Modelling of catchment areas for health facilities in Africa
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Outline

- Introduction
- Examples from South Africa and Kenya
- Application on Rwanda
- Difficulties/Limitations
- Findings
- Further steps
Introduction

- Health Management Information System (HMIS) in Rwanda: data on health centre level
- Estimation of catchment areas (in general 5 km or one hour by foot)
- Ability of estimating population to be served
Examples from South Africa and Kenya


- Public transport model (network) & walking model (Euclidean distances)
  - Proportion of homesteads using public transport
  - Quality and distribution of road network
  - Barriers (perennial rivers, nature reserves)
  - Reported travel times

- Limitations:
  - No further topography considered, average usage of public transport, assumed equally spread coverage of public transport

- **91% of clinic usage predictable**
Example from South Africa

Tanser et al. (2006)
Example from Kenya

- Walking model for travel time
  - Topography
  - Natural barriers
  - Population density
- Choice between different types of facilities

**Competition-adjusted transport network: overall accuracy of 84%**
Example from Kenya

Noor et al. (2006)

Transport Network Model (adjusted for competition between health facilities)

+ = government health facility; ■ = catchment area;
gray = 0-0.5 hours; light gray = >0.5–1 h; dark gray = >1 hour.
Application on Rwanda

- Unclear how population to be served is estimated (5 km or one hour by foot)
- Geographical coordinates of health facilities (GPS)
- Aggregated data available about origin of patients (zone, out of zone, out of district) on health facilities level
Origin of patients

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Buffer zones in 2500m and 5000m distance
gives the impression of missing health centres (or missing data)
Application on Rwanda

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Difficulties/Limitations

- Incomplete coordinates for health centres
- Incomplete road’s data
- Wrong/inconsistent data (roads, health centres, geometry and data)
- Data about origin of patients is available only aggregated
Patients are coming from other zones than the assumed catchment areas (5-30%)

Euclidean distances have been proved to underestimate travel time in Kenya

Network analysis proved to give better results in South Africa → until now limitations in Rwanda
### Further steps

- Retrospective data of origin of patients
- Fieldwork in health centres will give an idea of travel time, means and cost of travelling as well as reasons for choosing a certain health centre
- Consideration of results from fieldwork as well as barriers (water, elevation) for modelling
- Development of a “weighting system”
- Downscaling of population and calculation for catchment areas
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