

Estimates of fuel poverty in Northern Ireland in 2019

Modelled using data from the Northern Ireland House Condition Survey 2016

Published 22 February 2022

Table of Contents

Introduction & Executive Summary	2
Methodology & modelling outcomes	4
Fuel prices	4
Income	5
Energy efficiency projections	6
Conclusion	8
Tables	
Table 1: Estimates of 2019 fuel poverty in Northern Ireland, all households	3
Table 2: Change in Northern Ireland fuel prices used in modelling, 2016 to 2019	5
Table 3: Adjustments made to the components of income to model 2019 incomes	6
Table 4: Estimated improvement measures in Northern Ireland households, 2016 to 2019	7
Table 5: Estimates of 2019 fuel poverty in Northern Ireland, all households	8
Appendix A: Confidence intervals	9
Appendix B: User Guide	10

This report was produced by the [Building Research Establishment \(BRE\)](#) on behalf of the [Northern Ireland Housing Executive](#). It is based on the findings of the House Condition Survey 2016, which is published on the Housing Executive's website:

[Northern Ireland House Condition Survey 2016 main report](#)

Please note: This report was commissioned by the Housing Executive in order to meet the needs of users, who indicated a requirement for updated fuel poverty estimates. The purpose is to inform discussion about fuel poverty in Northern Ireland.

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Introduction & Executive Summary

Introduction

The Northern Ireland House Condition Survey (NIHCS)¹ 2016 main report was published in 2018. It estimated that in 2016, the number of fuel poor households (using the 10% definition)² in Northern Ireland was 160,000 (22% of all households).

In 2019, in response to the needs of data users, the Housing Executive published modelled estimates of fuel poverty in Northern Ireland for 2017 and 2018. These were modelled by BRE using data from the 2016 NIHCS, and estimated that the number of fuel poor households in 2017 was 128,000 (17%) and in 2018 was 131,000, equivalent to 18% of all households:

[Estimates of fuel poverty in Northern Ireland in 2017 and 2018](#)

Following this, and again in response to the requirement of HCS data users for more up to date figures, the Housing Executive commissioned the Building Research Establishment (BRE) to model estimates of the levels of fuel poverty in Northern Ireland in 2019, using a similar approach to the method used to model estimates of fuel poverty in 2017 and 2018. Using the 2016 NIHCS data as a base, the three main components of fuel poverty have been adjusted: inflation figures from external data sources were applied to the fuel prices and household income, while the installation of energy efficiency measures was simulated to 2019 levels.

It was hoped that 2020 fuel poverty figures could also be released as part of this reporting edition. However, this report is providing projections, which are calculations showing what happens if particular assumptions are made, based on available data. Unfortunately, due to the Covid-19 pandemic, data on household income, fuel prices, energy efficiency improvements and the change in household make-up (re-grouping or bubbling) were not available through other external sources or datasets. Therefore, at the time of completing this report it was not possible to provide a robust 2020 fuel poverty estimate.

In addition, many social (for example household composition changes which have an impact on occupancy and heating regimes) and economic (for example employment and income changes which impact energy and energy improvements and fuel prices) factors influence the level of fuel poverty and the relationship between these factors are complex and are not entirely known, particularly in unprecedented circumstances such as the Covid-19 pandemic.

¹ [Northern Ireland House Condition Survey 2016 main report](#)

² Under the 10% fuel poverty methodology, a household is considered to be in fuel poverty if, in order to maintain a satisfactory level of heating (21°C in the main living room and 18°C in other occupied rooms), it is required to spend in excess of 10% of its household income on all fuel use.

Executive Summary

Table 1 shows the combined effect of the three factors (fuel prices, household income and the installation of energy efficiency measures) on the number and percentage of households in fuel poverty in Northern Ireland. The estimated number of fuel poor households in 2019 was 179,000 (24%), an increase since 2016.

Table 1: Estimates of 2019 fuel poverty in Northern Ireland, all households

Fuel poor households		2016 (Base position from NIHCS)	2019 (modelled estimates)
Full income definition ³	Number of households	160,000	179,000
	% of households	22	24

³ Gross household income is collected for the Household Reference Person and partner. This excludes housing related benefits but includes other benefits and other sources of income. Rates, the winter fuel payment, income tax, National Insurance and additional adults are factored in to create a 'basic' income variable. Housing Benefit and rates rebate are added to the basic income, and then the net rates payable are deducted to create a 'full' income variable. For further information please see the Northern Ireland income calculation on page 137 Appendix E of the main 2016 HCS report.

Methodology & modelling outcomes

The 2016 NIHCS data has been used as a base in conjunction with the 2016 fuel poverty (10% definition) methodology to estimate the number of fuel poor households in Northern Ireland in 2019. Fuel poverty is determined by three factors: fuel prices, household income and energy consumption (which relates to the energy efficiency of a home). It was therefore necessary to project each of these three factors in turn to estimate the 2019 Northern Ireland fuel poverty figures from the 2016 base data.

The methodology for each stage of modelling, and the outcome for each component is outlined below.

Fuel prices

Non-metered fuels in Northern Ireland

The fuel prices for **non-metered fuels** in Northern Ireland are based upon a retrospective **three-year average**⁴. An average over the three years ending in April/May of the survey year is derived from two sources: firstly, data for heating oil, house coal and smokeless fuel is obtained from Northern Ireland specific data collected by the UK Government as a component of the Consumer Price Index (CPI) survey. Secondly, prices of other non-metered fuels are obtained from the Sutherland Tables⁵.

Metered fuels in Northern Ireland

The **gas and electricity fuel prices** (metered fuels) used in the calculation of the Northern Ireland fuel poverty statistics are based upon data obtained from the UK Department of Business, Energy and Industrial Strategy (BEIS), who provide average annual prices (April to March) for gas, standard electricity and off-peak (Economy 7) by the three payment types (direct debit, standard credit and pre-payment).

For the 2019 estimates of fuel poverty, the 2016 metered fuel prices used in the calculation of the 2016 fuel poverty statistics have been adjusted using updated domestic energy price data for electricity obtained from BEIS, and from the Sutherland Tables data for gas.

The percentage change in fuel prices between 2016 and 2019 are shown in Table 2. Heating oil is the predominant fuel used to heat homes in Northern Ireland, and alongside electricity, even small fluctuations in the fuel prices can have a large impact on the number of households in fuel poverty⁶. Fuel oil prices decreased by 3% between 2016 and 2019, however electricity prices for 2019 showed a large increase of 18% when compared with 2016. While fluctuations in gas prices may have a lesser impact on fuel poverty than heating oil and electricity, gas prices increased by 29% between 2016 and 2019 and is therefore likely to have an impact on the final number of households in fuel poverty in 2019.

The percentage change in the household fuel expenditure varied at different rates for households depending on the fuel type used. On average, applying the fuel price changes alone from 2016 to 2019 increased the overall mean household fuel expenditure in Northern Ireland from £1,530 to £1,650 in 2019, the equivalent of an 8% increase.

⁴ A three-year average is used to make the data more representative and reduce the variability or fluctuations of very high and very low oil prices.

⁵ [Sutherland Tables](#)

⁶ See the fuel poverty ready reckoner for the relative effect of fuel price changes on fuel poverty:

[NI fuel price ready reckoner for fuel poverty](#)

Table 2: Change in Northern Ireland fuel prices used in modelling, 2016 to 2019

Fuel	% change between 2016 and 2019
Bulk LPG	+7
Bottled gas	-4
Oil	-3
Coal	+3
Smokeless fuel	-4
Anthracite	-5
Wood	+8
Communal heat	-2
Gas ⁷	+29
Electricity (standard) ⁶	+18
Electricity (economy 7 - day) ⁶	+10
Electricity (economy 7 - night) ⁶	+33

Income

The 2019 modelled household incomes varied at different rates for different types of households depending on their income sources e.g., benefit income, employment income, private pensions etc. Different income uplift values were applied to the components that make up household income, as summarised in Table 3. The 'basic' and 'full' household income values⁸ were then recalculated.

Using the full income definition, applying the income changes from 2016 to 2019 increased the average net household income in Northern Ireland. The median income increased by 1% between 2016 and 2019 (from £20,100 to £20,300).

⁷ The price changes shown are for standard credit payment method. Equivalent changes were applied for direct debit and pre-payment methods within the analysis.

⁸ The full income definition is the method used to calculate the published 2016 Northern Ireland fuel poverty figures in the Northern Ireland House Condition Survey (NIHCS) 2016 Main Report. See [Northern Ireland House Condition Survey 2016 main report](#)

Table 3: Adjustments made to the components of income to model 2019 incomes

Income component	2019 projections
Employment income for the HRP and partner (based on working status/benefit receipt)	Using data from the Annual Survey of Hours and Earnings (ASHE) ⁹ , inflation factors were applied to the 2016 data based on the age, working status and benefit receipt of the HRP and partner.
Benefit income	From 2016 to 2019 the majority of means tested benefits were frozen and as a result, no changes to the amounts of benefits received were made.
Winter Fuel Payment (WFP)	No change occurred in the WFP rates between 2016 and 2019, therefore no adjustment was made to this amount.
Rates (deduction from household income)	The 2019 domestic poundage values were used to calculate 2019 annual domestic rate bill.
Rates rebate	The 2019 rate rebate amounts were applied at the same ratio of rates as used in 2016.
Additional adult income	Inflated in line with the change in the net income of the HRP and partner of the household.

Energy efficiency projections

Between 2016 and 2019, changes in fuel prices and incomes would have influenced the fuel poverty calculation for all households. To incorporate the estimated effect of energy efficiency improvements involved a two-stage process:

- Stage 1 – Identification of the energy efficiency improvement measures to be installed between 2016 and 2019, and an estimation of the number of installations in the home in this period.
- Stage 2 – Identification of suitable homes for the energy efficiency upgrades and simulation of the reduced energy consumption for the selected cases.

In line with the method used to calculate fuel poverty estimates in 2017 and 2018, three mainstream energy efficiency measures were used in the 2019 fuel poverty estimates: loft insulation, cavity wall insulation and heating system improvements. The projections on the likely number of energy efficiency improvements installed between 2016 and 2019 were based upon trends of changes in these items between 2011 and 2016 NIHCS survey data. The estimated number of installations of each type of measure is shown in Table 4 below.

⁹ ASHE data can be found on the Office for National Statistics website:

[Earnings and working hours - Office for National Statistics \(ons.gov.uk\)](https://www.ons.gov.uk/earningsandworkinghours)

Table 4: Estimated improvement measures in Northern Ireland households, 2016 to 2019

Improvement measure	Number of installations modelled - 2016 to 2019
Cavity Wall Insulation (CWI) – added to homes with unfilled cavity walls	9,000
Loft insulation – added to homes with a suitable loft space and where there is less than or equal to 150mm of insulation present	66,000
Gas/oil condensing boiler – added to homes that require a heating system upgrade	114,000

Reduced household energy consumption was simulated by incorporating the energy efficiency improvements identified in Table 4 into the 2016 base data using the following method:

1. A case requiring CWI was selected at random in the dataset for improvement. Further cases were randomly selected until 9,000 homes in 2019 were assigned the CWI improvement measure in the dataset.
2. Homes selected for CWI were also assigned the loft insulation upgrade if applicable.
3. The remaining loft insulation improvements were randomly assigned to homes requiring the upgrade until 66,000 homes in 2019 were assigned the loft insulation improvement measure.
4. Heating system upgrades were treated independently of the CWI and loft insulation improvement measures. A case requiring the heating system upgrade was selected at random in the dataset for improvement. Further cases were randomly selected until 114,000 homes in 2019 were assigned the heating system improvement measure.
5. Once all the identified improvement measures had been assigned, the energy consumption of the household was re-calculated where applicable to account for the energy improvement upgrades.
6. The fuel poverty status for each case was re-calculated based upon the 2019 projected incomes, the 2019 projected fuel prices and the 2019 projected energy consumption (that incorporated the energy improvement upgrades) and an overall level of fuel poverty was determined.

Because the methodological approach used a random selection process, the procedure above was repeated 100 times. Based on the 100 runs, the average number of households in fuel poverty was calculated for all households, alongside an average number of households in fuel poverty in the private tenure and an average number of households in fuel poverty in the social tenure. The run corresponding to the smallest difference from the average number of households in fuel poverty was selected.

Conclusion

The 2019 Northern Ireland fuel poverty indicators have been estimated by modelling the changes in 2019 fuel prices, household incomes and energy consumption as detailed above. The fuel poverty estimates are shown in Table 5 and separated into 'fuel price and income only' and 'fuel price, income, and improvement measures' to be able to compare the impact of energy efficiency improvements on the final fuel poverty estimates.

Further details on the sample and confidence intervals for these estimates is provided in Appendix A.

Table 5: Estimates of 2019 fuel poverty in Northern Ireland, all households

Fuel poor households		2016 (Base position)	2019 fuel price and income only	2019 fuel price, income, and improvement measures
Full income definition	Number of households	160,000	194,000	179,000
	% of households	22	26	24

The change in fuel prices and household income values between 2016 and 2019 led to an increase in the number of households estimated to be in fuel poverty in 2019, from 160,000 households in 2016 to 194,000 households in 2019. The main contributing factor to the increase in fuel poverty was the fuel prices, most notably for electricity and gas, where the average prices increased by 18% and 29% respectively. The increase in the average household income (1%) was not enough to offset the increase in household energy costs.

The 2019 fuel poverty estimates were reduced when incorporating the estimated installation of improvement measures (cavity wall insulation, loft insulation and heating system upgrades) alongside the fuel price and income changes. In 2019, the estimated number of fuel poor households decreased from 194,000 to 179,000 households following improvement measures.

Assumptions

In the creation of the estimated 2019 fuel poverty results the following assumptions were used:

- The number of households remained constant.
- The household composition remained constant.
- The employment status of individuals remained constant.

Appendix A: Confidence intervals

Standard errors measure the uncertainty around the survey estimates. Confidence intervals are calculated from standard errors and provide a method of assessing the magnitude of sampling errors by indicating the range of random variation in survey estimates. Note: The confidence intervals do not account for all potential sources of error e.g., the NIHCS 2016 survey design, measurement error and surveyor variability.

The fuel poverty projections should be interpreted as indicative estimates based on the assumptions and modelling techniques used.

Table A1: Proportion of fuel poor households, 2019 projections

	Unweighted base	In fuel poverty (%)	95% confidence interval	
			lower	upper
2019 projections: fuel prices and income only	1,917	26.2	23.9	28.5
2019 projections: fuel prices, income and improvement measures	1,917	24.1	21.9	26.4

Base: all households, Northern Ireland 2016

Appendix B: User Guide

Method

The BRE 'Estimates of fuel poverty in Northern Ireland in 2019 methodology' comprises:

- Data modelling of the 2016 NIHCS to simulate a 2019 position
 - The 2016 NIHCS data is adjusted to account for:
 - Changes in fuel prices between 2016 and 2019
 - Changes in income between 2016 and 2019
 - Improvements in energy efficiency between 2016 and 2019
 - Following these adjustments, the number of households in fuel poverty is calculated for 2019.

To aid understanding, further information about the methodology along with the various outputs is contained in the body of the report - see page 3. For more information on fuel poverty and how it is measured see Appendix E page 136 of the main 2016 NIHCS report.

[Northern Ireland House Condition Survey 2016 main report](#)

Quality information

The quality assurance of the modelling work used to produce this report focused on ensuring that the data translation and modelling processes were performed correctly, to provide accurate and reliable results. The process of development and the creation of results followed an internal procedure so the work undertaken could be reviewed and assessed by project managers.

Examples of the quality assurance undertaken to validate the model and results included:

- Updating and revising the methodology using the latest assumptions for this area of work
- Checking of transformations undertaken and mathematical formulae
- Internal checks of data inputs to assure translation was completed correctly
- Checks of correct units for calculations
- Check correct and latest external data sources were used
- Sense check of results
- Internal review of results and reporting.

Surveyors working on the 2016 NIHCS received training and support to help ensure their collection of energy related data were consistent and robust. A re-fresher training session in 2016 explained the principles, how the form should be completed as well as conducting practical exercises with feedback sessions. While these measures ensure a good level of consistency in judgements, some surveyor variability is to be expected.

Strengths and weaknesses of the modelling

Strengths

The NIHCS 2016 dataset was used as the base reference point for calculating estimates of fuel poverty in 2019. The method used to produce the base data, and any external data sources used to project changes from the base reference point, are important to the strength of the projected estimates.

All results should be taken in the context of this background, and the survey and modelling assumptions which occur within these. Specific strengths relating to the base data were:

- The publication of the NIHCS 2016 data as national statistics
- The robustness of the NIHCS survey approach and sample size. The size of the sample for the NI House Condition Survey 2016 was 3,000 addresses.
- The weighting and grossing process translated the information gathered into figures that reflected the real world.¹⁰ This provided robust data at Northern Ireland level.
- The substantial and detailed NIHCS base data, used in the calculation of fuel poverty
- The defined methodology for calculating fuel poverty

See Appendix A page 88 of the main 2016 House Condition Survey report for more information on for the survey's user guide.

[Northern Ireland House Condition Survey 2016 main report](#)

External data used to project changes to the components of fuel poverty, were based on large scale and high quality national statistics; e.g. the Annual Survey of Hours and Earnings (ASHE) or Quarterly Energy Prices (QEP). External data was used to inform the modelling assumptions for the projection calculations.

The methodology and core assumptions remained the same as developed for the previous published projections, including the calculation of fuel poverty using the 10% definition, and the inclusion of confidence intervals, to provide an indication of the accuracy of the calculated estimate. In addition, a comprehensive quality assurance process was undertaken as part of the modelling (see Appendix B).

Weaknesses

The modelling approach used the number of energy efficiency installations obtained from external sources as a guide. The modelling approach made no attempt to target these measures at particular household groups. The impact of energy efficiency improvements over this relatively short period is small, and it is unlikely that this assumption will have a large effect.

No attempt has been made to include the effect of new properties and demographic change over this period. This effect should also be relatively small due to the relatively short time period modelled.

¹⁰ Further information on the sampling, and weighting and grossing processes for the Northern Ireland House Condition Survey 2016 is available in the report.

[Northern Ireland House Condition Survey 2016 main report](#)