Navigating data scarcity to mainstream accessibility analyses in Africa

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WORLD BANK GROUP

GFDRR
Global Facility for Disaster Reduction and Recovery

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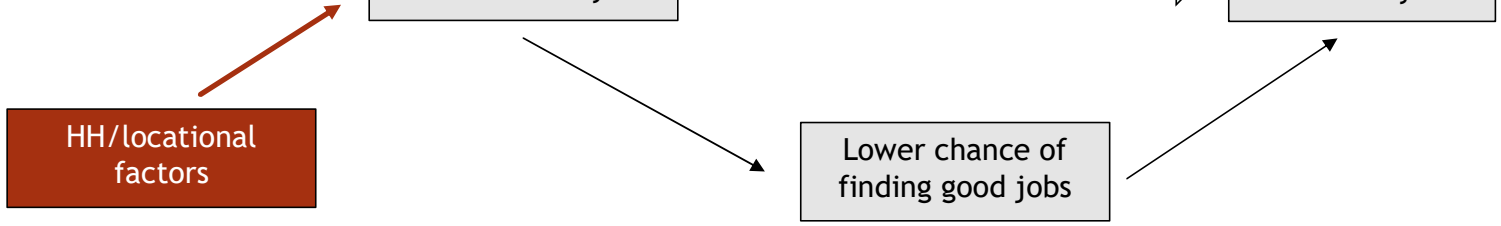
Objectives

- Compute accessibility to employment in 11 Africa cities
  - Bamako, Cape Town, Conakry, Dakar, Dar Es Salaam, Douala, Harare, Kampala, Kigali, Lusaka, Nairobi.
- Create metrics and visuals to compare accessibility across cities
- Create a range of datasets that can be re-used
  - To engage with clients
  - To investigate the impacts of land use planning/changes and transport investments through counterfactuals
- Investigate the impacts of disruption from natural hazards

Why Accessibility matters

- Long distance from jobs
- Transport not reached (network); not reliable (congestion); not affordable.
- Geographic/environmental constraints (hills, slums, etc).



1/ At the aggregate urban level
- Long commuting time
- Lack of positive spatial spillover

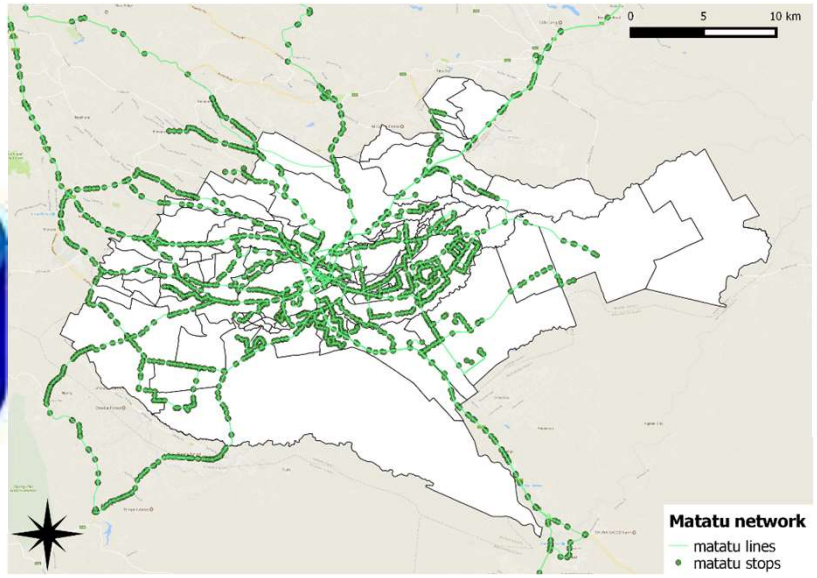
2/ At the household level
- High job searching costs
- Become inactive labor force

1/ Prud'homme and Lee (1999), Cervero (2001), Melo et al. (2013), Venables (2017)
2/ Aslund, Osth and Zenou (2010), Jin and Paulsen (2017), Franklin (2015), Chen et al. (2017), Norman et al. (2017),…

Accessibility – a simple and powerful metric

People

Transport



Jobs

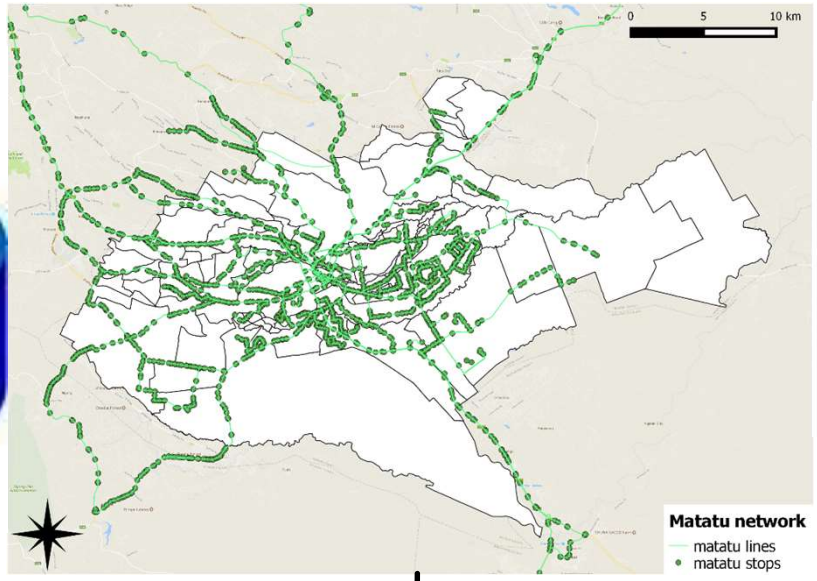
Accessibility

Accessibility – getting around data scarcity

People

OK

Transport



Getting there

Jobs

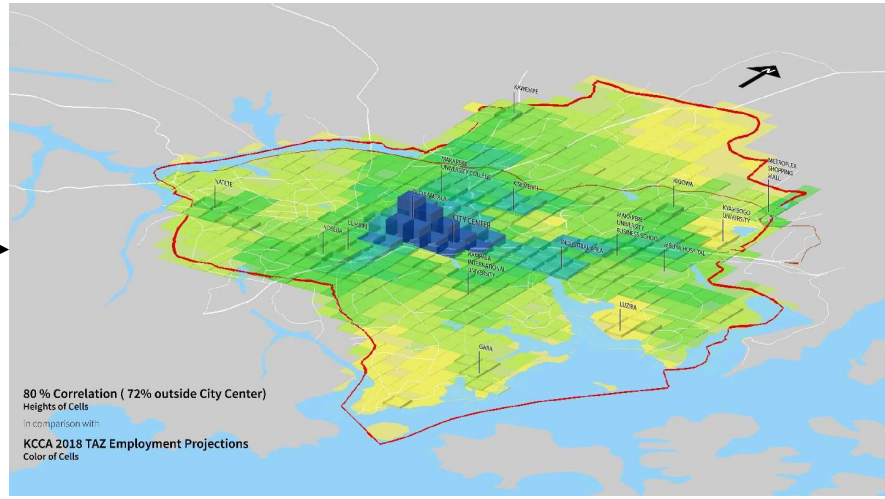
Problem

Building proxies for the distribution of employment opportunities

Using Open Source data to proxy for the location of jobs and inform urban planning and transport policies for accessibility

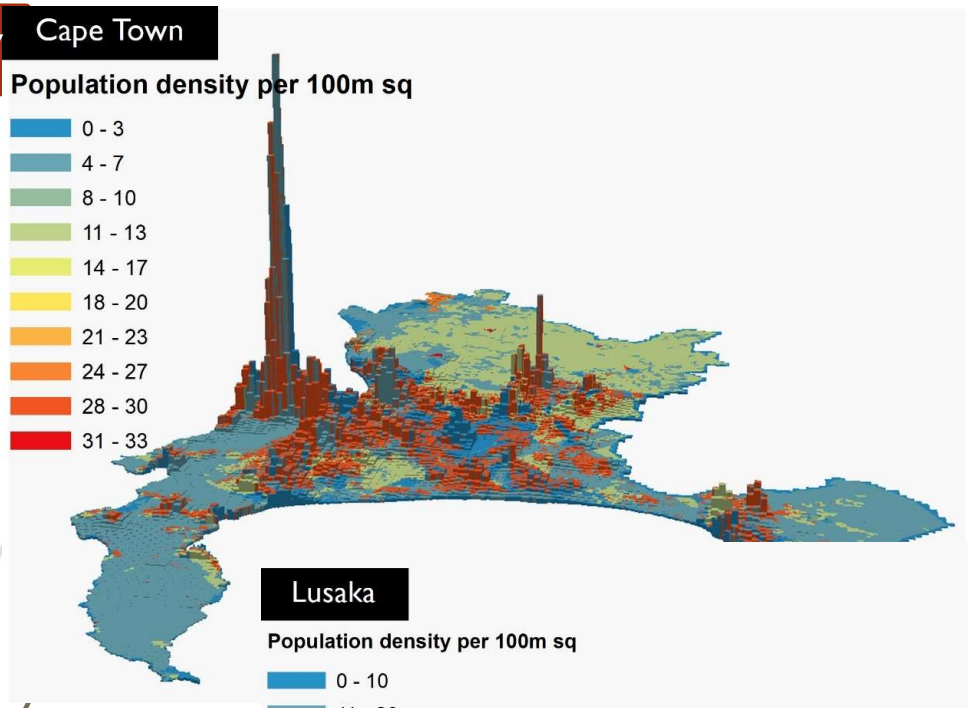
Extracting amenities, points of interest, road intersections, transportation hubs… from OSM and Google Maps

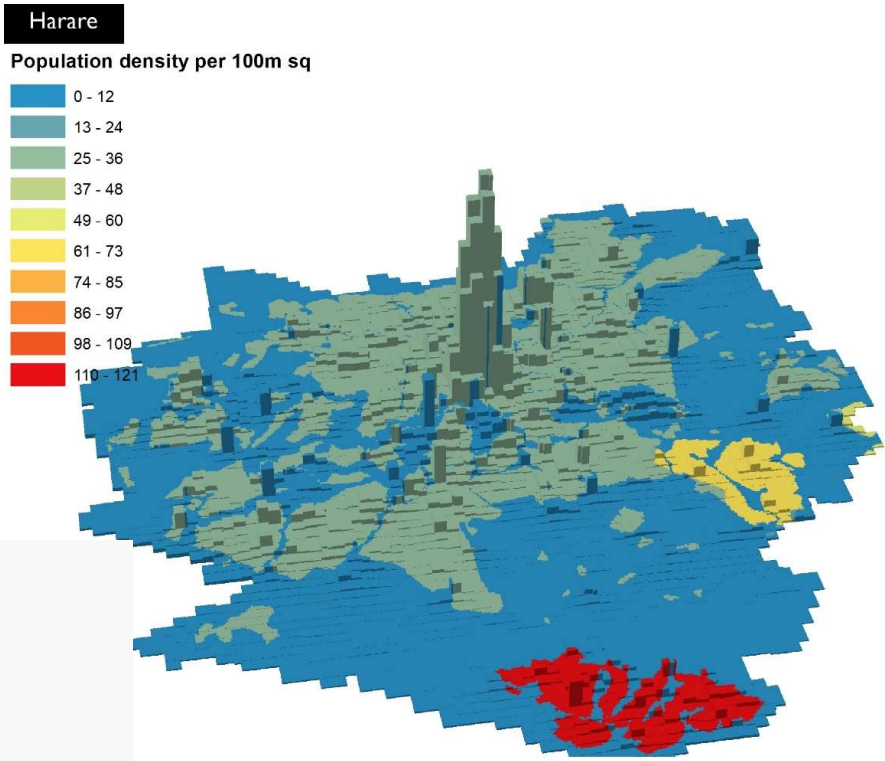
Using these data to proxy for the location of jobs. An 80% correlation in Greater Kampala with business registries

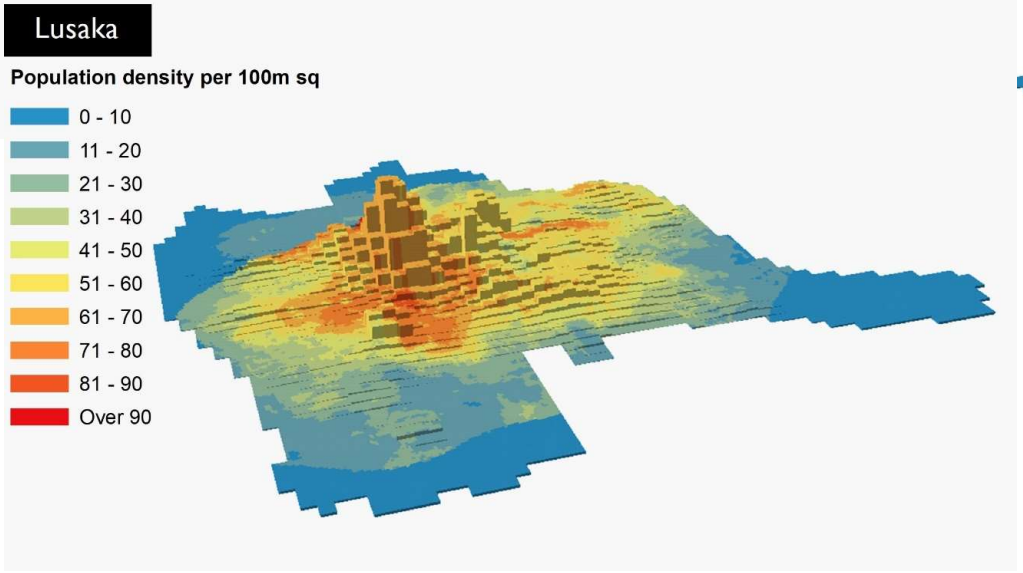


Avner et al., 2019, "Rapid Appraisal Methodology to determine Employment Opportunity Areas in African Cities", World Bank, draft

Distribution of employment opportunities

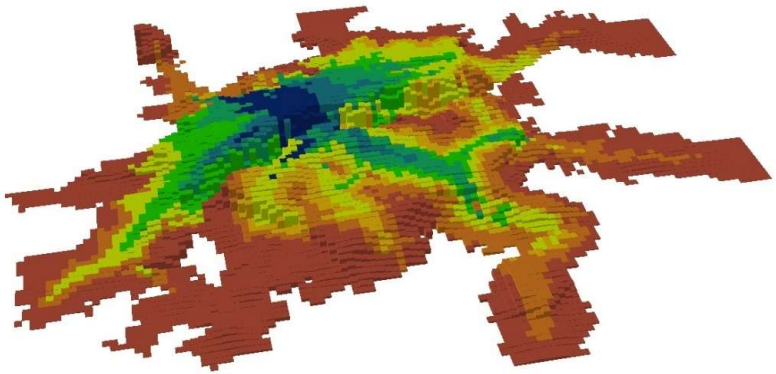




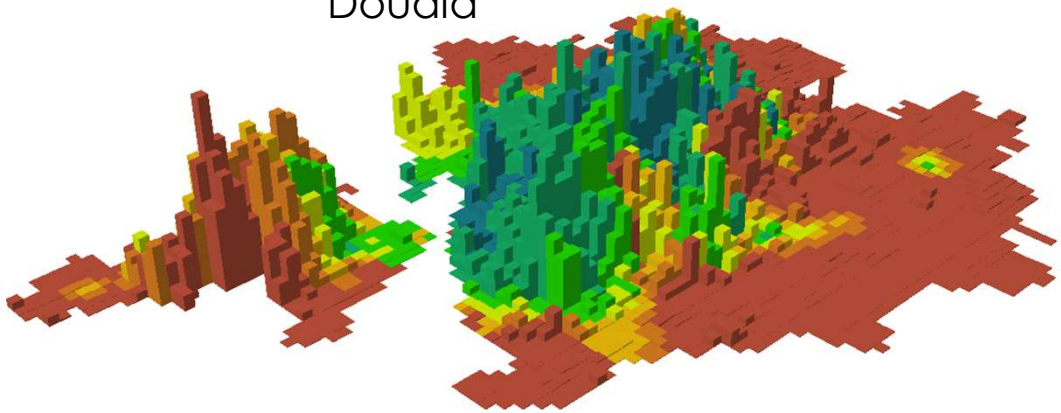


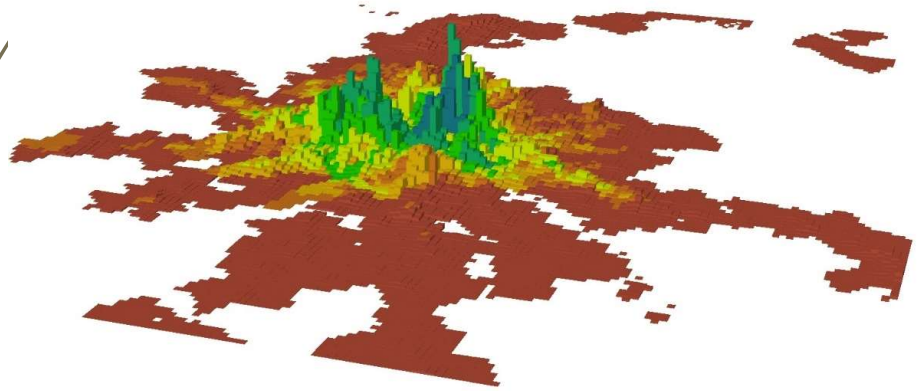
Distribution of accessibility and population

Bamako

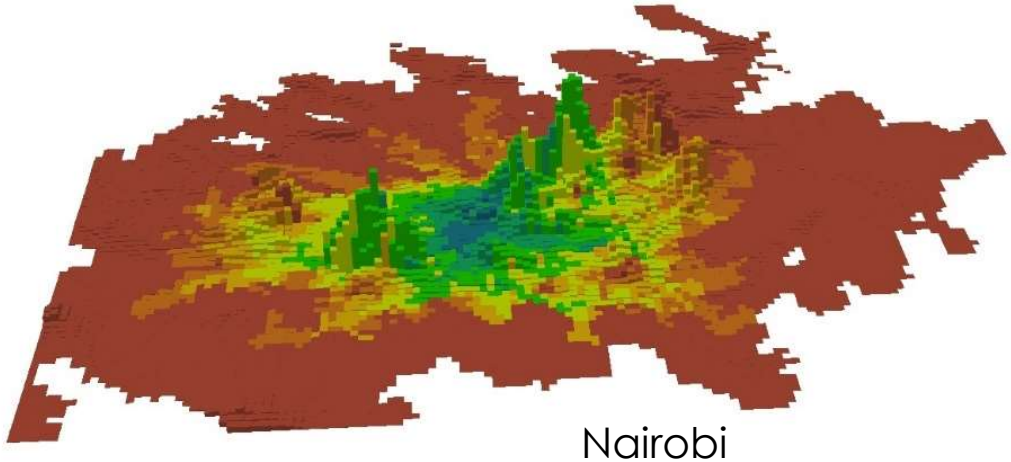


Douala





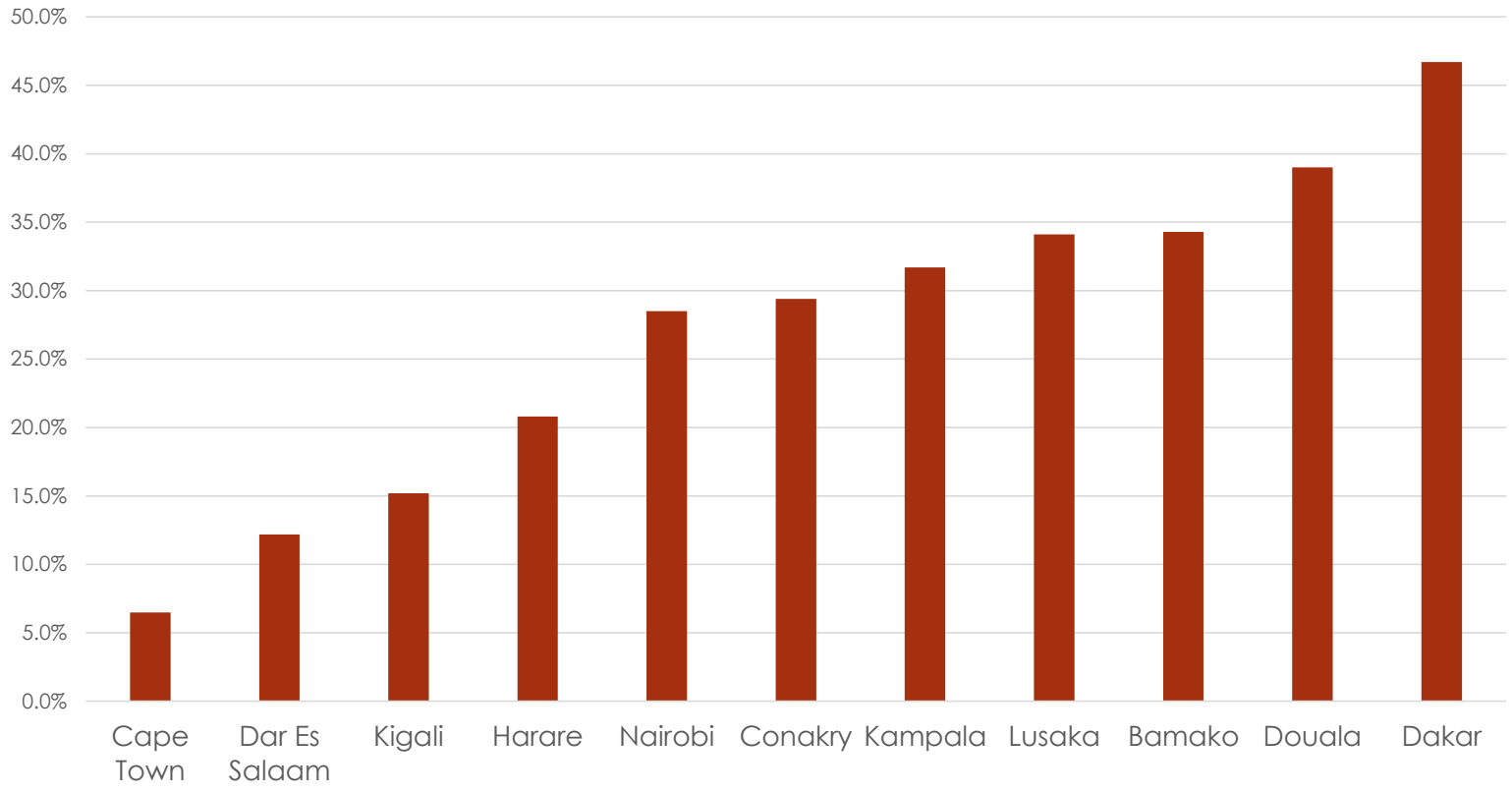
Kampala



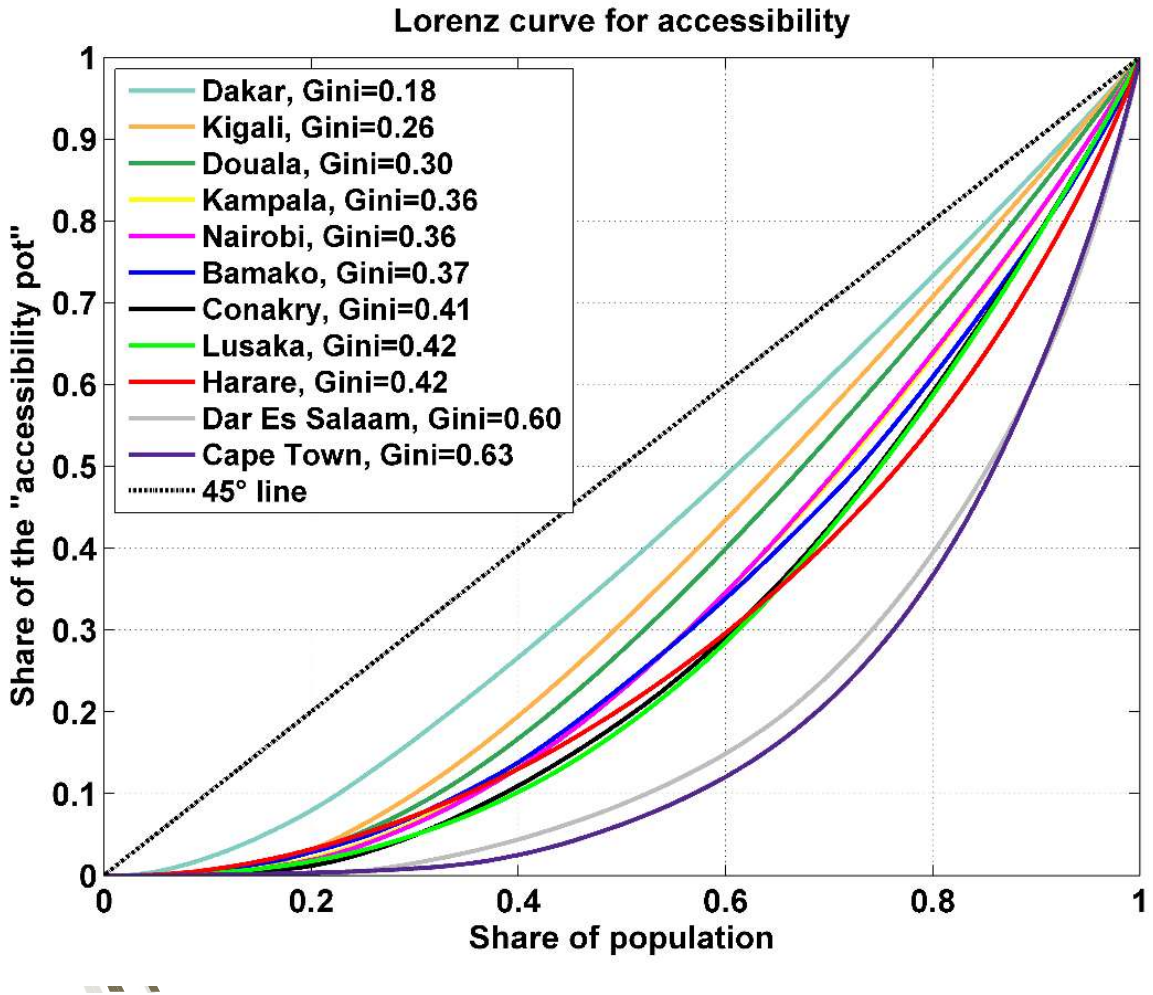
Nairobi

Note: Height is accessibility level and color is population density

Average accessibility across cities



Capturing inequality in access



- **Average accessibility** only tells us one side of the story…
- Capturing how **equally/unequally distributed accessibility levels are** in the urban area shows another important dimension
- The use of classic inequality metrics applied to the spatial distribution of accessibility levels: **Lorenz curves and Gini coefficients**

The impact of floods on accessibility to services

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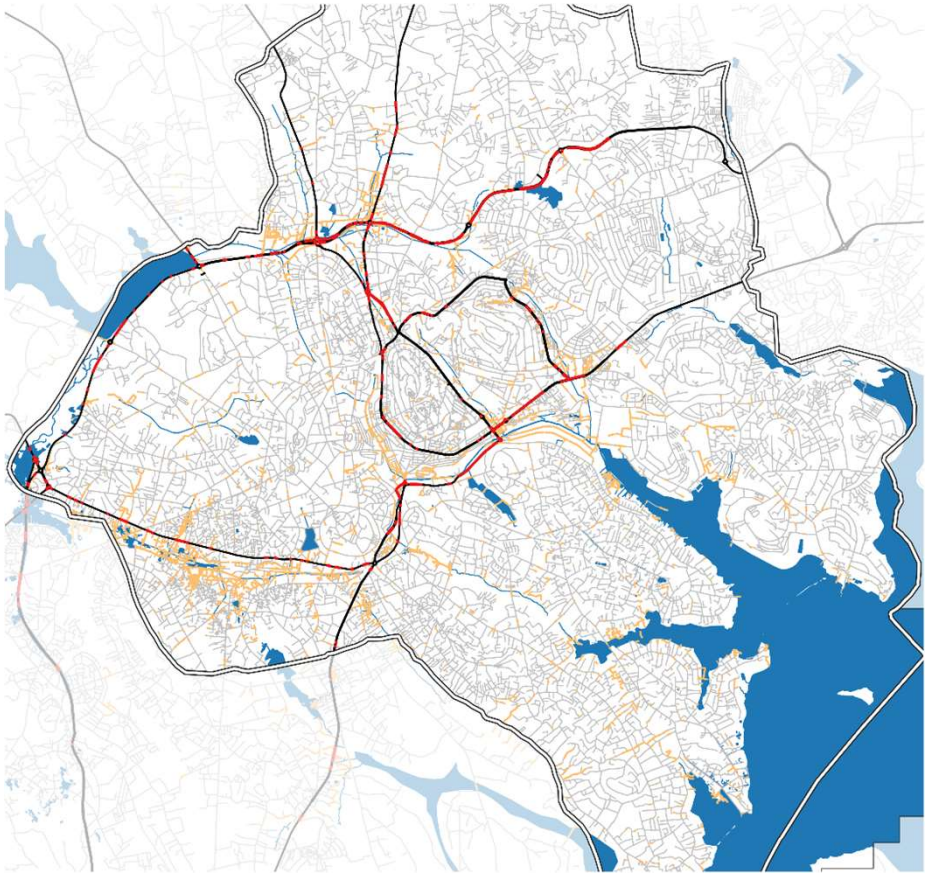
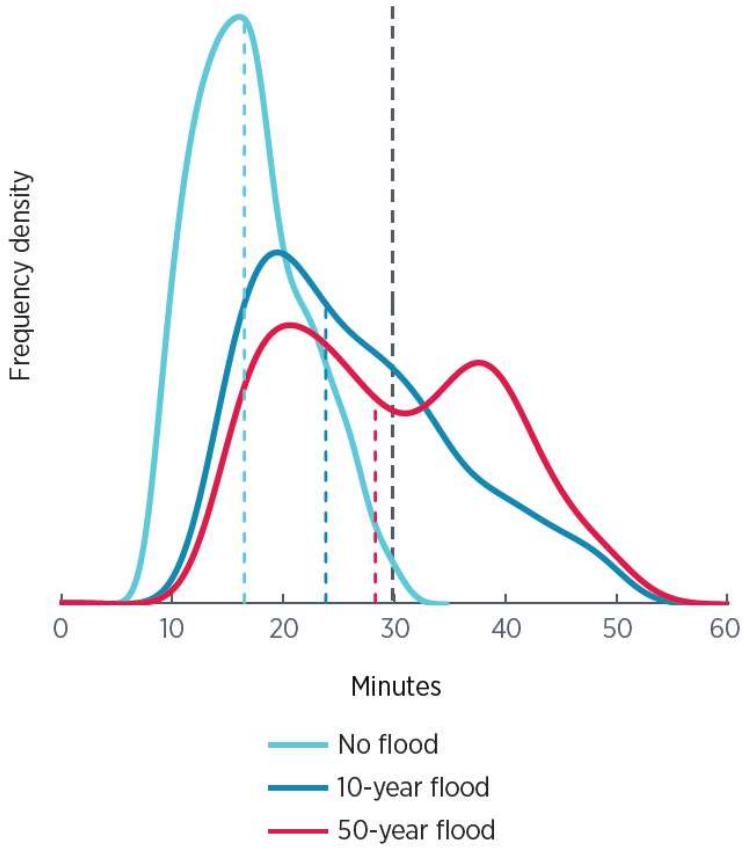
- Road segments affected by a flood with a 50 year return period in Kampala

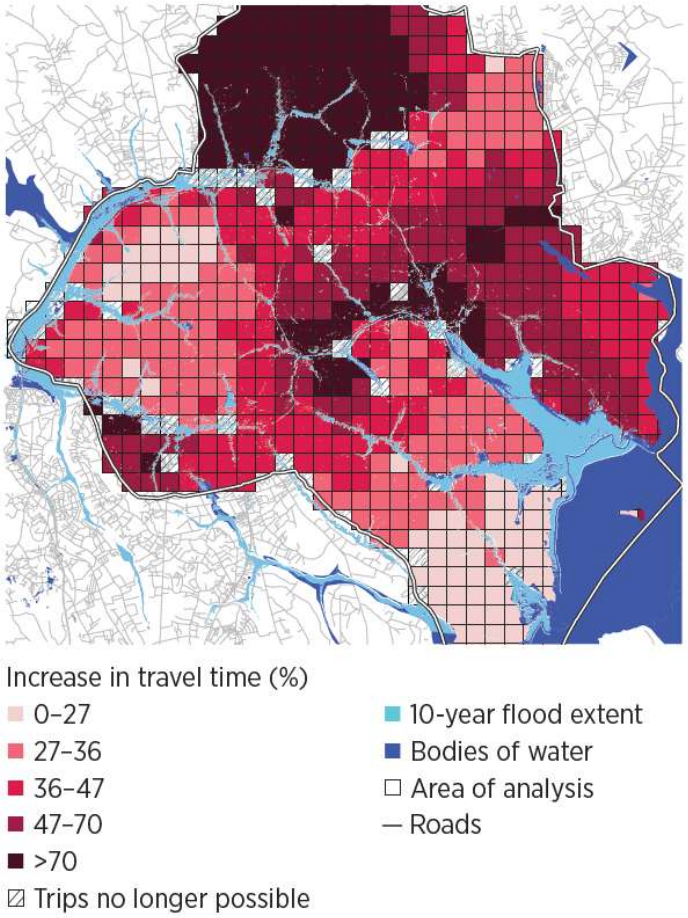


The impact of floods on accessibility to services

a. Mean travel times from locations in all of Inner Kampala to health care facilities



b. Increases in travel times from locations across Inner Kampala to hospitals in a 10-year flood



Hallegatte et al. 2019 *Lifelines. The Resilient Infrastructure Opportunity*

Conclusions

- An initial benchmark for accessibility in Africa cities: Equal, Unequal and In between cities
- The basis to look at counterfactual scenarios of land use changes and transport investments
- … And the basis to look at the impact of disruptions from natural hazards on accessibility to jobs and services. And to prioritize interventions!
- Freely re-usable sets of data
  - Employment Opportunity Areas (all 11 cities)
  - Transport GTFS data for (Douala, Harare, Nairobi, Kigali…)