and Mexico City (7, 26).

In Dhaka, Bangladesh, the airborne lead concentration is one of the highest in the world, and the mean concentration of lead in blood in 93 randomly chosen rickshaw pullers was 53 mg/dl, five times higher than the acceptable limit in high-income countries. The lead content of petrol sold in Africa is the highest in the world and is associated with high concentrations of lead in the atmosphere, dust and soil. Many other exposures in Africa come from industrial sources, cottage industries and domestic sources. In recent surveys, more than 90% of the children in the Cape Province, South Africa, had lead concentrations in blood over 10 mg/dl (27). The best available estimate of the neurotoxicity of lead at low doses in childhood comes from cohort studies conducted in industrialized urban populations. These studies indicate that preschool-aged children whose blood concentrations of lead are in the top and bottom quintiles, and which thus differ by around 10 mg/dl, have a persistent 2-3% difference in measures of intelligence (28).

Leadinduced deficits in children's intelligence are therefore probably widespread in cities of developing countries that have persistently high levels of environmental exposure to lead. Urban transport and air pollution. One consequence of the global influence of transnational corporations is that private car ownership is increasing spectacularly. In 2000 there are more than 750 million cars in the world. This rapid growth in car ownership reflects the influence of advertising, the power of the roads lobby, the wealth of consumers and their desire for status, comfort and mobility. In cities where there is no public transport, private cars are especially desirable. Car congestion is now endemic in cities everywhere (29).

In addition to the fragmentation of neighbourhoods, intrusive noise, and restrictions on physical exercise, there are three broad categories of public health hazard from urban car traffic. Firstly, over 750 000 people die from car crashes annually, including car occupants, pedestrians and cyclists, most of them in developing countries (30). Secondly, emissions from vehicles cause local air pollution, particularly photochemical smog during summer. Urban air pollution has, in recent decades, become a worldwide public health problem, particularly in many large cities in the developing world. An estimated 130 000 premature deaths and 50-70 million incidents of respiratory illness occur each year due to episodes of urban air pollution in developing countries, half of them in East Asia (31).

In Mexico City, for example, three-quarters of the air pollution is caused by motor vehicle exhaust, and nearly half of the toxins within that pollution come from the same source (32). In Sa~o Paulo, which currently has a population of around

17 million, rapid development has created a culture of car dependency, with little investment in the subway and rail systems. The proportion of trips in a motorized vehicle taken by car in Sa~o Paulo has doubled over the past quarter of a century, from around 25% to 50%; the number of vehicles in the city is estimated at five million, two thirds of which circulate within the city each day (33).

Studies elsewhere have shown that increases in airborne nitrogen oxides and fine particulates are followed by an increase in the incidence of, and mortality from, respiratory diseases in children and the elderly over the ensuing several days. The local topography and climate exacerbates air pollution in winter, when strong thermal inversions trap the pollutants close to the ground (33). Thirdly, exhaust emissions contribute to acid rain and to the global accumulation of carbon dioxide. Each of these have wide ranging consequences for human health. In developed countries, traffic exhaust accounts for approximately onequarter of all carbon dioxide emissions. Heatwaves, urban vulnerability and mortality.

Heatwaves adversely affect health. The frequency and intensity of heatwaves will likely increase over the coming century as world temperatures rise (34). The impact of heatwaves on mortality is typically greatest in the centre of large cities, where not only do temperatures tend to be higher than in the suburbs and surrounding countryside but night-time cooling is lessened. This “heat island” effect is caused by the large heat-retaining structures and treeless asphalt expanses of inner cities and the physical obstruction of cooling breezes. Studies of heatwaves have shown that those who are most vulnerable to heat-related illness and death are elderly people, those who are sick and poor people living in urban areas.

In the United States in July 1995 more than 460 extra deaths occurred as a result of a heatwave in Chicago during which temperatures reached 40 oC. The rate of heat-related death was much greater among African Americans than the rest of the population and among people who were confined to their beds or poorly ventilated inner-city apartment blocks (35). In the severe heatwave in England and Wales in 1995, a 10% excess of deaths occurred, particularly in the adult age ranges, from respiratoiy and cerebrovascular disease (36).