

Key Fuel Poverty Indicators and Variables: A Systematic Literature Review

Luiza Brabo-Catala,^a Eva Collins,^b and Barry Barton^c

1. Motivations underlying the research

Fuel poverty is associated with high energy costs and low housing quality. In addition, it results in poor physical and mental health outcomes. Fuel poverty is also known as energy poverty in the European Union and it is part of the concept energy hardship in New Zealand. However, there are no homogenous international indicators or variables of this serious condition. This inconsistency causes obstacles for researchers and policymakers trying to quantify and compare the number of households struggling with fuel poverty.

Although we do not suggest a one-size-fits-all solution to this multifaceted issue, we performed a systematic literature review to highlight and discuss the pros and cons of leading indicators and variables used to measure fuel poverty and its counterparts. Additionally, we explored and discussed the presence of major themes associated with fuel poverty in the selected publications, such as the presence of elderly members in the household and food insecurity issues.

2. A short account of the research performed

Using Google Scholar as the search engine in February 2023, we assessed at the first twenty results (sorted by relevance) of the following searches:

- Fuel poverty definition,
- Fuel poverty indicator,
- Energy poverty definition,
- Energy poverty indicator,
- Energy hardship definition, and
- Energy hardship indicator.

Several of the same results were shown using different search criteria. Removing duplicates and results not focused on energy affordability issues resulted in eighty-four publications, including the grey literature.

We focused on eight main types of fuel poverty indicators, identifying their presence in the selected literature:

- Spending 10% of income on energy services (10%),
- The share of energy expenses over income being at least two times the mean energy expenditure (2x Mean),
- The share of energy expenses over income being at least two times the median energy expenditure (2x Median),
- The share of energy expenses over income being less than half the median energy expenditure (Median/2),
- Falling below the poverty line after energy expenditure (AFCP),
- Having above-median energy expenditure and falling below the poverty line after that expense (LIHC),
- Not being able to afford energy expenditure after paying for other established basic expenses (MIS), and
- Reporting being unable to pay their utility bills, having inadequate heating systems at home, or other subjective parameters relating to fuel poverty, often mixed with self-reported objective variables relating to housing quality (Subjective).

The key fuel poverty variables selected for analysis in the selected literature were:

- Ability to maintain home warm (subjective),

a Corresponding author. Waikato Management School. University of Waikato. LB170@students.waikato.ac.nz

b Waikato Management School. University of Waikato. Eva.collins@waikato.ac.nz

c Te Piringa Faculty of Law. University of Waikato. Barry.barton@waikato.ac.nz

- Age of dwelling (objective),
- Age of household members (objective),
- Arrears on energy or other utility bills (subjective),
- Damp walls, floor, or foundation (objective),
- Dwelling type (objective),
- Employment status (objective),
- Fuel prices (objective),
- Income (objective),
- Leaking roof (objective),
- Rot on window frames or floor (objective),
- Size of dwelling (objective),
- Size of household (objective), and
- Tenure (objective).

The presence of the following themes was explored with the assistance of NVivo (March 2020 version), all of them selecting only valid results for the topic and allowing for synonyms: *children*, *elderly*, *food*, *health*, and *tenure*. In addition to presenting the frequency of the above indicators and variables, their strengths and weaknesses were examined, having the themes in context.

3. Main conclusions and policy implications of the work

Subjective, 10% of income, and LIHC were the most common indicators found in this systematic literature review, which shows that the policies from the United Kingdom and the European Union have a great influence in fuel poverty research worldwide. Additionally, variables associated with the households' structure and composition were the predominant, and the great majority of publications mentioned or discussed health. These latter findings show that fuel poverty is a social issue with significant health implications. The authors suggest that policymakers, researchers, and practitioners make a careful comparison of indicators and variables prior to adopting them, using a combination of objective and subjective variables to avoid overlooking underprivileged groups, especially those underconsuming energy.