

ASSESSING THE MAJOR HEALTH
DISPARITIES IN KENYA FOR ITS
HEALTH SYSTEM
IMPROVEMENT

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Intro to Health disparities in Kenya

■ Unequal access to health care:

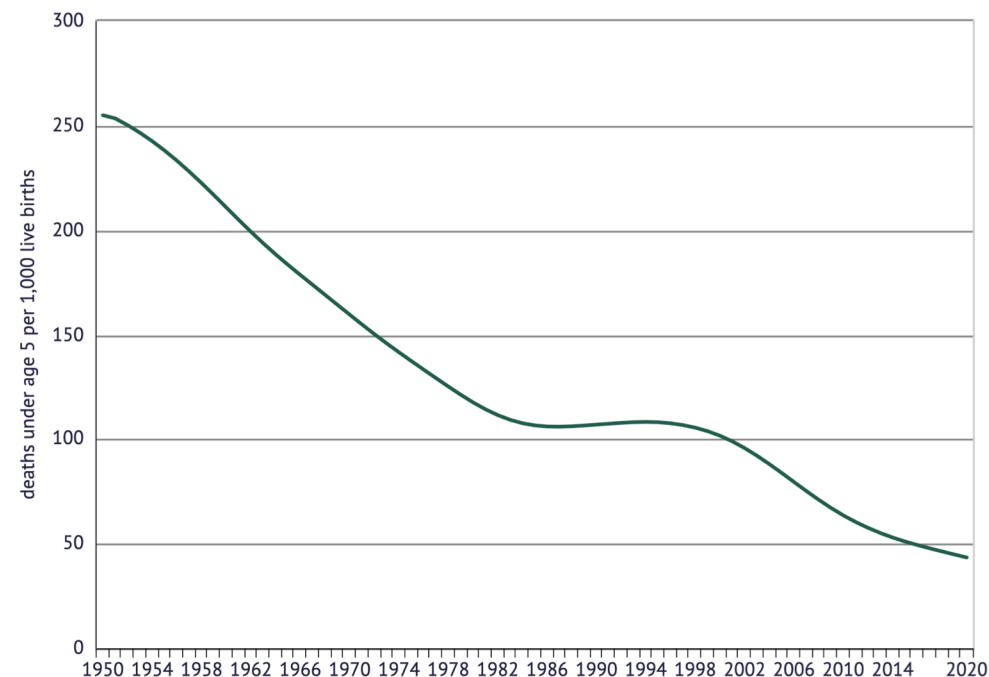
- *Affordability*
- *Availability*
- *Geographical accessibility*

■ Major health issues:

- *High under-5 mortality rate*
- *High maternal mortality rate*
- *Mortality from both communicable and non-communicable diseases*



What is Kenya under-5 mortality rate?



My central research question:

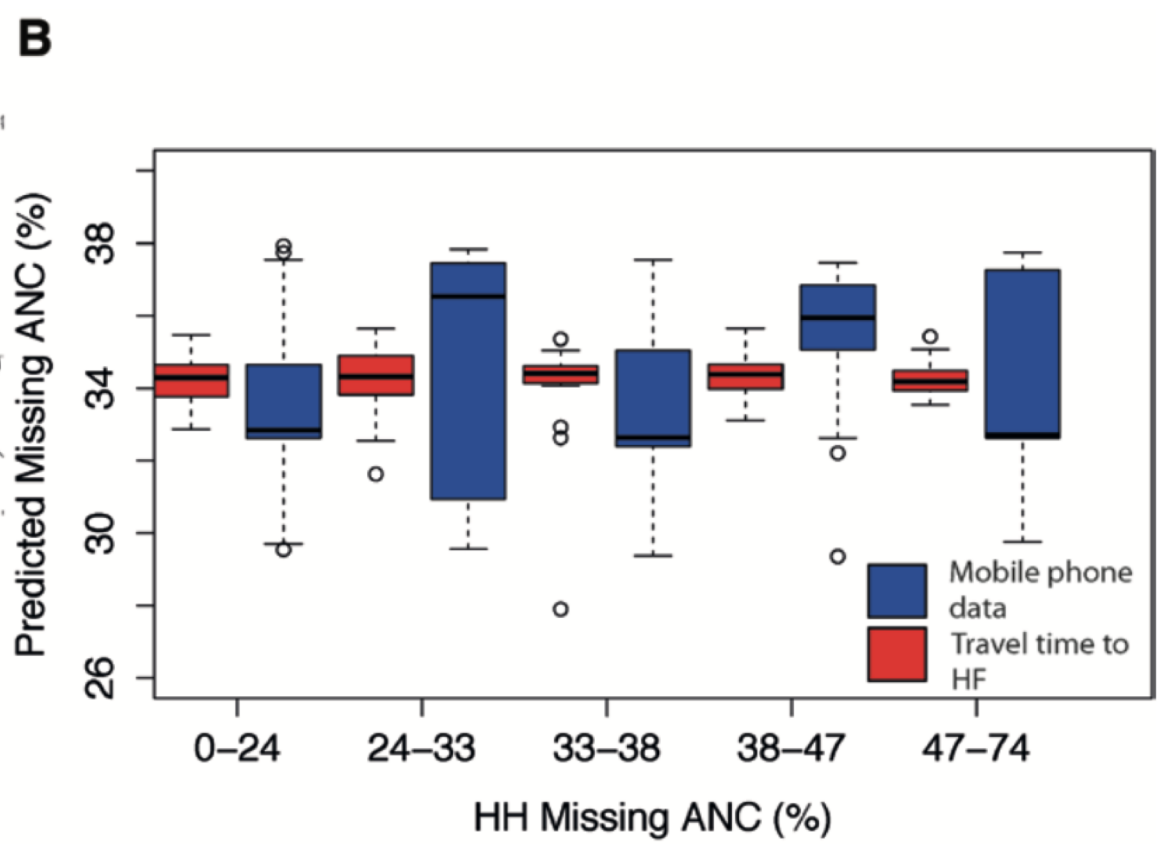
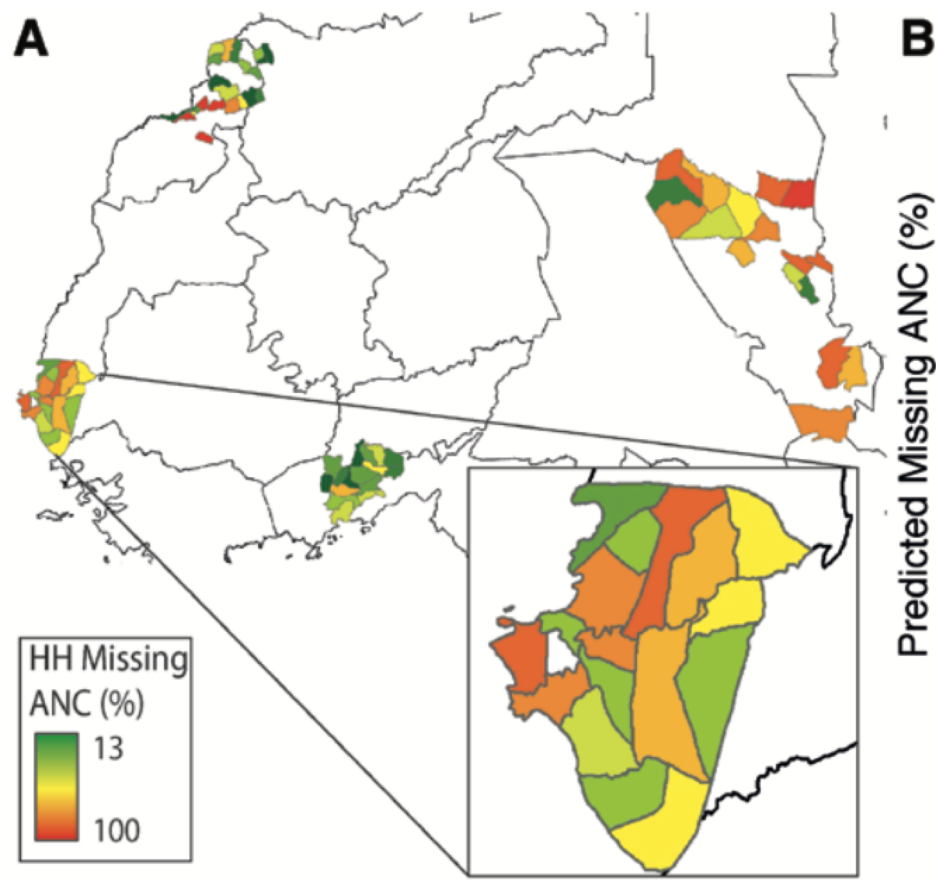
How can data science methods be applied to examine and quantify health inequality issues within Kenya and provide insights for the improvement of its public health system?

Method 1: Quantify impact of poor physical access

- CDR (call detail record) data: the relative location to each cell tower, sender, and receiver
- Individual mobility is modelled by a measure called **Radius of gyration**:

$$r_g^a(t) = \sqrt{\frac{1}{n_c^a(t)} \sum_{i=1}^{n_c^a} (\vec{r}_i^a - \vec{r}_{cm}^a)^2}$$

- Travel time is calculated using a cost-distance algorithm
- Preventive healthcare uptake of 89 sublocations



Method 2: Map variations of geographical accessibility to emergency health services

- Major Metric: proportion of population located more than 2 hours travel time to the nearest hospital
- Geographical coordinates of all the public hospitals with emergency services
- Total population mappings at 1 km² spatial resolution
- Travel impedance surface: 3 classes of roads assigned with different travel speed.
- Estimate travel time using AccessMod (version 5)

- <1 person per 1 km² who would take >2 h to travel to the nearest hospital
- ≥1 person per 1 km² who would take >2 h to travel to the nearest hospital
- Within 2 h travel time of the nearest hospital

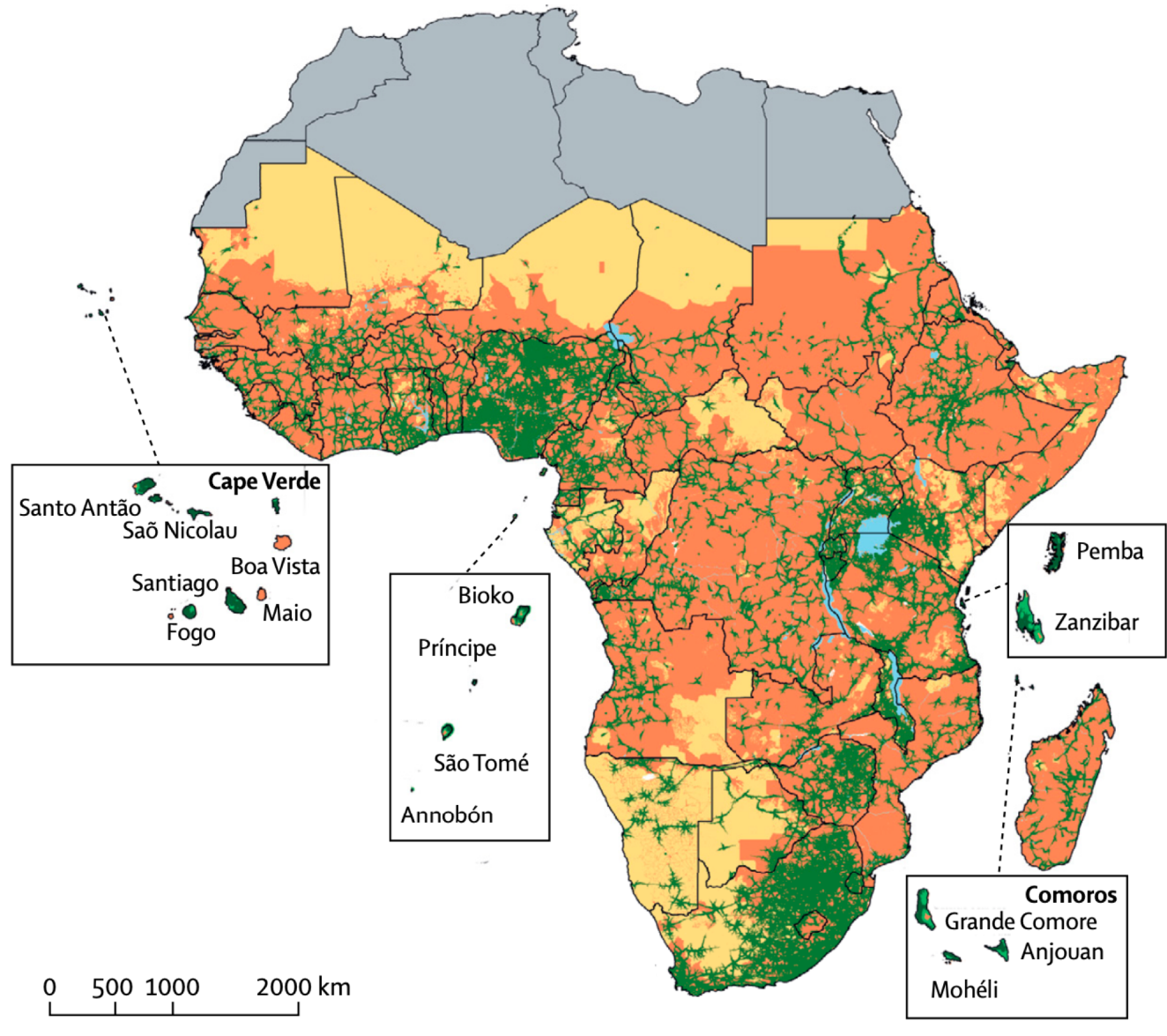


Figure 2: Geographical access of the general population to public hospitals
 Regions shaded in grey were not included.

Research Gap

- How can data science methods be applied to examine and quantify health inequality issues within Kenya and provide insights for the improvement of its public health system?
 - *Affordability* 🎯
 - *Availability* 🎯
 - *Geographical accessibility*
- Lack of testing and validation

Further Investigation

- Apply similar geographical techniques to map the variations in availability and affordability of health care
- Incorporate all these factors into a single aggregated geospatial model.
- For model testing
 - *Apply model to develop a hypothetical policy for some regions with worst health care*
 - *Make predictions of the policy's impact*
 - *Work with local government, to actually implement this hypothetical policy on a small range of area.*
 - *Take measurement and compare to the predictions*



THX

