

## Barriers to pedestrians in a growing African city

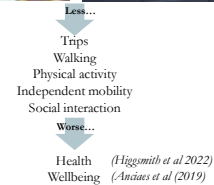
### How to quantify them using minimal data

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*International Conference on Transport and Health*  
In-person transit stop meeting, 21-22 June 2022, Cardiff

## Community severance (barrier effect of roads)



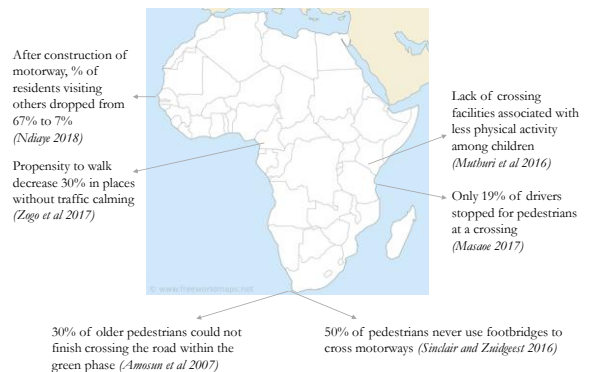
## Existing methods



Video surveys  
Street audits  
Participatory mapping  
Spatial analysis  
Travel vs. health/wellbeing survey  
Stated preference surveys

<https://www.ucl.ac.uk/street-mobility/toolkit>

## Community severance in African cities



## Contributions of this study

### To literature on barrier effects in African cities

Quantify the barrier effect of roads for the first time in an African city (Praia, capital of Cabo Verde)

Analyse the equity dimensions of the barrier effect

### To literature on barrier effects

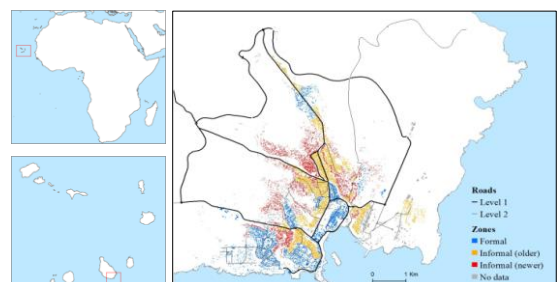
Map the effect at the city level

Indicators that account for land use (what is on the other side of the road)

- Houses of others
- Food shops



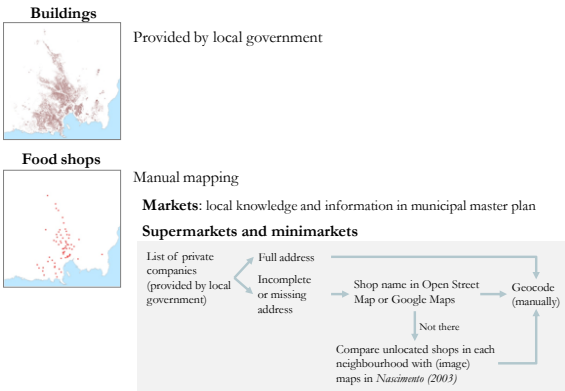
## Praia



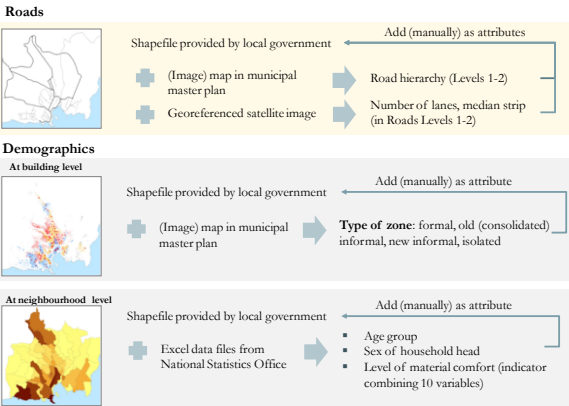
- 132,000 people (2010) → 188,000 (2023 est.)
- 75% of buildings in informal settlements, 15% of population in poverty
- 81% of households do not own a car, insufficient public transport
- 9%/year increase in number of vehicles. New roads planned.



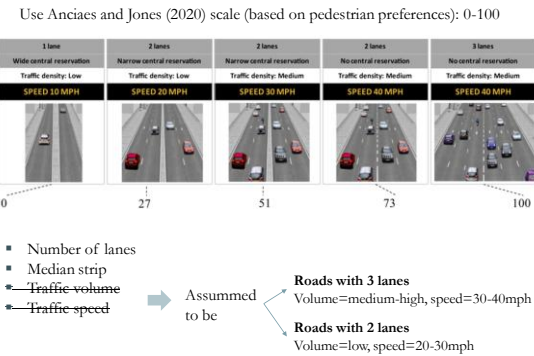
### Data



### Data



### Barrier effect of a road segment



### Barrier effect for residents in a given building *j*

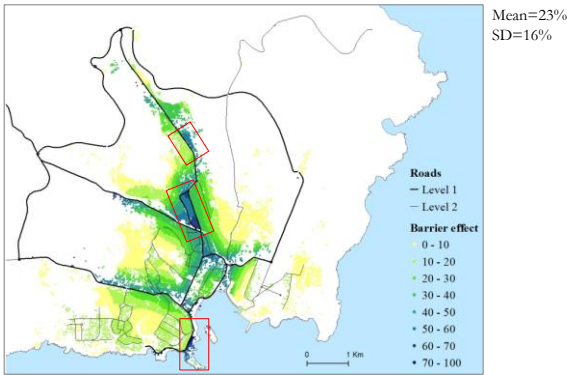
**Barrier to homes of others (within 600m)**

$$\sum_k \text{Sum of barrier effect of all roads from building } j \text{ to building } k \text{ from building } j \text{ to building } k * \text{Proportion of area of } k \text{ in area of all buildings within 600m of } j$$

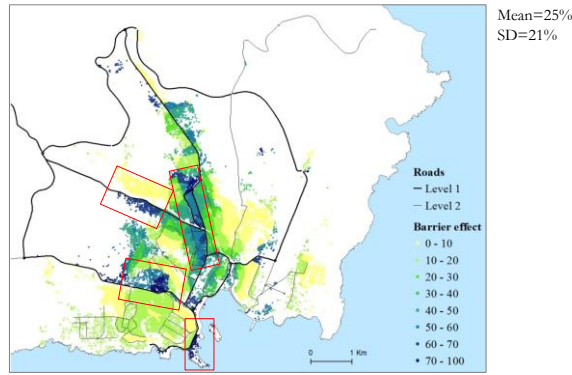
**Barriers to food shops (within 600m)**

$$\sum_k \text{Sum of barrier effect of all roads from building } j \text{ to shop } k \text{ from building } j \text{ to shop } k * \text{Proportion of area of } k \text{ in area of all shops within 600m of } j$$

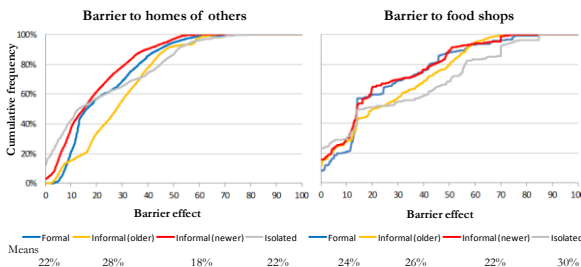
Results – barriers to homes of others



Results – barriers to food shops

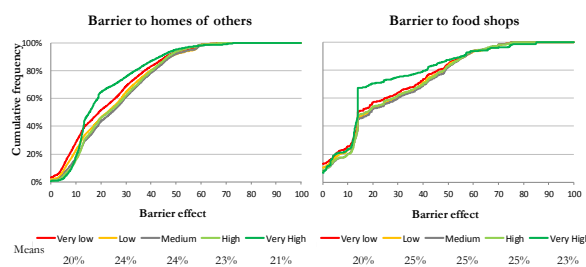


Results by type of area



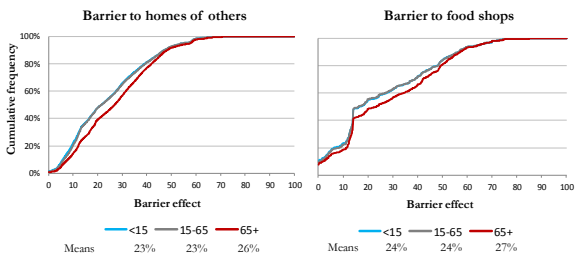
Further (regression) analysis confirmed that older informal areas have higher than average barrier effects and newer informal areas have lower barrier effects

Results by household comfort level



Further (regression) analysis confirmed that populations with very low and very high comfort levels have lower than average barrier effects

Results by age group



Further (regression) analysis confirmed that individuals aged 65+ have higher than average barrier effects

Sensitivity analysis

Alternative assumptions for same indicators

- Only Level 1 roads
  - Destinations within 400m
  - Destinations within 800m
  - Inversely weight destinations by distance
- Indicators are more variable  
Most socio-economic patterns still apply

Alternative indicators

- Distance to nearest Level 1 road
  - Distance to nearest Level 1 or 2 road
  - Length of Level 1 roads within 600m
  - Length of Level 1/2 roads within 600m
- Indicators are less variable  
Some socio-economic patterns do not apply anymore

## Conclusions

- ❶ Roads reduce walking accessibility, affecting most of the city but with higher incidence in **older informal** zones and affecting **older people**
- ❷ Households with very high and very low comfort levels are least affected
- ❸ Policy implication: barrier effect already high in many areas. New roads will increase this effect, so **mitigation measures** are needed
- ❹ **Indicators capture differences** between areas near roads with many destinations on other side and areas near similar roads with no reason to cross the road. Simpler indicators would not capture those differences
- ❺ Possible to build this indicator **with minimal data** (but tedious manual mapping.)

Thank you!

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<https://iris.ucl.ac.uk/iris/browse/profile?upi=PRANC25>