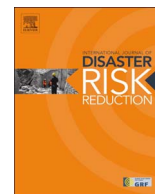




Contents lists available at ScienceDirect

International Journal of Disaster Risk Reduction

journal homepage: www.elsevier.com/locate/ijdr

The impact of urban development on risk in sub-Saharan Africa's cities with a focus on small and intermediate urban centres[☆]

David Satterthwaite¹

IIED, 80-86 Grays Inn Road, London WC1X 8NH, UK

ARTICLE INFO

Keywords:

Urban change
Urban risk
Small urban centres
Local government
Infrastructure
Services

ABSTRACT

The main urban issue that sub-Saharan Africa is facing is rapid growth in its urban population without the urban governance structures in place that can meet their responsibilities and manage the change. This has created very large deficits in infrastructure and service provision which exposes much of the urban population to high levels of risk. Without competent, effective and accountable urban governments, it is not possible to tap the great potential that cities have for supporting good living conditions and good health. This paper examines both the scale of urban change and the development challenge facing sub-Saharan Africa's urban areas and the possible implications on risk. It describes how a substantial proportion of sub-Saharan Africa's national (and urban) population lives in small and intermediate size urban centres (and thus not in rural areas or large cities) and considers what we know about risk in these urban centres and the implications for development. The paper suggests that within the region's urban population, inadequacies in provision for basic infrastructure and services are usually larger, the smaller the urban centre. Most small urban centres in the region have local governments with very little capacity or funding to fulfil their responsibilities for risk reducing infrastructure and services. Of these, the inadequacies in provision for water and sanitation are the best documented. But in some instances, provision for water and sanitation is so poor in large cities that the proportion of their inhabitants lacking adequate provision is as high as those living in small urban centres.

1. Introduction

For each five year period between 1950 and 2015, sub-Saharan Africa had the fastest urban population growth rates among the world's regions – driven by high rates of natural increase and net rural to urban migration. But part of this is due to most sub-Saharan African nations having much lower starting points; sub-Saharan Africa was much the least urbanized region in 1950 [1]. But Asia has had a more rapid rate of change of the percentage urban from 1990.

Sub-Saharan Africa's urban population was 294 million inhabitants in 2010 and is projected to grow to 621 million by 2030; it was just 19 million in 1950. As Table 1 indicates, in 2010 it had one mega-city (Lagos with 10.8 million inhabitants) two very large cities (Kinshasa with 9.4 million and Greater Johannesburg with 8.0 million), 15 large cities with 2–4.9 million and 123 cities with 250,000–1.99 million. 140.7 million urban dwellers in the region lived in urban centres with less than 250,000 inhabitants including a substantial proportion in urban centres of less than 20,000 inhabitants. Not surprisingly, the nations with the most large cities are generally those with the largest

economies [2].

The countries with the largest number of cities of 250,000+ inhabitants in 2010 were:

- Nigeria: 42
- Democratic Republic of the Congo: 15
- South Africa: 12
- Cameroon: 6
- Somalia, United Republic of Tanzania: 5
- Ghana, Kenya, Mozambique: 4
- Angola, Côte d'Ivoire, Zambia, Zimbabwe: 3

Of all the urban centres in sub-Saharan Africa that were thought to have 300,000 plus inhabitants in 2015 [4] it is worth noting how many of these had their fastest population growth rates from the 1950s to the 1970s. In reviewing these cities' population growth rates for five year periods between 1950 and 2015, 64% of the cities had their two most rapid five-year population growth rates before 1980. 22% had their two most rapid five year population growth rates during the 1950s. One

[☆] This article draws on two working papers for the UrbanARK project: Small and intermediate urban centres in sub-Saharan Africa and The current and potential development impact of sub Saharan Africa's cities, funded by the ESRC-DFID Grant no. ES/L008777/1.

E-mail address: david@iied.org.

¹ David Satterthwaite is a Senior Fellow at the International Institute for Environment and Development (IIED) and visiting Professor at University College, London.

Table 1
Distribution of sub-Saharan Africa's urban population in different size categories of urban centres in 2010 [3].

	Rural	Proportion of the population living in urban centres with:							
		Under 20,000	20,000–49,999	50,000–249,999	250,000–499,999	0.5–1.99 million	2–4.99 million	5 – 9.99 million	10 million +
Number of urban centres					60	63	15	2	1
Population	537.3 million		140.7 million		21.0 m	59.7 m	44.5 m	17.4 m	10.8 m
% of total population	64.6%		16.9%		2.5%	7.2%	5.4%	2.1%	1.3%

reason for this is that as a city's population becomes very large, the population growth rate slows because the city's population at the beginning of the period (the denominator in the calculation of the growth rate) is so large. A very large city can have a relatively low population growth rate yet also have a very large annual increment in its population. Thus, while Lagos is reported to have a population growth rate of 4.5% per year during the period 2000–2010, this means that its population would have grown by an average of 350,000 persons per year during this decade. Greater Johannesburg's population grew by 4% a year for this same decade but this meant growing by an average of 239,000 people a year. For city governments struggling to ensure basic infrastructure and services, it is the size of the increment in population rather than the population growth rate that is the biggest challenge. However, even if cities' population growth rates in recent decades were usually lower than in previous decades, what is also notable is how rapid population growth is for more than half of the 300,000+ population cities in the decade 2000–2010. 32 had population growth rates of 6.0% or more a year during this decade and another 50 had population growth rates of between 4% and 5.9% per year. However, few of the 25 cities with the largest annual increment in their population 2000–2010 are in the 25 cities with the highest population growth rates (only Abuja, Ouagadougou, Luanda and Yaoundé).

2. Infrastructure and service deficits and health risks for urban populations

The very large annual increment in the urban population (and in the population of most major cities) should not be a problem if the competence and capacity of their governments also grows. But it is where metropolitan, city and municipal governments lack the capacities to fulfil their responsibilities – for infrastructure, services, land-use management and accountability to their citizens (including decisions about funding priorities). Most cities in sub-Saharan Africa have very limited revenue bases [5] – and so depend on national government and international agencies for needed funding that usually does not come. Most national governments have been reluctant to fund urban initiatives or urban governments, sometimes for political reasons (e.g. most members of parliament with rural constituencies or urban centres governed by opposition parties) and sometimes for spurious reasons (for instance the belief that cities are parasitic or that very little poverty is in urban areas). International funding agencies have also given a low priority to addressing urban problems and the lack of capacity among urban governments in the region. This helps explain why large sections of Sub-Saharan Africa's urban population face very large health burdens associated with a lack of risk reducing infrastructure and services, including very high infant, child and maternal mortality rates [6]. The causes include very poor quality and over-crowded living conditions and the lack of provision for safe, regular, affordable water, good quality sanitation and household waste collection, health care, schools and emergency services. These in turn are linked to the inadequacies in local governments who often refuse to work with those living in informal settlements, even as these house half or more of the population of many African cities.

The scale of the inadequacies in provision for water and sanitation in sub-Saharan Africa's urban centres is astonishing, especially given the many commitments governments have made to the United Nations for universal coverage over the last forty years. For the whole region, in 2015, only a third of the urban population has water piped on premises, down from 43% in 1990 [7]. South Africa is the most notable outlier with 92% of its urban population with water piped to premises and a high proportion with sewer connections. This is also a nation with functioning city governments that have increased the proportion of the population with good quality water and sanitation and sought to reach the lowest-income groups through its free basic water programme [8]. Worldwide, most of the countries with the lowest proportion of their urban population with water piped on premises – and a lower proportion in 2015 compared to 1990 - are in sub-Saharan Africa (see Fig. 1). Note how in Nigeria only 3% of the urban population is reported to have water piped on premises [9].

For sanitation, most cities in the region have no sewers, including many cities with several million inhabitants. Or if they have sewers, these cover only a small proportion of their urban population. South Africa is the exception in this too.

Low-income urban dwellers in sub-Saharan Africa generally have much worse health than middle and upper-income groups. A high proportion die at an early age, mostly from diseases or injuries that can and should be easily prevented. This can be seen in the large differences in, for instance, life expectancy at birth or in infant 0–1 years old), child 1–4), under-5 and maternal mortality rates between income groups. Many of those who have inadequate incomes also face much larger risks of debilitating injury or illness. Figs. 2 and 3 show differentials in

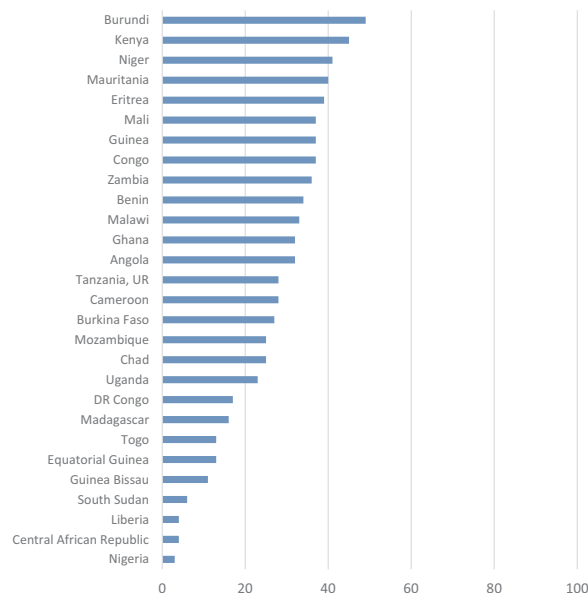


Fig. 1. Sub-Saharan African nations with among the lowest percent of their urban populations with water piped on premises in 2015 [10].

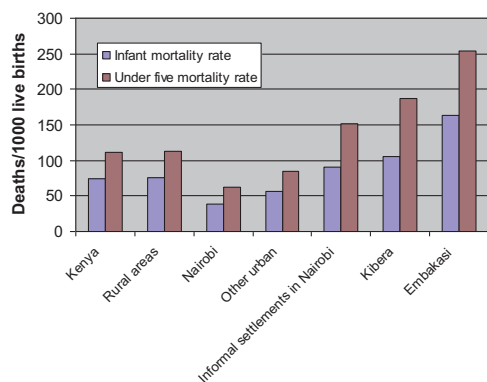


Fig. 2. Infant and under-five mortality rates comparing Nairobi, rural and urban areas in Kenya and informal settlements in Nairobi (2000) [12].

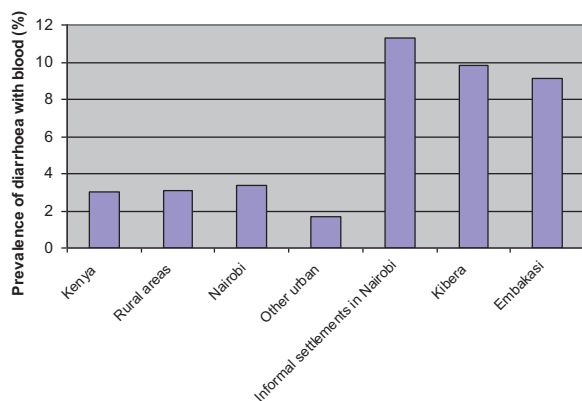


Fig. 3. Prevalence of diarrhoea with blood in children under 3 in two weeks prior to interview in Nairobi, rural and urban areas in Kenya and informal settlements in Nairobi (2000) [13].

under-five mortality rates and the prevalence of serious cases of diarrhoea between informal settlements in Nairobi, and rural and urban areas [11].

Drawing on available studies, the following generalizations seem valid for urban population in sub-Saharan Africa [14]:

1. It is common for between a third and two-thirds of an urban centre's population to live in housing of poor quality with high levels of overcrowding in terms of indoor space per person and number of persons per room.
2. A perhaps surprisingly large proportion of urban dwellers still use dirty fuels for cooking and, where needed, heating, which usually means risks from high levels of indoor air pollution and their severe health impacts as well as fire risk. Nearly half the region's urban population lack electricity [15].
Low-incomes may also mean households keep down fuel use – for instance by cutting down on cooked food (in extreme circumstances to one meal a day) or switching to faster-cooking but less nutritious food or greater reliance on street foods [16]. Having access to electricity at prices that low-income households can afford obviously brings multiple health and other advantages. These include reliable, cheap and safer lighting (compared to candles and kerosene lamps) and use of appliances (including fridges and, where needed, fans). It also provides advantages for household enterprises (better lighting at night, use of equipment such as electric sewing machines or fridges for food preparation).
3. Much of the urban population lacks safe, regular, convenient supplies of water and provision for sanitation – far more so than the official statistics suggest; this is discussed in more detail above.
4. Much of the urban population lack regular (or even irregular)

services to collect household waste. Many live in settlements that lack the paved roads needed to allow conventional garbage collection trucks to provide a door-to-door service.

5. There are very large health burdens relating primarily to infectious and parasitic diseases and accidents. This includes large health burdens arising from unsafe working conditions for low income urban dwellers with exposure to diseases, chemical pollutants and physical hazards in the workplace being a significant contributor to premature death, injury and illness (and the obvious economic consequences of these). A considerable part of this occurs within the residential environment, since this is where a significant proportion of low-income people work in most cities.
6. In many urban locations, there are also large and often growing health burdens from non-communicable diseases. For instance, cancer, diabetes and strokes are often creating 'a double burden' as low-income urban dwellers face large health burdens from communicable and non-communicable diseases [17].
7. Physical hazards evident in the home and its surroundings are likely to be among the most common causes of serious injury and premature death in informal settlements and other housing types used by low-income urban dwellers [18] – for example, burns, scalds and accidental fires, cuts and injuries from falls. Large health burdens and high levels of accidental death from physical hazards are also related to the lack of provision for rapid and appropriate treatment, both from health care and from emergency services.
8. Road traffic accidents are among the most serious physical hazards in many urban areas – although for many nations there are no data that separate rural from urban. Violence may also be among the most serious physical hazards and a significant contributor to death or injury – and linked to inadequate, no or inappropriate policing in informal settlements
9. There are also many cities and smaller urban centres, or particular settlements within cities, where levels of outdoor air pollution considerably exceed WHO guidelines – but there is little or no data for most cities in sub-Saharan Africa [19].

It is also important to consider the impact of disasters on urban populations in the region and identify who is most at risk and most impacted. There is also a need to consider how climate change is or will change the scale and range of extreme weather events and other changes that impact on urban populations and urban economies. The impact of both in the sense of hitting low-income groups hardest and in the sense of exacerbating poverty or creating poverty among those who before the disaster were not poor has been greatly under-estimated [20]. In part, this is because most disasters go unrecorded in national and international disaster databases. In part, it is because the metrics used to assess disaster impact do not include many of the impacts that are most relevant to low-income groups – for instance damage to their housing, injury, disruption to their livelihoods and loss of assets [21].

There is now a renewed enthusiasm within discussions of urban development for countries to devise national urban strategies [22]. But it is not yet clear that this will address the urgent need for national governments and international agencies to support more capable, accountable and better resourced city and municipal governments. This needs to support the potential agglomeration economies for city governments in provision for water, sanitation, drainage, solid waste collection, informal settlement upgrading, health care, schools, the rule of law and much else. Ensuring their provision (which may include some that is provided by civil society and public-private partnerships) also makes cities much more attractive to new investment. It also tends to decentralize the urban system as certain smaller well-governed cities come to compete successfully with the largest cities for new investments [23]. At present, most cities in the region have almost no investment capacity as most of their limited revenues go on recurrent expenditures [24]. Fig. 4 shows just how low city budgets are per person for cities in sub-Saharan Africa. The cities of Rosario (Argentina) and

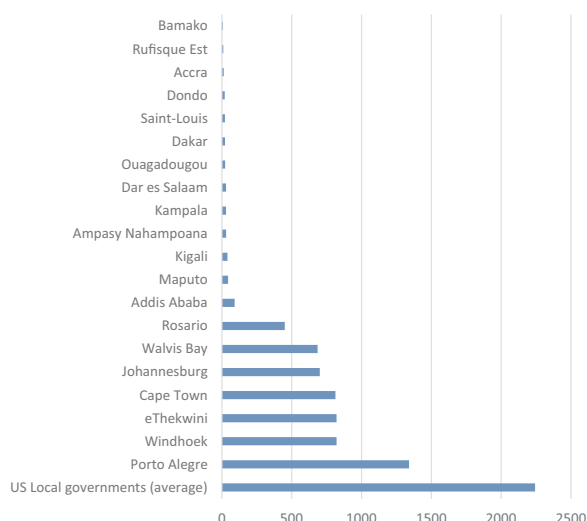


Fig. 4. Comparisons between cities in local government budgets per person per year (US \$) [26].

Porto Alegre (Brazil) have been included to show the differences in scale for city budgets – these are also two of the most innovative cities in Latin America with a high proportion of their population served with risk reducing infrastructure and services [25]. The average figure for local governments in the USA is also included. Dondo, Accra, Rufisque Est and Bamako have local government budgets of \$20 or less per person; Kigali, Ampasy Nahampoana, Kampala, Dar es Salaam, Ouagadougou, Dakar and Saint-Louis have less than \$40 per person. Almost all of these meagre budgets are likely to go on recurrent expenditures. Among the cities listed in Fig. 4, only in South Africa and Namibia are there sub-Saharan African cities with substantial budgets.

3. Small and intermediate urban centres

Internationally, growing interest in urban centres other than large cities [27] comes in part from a recognition that a significant and usually growing proportion of national and urban populations live in urban centres other than the largest cities. In part, it is fuelled by a concern for the weakness of local governments in most such centres. For some governments, the interest in these urban centres is also about the issue of whether promotion of these (or some of these) urban centres would slow migration flows to large cities. Defining small or intermediate urban centres is problematic. For instance, does this depend on population size, economic activity or administrative importance? Do we use universal definitions of small and intermediate urban centres or definitions adjusted for each nation so small population countries have different definitions? There are also the difficulties of the different definitions used by nations for what constitutes an urban centre and political reasons why a settlement does or does not become an urban centre (being ‘rural’ or ‘urban’ may determine access to different types of funding, for example).

If small and intermediate urban centres are taken to mean all settlements defined by governments as ‘urban’ with fewer than half a million inhabitants, then by 2015, around 196 million people lived in these urban centres, in sub-Saharan Africa – equivalent to almost half of the urban population and a fifth of the total population [28]. However, this definition includes such a diverse set of urban centres. For some relatively rural and small population nations, their largest city is under half a million inhabitants. There are many urban centres with under half a million inhabitants that are among the most important and successful urban centres in their region or nation – and these should not be classified in the same category as urban centres with a few thousand inhabitants and no strong economic base.

Table 2 shows the proportion of national populations that are within

seven categories of urban centres defined by population size. This shows the demographic importance of urban centres with under 20,000 inhabitants and of between 20,000 and 49,999 inhabitants, as well as larger urban centres. What needs to be emphasized is that most urban centres in sub-Saharan Africa have less than 50,000 inhabitants and in many nations, these have more than 15% of the national population.

In most nations, many of the settlements with fewer than 20,000 inhabitants (for instance all those with more than 2500 or more than 5000 inhabitants) are considered urban centres; in a few, all settlements with fewer than 20,000 inhabitants are regarded as rural. Settlements with fewer than 20,000 inhabitants can have strong and obvious urban characteristics – for instance, economies and employment structures dominated by industry, services or large, diverse concentrations of retail stores [36]. They can include some settlements considered as cities – usually urban centres that are important historically but not successful in recent decades. They also include thousands of settlements in which much of the population works in agriculture, forestry or fishing.

Many small urban centres are ‘administrative towns’, in that a significant proportion of their populations directly or indirectly derive income from the concentration of government functions there – including the employees of the local district government and those who work for government-funded services (such as in health care, hospitals, schools, postal services, the police and courts). Among the many other economic underpinnings of small urban centres are mining enterprises, tourism, border posts, river ports (or ‘land ports’ in the sense of being key nodes linking local settlements to larger markets), education centres (for instance, with one or more secondary schools or a higher education institution), hotels/boarding houses for migrant/temporary workers, agricultural processing, retirement centres (sometimes with foreign retirees being an important economic underpinning for the urban centre) or centres for the armed services [37].

4. Data on risk in small and intermediate urban centres in sub-Saharan Africa

There are so few recent studies of small and intermediate urban centres in sub-Saharan Africa; this reflects the limited attention given to urban issues in sub-Saharan Africa and within this the fact that most of the focus is on large cities. Among the studies that do look at small and intermediate urban centres in this region, few focus on risk; Manda (2013) and Manda and Wanda 2017 being notable exceptions [38].

In the absence of data on risk in small and intermediate urban centres – for instance risk of premature death from a communicable disease or from a traffic accident, fire or flood – there are some relevant data and some case studies on provision for water, sanitation, solid waste collection and electricity [39]; provision for these can and should contribute to risk reduction. However, available data on these and other services that contribute to risk reduction are usually too aggregated to show provision for these in small and intermediate urban centres. The official UN database on provision for water and sanitation only gives statistics for nations’ ‘urban’ and ‘rural’ populations [40]. The UN datasets on provision for water and sanitation and some other services (for instance electricity) are mostly drawn from national sample surveys that have sample sizes too small to provide disaggregated data – for instance how provision for water and sanitation varies by size-category of urban centres. The Demographic and Health Surveys that are available for most nations in sub-Saharan Africa have a lot of detail on key risks but with sample sizes too small to provide this for each urban centre or each district within large urban centres. Most governments have census data that can provide some information on the quality of housing and extent of provision for water and sanitation for all urban centres and districts – but national agencies responsible for censuses choose not to make such data available for individual urban centres. So local government officials have difficulties accessing census data about their urban centre in a form that is useful for identifying and acting on deficiencies in housing and provision for water, sanitation, solid waste

Table 2
The division of national populations between rural areas and urban centres of different sizes.

Nation and date of census	Rural areas	Proportion of the population in urban centres with (number of inhabitants):						
		Under 20,000	20,000–49,999	50,000–199,999	200,000–499,999	0.5–1.99 million	2–4.99 million	5 million +
Benin (2013)	56.8	8.9 [29]	12.4	7.4	7.7	6.8	–	–
Botswana (2011)	36.4	15.8 [30]	19.8	16.5	11.4	–	–	–
Burkina Faso (2006)	77.6	1.7	4.2	2.5	3.5	10.5	–	–
Burundi (2008)	90.2	1.3	2.3	–	6.2	–	–	–
Cameroon (2005)	51.5	8.0	5.8	8.0	5.4	21.3	–	–
Central African R (2003)	62.1	7.8	9.0	5.2	–	16.0	–	–
Chad (2009)	78.2	3.0	6.2	4.0	–	8.6	–	–
Congo (2007)	27.8 [31]	7.9	3.7	4.2	–	56.5	–	–
Congo DR (2004e)	63.0	0.9	3.7	5.1	6.0	7.4	–	13.8
Cote d'Ivoire (1998)	57.3	4.7	7.0	9.2	3.0	–	18.7	–
Eritrea (1997)	71.8 [32]	5.1	6.5	2.1	14.4	–	–	–
Ethiopia (2013)	81.5	8.9	2.9	1.5	1.5	–	3.6	–
Gabon (2003)	18.0	24.6	8.2	–	13.8	35.5	–	–
Ghana (2000)	56.1	14.5	6.5	6.9	1.1	15.0	–	–
Guinea (1996)	70.2	2.6	4.8	7.1	–	15.3	–	–
Guinea Bissau (2009)	55.8	13.9	4.8	–	25.5	–	–	–
Kenya (2009)	76.8	2.9	3.0	4.2	2.7	2.4	8.1	–
Liberia (2008)	52.9	9.1	5.6	3.1	–	29.4	–	–
Mali (2009)	64.9	10.8	3.6	6.7	1.6	12.5	–	–
Mauritania (2013)	37.5 [33]	8.1	19.0	8.3	–	27.1	–	–
Mauritius (2011)	30.9	24.3	3.6	41.3	–	–	–	–
Malawi (2008)	84.7	1.2	2.1	1.7	–	10.2	–	–
Mozambique (2014)	68.4	1.4	3.8	8.0	7.4	10.9	–	–
Namibia (2011)	57.3	9.4	12.0	5.9	15.4	–	–	–
Niger (2012)	88.0	4.1	2.7	2.5	2.9	5.7	–	–
Nigeria (1991) [34]	68.5	na	6.1	9.0	4.7	7.9	2.4	5.8
Rwanda (2011)	75.0	12.9	1.7	2.2	–	8.2	–	–
Senegal (2013)	52.2	2.4	4.6	5.1	10.5	5.6	19.6	–
Sierra Leone (2004)	63.4	11.1	1.1	8.9	–	15.5	–	–
South Africa (2011)	37.2	6.3	6.0	9.0	6.6	7.7	12.0	15.2
Tanzania (2002)	76.7	5.5	2.7	4.0	4.3	–	6.8	–
Uganda (2014)	84.2	1.8	3.6	5.2	0.9	4.3	–	–
Zambia (2010)	61.3	3.3	2.8	10.4	5.0	17.2	–	–
Zimbabwe (2012)	67.0	5.5	3.4	5.5	2.5	16.2	–	–

Sources and notes for Table 2: These figures are derived from census data – from lists of urban centres and their populations (for virtually all nations listed here, these come from www.citypopulation.de/) and from figures for national urban and rural populations, drawn mostly from government websites and The United Nations Population Division [35].

collection and services. There are case studies that show how inadequate provision is for particular small urban centres but we cannot generalize from a few case studies.

However, an analysis of service provision in urban areas of 43 low and middle income nations including 22 sub-Saharan African nations drawn from Demographic and Health Surveys, published in 2002 showed that provision for water, sanitation and electricity is usually worst in urban centres with under 100,000 inhabitants – see Fig. 5. This shows the vast deficits in provision for flush toilets (with the deficit largest in urban centres with under 100,000 inhabitants) and water in the home (although here the largest cities have lower levels of provision than urban centres with under 100,000 inhabitants). Provision for electricity shows so clearly the increase in provision with city-size category – while the number of households lacking all three decrease with city size. Although this is drawing on data from DHSs undertaken in the 1990s, there is little reason to think that the gap between small and large urban centres in the percent of their population with basic services has closed.

There is one paper that seeks to identify the full spectrum of risk in Karonga, an intermediate sized urban centre in Malawi [42]. This draws on a household survey with a representative sample for the urban centre's population, interviews with key informants, focus group discussions and an analysis of hospital records. This allowed the construction of a table that lists all the risks identified in the research for the whole urban centre – see Table 3. This is unusual for at least two reasons. The first is that it reports on impacts from large disasters, small disasters (those that do not meet the criteria for being included as a disaster in EM-Dat) and everyday risks. The second is the coverage of

the whole urban centre; studies of risk among urban populations usually focus on particular settlements. One reason why this was possible was because this is still a relatively small urban centre; there are many informal settlements in cities in the region with much larger populations than Karonga.

Table 3 shows the range of causes of premature death, injury and asset loss for the inhabitants of Karonga. It highlights how impacts from what could be termed everyday risks may be causing more premature deaths than disasters. Records from Karonga District Hospital show 67 TB related deaths and 32 respiratory disease related deaths (probably mostly infant and young children) in 2014. As the paper on Karonga points out, these are very different in character to disaster deaths as they do not relate to a specific physical hazard and event and, unlike

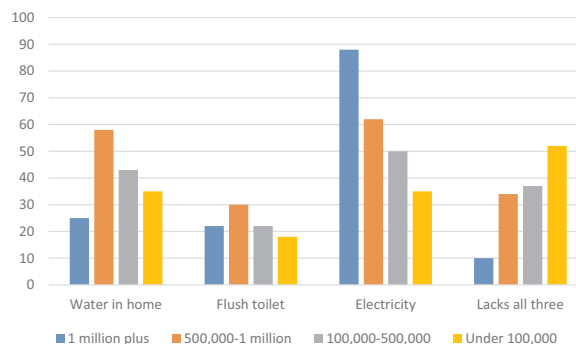


Fig. 5. Sub Saharan Africa; service provision in different size-classes for urban centres [41].

Table 3
Nature, scale and frequency of risks in Karonga town [43].

Type of risk	Category	Nature of the risk event	
		Occurrence and frequency	Examples
Flooding	Small disaster	Flooding has been occurring every rainy season from 2009 to 2016	Karonga District Council reports that 50 households, whole central town and settlements along Rukuru river were flooded in 2010; 6 December 2016 whole town centre was flooded and 14 houses collapsed
Earthquakes	Large disaster	These occur frequently; 4 in December 2009 alone	Entire town affected in 2009; 775 houses collapsed, 1154 houses developed cracks, many public buildings, businesses and services damaged or destroyed
Droughts/ food insecurity	Small disaster	Drought and food security problems in 2012 and 2014	Drying of crops, death of livestock and 9 and 13 reported deaths in 2012 and 2014, respectively due to malnutrition/hunger
Road/traffic accidents	Everyday risk/hazard	These reported to be occurring on daily basis	Karonga District Hospital reported 5 car accidents in 2016, leaving 5 people dead and 10 injured
Politically linked violence	Small disaster	This has occurred periodically, usually during food distribution exercises and political campaigns	Household respondents reported 12 people were injured in run up to 2014 national elections and some houses were burnt
Gender/ sexual related violence	Everyday risk/hazard	Reported to be a daily event.	Respondents reported 10 injuries due to gender based violence
Drowning in river/lakes	Small disaster	Mainly occurring in rainy season	Respondents said boats often capsized, with several undocumented fatalities
Crocodile/ snake/ animal attacks	Small disaster	These attacks happening each year, especially in rainy season	Community members indicated that several people were killed or injured along the lakeshore – no specific events reported
Strong winds	Small disaster	Happening each year, especially in rainy season	Community members indicated that scores of house roofs blown off – no specific event reported
Polluted/ poor water quality	Every day/ Small disaster	Polluted/poor water quality issues reported as taking place daily, but more serious during rainy season	Hospital records indicated 4 deaths due to cholera in 2016
Fish kills/ mortality	Small disaster	Reported to be a seasonal event, especially during temperature inversions and mixing of waters due to currents in lake Malawi	Respondents reported widespread unexplained death of fish species in Lake Malawi in 2006, 2011 and 2014,
Diseases/illness	Everyday risk	Daily	Karonga District Hospital reported 30 TB related deaths in 2012. 67 TB related deaths in 2014 and 13 and 32 deaths from respiratory infections in 2012 and 2014, respectively

most disasters, they do not include damage to property. Risks of premature death from TB and from acute respiratory infections were much higher than from flooding. But flooding would bring risks of damage to property and assets and perhaps secondary impacts (high risk of a cholera outbreak?) The paper also points to other causes of premature death (including traffic accidents, drought, drowning, animal attacks, and cholera) and injury (politically linked violence, gender-based violence). The authors of this paper acknowledge that their data sources will not pick up on all the impacts of life and health threatening risks in Karonga. But Table 3 does represent a challenge to researchers working on risk not to neglect the risks from ‘small’ disasters and ‘everyday’ hazards

The city of Karonga has almost no capacity to fulfil the long list of responsibilities assigned to its local government. A case study of the city was entitled “Where there is no local government: addressing disaster risk reduction in a small town in Malawi” [44]. A case study of a small town in Ghana, Mpasatia, showed the difficulties facing traditional leaders and local authorities who lacked the capacity to manage urban development and land use changes [45]. But there are few recent case studies of small urban centres in sub-Saharan Africa. It is the deficits in provision for risk reducing infrastructure and services that are local government responsibilities that the lack of local government capacities is most evident.

Various national or regional studies show that provision for water and sanitation is usually very inadequate in small urban centres [46]. For instance, in Cameroon in the late 1990s, only 99 of the 320 urban centres were served by the national water company (SNEC) [47]. In Senegal, a study of 47 small towns in Matam department with between 2000 and 15,000 inhabitants that are part of a water management support programme highlighted the inadequacies – very few or no individual water connections and in towns of 5000 or more inhabitants, uncontrolled expansion of the original network causes water pressure imbalances and leaks [48]. In Ghana, a 2005 assessment showed the lack of capacity in the urban utility (the Ghana Water Company Limited) that manages water supply systems for the 100 largest urban

centres; only 40% of the urban population was covered by this utility’s networks [49]. In Nigeria, a survey of 37 small towns and peri-urban settlements with between 5000 and 20,000 inhabitants in 1997 showed that less than 1% of households had piped water from yard, shared or public standpipes. 27.4% relied on water from rivers and streams, while 24.5% used yard wells. The rest obtained water from community wells (13.4%), water sellers (8.6%), springs (6.6%) boreholes (5.1%) and water tankers (4%) and other sources, such as ponds (8.2%). Many motorized boreholes in the towns were no longer working. The quality of water is poor, and cases of water-related diseases such as diarrhoea, dysentery, typhoid and cholera were prevalent. Distance from water supply (up to 600 m in some cases) and intermittency of supply were also problems. For sanitation, only 0.7% of households had septic tanks, 4.9% used pour-flush toilets and 74.6% used simple pit latrines. 15% had no sanitation facility and solutions included using public toilets, the bush or the farm. However, the majority (73.2%) of households had toilets located within 20 m of their homes [50].

Case studies of particular cities or towns further highlight the problematic:

- Kumi town in Uganda is a district capital and had a population estimated at 17,000 inhabitants in 2000. The Town Council is responsible for water and sanitation services. The town’s water supply comes from boreholes and pumps plus overhead tanks feeding a piped distribution network with public kiosks (at the time of the study there were 15 kiosks but two were closed) and a few household connections. Water was available for two hours a day. Virtually all households are reliant on water kiosks or water vendors. Around 60% of households have pit latrines and there are two public pit latrines although one was locked when visited by a study in 2000 [51].
- Mandiana (Guinea) is an administrative centre of 7640 inhabitants [52]. Water provision comes from two boreholes with solar pumps managed by the national water company (SEEG) which supply a water tower that serves 12 active standpipes (with two taps each);

there are also 3 inactive standpipes. Each standpipe serves an average of 50 people. These standpipes are regularly used by 85% of households during the dry season (when traditional wells have dried up) and 55% of households during the winter period. The high cost of water from the standpipes means that it is used primarily for cooking/drinking, rather than washing which is carried out either at the river or at home.

- In Bunda (Tanzania) with 46,178 inhabitants in 2002, around half the population is served with a piped water system with water available for 8 h every two days. Many new areas are unserved (including low income areas) and their inhabitants get water from the lake or wells or from street vendors. In 2004, there were just 365 connections, 191 of which were metered. There are no sewers and only a few houses have septic tanks. There is no public provision for solid waste collection in residential areas and the drainage system is inadequate [53].
- Homa Bay (Kenya) is a trading centre, fishing centre and district headquarters with around 32,600 inhabitants. Water quality in the water supply system is often poor, water volume is far below demand and supply is not continuous. The town has several unplanned informal settlements and most of their inhabitants get their water direct from the lake. Only 22% of the population is connected to sewers; most people use pit latrines or toilets connected to septic tanks or the bush. Overflowing toilets are common during rainy seasons. Storm drains are not available for most of the town and provision for the collection of solid wastes is very inadequate, so it is common for drainage networks to be blocked [54].

There is little reason to think that the case studies summarized above are unusual. Three points are worth highlighting. The first is how few of the population (or in some instances none of the population) in most small urban centres have access to a piped water system within their home or yard (i.e. a private connection). In most case study urban centres, much of the access to piped supplies is through standpipes or kiosks. The second is the high proportion of the population in most of the case study urban centres that rely on untreated water at least for part of their needs. The third is the lack of provision for sanitation. Most small urban centres in sub-Saharan Africa have no sewers and for those that do, these serve a small proportion of their population. Many case studies also pointed to no other forms of public provision for sanitation – for instance no service to empty pit latrines. Some case studies highlighted how significant proportions of the population had no latrine in or close to their home and how communal or public latrines were common. Many case studies also mention the lack of provision for solid waste collection and for drainage.

5. Conclusions

We know that the absence of risk reducing infrastructure and services, poor quality, overcrowded housing and use of dirty fuels greatly increase risks of premature death, serious illness and often injury in urban areas. Although most of the documentation of this lack of urban infrastructure and services in sub-Saharan Africa is for relatively large cities, there is no reason to think that this does not apply to smaller urban centres – smaller concentrations of urban populations, especially high density concentrations. We also know that most of the measures to reduce risks fall within the responsibilities of local governments [55] and how addressing these risks depends heavily on the competence and capacity of local governments in what they do, what they support and what they prevent. So to implement measures to identify the most serious risks (including disaster, small disaster and everyday risks) for women and men at different age groups and then act on them. This paper is intended as a reminder of the need to consider risk in small urban centres, in part because of their demographic and economic importance, in part because it is here that much risk is concentrated and usually with so little local capacity to address it.

Furthermore, in the absence of data available in each city and smaller urban centre on what are the most serious environmental health problems and who is most at risk (socially and spatially), it is difficult to know what are the priorities – both for action and for research. When this is combined with research and action agendas strongly influenced by external funding and preferences and choices by external professionals, it can lead to inappropriate choices.

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