Sub-Regional Fuel Poverty in England, 2024 (2022 data) Methodology Document

25 April 2024   **Statistical Methodology**

Sub-regional fuel poverty statistics methodology: 2022 data

1. Introduction

The Annual Fuel Poverty Statistics Report[1] is an Accredited Official Statistic, which provides a comprehensive view of the latest statistical trends and analysis of fuel poverty in England. These statistics report on the proportion of all households in fuel poverty in England and the depth of their fuel poverty. The report also looks at the key drivers of fuel poverty and how fuel poverty in England varies depending on dwelling and household characteristics.

The sub-regional Official Statistics in Development aim to complement the fuel poverty National Statistics by estimating the number and proportion of fuel poor households for smaller geographical areas, for example at individual Local Authority (LA) level. The sub-regional statistics do not report on the average fuel poverty gap.

The headline statistics detailed in the 2024 annual report are based on projections to 2023, to provide more timely estimates of fuel poverty, while the sub-regional fuel poverty estimates are based on the 2022 modelled data. Interpretation of the sub-regional results should therefore be undertaken separately to the 2023 fuel poverty projections.

The sub-regional fuel poverty modelling provides estimates of the level of fuel poverty for all Output Areas (OAs) across England, using a regression model that uses predictors of fuel poverty from the English Housing Survey (EHS) data. These are then aggregated to higher level geographies, which are constrained to the regional fuel poverty totals. This document provides an outline of the methodology using the 2022 data.

This year's sub-regional fuel poverty report, and the sub-regional data tables, can be found at the following link:

https://www.gov.uk/government/collections/fuel-poverty-sub-regional-statistics

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Data created

For each of the following geographical levels, estimates have been created for the total number of households, the number of fuel poor households, and the proportion of households in fuel poverty:

- English Region (former Government Office Region)[2]

- County

- Local Authority District / Unitary Authority

- Parliamentary Constituency

- Lower Super Output Area (LSOA)

2. Methodology

The 2022 sub-regional fuel poverty model is based on national data drawn from the EHS combined 2021 and 2022 dataset. Application of the model requires specific local area data for a variety of demographic and socio-economic factors, which are derived from the 2011 Census small area datasets and 2020 Experian data.

Ideally, the EHS data would be used directly to model at the local level. Unfortunately, this is not possible because of the relatively small sample used for the survey, which does not give sufficient coverage for each of the 296 Local Authorities or the individual Census Output Areas (COAs) within them. To produce estimates at this level, EHS data is used to create a model which can then be applied to a national (household level) dataset. The limitation this brings is the possibility that small areas which are atypical in characteristics are unlikely to be identified by the model. It is therefore essential to compare, where possible, the modelled sub-regional level results to the national and regional statistics.

The process undertaken for the modelling can be summarised in the following five stages:

a. Regression model

A set of predictor variables for fuel poverty were determined using EHS data and the fuel poverty indicator from 2016 to 2019. This provided a larger sample from which to model the predictors of fuel poverty, along with allowing a consistent set of variables to form the base for the calculation of updated statistics each year and to establish a more robust time series.

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[2] These are National Statistics and are presented in the Annual Fuel Poverty Statistics Report. https://www.gov.uk/government/collections/fuel-poverty-statistics

The LILEE fuel poverty model is currently based on the following six variables, derived from public and commercial sources:

- Tenure – owner occupied, private rented, social rented (Experian)
- Dwelling age – pre-1919, 1919 to 1944, 1945 to 1980, post-1980 (Experian)
- Household composition (Experian)
- Mosaic household classifications by postcode – 15 socio-economic groups as detailed in the Mosaic guide[3] (Experian)
- Dwelling type – terraced, detached, semi-detached, bungalow, flat (Experian)
- Employment status - proportion of households in COA with household member in full time employment (2011 Census[4])

b. Model application

The coefficients for each category of the final model's independent variables are run to give the predicted outcome for each household in each area. These are then combined to produce the total numbers and proportion of fuel poor at COA level. This is run separately for each region using a multiplying factor calculated from the modelled and published regional fuel poverty proportions applied to each COA fuel poor total.

c. Output area imputation

After this process, a small number of COAs have missing fuel poverty data. These gaps are filled by identifying COAs with complete data, which share the same LSOA as the COA with missing data. The median fuel poverty status for the COAs with complete data is used to impute the missing value, preventing any extreme values having a large impact on the imputed fuel poverty value, and resulting in the LSOA averages remaining constant.

d. Consolidation to national figures

In order to provide an exact match between the modelled household totals and the national figures (for all households and fuel poor households), a final adjustment is made in which small incremental changes are made randomly at a COA level, until the totals of all households and fuel poor households match the published regional totals.

e. Validation and aggregation

The adjusted figures are re-checked against the published totals before the data is aggregated to the most up-to-date output areas for: LSOA, Parliamentary Constituency, Local Authority District / Unitary Authority, and Region level. Further validation is then applied to ensure that the COA fuel poverty percentages are within a sensible range, and

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[3] https://www.experian.co.uk/business/platforms/mosaic/segmentation-groups
[4] 2011 Census data continued to be used rather than updating to 2021 for this indicator due to changes to question categories and the impact of covid-19 pandemic on economic activity in 2021.

that the regional totals are achieved at each level of aggregation. Results are also compared to the previous year's figures to check for consistency.

Fuel poverty model outputs

The results from the model are output as a percentage of households at COA level which are fuel poor. To convert this to a numerical total of fuel poor households, the percentage is applied to an estimate of the total number of households in each COA.

The fuel poor and household totals are then benchmarked to reflect the 2022 national fuel poverty figures. This model is then aggregated to Lower Super Output Area (LSOA), Parliamentary Constituency, Local Authority District / Unitary Authority, County and Region levels.

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