

Part Three

03

ENVIRONMENTAL HARMONY

Like any other organic system, cities consume, metabolize and transform energy, water and materials into goods and waste. Part 3 presents an analysis of energy consumption at the city and household levels, which clearly shows that consumption patterns vary widely between developed and developing regions and between low- and high-income households. Although cities consume a disproportionate share of the world's energy, and are responsible for a large share of climate-changing greenhouse gas emissions, Part 3 clearly shows that it is not the level of urbanization in a country or the size of a city that determine the quantity of greenhouse gas emissions per capita; rather, the level of emissions is determined by other factors, such as consumption patterns, lifestyles, income levels, urban form and structure and national and local environmental policies.

Part 3 also presents detailed information on how climate change will impact coastal urban settlements that may be adversely affected by climate change and rising sea levels. Using various examples, this Part also shows how cities present a real opportunity to minimize environmental impacts by improving energy efficiency, minimizing urban sprawl, promoting the use of energy-efficient public transport and improving disaster preparedness.





3.1

Urban Environmental Risks and Burdens



▲
Cairo's rooftops.
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By 2030, 60 per cent of the world's population will live in urban areas. From a sustainable development perspective, the welfare of future generations depends on how well present generations tackle the environmental burdens associated with urban living. Environmental harmony – between rural and urban areas, and within cities – is a growing concern among urban planners, policymakers and environmentalists.

Cities, when not properly planned, governed or managed, can easily threaten the quality of the air, the availability of water, the capacity of waste processing and recycling systems, and many other qualities of the urban environment that contribute to human well-being.

Low-income groups, particularly those living in slums or deprived neighbourhoods, are particularly vulnerable to the environmental and health risks associated with poor air quality, lack of safe water and poor sanitation. Cities in developing countries tend to struggle most with localized, immediate and health-threatening environmental issues belonging to the “brown” agenda, such as lack of safe water, inadequate sanitation and poor waste management, while cities in high-income industrialized countries are dealing more with the “green agenda”, including non-point source pollution and consumption-related burdens, including greenhouse gas emissions that have a global and intergenerational impact.

At the global level, urban environmental burdens are

associated with energy consumption patterns and land use changes that can lead to a rise in greenhouse gas (GHG) emissions – the leading cause of climate change. The global environmental burden of urban activity is often measured through aggregate indicators such as ecological footprints. Although cities and urban-based activities are usually blamed for the increase in GHG emissions globally, UN-HABITAT analyses show that the contribution of cities to GHG emissions is more related to consumption patterns and gross domestic product (GDP) per capita than it is to levels of urbanization.

Environmental burdens in cities of the developing world

Urban environmental burdens may be analyzed at two levels – at the urban and the household level.

At the urban level, the most visible urban environmental burdens are those associated with the environmental and ecological degradation that occurs in and around urban areas as a result of the concentration of production and consumption activities, including industry and motorized transport. Examples include air pollution, urban ground and surface water extraction and contamination, urban waste dumping, the expansion of built-up areas and its effect on natural areas, agriculture, and biodiversity. At the household level, environmental burdens are expressed as environmental hazards in and around people’s homes and workplaces that result from poor living conditions (e.g. inadequate access to water and sanitation, indoor air pollution, neighbourhood waste accumulation, pest infestation, and the like). These burdens are particularly acute and dramatic where persistent poverty and precarious conditions have been geographically or socially concentrated. Lack of access to adequate sanitation, in particular, is associated with a variety of health and environmental risks. Currently more than a quarter of

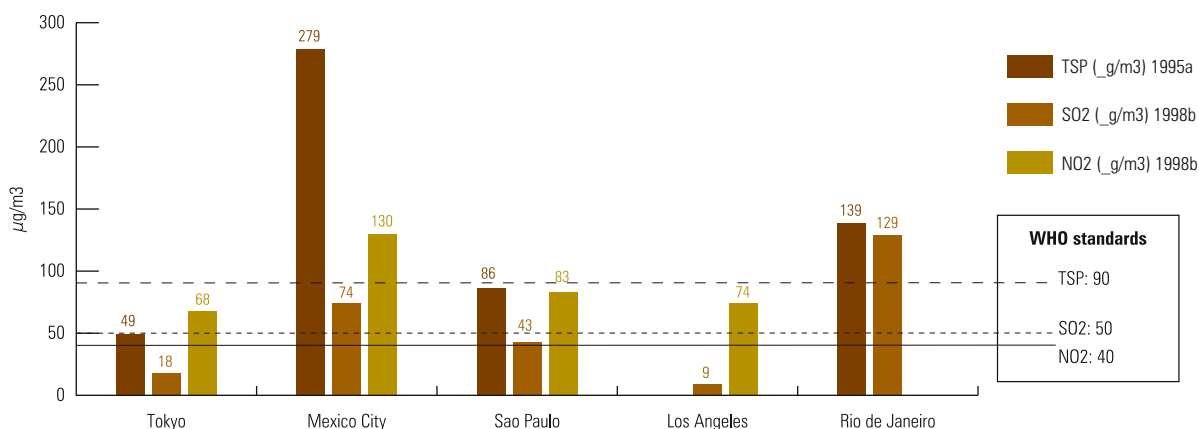
the developing world’s urban population lacks adequate sanitation. The problem of inadequate sanitation in urban areas is particularly acute in sub-Saharan Africa, Southern Asia and Eastern Asia, where 45 per cent, 33 per cent and 31 per cent of the urban population do not have access to a proper toilet, respectively. Poor hygiene and lack of sanitation account for 1.6 million deaths a year globally.

Air pollution

Air pollution has led to an increase in the incidence of disease and ill health in several developing countries; in many of these countries, lower respiratory disease linked to air pollution is a leading cause of premature death. Middle-income, newly industrializing countries are also facing new challenges associated with the exploding growth in motorized transport and industrialization, such as increase in water and air pollutants. Cities in China and India, for instance, which are experiencing exceptionally high economic growth rates of more than 9 per cent per year, have extremely high levels of air pollution compared to the global average.

The World Health Organization (WHO) estimates that more than 1 billion people in Asia alone are exposed to outdoor air pollutant levels that exceed WHO guidelines, leading to the premature death of half a million people annually. Concentrations of airborne pollutants in many large metropolitan areas in Latin America and the Caribbean also surpass recommended limits. Transport is a major source of direct and indirect air pollution in many Latin American cities. Since polluted air can aggravate existing health conditions and cause increased sensitivity in healthy people, interventions to improve air quality have positive health impacts for all. WHO’s Global Burden of Disease project attributes 58,000 annual premature deaths to urban air pollution, which also accounts for 507,000 years of life lost (disability adjusted) in

FIGURE 3.1.1: AIR QUALITY IN MEGA CITIES



Source: UN-HABITAT, *Global Urban Observatory*, 2008. Data is from Molina and Molina (2002:5)
 Note: Data is for the most recent year between 1990 and 1998. Most is for 1995.
 (TSP: Total Suspended Particles, SO2: Sulfur Dioxide, NO2: Nitrogen Dioxide)

Bangkok's strategy to tackle air pollution

As a consequence of population increase, city development and a growing number of motor vehicles on its roads, Bangkok, the capital of Thailand, has experienced serious air pollution problems over the past several decades. Measures recently adopted by the Thai government, however, have helped the growing city manage its air quality, putting Bangkok on the path to cleaner air and better quality of life for its residents.

Transport is the greatest source of air pollutants in Bangkok. Street-level concentrations of air pollutants along the city's major roads can reach hazardous levels, owing to increased numbers of high emission motor vehicles coupled with long distances traveled and extreme traffic congestion. The number of motor vehicles registered in Bangkok soared from 600,000 in 1980 to 4,163,000 at the end of 1999 – a seven-fold increase. Between 1999 and 2007, vehicle registrations continued to rise. By the end of 2007, there were 5,614,294 vehicles choking Bangkok's inadequate street and roadway networks, comprising 3,208,462 passenger cars; 2,261,545 motorcycles; 110,571 trucks; and 33,716 buses.

Results of ambient air quality monitoring indicate that the air pollutants of concern in Bangkok are particulate matter (PM), ozone (O₃), carbon monoxide (CO), sulfur dioxide (SO₂), and nitrogen dioxide (NO₂). The ambient air quality in the city and in general background and roadside areas is shown in Figure 1. This illustrates that PM (PM₁₀ and total suspended particles) is the pollutant of greatest concern, and the pollution near roads is more serious than elsewhere in the city.

The Royal Thai Government has adopted a number of measures to mitigate Bangkok's air pollution problems, focusing on maintaining a good quality of life for the general public. The government's ultimate goal is to bring emissions and ambient air quality in line with the National Air Quality Standards or better. One important milestone was the elimination of lead from gasoline in 1996. Now, the ambient air lead concentration in Bangkok is near zero.

Since the 1990s, the government has facilitated ongoing collaboration among the municipality of Bangkok, various sectors impacting air pollution, and the public, resulting in the adoption of air pollution



▲ Bangkok's Skytrain.
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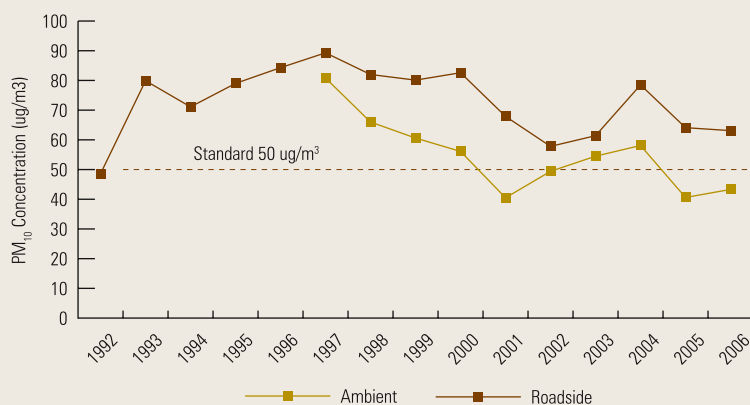
control strategies for transport-related sources, such as improving fuel quality; enforcing emission standards for new and in-use vehicles; implementing an inspection and maintenance program; reducing vehicle kilometers traveled; and performing roadside inspection, traffic management and gasoline vapor recovery. Air pollution control strategies for stationary sources have also evolved, including requiring environmental impact assessments, enforcing emission standards and fuel oil standards, and implementing monitoring requirements.

To provide transport alternatives and decrease the number of vehicles on the roads, Bangkok developed a new public transport system,

featuring a subway line and an above-ground Skytrain, in 2004. The mass-rapid-transit system has helped improve air quality somewhat, but the limited area covered by the system does little to alleviate traffic and curb the city's overall pollution. Bangkok is now working to expand the distance reachable by Skytrain, which will help ensure good air quality even while the population increases.

Thailand has succeeded in mitigating air pollution in Bangkok, but the government continues to conduct research to make use of new knowledge and keep up with rapidly advancing technology. Thailand is disseminating and sharing its experiences in air pollution control with other countries in Asia.

ANNUAL AVERAGE OF PM₁₀ IN BANGKOK DURING 1992 - 2005



Sources: Thailand Department of Land Transport, 2008, with contributions from Pollution Control Department of Thailand and Clean Air Initiative for Asian Cities Centre.

Ougadougou's Green Brigade

As the capital of one of the poorest countries in the world, Ouagadougou faces great challenges with poverty and environmental degradation. Many of the poorest residents of Burkina Faso's largest city have turned to the city's dwindling green spaces for income by illegally cutting trees to sell firewood. Most of these poor city residents are unemployed females who are the sole providers for their families.

In the early 1990s, Ouagadougou's mayor held a series of meetings with women involved in these environmentally harmful practices to convince them to stop the degradation of the city's green spaces in return for employment. As a result, using his own personal funds, the mayor initiated the "Green Brigade" to combat the city's overwhelming rate of female poverty, to improve city sanitation,

and to mitigate environmental damage to the city's green spaces. The Green Brigade would employ women to clean streets and public spaces as an alternative to illegal use of city green space.

Despite the obvious benefits of the programme, women were reluctant to participate or support the initiative because of the cleaning industry's negative cultural stigma. In order to bring value and respect to the occupation, the initiative coupled its employment efforts with educational campaigns on the importance of the industry. Today, the initiative has grown to employ more than 1,700 women.

The programme enhanced its effect on welfare, long-term poverty and sustainability by providing workers with a money-saving scheme and basic

health care for all women employees. More importantly, these jobs brought income and welfare to the city's most vulnerable populations: women and children.

As a result, the city's green spaces and trees are more protected, waste is disposed of in an appropriate manner, and overall hygiene of city residents has improved. The success of the Green Brigade has spread, with more cities in Burkina Faso, as well as cities in Mali, Benin, and Guinea replicating the initiative to address issues of poverty, sanitation, and unsustainable methods of income generation. In 2006, Ouagadougou's Green brigade was awarded the Dubai International Award for Best Practices in Improving the Living Environment for "providing regular employment to needy women while promoting cleanliness".

Source: www.bestpractices.org

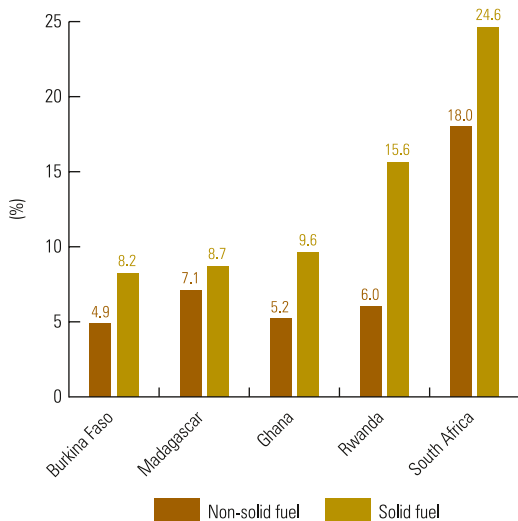
Latin America and the Caribbean. Indoor air pollution, on the other hand, is responsible for 26,000 premature deaths and 773,000 years of life lost in the region. WHO also reports that in the year 2000, 54,000 premature deaths in the region resulted from water, sanitation and hygiene factors, and 2,045,000 years of life were lost (disability adjusted)¹.

Studies indicate that the monetary costs of environment-related health problems can reach several percentage points

of gross domestic product (GDP). In 2004, the cost of the damage caused by particulate emissions in Latin America and the Caribbean was 0.5 per cent of the regional gross income². A World Bank survey of Mumbai, Shanghai, Manila, Bangkok, Krakow, and Santiago also found that health impacts of air pollution accounted for two-thirds of the social costs of these cities in 1993³.

Many developing countries are establishing legislative and policy frameworks to address air pollution at the national and city levels. Most Asian countries, for example, are phasing out lead fuel, and some cities, such as Bangkok, Beijing, Jakarta, Manila, New Delhi, and Singapore, have already made concerted efforts to reduce levels of air pollutants⁴.

FIGURE 3.1.2: PROPORTION OF CHILDREN IN URBAN AREAS IN SELECTED AFRICAN COUNTRIES WITH ACUTE RESPIRATORY INFECTIONS BY TYPE OF FUEL USED FOR COOKING



Source: UN-HABITAT, Global Urban Observatory, 2008

Indoor air pollution

It is estimated that indoor air pollution is responsible for between 2.7 and 2.8 million deaths annually⁵. UN-HABITAT analyses also show that indoor air pollution is a leading cause of respiratory illnesses among women and children living in Asian and African slums, as they are most likely to be exposed to poorly ventilated cooking areas⁶.

Yet indoor air pollution is rarely discussed outside of public health circles, probably because its health consequences are not immediate and are difficult to trace. Thus, indoor air pollution remains a quiet and neglected killer, with lack of global awareness being one of the primary obstacles to the widespread implementation of existing, proven interventions.

Solid fuel (biomass fuels and coal) used for cooking is a leading cause of indoor air pollution, especially in urban slums. The incomplete combustion of solid fuels releases pollutants such as particulate matter (PM), carbon monoxide

(CO), sulphur dioxide (SO₂), nitrogen dioxide (NO₂) and other organic compounds into the atmosphere, leading to respiratory illnesses. The use of solid fuel has been associated with respiratory infections in children and accounts for a significant proportion of infant deaths in developing countries. Biomass fuels, such as animal dung, crop residues and wood, produce the highest levels of these pollutants thus posing the greatest danger to respiratory health, followed by other solid fuels, such as coal and charcoal. Liquid fuels, such as kerosene and Liquid Petroleum Gas (LPG), are relatively less polluting with electricity being the safest energy source, which places at the top of what is known as “the energy ladder”⁷. Combustion of wood, for instance, emits 50 times more indoor air pollution than gas from a stove⁸. Thus policies to accelerate the transition for biomass fuels to liquid fuels or electricity should be a priority in developing countries. Unfortunately, poor households in many developing countries cannot afford to make this transition; yet the associated cost of this transition would lower poor households’ expenditure on fuel in the long run and would have enormous health benefits and reduce global environmental risks.

Use of solid fuels is particularly prevalent in African cities. In the cities of Burkina Faso, Congo, Ghana, Ethiopia,

Rwanda, South Africa and Zambia, the prevalence of acute respiratory infections (ARI) among children under the age of five years is higher in households using solid fuels, such as dung, wood, charcoal, than in households where other sources of energy are used⁹. In the cities of Burkina Faso, including the capital Ouagadougou, the prevalence of acute respiratory infections among children under the age of five is almost two times higher in households using solid fuel for cooking than in those that use non-solid fuels. In the urban areas of Congo, the prevalence of ARI is two times higher in households using dung for cooking than in those using wood or charcoal for cooking. Ethiopia’s urban households display the largest variation in the prevalence of ARI in children under the age of five— with nearly 30 per cent prevalence when dung is used for cooking against 8.3 per cent prevalence when charcoal is used and 4.8 per cent prevalence when kerosene is used¹⁰.

Inadequate waste management

Inadequate solid waste management is becoming a health hazard in many cities. Although the amount of waste produced in low-income cities is smaller than that produced by high-income cities, waste management is a growing concern, as the consequences of inadequate collection and disposal impact the ecosystems of cities, contribute to the degradation of the urban environment and pose a health hazard to urban populations.

Cities in developing countries suffer more from the consequences of inadequate urban solid waste collection than cities in the developed world. In Freetown, Sierra Leone, for example, only 35 to 55 per cent of the urban solid waste is collected; uncollected waste is illegally dumped in open spaces, water bodies, and storm-drainage channels, buried, burnt or deposited along the streets or roadsides¹¹. In Cairo, Egypt, only one-third of waste is collected and processed by the municipality and the formal sector.¹² In Benin, less than 50 per cent of urban households benefit from collection of household wastes either through a public or private system.¹³

In general, waste generated in cities of the developing world consists mostly of organic material, such as ashes from fuel wood and charcoal, as well as food. In cities such as Freetown, Kigali and Accra, more than 80 per cent of the waste is organic material, compared to 30 per cent or less in cities such as Bologna, Goteborg, Milan, and New York. Although the recycling and reuse of solid waste are common practices in cities of the developing world, these practices are often carried out by the informal sector under hazardous conditions. Furthermore, recycling and reuse of waste remains confined to the informal or private sectors in many cities and has not been seriously adopted as a national policy in many countries.

Poor solid waste management can lead to a range of excreta- and vector-related diseases. Poor drainage, for instance, can lead to leptospirosis (Weil’s disease), which is spread through rodent urine and poor drainage in construction. Improperly managed solid waste can clog storm drains, cause flooding and provide breeding and feeding grounds for mosquitoes, flies, and rodents. Collectively, these can cause diarrhoea,



▲ A young girl carries a baby on her back while searching through rubbish for metal scraps to sell in Kroo Bay, Freetown, Sierra Leone: Approximately half of the solid waste in the city remains uncollected.

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The informal recycling economy of Asian cities



▲ Garbage dump at Stung Meanchey, Phnom Penh, Cambodia.
©Maciej Dakowicz

Waste recycling in developing countries relies largely on the informal recovery of materials by scavengers or waste pickers. Estimates for cities in Asia and the Pacific reveal that up to 2 per cent of the population survives by recovering materials from waste to sell for reuse or recycling or for its own consumption. In some cities, waste scavengers constitute large communities: approximately 15,000 squatters make their living by sifting through the Smoky Mountain municipal rubbish dump in the Philippines. Similarly, it is estimated that Bangalore has between 20,000 and 30,000 scavengers who make a living from rubbish, while there are between 15,000 and 20,000 waste pickers in Jakarta. Some of these scavenger communities have high levels of organization and have created their own cooperatives.

The presence of sizeable communities making their living from waste has favoured the development of enterprises that form an extensive waste recycling network that has developed without government assistance and without the formation of commercial monopolies. For example, the waste scavengers of Hanoi operate at no cost to the city's municipal authority and provide both financial benefits to the society in the form of avoided costs (such as landfill space, collection

and transport costs, energy, employment generation, and protection of public health) as well as ecological benefits in the form of resource conservation and environmental protection. The recycled materials from waste work their way from the "waste economy" back into the productive economy through an elaborate system of buyers. It is estimated that some 1,500 families make their living by buying and selling waste materials; as a result, a trade network has emerged with clients from Hanoi and the surrounding provinces in Viet Nam regularly visiting individual junk dealers to buy and pre-order specific types of recycled materials. The majority of dumpsite scavengers are women and children, who live in overcrowded, poorly ventilated temporary huts, often on the peripheries of the waste dump. The scavengers seldom have access to public or private latrines, are malnourished and suffer from a range of illnesses, including worm infections, scabies, respiratory tract infections, abdominal pain, fever, and other unspecified diseases.

A similar situation is found in the shantytown of Dharavi in Mumbai, which has been dubbed "India's largest recycling centre". With more than 700,000 people crammed into 175 hectares, Dharavi is the biggest slum in Asia. But Dharavi

can also be defined as a well-organized industrial district with distinct layers of workers dealing with the recycling of waste: scavengers, pickers, waste sorters, specialized waste sorters, and recyclers. Washing and recycling activities are carried out inside the dumps, in unhealthy conditions, using recycled devices. Plastic chopping and smelting operations are also carried out inside the slum district, with serious consequences in terms of disease and pollution.

The economy of Dharavi defies official statistics, as it is self-sustaining and devoid of government bureaucracy. Waste recycling has become an industry in itself and has helped to provide employment to hundreds of people working in some 400 recycling units. It is estimated that Dharavi has as many as 15,000 "factories" where recycled material is converted to products, such as pots and toys. However, all these activities are carried out without any environmental and health protection measures. The price of Dharavi's economy, therefore, is paid in human deaths, diseases and environmental pollution. Moreover, the future of the waste economy is uncertain as plans are underway to resettle the residents to pave way for Mumbai's multibillion-dollar urban redevelopment plan to turn the city into a world-class financial centre by 2015.

Sources: M. Portanuova (2004), *La città della spazzatura*, *Diario*, 13 February.
The Economist (2007), "A flourishing slum", 22 December.

Does the urban environment affect emotional well-being?

There is increasing research interest in the correlations between the built environment, geographical location and psychological well-being in cities. The World Health Organization (WHO) Commission on Social Determinants of Health has established that urbanization in and of itself is a determinant of health, and that the urban setting is a lens that magnifies or diminishes a range of social determinants of mental health.

Increasing urbanization is often associated with declining community relationships, social isolation, greater stresses of urban life, concentration of poverty (and subsequent stigmatization), breakdown of family structures, and overcrowding. This could explain why, in almost all countries (with the exception of India, China and Sri Lanka) higher suicide rates are reported in urban areas than in rural areas. Research also indicates that living in a more urbanized environment increases the risk of suicide among women but reduces the risk among men.

Poverty, housing and the living environment

Although the higher incidence of mental disorders in urban areas could be because urban residents are more likely than rural residents to seek health services, studies have found that many psychosocial disorders in urban areas are associated with poor quality housing and living environments. Among the urban poor, lack of financial resources and high costs of living, harsh living conditions and physical exhaustion from lack of transport (especially when living far from the workplace) all contribute to sustained and chronic stress that predispose individuals and families to mental health problems. Overcrowding, noise and air pollution, poverty and dependence on a cash economy, high levels of violence and reduced social support in cities also weaken and devastate both individuals and the social supports that could serve as buffers against mental health problems.

Data from a cross-sectional survey carried out in socio-economically contrasting sub-districts in São Paulo, Brazil, shows that even after key socio-economic variables are controlled, the area of residence has a statistically significant effect on mental health. In Dhaka, a comparison of mental health status between slum and non-slum adolescents shows lower self-reported quality of life and higher "conduct problems" among males living in slum areas. Recent studies have also shown that living in socio-economically deprived neighbourhoods is associated with higher incidences

of depression and higher levels of child problem behaviour than in wealthier areas. A study conducted in 59 New York City neighbourhoods in 2002 found that people living in neighbourhoods characterized by dilapidated or poorly maintained built environments were 36 to 64 per cent more likely to report lifetime depression than respondents living in better-served neighbourhoods. This could be explained by the prevalence of daily stressors, such as noise pollution, lack of green spaces, violence and crime, in deprived urban neighbourhoods and the social stigma attached to living in such a place.

Lack of public spaces, sports clubs and other venues for leisure activities can also contribute to youth boredom and idleness, which are directly

Overcrowding, noise, air pollution, and lack of green spaces and communal meeting places such as parks, are associated with increased stress levels among city residents

linked to substance use and high crime rates, which in turn contribute to mental illnesses. Many studies conducted in Europe and North America have suggested that the type of housing – single-family detached house versus multi-family high-rise dwelling – also impacts mental health, especially among low-income people. In general, people living in high-rise apartments suffer more from psychological disorders than those who live in low-rise housing or in detached houses, although cultural factors play an important role in reducing stress levels. Highly-dense high-rises in Indian and Egyptian cities, for instance, do not appear to have a significant impact on levels of well-being. For low-income residents, living in high-rise apartments is linked with social isolation and lack of access to amenities that aid well-being. Women staying at home with their children are particularly vulnerable; several studies have shown that women in high-rise housing report more loneliness and less social contact with their neighbours

than those in other housing types, owing in part to distance from communal meeting places, such as outdoor gardens, play areas, porches, terraces, and patios. At the same time, increasing suburbanization, and the decline in community life and longer commute times associated with it, is also being blamed for increased stress among women and men, regardless of the presence of outdoor amenities and single-family homes in suburban and peri-urban areas.

Overcrowding, or lack of adequate living space, is a key contributor to mental disorders. A 2007 WHO study conducted in overcrowded refugee camps in the Occupied Palestinian Territories reported that high levels of depression and frustration have increased the demand for mental and other health services in the camps. The camps located in the Gaza strip, for instance, have the highest population densities in the world, which are reflected in overcrowded schools and households. Physical congestion and lack of privacy have also put a strain on relationships and increased the risk of infection among camp residents. Stigmatization and fear of violence or eviction have compounded the emotional strain of families living in camps.

Poor-quality housing and living environments not only impact the people who live in them, but also have other consequences, such as rising levels of crime, suicide and violence, which impact all city residents. Mental health promotion thus requires multi-sectoral and multi-layered action, involving government sectors and non-governmental and community-based organizations, and urban planning processes that are more responsive to the psychological needs of residents. New York City, for instance, has in the last decade maintained a lower rate of suicide than the United States as a whole by implementing integrated and effective public health practices and developing an extensive knowledge base for services intervention, which involves advanced tracking and surveillance, emergency response, multi-layered public health and social services, gun control, and social norms for community interventions.

In low-income countries, where psychological services are not widely accessible or affordable, health service providers and government agencies need to become more aware of the underlying causes of psychological illnesses, such as poor-quality housing and overcrowding, so that interventions are designed to respond to these causes.

References:

WHO, 2007; WHO Centre for Health Development, 2007; Evans, Wells & Moch, 2003; Vijayakumar, 2004; New York City Department of Health and Mental Hygiene, (n.d.); Qin, 2005; Galea, et al. (n.d.); Blue, 2000; Izutsu, et al., 2006.

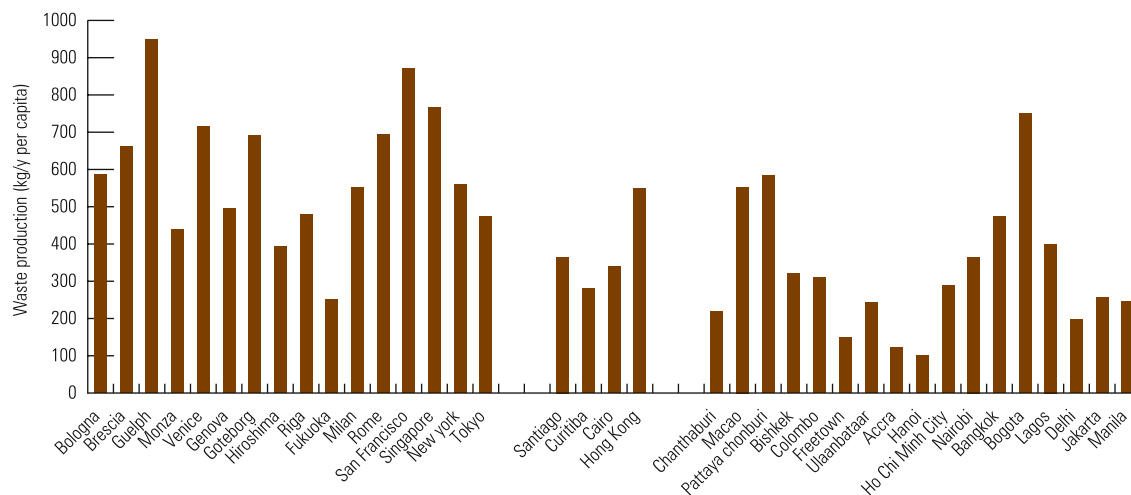
parasitic infections, and injuries. Pools of standing water and flooding can lead to increased incidence of malaria and other mosquito-borne diseases, especially during the rainy season, placing workers and local residents at risk. Public facilities often fall into disrepair for lack of maintenance, setting the stage for accidents and poor waste management. Poor waste collection also increases risks of flooding. Garbage in drains seriously affects a city's storm water management capacity.

In the absence of regular collection of household solid wastes, organic waste fills up public spaces, backyards, lanes, pathways, and vacant lots, where it attracts disease-carrying insects and pests and clog overflowing drainage channels. Associated health problems include high incidence of cholera, diarrhoea and dysentery, especially among children. In Benin, for example, a 2001 Demographic and Health Survey showed that the prevalence of diarrhoea among children under the age of five years was 18.5 per cent in urban households where the garbage is dumped in the yard against 7 per cent in urban households where the garbage is collected. Uncollected household waste is also associated with the spread of respiratory infections. In Benin, the prevalence of ARI is 17.1 per cent among children living in households that dump waste within the compound against 13.6 per cent among children living in

households with regular collection of garbage. In Ethiopia the prevalence of ARI is six times higher among children living in households where the waste is uncollected than among children living in households that benefit from regular waste collection. A 2003 survey in Kenya showed that one out of every four children living in households where garbage is dumped within the yard suffered from diarrhoea compared to less than one in ten children living in households where solid waste is regularly collected.

Lack of drainage, especially in areas of communal water supply, breeds mosquitoes and flies, which can also be a nuisance and spread disease. Water lines flow next to storm drains, which become open sewers (with time, water lines can sag directly into storm drains from neighbourhood activity and illegal connections). Poor management of waste water can increase the spread of malaria in many ways. Mosquito-related diseases, especially malaria and dengue, can spread by extending breeding areas in water that has accumulated in disposed construction materials and holes dug for sand and gravel. Pollution of local water from improper disposal of excreta and domestic waste at work camps can also lead to vector-related diseases, particularly malaria, filariasis, and, sometimes, schistosomiasis.

FIGURE 3.1.3: WASTE PRODUCTION (KG/YEAR) PER CAPITA IN SELECTED CITIES



Source: UN-HABITAT Global Urban Observatory 2008
 Note: Data derived from various sources, 2000-2007

END NOTES

- The disability adjusted figure, or DALY, is a summary indicator that combines the impact of illness, disability and mortality on a given population's health.
- World Bank, 2004a.
- Lvovsky, et al., 2000.
- UNEP, 2007b.
- Bruce, Rogelio & Albalak 2000.
- UN-HABITAT 2006a
- Climbing the energy ladder means not only using cleaner fuels, but using fuels that are less costly in the long run. The transition from costly and

- polluting fuels to cleaner, more efficient and cheaper fuels thus has long-term social and economic benefits.
- Ibid.
- UN-HABITAT Global Urban Observatory 2006, computed from Demographic and Health Surveys, various years.
- Ibid.
- Sood, 2004.
- Palczynski, 2002.
- UN-HABITAT UrbanInfo database, 2006 version