

## Slums, climate change and human health in sub-Saharan Africa

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Sub-Saharan Africa is the least urbanized region in the world. Only 39.1% of the region's population lives in cities.<sup>1</sup> However, the region's urban population is projected to more than double to 760 million by 2030.<sup>1</sup> The rate of urbanization makes it very challenging to manage. A recent paper in the *New England Journal of Medicine* argued that urbanization is a "health hazard for certain vulnerable populations, and this demographic shift threatens to create a humanitarian disaster."<sup>2</sup>

Urbanization in Africa is linked to poverty. Globally, nearly 1 billion people live in slums, and this number is projected to double to 2 billion in the next 30 years.<sup>3</sup> The United Nations Human Settlements Programme (UNHABITAT) defines a slum as an urban area with a lack of basic services (sanitation, potable water, electricity), substandard housing, overcrowding, unhealthy and hazardous locations, insecure tenure and social exclusion.<sup>3</sup> In sub-Saharan Africa, 71.8% of urban dwellers live in slums, the highest proportion in the world.<sup>4</sup>

Over the coming decades, the effects of climate change will also be progressively felt across the African continent. Climate change and urbanization will interact, with unpredictable effects. The *Fourth Assessment Report of the Intergovernmental Panel on Climate Change* stated that "urbanization and climate change may work synergistically to increase disease burdens."<sup>5</sup>

A significant share of ill health in slums stems from poor access to sanitation and clean drinking water. In 2000, 30–50% of African urban dwellers lacked a safe water supply.<sup>6</sup> Even where it is available, access to safe water is often unaffordable for the urban poor. Slum dwellers in cities in east Africa pay 5–7 times more for a litre of water than the average North American.<sup>7</sup>

Across Africa, 45% of the urban population lacked access to improved

sanitation in 2000.<sup>4</sup> In eastern Africa in 2006, open defecation was the only sanitation practice available to 33% of the population.<sup>1</sup> This contributes to the contamination of water and land within cities as well as to many of the waterborne diseases prevalent in slums.<sup>4</sup>

Flooded areas and ditches, latrines and septic tanks are key reservoirs that perpetuate cholera, malaria, dengue and yellow fever in urban areas.<sup>8</sup> Infectious disease outbreaks are also precipitated by the high population density found in these areas, with overcrowding triggering epidemic-prone infections like pertussis and influenza.<sup>2,8</sup>

Children bear a disproportionate burden of disease in slums. In Ethiopia and the Niger, rates of child malnutrition in both urban slums and rural areas are around 40%.<sup>4</sup> Immunization coverage in slums in the Niger is 35% compared with 86% in non-slum urban areas.<sup>4</sup> In Nairobi, where 60% of the city's population live in slums, child mortality in the slums is 2.5 times greater than in other areas of the city.<sup>7</sup>

Droughts are associated with a lack of access to water supplies for consumption and sanitation, as well as with poor agricultural productivity. Water scarcity will increase for both urban and rural populations in Africa over the next century. Climate change is expected to bring more frequent and longer droughts to the region.<sup>9</sup> Drought in rural areas may be a major trigger for in-migration to urban areas, further stressing urban infrastructure.<sup>5,10</sup> Falling agricultural productivity in the region could place increased strain on local food markets, thus increasing rates of malnutrition in slums.

Because climate change is associated with more extreme precipitation events and rising sea-levels, African cities will also experience more severe and more frequent flooding. Urbaniza-

tion creates flood-prone conditions by covering the ground with pavement and buildings, and by building urban drains, causing runoff water to move more rapidly into rivers than under natural conditions.<sup>10</sup> The urban poor build houses of weak, inadequate materials, often against hillsides that are subject to landslides during heavy rains.<sup>8</sup> More than 70% of flood deaths in the Mozambique floods of 2000 occurred in urban areas.<sup>6</sup> The Luis Cabral slum neighbourhood in the capital city of Maputo was completely destroyed and water and sanitation services were disrupted causing outbreaks of dysentery and cholera.<sup>10</sup>

Urban outdoor pollution in Africa is responsible for an estimated 49 000 premature deaths annually.<sup>1</sup> Slums are often located near factories and busy roadways thus rendering their inhabitants vulnerable to a high burden of respiratory disease. Exposure to elevated concentrations of ozone is associated with increased hospital admissions for pneumonia, chronic obstructive pulmonary disease, asthma as well as with premature mortality.<sup>5</sup> As summer temperatures rise, the concentration of ground-level ozone is increasing in most regions of the world.<sup>5</sup>

African slum dwellers are particularly vulnerable to the negative health effects of rapid urbanization and global climate change. Further research is required to understand the impacts of climate change on the health of slum dwellers as well as to design appropriate adaptation policies. When planning public health interventions in Africa one must consider the dynamic relationship between climate change and urbanization and their impact on vulnerable urban populations. ■

### References

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