

An exploration of fuel poverty in the private rental housing market in City of Glasgow

Qunshan Zhao
Lecturer in Urban Analytics
Urban Big Data Centre
University of Glasgow
20/10/20

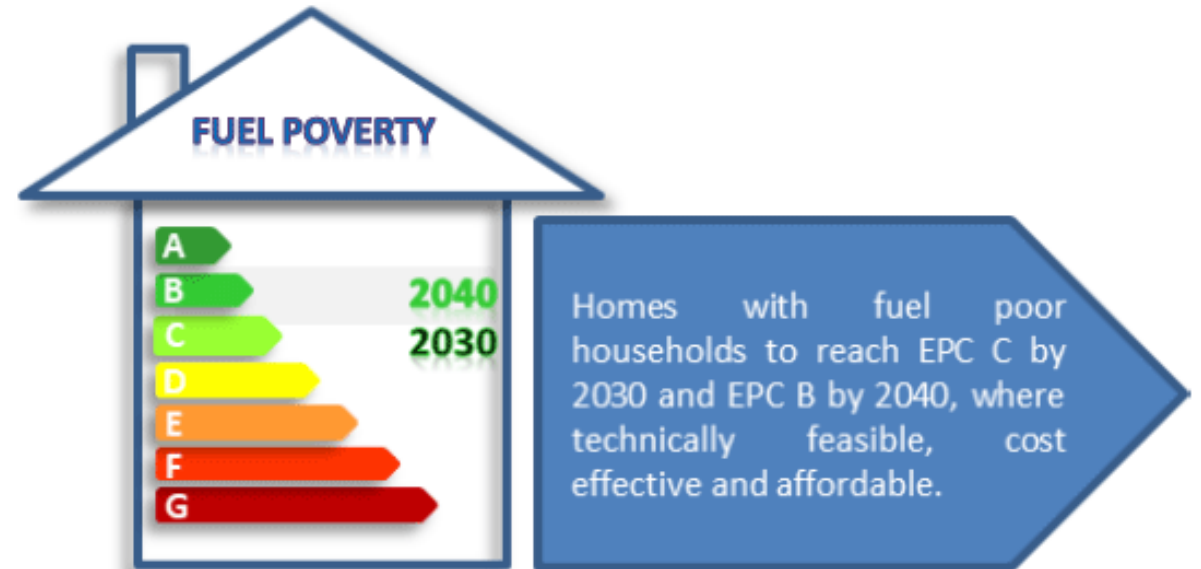
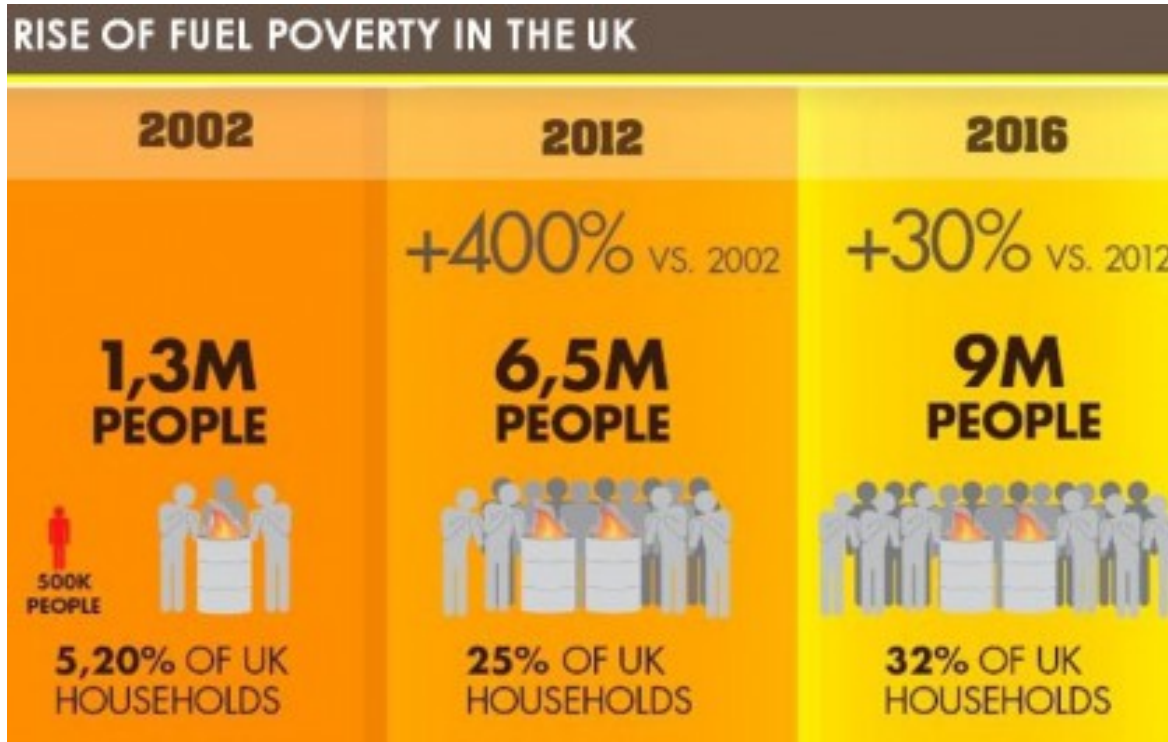
Personal Introduction

- Using urban analytical approaches to solve social, economic, and environmental problems in our cities with new forms of urban big data.
- Approaches include but not limit to:
 - GIScience (GIS, remote sensing, spatial analysis)
 - Machine learning/statistics
 - Operations research
 - Sensor network
 - Urban climate modeling and instrumentation
- Teaching: Big Data & Urban Analytics, Programming Tools for Urban Analytics, and Urban Analytics Group Project
- Check out my staff and personal website to learn more:
<https://www.gla.ac.uk/schools/socialpolitical/staff/qunshanzhao/> or
<http://qunshanzhao.weebly.com/>

Urban Big Data Centre

- UBDC is a research centre that is jointly funded by the ESRC and the University of Glasgow.
 - We promote the use of big data and innovative research methods to improve social, economic & environmental well-being in cities.
 - We do this through:
 - World-leading Urban Research
 - Data Collection and Data Services
 - Teaching and Capacity Building
- | | | |
|---|--|--|
| <ul style="list-style-type: none">• <i>Education & Skills</i>• <i>Urban Governance</i> | <ul style="list-style-type: none">• <i>Housing, Neighbourhoods & Environment</i>• <i>Transport & Infrastructure</i> | <ul style="list-style-type: none">• <i>Urban Sensing & Analytics</i> |
|---|--|--|

Why study fuel poverty?



Traditional methods to understand fuel poverty

- Household and building survey (Rudge & Gilchrist, 2005)
- Official statistics and energy cost from electricity companies (Teller-Elsberg et al., 2016) and (Bosch et al., 2019)
- Qualitative and conceptual discussion (Baker et al., 2018)
- What's next??

Rudge, J., & Gilchrist, R. (2005). Excess winter morbidity among older people at risk of cold homes: A population-based study in a London borough. *Journal of Public Health*, 27(4), 353–358. <https://doi.org/10.1093/pubmed/fdi051>

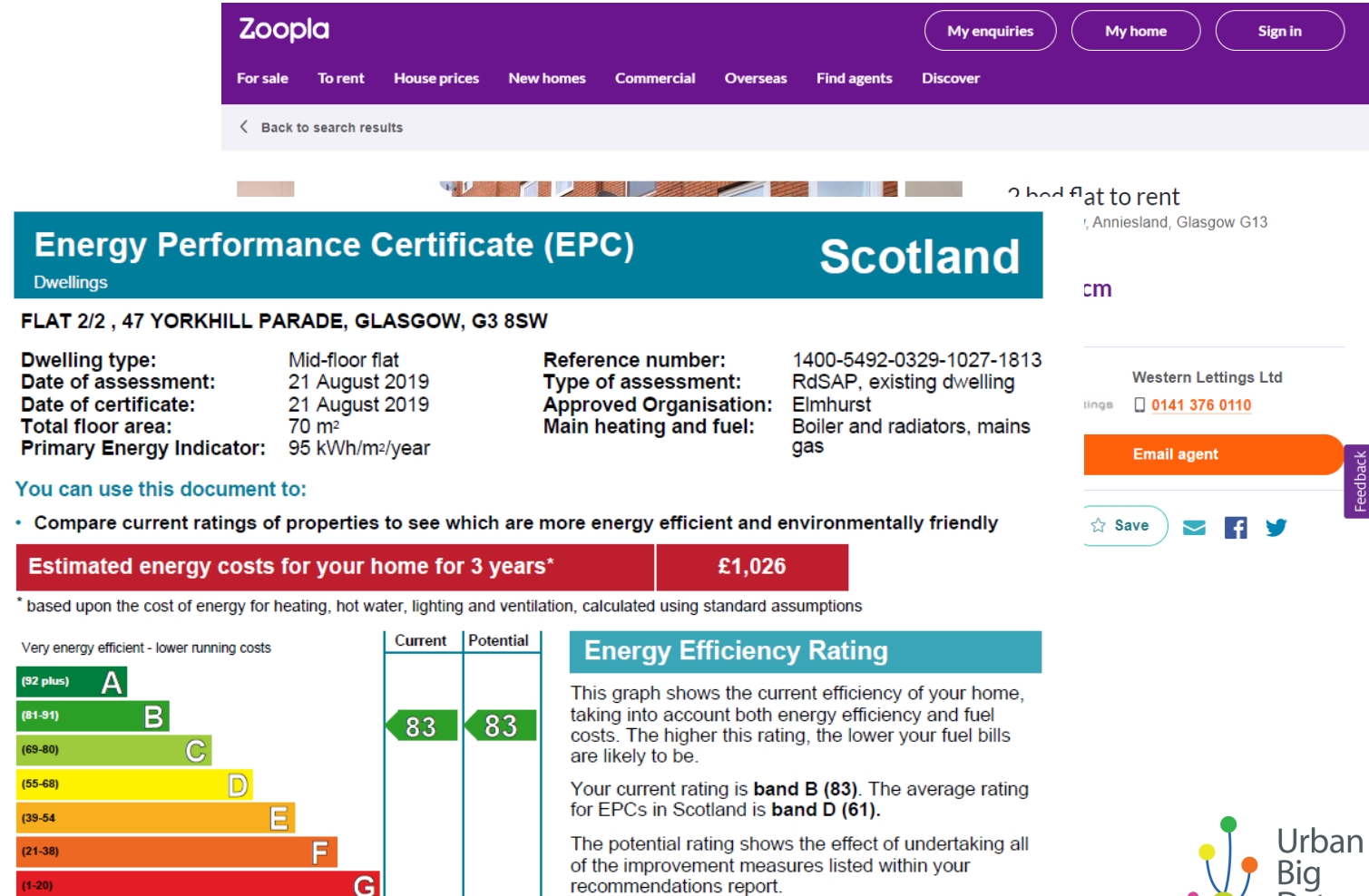
Teller-Elsberg, J., Sovacool, B., Smith, T., & Laine, E. (2016). Fuel poverty, excess winter deaths, and energy costs in Vermont: Burdensome for whom? *Energy Policy*, 90, 81–91. <https://doi.org/10.1016/j.enpol.2015.12.009#>

Bosch, J., Palència, L., Malmusi, D., Marí-Dell'Olmo, M., & Borrell, C. (2019). The impact of fuel poverty upon self-reported health status among the low-income population in Europe. *Housing Studies*, 34(9), 1377–1403. <https://doi.org/10.1080/02673037.2019.1577954>

Baker, K. J., Mould, R., & Restrict, S. (2018). Rethink fuel poverty as a complex problem. *Nature Energy*, 3(8), 610–612. <https://doi.org/10.1038/s41560-018-0204-2>

New forms of urban big data to understand fuel poverty

- Zoopla private rental listing data
- Energy performance certificate



Zoopla Data

- Zoopla data can be obtained through UBDC data services for non-commercial research: <https://www.ubdc.ac.uk/data-services/data-catalogue/housing-data/zoopla-property-data/>. **Feel free to check out!**
- Zoopla data time range: 01/01/2010 - 31/03/2019
- Zoopla files: 188 csv, 44.3 GB
- Coverage: Great Britain (England, Wales, Scotland)
- Geographical unit: full postcode

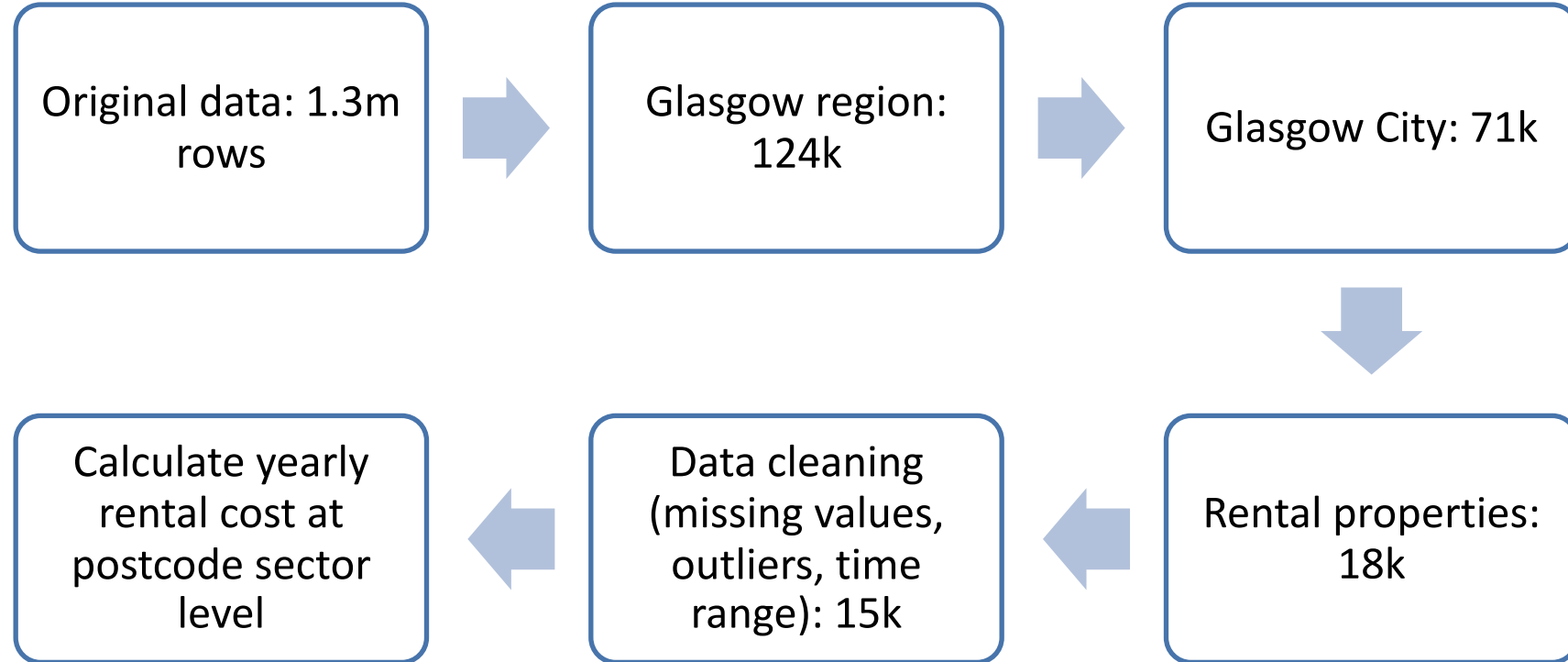
Scottish EPC Data

- Scottish EPC data can be obtained through Scottish Government:
<https://statistics.gov.scot/data/domestic-energy-performance-certificates>
- EPC data time range: Oct 2012 - Mar 2020.
- EPC data: 2.5GB, 30 csv.
- Coverage: Scotland
- Geographical unit: postcode sector

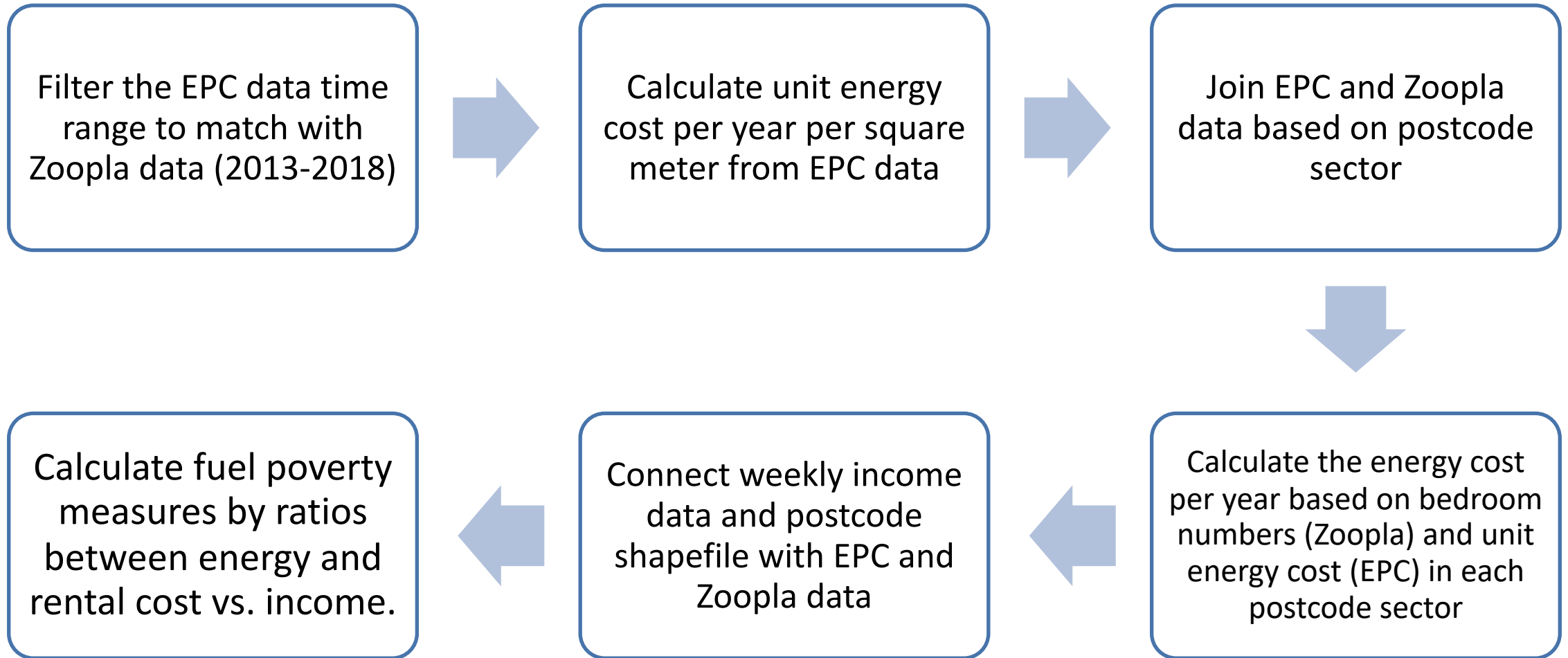
Other Data

- Weekly household average income estimate from Scottish Government:
<https://statistics.gov.scot/data/local-level-average-household-income-estimates-2014>
- Scottish postcode directory files:
<https://www.nrscotland.gov.uk/statistics-and-data/geography/our-products/scottish-postcode-directory/2020-2>

Zoopla Data Cleaning: Big data to 'small' data



Further Data Cleaning and Analysis



Fuel Poverty Measures

$$\text{Fuel Poverty} = \frac{\alpha}{\gamma}$$

α = Yearly energy cost

β = Yearly rental cost

γ = Yearly household income

$$\text{Rental Poverty} = \frac{\beta}{\gamma}$$

$$\text{Deprived Poverty} = \frac{\alpha + \beta}{\gamma}$$

Fuel Poverty + Rental Poverty = Deprived Poverty!!

Results – fuel poverty




The picture can't be displayed.

Results – rental poverty



The picture can't be displayed.

Results – deprived poverty

 The picture can't be displayed.

Summary

- Fuel poverty has been observed in the east end of Glasgow, as well as northwest and southwest of the city.
- High rental cost has been confirmed in the city centre, and gradually decrease from the city centre to the outskirts.
- The most deprived areas is in the north of the city centre
- Results illustrate the value of using new forms of urban big data to understand fuel poverty, and more generally, a new way to tackle traditional urban questions.

Future Work

- Extend the study area to the major cities of Scotland (and potentially England and Wales).
- Analyze the fuel poverty for homeowners.
- Further understanding of fuel poverty with other data such as Scottish census.

Related publication

- Vonnak, R., & Zhao, Q. (2020). Fuel Poverty and Income Deprivation in Bristol, UK. GISRUK 2020. 25th Geographical Information Science Research UK Conference (GISRUK 2020).
<http://eprints.gla.ac.uk/215736/1/215736.pdf>

Thank you!
Questions?

Email: Qunshan.Zhao@glasgow.ac.uk

Staff Website:

<https://www.gla.ac.uk/schools/socialpolitical/staff/qunshanzhao/>

UBDC website: <https://www.ubdc.ac.uk/>