Urban Africa Risk Knowledge

Briefing

No.7 July 2017

Keywords
Urban, risk, resilience, Africa

# Applying multiple methods to understand and address urban risk

The inhabitants of African towns and cities face a range of hazards, which can best be described as representing a 'spectrum of risk' from events that can cause death, illness or injury, and impoverishment. Yet despite the growing numbers of people living in African urban centres, the extent and relative severity of these different risks and how they relate to each other are poorly understood. A wide-ranging multi-country programme of research has shown that using a 'spectrum of methods' is an effective way of understanding urban risk, and an essential tool for breaking the cycle of risk accumulation.

## Policy Pointers

- The inhabitants of African towns and cities face a range of hazards that can be described as representing a `spectrum of risk'.
- This 'spectrum of risk' requires a 'spectrum of methods' to understand it.
- Multidisciplinary research and multi-faceted research endeavours are central to reducing urban risk.

## Introduction

Most sub-Saharan African towns and cities are risky places. Dense concentrations of people and economic activities, high levels of water and air pollution, and inadequate provision of basic services and risk reducing infrastructure result in high levels of physical injury, serious illness, reduced productivity, and loss of life. This risk – whether from disasters or from disease – disproportionately impacts low-income groups. Urban Africa: Risk Knowledge (Urban ARK) – a wide-ranging multi-country programme of research – has applied a 'spectrum of methods' to understand the 'spectrum of risks' across urban sub-Saharan Africa. Taking this approach helps us to understand and address the events and processes that affect health, disrupt lives and livelihoods, prevent some people from escaping from poverty, and cause other 'precarious' individuals and households to slip back into poverty.

## The Spectrum of Urban Risk

Residents of urban centres – and particularly residents of low-income neighbourhoods – face a range of risks. The 'spectrum of risk' can be understooof of as "all the potential and likely causes of events resulting in premature death, illness or injury, and impoverishment".[1] While for many years, studies of disaster risk focused primarily on large single hazard disasters that caused substantial damage to property or loss of life, there has been growing recognition of what is termed 'extensive risk' that is associated with the "dispersed and recurrent occurrence of small and medium scale impacts"[2] that cumulatively erodes coping capacities and livelihood strategies. However, direct engagement with residents of low-income urban communities frequently highlights the many other factors that can cause loss or damage to property, injury, ill-health, or even death; and the many other underlying drivers which can create susceptibility to harm in the multi-hazard environments of everyday life.

At one end of the spectrum of risk are the everyday health risks faced by residents of low-income and informal settlements: most informal settlements are particularly unhealthy places with especially high risks of infection and injury, particularly for children. At the other end, are the large and obvious urban disasters: epitomised by Hurricane Katrina in New Orleans (2005) and the Port au Prince earthquake (2010).

## BOX 1: WHY IS IT IMPORTANT TO UNDERSTAND RISK IN URBAN CENTRES IN SUB-SAHARAN AFRICA?

Understanding and reducing risk in urban centres in sub-Saharan Africa (SSA) is relevant for several reasons:

i) Most towns and cities in SSA are growing rapidly. Between 1950 and 2000, the urban population of SSA grew from 20 million to 197 million; in 2015 it was 360 million, and it is projected to be 1.1 billion by 2050.[3] Smaller urban centres with fewer than 1 million inhabitants are among the fastest growing, although research has overwhelmingly focused on the largest cities. Reducing risk in these contexts is central to achieving the goals of the Sendai Framework for Disaster Risk Reduction, UN Habitat's New Urban Agenda, and the Sustainable Development Goals.

ii) The expansion in urban populations is not matched by an equivalent expansion in urban governments' resources and capacity, and in the availability of appropriately located, properly serviced and affordable land and housing for low-income groups. This means that many urban residents live (and are likely to continue living) in what can be termed slums. Of course, not all slums are equally risky – and the inhabitants of many areas that are not slums are also exposed to unacceptably high levels of risk – but these deprivations both create risks and reduce the ability of people living in slums to cope with them.

iii) Urban growth is taking place alongside climate change and other pressing global challenges, such as the threat of new and emerging diseases. The IPCC Fifth Assessment Report recognises the "rapid growth of highly vulnerable urban communities living in informal settlements, many of which are on land at high risk from extreme weather".[4]

iv) There is significant opportunity and potential for resilience building and addressing disaster risk before or as it arises, especially in emerging urban centres and in slums where much innovation and creativity is centred.

The Urban ARK project attempts to build knowledge about the spectrum of risk in the eight cities shown in the map below, with the aim of using this understanding to reduce risk for cities across sub-Saharan Africa.


Falling somewhere in between are the floods, fires, and temperature extremes that particularly affect low-income and informal settlements, yet most of these are ignored outside of (or even in) local media outlets.

## Filling the Gap: addressing the information deficit

Generating comprehensive, detailed, and socially and spatially disaggregable information on the full spectrum of risk requires complete and detailed reports of all events that result in premature death, serious illness or injury, loss of or damage to assets (including housing), and livelihoods. Yet many of the records that ought to provide this type of information are absent or partial in many SSA cities.

The approach taken to research throughout the Urban ARK project was deliberately open and iterative rather than narrowly-defined and restrictive. This ensured that the most appropriate approaches – using available data, presence of local expertise and identified need from policy actors – were used in each location. A major focus has been on engagement with city stakeholders, and supporting demand-driven approaches to evidence generation and identifying policy priorities.

## Documentary and institutional analysis

Despite the widespread deficiencies in records, documentary analysis can be a useful source of information on the spectrum of risk in African cities. While this is seldom as straightforward as analysing readily available datasets, there are certain sources that are already prepared and others that can be accessed and analysed.

The Demographic and Health Survey is a large-sample survey that is undertaken on a regular basis (often every five years) to provide data for a wide range of indicators in the areas of population, health, and nutrition. DHS data has been used in Urban ARK countries to attempt to uncover differences between smaller and larger urban centres. In Malawi, this shows that smaller urban centres have a lower provision of basic health promoting services (such as water, sanitation and electricity) than larger urban centres, and suggests their populations may suffer from some of the most serious urban environmental problems linked to unsanitary conditions.

One of the most comprehensive datasets available for understanding extensive risk in particular nations, regions or cities is that generated by DesInventar,[i] an online database that builds a body of evidence on disasters, based on pre-existing official data, academic records, newspaper sources, and institutional reports. An analysis of DesInventar data from Kampala, Nairobi, Niamey, Dakar and Freetown,[5] suggested that the major losses in urban disasters were from flooding, epidemics, fires, and accidents, and to a smaller extent structural collapse, industrial disasters, drowning, and storms. In terms of houses destroyed or damaged, flooding is by far the most prevalent, although fires and storms also cause considerable losses.

Other sources of data can be accessed to give a full picture of the drivers of risk – for instance records from hospitals, or records of traffic accidents and fires. For example, the research in Karonga Town included archival research of inpatient records at Karonga District Hospital for a one-year period to assess the relative importance of different environmental health problems – ranging from poor water and sanitation,

i. www.desinventar.net

to seasonal floods and drought, to large-scale disaster events.[6]

## Community Data: surveys and participatory approaches

Various forms of data collection can be used to build understanding of risk in low-income urban neighbourhoods. These approaches can vary from highly structured surveys to more participatory approaches.

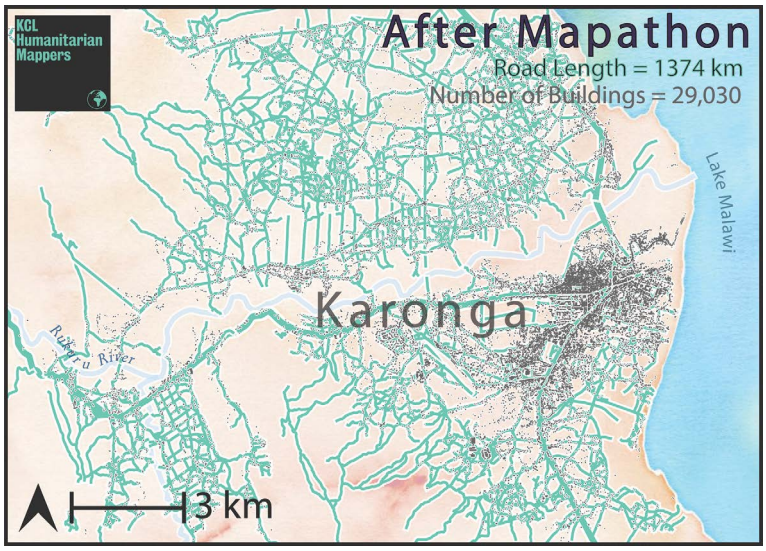
Household surveys to assess risk can draw on and develop existing methodological approaches. Boubacar *et al*. (2017) modified the Household Economy Approach (HEA) – a tool routinely used to monitor household-level vulnerability to food security shocks in rural sub-Saharan Africa – to assess the absorptive capacity of residents in flood-prone neighbourhoods in Niamey, Niger.[7] More participatory and ethnographic approaches, such as participatory mapping and transect walks, can also be applied. If applied appropriately, these local and participatory methodologies can go beyond recording perceptions of risk to ensuring that the local manifestations of risk are brought to policy attention. While these approaches often provide nuanced insights into complex risk contexts, taken on their own they can be idiosyncratic in design and miss an opportunity for synthetic analysis.

## Observational tools and remotely sourced data

Technological advances have made it increasingly easy to record different types of data using relatively low-cost and portable equipment. This includes logging the locations of particular hazards, and recording accurate data on air and water pollution. The use of this type of data in Mombasa and Nairobi, Kenya and Dakar, Senegal has helped to establish the linkages between exposure to poor solid waste management and self-reported health conditions, while biomedical sampling around the municipal waste dump site in Nairobi showed infections, injuries and accidents, and chronic and psychological illnesses associated with exposure to solid waste among waste workers at the Dandora dump site.[8]

Remote sensing techniques can also be used to build an understanding of the spectrum of urban risk. One approach to understanding urban risk in light of data paucity is by developing 'good enough' models to create first approximations. For several Urban ARK cities (including Nairobi and Karonga), remote sensing provided a coarse description of the infrastructure in different parts of the city (eg roads, water, communications, electricity) by zoning the city into different parcels ('urban textures'). Overlaying these urban texture maps with coarse scale hazard maps allows stakeholders to think through scenarios of how different parts of the city might be affected by the same hazard, and how people, goods, and hazardous processes might flow between these parcels during a hazard event.

### BOX 2: OPEN SOURCE MAPPING FOR RISK REDUCTION




In addition to local knowledge, the global citizen science community can also contribute to the generation of data useful for understanding exposure to natural hazards. An Urban ARK 'mapathon', (mapping marathon) organised by KCL Humanitarian Mappers in London in March 2016, aimed to enrich the globally crowdsourced OpenStreetMap,[ii] spatial dataset for the town of Karonga. Before the mapathon, 75 buildings and 243km of roads were mapped. After the mapathon (and during the following weeks where the task was available online for the global community to contribute to) 29,030 buildings and 1,347km of road were mapped, with the data being freely available for download. As the generated map is based on tracing buildings and roads from recent aerial imagery, the resulting map presents a more neutral view of the spatial distribution of both formal and informal houses and roads across the area from which exposure to hazards, such as floods and earthquakes, can be better understood through overlaying hazard maps with infrastructure maps.

Providing climate information for cities requires using different types of data from multiple sources. Climate data has been used to develop climate profiles and narratives for various Urban ARK cities to support the effective communication of complex climate information and facilitate stakeholder engagement and usability. But this information needs to be complemented by qualitiative studies that look at issues such as the effect of heat stress in informal settlements.

## Conclusion: principles for understanding risk in low-income urban centres

Taken together, the 'spectrum of methods' covers a broad range of the 'spectrum of risk' and demonstrates a move towards more granular and detailed data that can be triangulated and contextualised with other sources of information.

Addressing the spectrum of urban risk requires innovation in methodological approaches; in particular, the use of a diverse set of methods (quantitative and qualitative, deductive and inductive),

ii. www.openstreetmap.org

capable of capturing and supporting action on risk in integrated ways. Adopting a mixed methods approach through a large programme such as Urban ARK helps to bridge technical, historical, social, health, and other perspectives and data.

Several key conclusions can be drawn from this:

- Methods are particularly useful where they are **locally relevant and informed**. The approaches described above recognise the specific challenges posed by urbanisation in Africa and how these contribute to risk, and identify approaches that can be applied in low-income neighbourhoods and high-risk settlements.

- Effective research on the spectrum of urban risk requires **close partnerships** between researchers, local community organisations, municipal authorities, and other research users – not just to provide the type of information that are assumed to be useful, but to work closely in identifying data that will be useful for policy and practice.

- There is a need for greater **inter-urban and intra-urban perspectives** that identify and address risk differentials between and within urban centres of different sizes and in different geographic situations, and that can inform urban and regional approaches to planning and risk reduction.

Individually, the methods address an important, yet partial, range of the spectrum of risk. But as joined-up approaches, they have the potential to address many of the major risks in urban centres.

## Authors

David Dodman, Director: Human Settlements Group, IIED. david.dodman@iied.org

Hayley Leck, Research Associate, Department of Geography, King's College London. hayley.leck@kcl.ac.uk

Faith Taylor, Postdoctoral Research Associate, Department of Geography, King's College London. faith.taylor@kcl.ac.uk

## References

1. Satterthwaite, D and Bartlett, S (2017) Editorial: the full spectrum of risk in urban centres: changing perceptions, changing priorities. *Environment and Urbanization* 29(1): 3.

2. Lavell, A and Maskrey, A (2014) The future of disaster risk management. *Environmental Hazards*, 13(4), 271.

3.United Nations, Department of Economic and Social Affairs (UN DESA), Population Division (2014) World Urbanization Prospects: The 2014 Revision, CD-ROM Edition.

4. Revi, A, Satterthwaite, D, Aragón-Durand, F, Corfee-Morlot, J, Kiunsi, R, Pelling, M, Roberts, D and Solecki, W (2014) Urban areas. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 538.

5. Osuteye, E, Johnson, C and Brown, D (2016) The data gap: An analysis of data availability on disaster losses in sub-Saharan African Cities. Urban ARK Working Paper #11. Available online: www.urbanark.org/data-gap-analysis-data-availability-disaster-losses-sub-saharan-african-cities

6. Manda, M and Wanda, E (2017) Understanding the nature and scale of risks in Karonga, Malawi. Environment and Urbanization 29(1): 15-32.

7. Boubacar, S, Pelling, M and Barcena, A (2017) The erosive effects of small disasters on household absorptive capacity in Niamey: a nested HEA approach. *Environment and Urbanization* 29(1): 33-50.

8. African Population and Health Research Center (APHRC) (2017) Solid Waste Management and Risks to Health in Urban Africa: A Study of Nairobi and Mombasa Cities in Kenya. Nairobi, APHRC.

Urban Africa Risk Knowledge

www.urbanark.org

**Urban Africa: Risk Knowledge (Urban ARK)** breaking cycles of risk accumulation in sub-Saharan Africa

A three-year programme of research and capacity building that seeks to open up an applied research and policy agenda for risk management in urban sub-Saharan Africa. Urban ARK is led by 12 policy and academic organisations* from across sub-Saharan Africa with international partnerships in the United Kingdom.

* Abdou Moumouni University; African Population and Health Research Centre; Arup; International Alert; International Institute for Environment and Development; King's College London; Mzuzu University; Save the Children; UN-Habitat; University of Cape Town; University College London; University of Ibadan

Contact: Mark Pelling mark.pelling@kcl.ac.uk

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

UKaid from the British people

Urban ARK is funded by the Economic and Social Research Council (ESRC) and the UK Department for International Development (DFID) Humanitarian Innovation and Evidence Programme.