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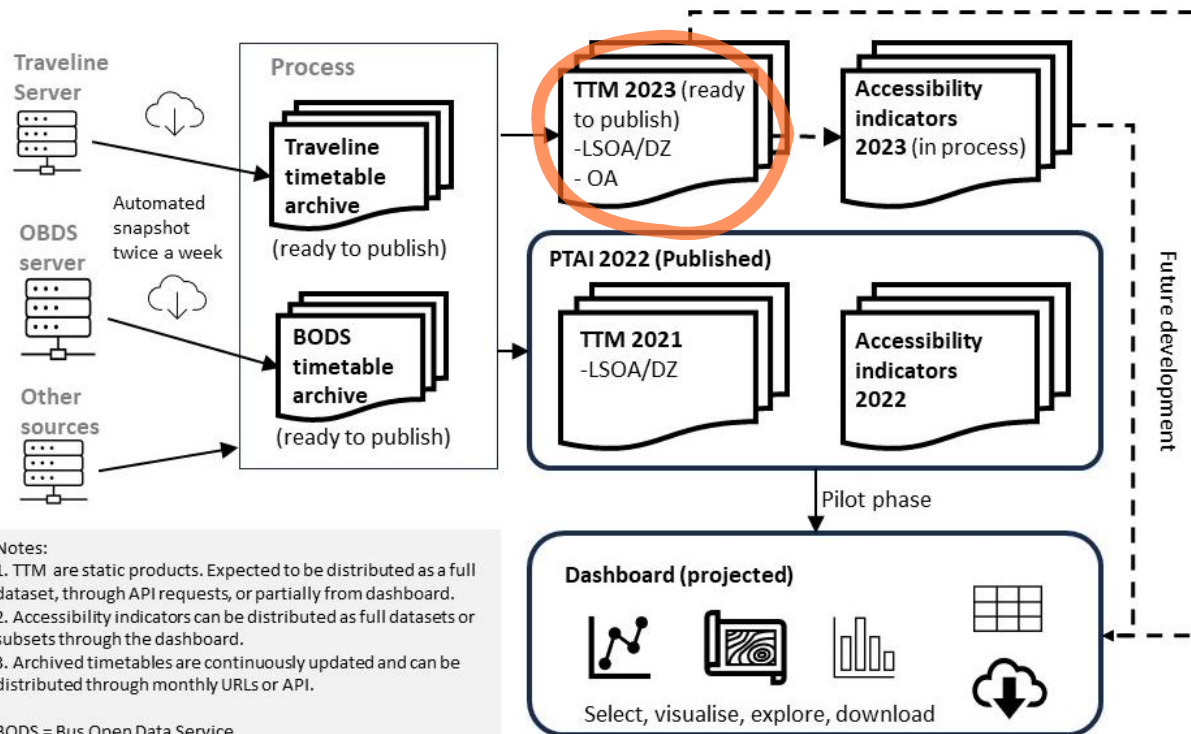
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UBDC Data Service Overview:
A family of geospatial data products and tools for public transport analytics in Great Britain

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).

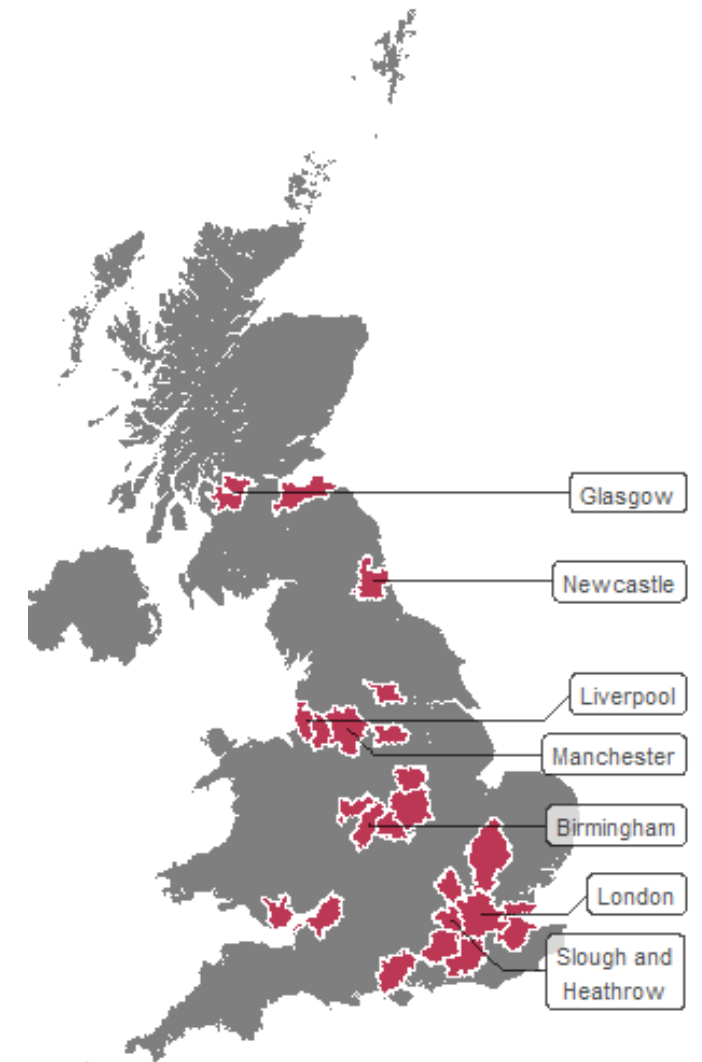- 9 million individuals in night-time shifts in the UK (ONS, 2023)

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

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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'.
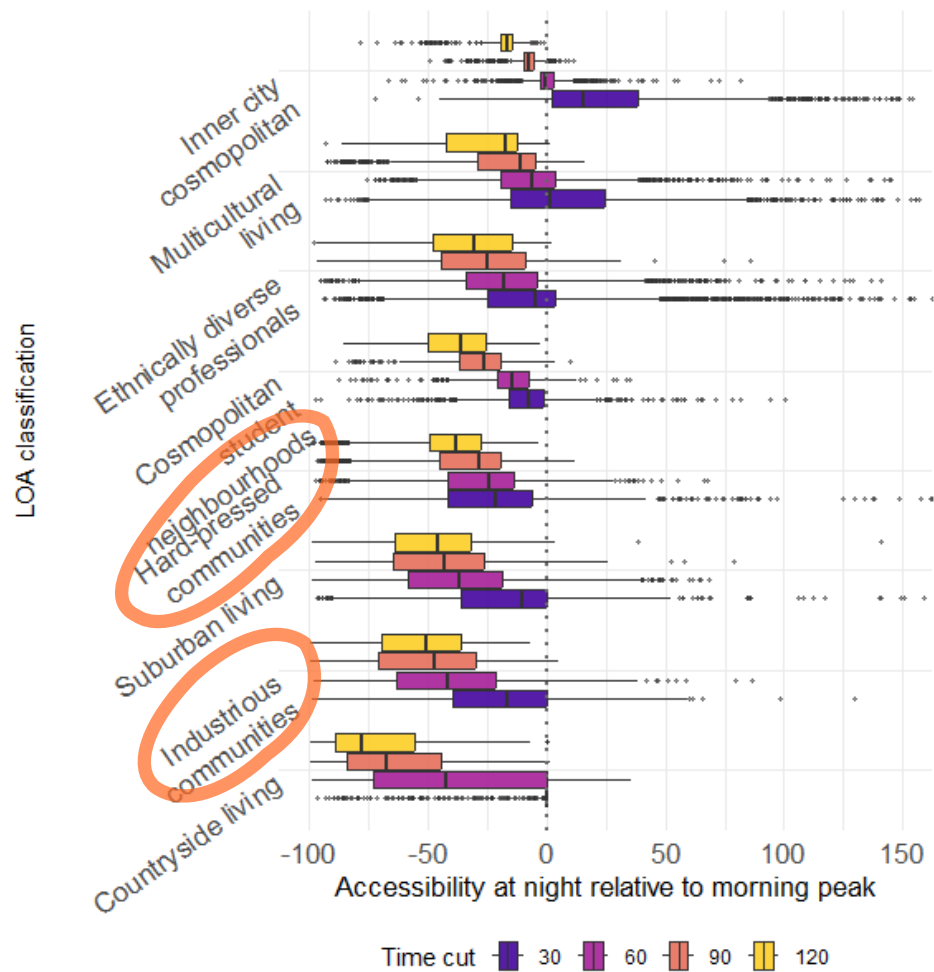
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Definitions for the analysis

- 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)".

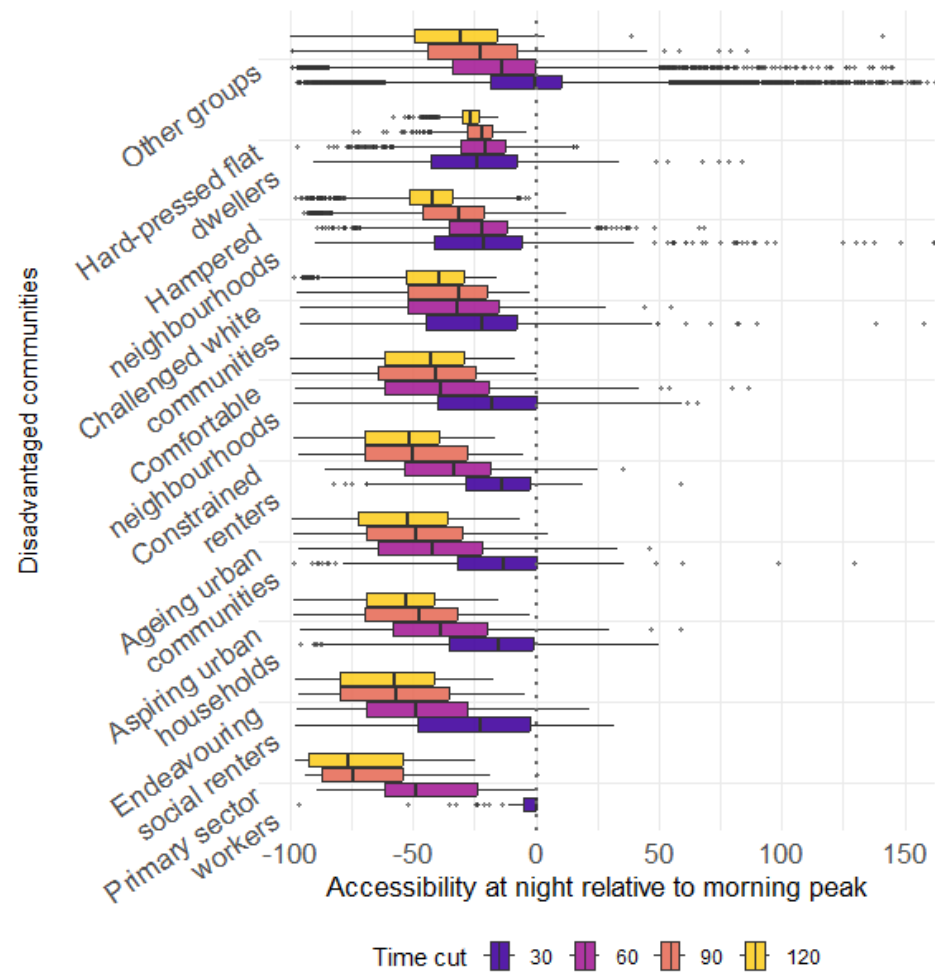- Two times of day: Morning peak (7-10 am) =; night (9 pm to 12 am).

Glasgow

Newcastle

Liverpool

Manchester

Birmingham

London

Slough and Heathrow

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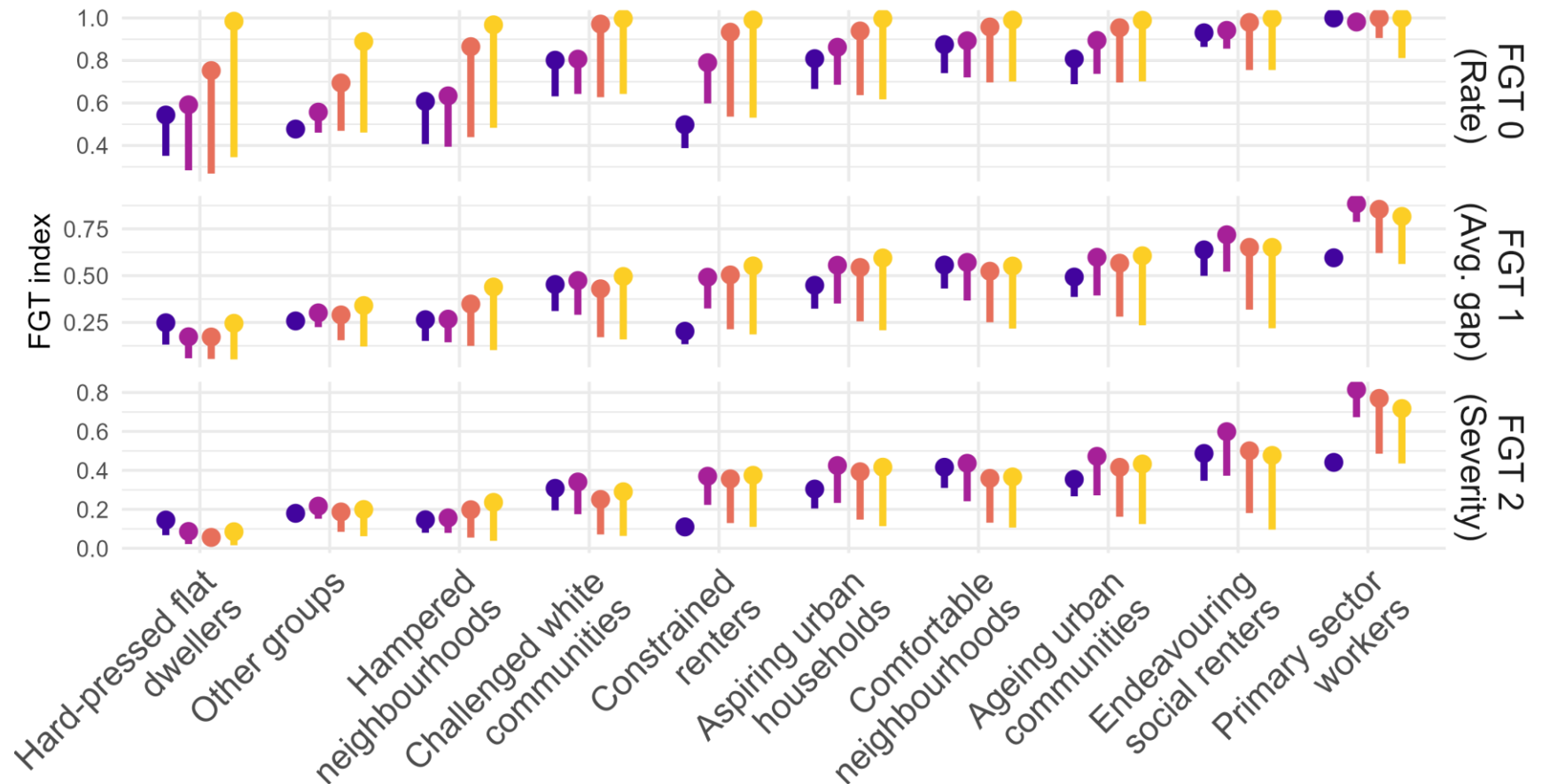# Descriptive/Exploratory (Social classification)

Super-group LOAC

Sub-groups and 'Other groups'

Accessibility poverty analysis

Foster–Greer–Thorbecke (FGT) index

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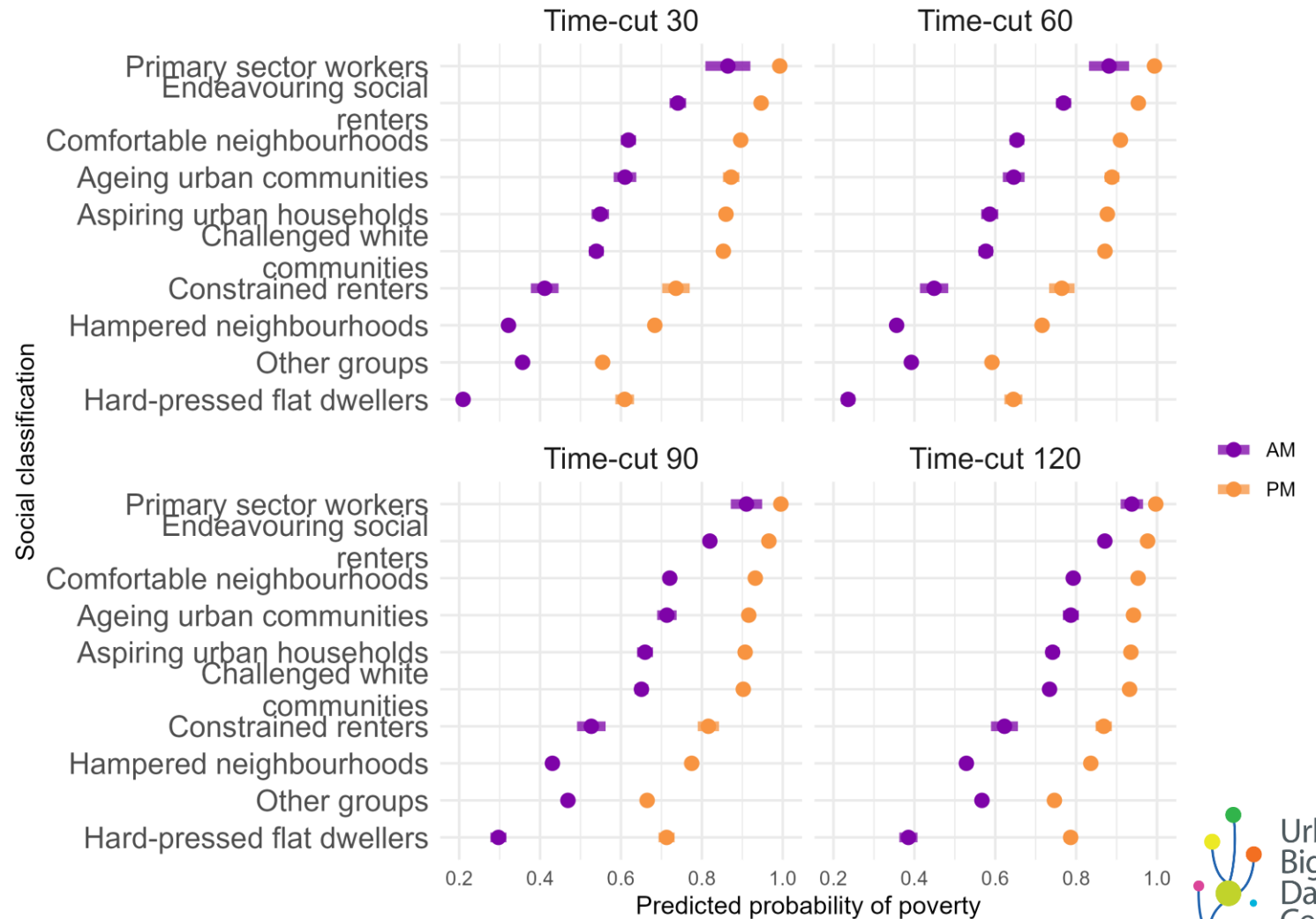
Modelled risk of accessibility poverty

Logit model:

LogOdds Poverty =

... + β * timePM * SOAC + ...

+ error

Interaction effect of time of day and community on poverty

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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

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Thank you!

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References

▪ Bailey, N., & Minton, J. (2018). The suburbanisation of poverty in British cities, 2004-16: Extent, processes and nature. Urban Geography, 39(6), 892–915. https://doi.org/10.1080/02723638.2017.1405689

▪ Bastiaanssen, J., Johnson, D., & Lucas, K. (2022). Does better job accessibility help people gain employment? The role of public transport in Great Britain. Urban Studies, 59(2), 301–322. https://doi.org/10.1177/00420980211012635

▪ Karner, A., Pereira, R. H. M., & Farber, S. (2023). Advances and pitfalls in measuring transportation equity. SocArXiv. https://doi.org/10.31235/osf.io/y246u

▪ ONS. (2023). The night-time economy, UK: 2022 [Goverment report]. Office for National Statistics. https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/articles/thenighttimeeconomyuk/2022

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Descriptive/Exploratory (Access as percent change)