Open Tools for Equitable and Sustainable Accessibility and Mobility Analysis (OTESAMA ‘23) Workshop

Towards Just Neighbourhoods:
Leveraging Geospatial Data Science to Understand Night-Time Public Transport Variability in British Cities

September 2023 - Rafael Verduzco
UBDC Data Service Overview:
A family of geospatial data products and tools for public transport analytics in Great Britain

Envisioned developments for our next phase:

• Full dashboard
• API interface
• R package
• RT bus location
Overall background

- Harnessing tools and open resources -> address equitable accessibility RQs.

- Public Transport increases the chances of entering the employment market (Bastiaanssen et al., 2022).

- At the same time, urban poverty is suburbanising in British cities (Bailey & Minton, 2018).

- 9 million individuals in night-time shifts in the UK (ONS, 2023)

How do night-time public transport service variations impact disadvantaged communities in British cities?
Transportation equity

- Review by Karner et al. 2023:
  - Egalitarian: Focus on mitigating accessibility inequalities.
    - Measure: Net or proportional change, Gini index.
    - Limitation: Some cities/zones have low access both day and night. Thus, no change between AM and PM is detected.
  - Sufficientarian: Focus on to meet basic needs (work).
    - Measure: Foster–Greer–Thorbecke (FGT) index. It recognises that some might have high accessibility (which is fine), but some do not meet a minimum.
    - Limitation: Defining a ‘poverty line’.
Definitions for the analysis

- LSOA/DZ as the geographic analytical unit.
- British cities as the 24 largest travel to work areas (TTW)
- Disadvantaged population groups (LOAC, Census classification):
  - Industrious communities
  - Hard-pressed communities
- Accessibility to employment with a large proportion of night or evening shifts (ONS, 2023):
  - 1. "Health (Q)", 2. "Accommodation & food services (I)", and 3. "Wholesale and retail trade; repairs (G)"
- Two times of day: Morning peak (7-10 am) =; night (9 pm to 12 am).
Descriptive/Exploratory (Social classification)

Super-group LOAC

Sub-groups and ‘Other groups’
Accessibility poverty analysis

Foster–Greer–Thorbecke (FGT) index

Poverty line: 50\textsuperscript{th} percentile accessibility during the day for each region and time cut.
Modelled risk of accessibility poverty

Logit model:

\[ \text{LogOdds Poverty} = \ldots + \beta \times \text{timePM} \times \text{SOAC} + \ldots + \text{error} \]
Final thoughts

- All disadvantaged communities are at higher risk of accessibility poverty in the evening compared to other groups
- Disadvantaged communities in British cities are experiencing dual exclusion—By location and exclusion from the night-time economy
- Geospatial data science resources can play a critical role in supporting the understating and development of policies for equitable neighbourhoods
Thank you!

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References


Descriptive/Exploratory (Access as percent change)