Fuel poverty estimates for Wales: 2018
Annex 1

1. Calculation of Fuel Poverty Statistics

Fuel Poverty estimates for Wales are calculated by the Building Research Establishment (BRE). A methodology report will be published in the summer which will provide more information on the methodology used to calculate these statistics.

The definition of fuel poverty used in this release is any household that would have to spend more than 10 per cent of their income on maintaining a satisfactory heating regime in their home as defined by the World Health Organisation (WHO) - this requires a minimum of indoor temperature of 21 degrees centigrade in living areas and 18 degrees centigrade in other areas.

Any household having to spend more than 20 per cent is defined as being in severe fuel poverty.

There are three main components to the calculation of the Fuel Poverty, these are:

- Annual household incomes.
- Household fuel prices.
- Annual required household energy use.

1.1 Calculation of annual household incomes

Fuel poverty measures require income information for the household. The data from the National Survey for Wales (NSW) interview survey on the income sources and amounts of the Household Reference Person (HRP), Partner (if one exists) and the household as a whole are taken and fed into a bespoke income model developed by BRE.

Two measures of household income are produced for these fuel poverty statistics; basic income and full income. Household income is generated from the component parts of income collected through the NSW interview survey. Each element of income for each individual case needs to be combined to produce the final total income of the household.

Income from the HRP and partner from private sources is combined with benefit income, net of Income Tax and National Insurance and, where appropriate, values that are missing or implausibly low are imputed. Income from savings is then added. To produce the required variables for fuel poverty, data on the income of additional benefit units and modelled Winter

Fuel Payment amounts are used to create 'Basic' income. Income related to housing costs is then added. This includes income from Housing Benefit, Support for Mortgage Interest (SMI) and Mortgage Payment Protection Insurance (MPPI). The net amount of Council Tax paid (after accounting for Council Tax Benefit) is removed to produce 'Full' income. This is the income measure used for the main fuel poverty headlines figures (10% and 20% thresholds).

At each stage of the income modelling process, the data are carefully validated to ensure that the resultant variables are of the highest quality.

The model is constructed to reflect as closely as possible the methodology used to produce income data for England as well as the model used for fuel poverty in Wales in 2008 however it is recognised that the NSW interview questionnaire and the resultant data are quite different from both these other surveys, therefore a new bespoke income model for the 2017 Welsh Housing Conditions Survey (WHCS) has been created which makes much use as possible of existing syntax from Living in Wales (LiW) 2008. The syntax has been updated to reflect the fundamental changes to the benefit and tax systems that have occurred since 2008.

1.2 Calculation of fuel costs

To estimate household fuel costs, BRE take the energy consumption required to maintain the appropriate heating regime, as calculated under Section 1.3 below, and combine this with the corresponding fuel price for the Method of Payment and region of each WHCS case. Standing charges (or proxies for standing charges, such as produced through split level tariffs) have been included in the fuel costs.

The prices of non-metered fuels (e.g. Fuel Oil, Coal, LPG) are obtained from a variety of sources including the Consumer Price Index surveys which are undertaken by the UK Office for National Statistics and collated via the UK Department of Business, Energy and Industrial Strategy (BEIS), and a set of independently produced reports published by Sutherland Associates.

Average gas and electricity prices for Wales are provided by BEIS. The source of the data is the Quarterly Domestic Fuels Inquiry, which obtains detailed information about the various tariffs available from each supplier. These prices are matched with the WHCS data by each household's method of payment (Pre-Payment, Direct Debit or Standard Credit). Fuel prices are based on the geographical region within Wales and the method of payment for fuels. The fuel price model has been developed to retain the flexibility to adapt to changing modelling and analysis requirements.

1.3 Calculation of the required annual household energy use

The household energy use and energy costs data has been calculated using the BREDEM model. BREDEM is a method for estimating energy consumption in dwellings, including estimates for space heating, water heating, cooking, lights and appliances.

The heating regimes define the heating periods and heating extent. There are four defined heating regimes in the fuel poverty methodology. WHCS data from both the interview and physical surveys is used to establish the appropriate heating regime for each household on the WHCS dataset, taking account of the dwelling size, number of occupants, household composition and number of bedrooms. These data are used to determine whether the household is in all day and whether the property is fully occupied.

Having determined the household heating regime, energy modelling using a BREDEM methodology is used in order to determine the dwelling energy requirement. The energy model takes account of the key determinants of energy consumption in dwellings for all energy use in the home, namely space and water heating, lights and appliances, and cooking Total household energy use is the combination of these.

Space heating energy use is determined by the heated volume of the dwelling, the heating requirement for each household, heat losses and gains from the dwelling and energy input from the heating system. Location is also taken into account as calculations use regionally based temperatures and other climatic conditions. Water heating energy use is determined by the hot water demand, hot water losses and water heating supply system (including controls). Lights, Appliances and Cooking energy use is calculated using algorithms based on the number of occupants and floor area, taking into account low energy light fittings.

Key data inputs into these components of energy use are as follows:

Heated volume: An input into the Space Heating energy component providing the heated volume for the dwelling and the heat loss areas for each element of the building (e.g. doors, walls and windows). Dwelling dimensions data are required for each record in the WHCS sample. Heated volume is also determined by occupancy, with some dwellings classed as under-occupying and required to heat only half of the total floor area.

Dwelling construction data are used to indicate the configuration of the dwelling (e.g. detached, terraced or flat) and major building elements such as the wall type (e.g. solid walls). Characteristics of the dwelling are taken largely from the physical survey form and validated using established BRE procedures.

Dwelling energy data are used to estimate heating system efficiency and the rate of heat loss from the building elements. Each property will have specific energy attributes which may change over time.

1.4 Derivation of the fuel poverty Statistics

The first stage in the production of the fuel poverty estimates is the combination of fuel prices and required fuel consumption to produce fuel costs. These then need to be adjusted to incorporate the Warm Homes Discount (WHD), which is a discount of £140 from electricity bills for eligible households. These costs are then combined with full and basic household incomes to produce the fuel poverty ratio variable using the equation below (equation 1).

$$\text{Fuel poverty ratio} = \frac{\sum(\text{Unit Fuel Price} \times \text{Fuel Consumption}) + \sum \text{Standing Charge}}{\text{Income}}$$

This variable is then used to create flag variables stating whether the case is fuel poor using both the 10% and 20% thresholds of fuel poverty and extreme fuel poverty respectively. Validation of each of these variables is undertaken to ensure that the outputs are of suitable quality for a national statistics release. This validation includes checks on levels of fuel poverty by different groups within the housing stock as well as comparisons with the 2008 LiW results and the latest available results for the other UK nations.

The fuel poverty estimates based on the Low Income High Costs (LIHC) indicator – the indicator which is currently used in England, will be included in the more detailed statistical bulletin which will be published later in the summer.

Further information

The document is available at: https://gov.wales/fuel-poverty-estimates-wales-2018

This report is also available in Welsh

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