



Short Communication

Contrasting approaches to fuel poverty in New Zealand



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HIGHLIGHTS

- Household's spending on fuel is weakly related to self-reported fuel deprivation.
- Many older people spend more than 10% but do not go without.
- Many families who spend less than 10% but do go without fuel

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ABSTRACT

We contrast two measures of fuel poverty in New Zealand. The first is based on estimated expenditure of over 10% of household income on fuel. The second is self-reported deprivation of fuel because of an inability to afford it. Households denoted as fuel poor on the two measures are mostly different and the findings suggest that research is needed to investigate if different households make different trade-offs between expenditure on fuel and other necessities.

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1. Introduction and background

Interest in fuel poverty has increased in the recent past with the result that there have been several new enquiries into both the nature of the phenomenon and its measurement (for example Healey and Clinch, 2004; Hills, 2011; Moore, 2012; Liddell et al., 2012; Price et al., 2006; Walker and Day, 2012). It is accepted that fuel poverty is a phenomenon in its own right and not simply a dimension of wider poverty and inequality issues (Hills, 2011) but aspects of the deprivation and the consequences of the insufficiency still seem unclear. For example, most of the work on fuel poverty has been motivated by health issues reflecting concern over conditions ranging from hypothermia in cool climates to respiratory illnesses (for example Shortt and Rugkasa, 2007; Liddell and Morris, 2010). In themselves these might be health manifestations of two very different situations. Hypothermia may be the result of an inability to heat a property adequately over a very short period of time while a respiratory condition might be

the consequence of a chronic situation resulting from a small but continuously occurring deficit. However, the consequences of fuel poverty are wider than pure health concerns. Personal communication from executives running the Beacon project in New Zealand¹ explained how retrofitting and warming houses had resulted in increased social activity and connectedness since friends were more willing to visit and spend time with the occupants. A further open question is whether fuel poverty should be widened in definition to include fuels like petrol that support mobility. Inability to access social infrastructure for economic reasons is an accepted indicator of wider assessments of poverty (see for example Citro and Michael, 1995; Rashbrooke et al., 2013 or the United States Census Bureau, 2013). Not being able to take the children to the park, or to afford petrol to shop at the hypermarket instead of the expensive local store are all facets of poverty. It is well understood that there is a serious 'double jeopardy' effect in poverty situations. Not only can the poor afford less but they often pay more for what they do get (e.g. prepay meters for electricity), and they get less benefit for their expenditure (e.g. housing is lower quality and heat losses are greater).

We are curious to understand if the way fuel poverty is measured might influence who is diagnosed as experiencing it and the

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¹ <http://www.beaconpathway.co.nz/new-homes>.

potential policy responses that might be required. The main approach to defining fuel poverty in the literature is based on the proportion of household income needed to maintain a home at comfortable and healthy living standards (Boardman, 2010; Howden-Chapman et al., 2012). These are usually represented as being temperatures of 21 °C in the living area and 18 °C elsewhere in the home. Having to spend more than 10% of income to maintain these standards is suggested as placing people in fuel poverty. Operationalising this approach in large scale studies can be problematic. The 10% level is subjective and there are many individual factors that may affect whether it is a reasonable diagnostic. Also, the data to make these judgements may be complex to obtain. In New Zealand, where our study took place, there is a huge variation in home construction materials, insulation levels and heating methods, many of which do not provide opportunities to control indoor temperatures very effectively. When this is compounded by personal factors such as health or life stage, the actual required expenditure may be difficult to ascertain. In this study we use the 10% threshold as one of our measures of fuel poverty but use an estimate of actual expenditure as a proportion of before tax household income. We compare the characteristics of households who we estimate are in fuel poverty based upon the 10% threshold and those who inform us that they have gone without power in their home at some point in the previous twelve months because they were unable to afford it. The last approach to diagnosing fuel poverty is one we have not seen previously recorded in the research on the topic and it was particularly framed to try to assess levels of short term fuel poverty. In method it would be closest to some of the subjective measures that have been proposed. A number of these are reviewed by Hills (2011, pp. 128–131). A particular facet we are interested in examining is whether or not we can identify a group in the population who do not appear to spend more than 10% of income on fuel yet are still going without power on occasions. It may be that such a group are restraining expenditure below that threshold but in reality they are still fuel poor.

2. Methods

A commercial market research company was employed who used an online panel and quotas were established to ensure the sample was representative to the national population in terms of age, income and regions. The only noticeable bias in the demographic statistics was an underrepresentation of Pacific Island ethnicities and an overrepresentation of Asian ethnicities. New Zealanders of European descent and Maori were both accurately represented in the number of respondents. Data on fuel expenditure was gathered by asking respondents for their typical monthly summer and winter bills for each of the following fuel types: coal, electricity, gas, petrol/diesel, wood, and other miscellaneous fuels. This was the simplest form of self-report question that we tested that produced reliable responses. We took the typical summer and winter expenditures for each fuel, multiplied each by six and summed the total to estimate total fuel expenditure over a twelve month period. This produced an estimate of a weekly average expenditure of \$59.61, excluding petrol and diesel. The closest available data from the New Zealand Household Expenditure Survey gives an average weekly household expenditure of \$43.20 for 2010 (Statistics New Zealand, 2010). Fuel prices increased between the Statistics NZ survey in 2010 and ours in 2011 but not by an amount that would explain this difference. The difference arises from higher reported expenditures on both electricity and wood in our survey, with the latter explaining 3/4 of the difference. We believe our estimates are internally consistent with our data, for example 23% of our sample report using

wood as their main source of fuel for heating. Such a percentage would not be consistent with the Statistics New Zealand estimate of \$1.10 for average weekly expenditure on all solid fuels for all New Zealand households. The sampling and data collection methods for the two surveys are quite different and this may cause some discrepancy but a further complicating issue in the comparison is that our data has a significant positive skew. This seems reasonable but it does imply that the median or possibly mode would be a better statistic than the average for comparison. However, these statistics are not available in the published data.

Initial comparisons between our two indicators of fuel poverty were made using cross-tabulations. Subsequently, four groups were developed in the dataset according to combinations of fuel poverty indicators and these four groups are then compared on other available information using crosstabulations, median and Kruskal–Wallis tests as appropriate, considering measurement levels and distributions. Because of the relative disparity in group sizes we elected to be guided by Monte Carlo, as opposed to asymptotic, p -values when judging whether to report “significant” differences. Also, because we have a sample of over 2000 and are reporting multiple tests, we use the 1% level of significance.

3. Results

Using the estimated expenditure method of determining fuel poverty 17.2% of our sample is classified as in fuel poverty spending more than 10% of household income on home fuel. As an estimate this figure is not inconsistent with extrapolations made by both Howden-Chapman et al. (2012) and Lloyd (2006) even though both used other methodologies and it is also comparable with countries with similar climates within the European Union (BPIE, 2014). As an aside, it is worth noting that this would increase to 19.1% if we included expenditure on petrol in our calculations. We are not aware that the issue of mobility has really been covered as an aspect of fuel poverty but wider literature on poverty does embrace discussion on features like access to employment, shops, schools and services as well as social integration. New Zealand is heavily reliant upon private transport even in our larger cities and we believe that wider considerations of fuel poverty, other than those motivated by biophysical health concerns, need to be debated as an issue when considering fuel poverty.

Our reported measure of going without fuel in the home estimates that 23.9% of sample experience fuel poverty in this way. It is not surprising that as a short term indicator this figure would be higher than our previous estimate and it is also worth noting that Canterbury and Otago figure as regions where people are going without fuel. These are both areas of the cooler South Island where demand for winter heating will be higher than in most of the more populous North Island. A key finding in our data is the lack of overlap between the two measures. The majority of those we estimate have spent more than 10% do not admit to going without power while approximately 1/5 of those who potentially spend less than 10% indicate that they have gone without because they could not afford it. An obvious conclusion is that that people are potentially curtailing expenditure on fuel in order to afford other items. The measure of association between the two variables, although statistically significant ($p < .000$ on the χ^2 test) is low to moderate ($\phi = .143$). We conclude from this analysis that *different respondents* are classified as being fuel-poor by each measure; i.e. they are not parallel indicators of the same construct.

Reviewing the four different groups arising from the combinations of the two indicators we see that they each have some distinct characteristics. Key variables are summarised in Table 1.

Table 1
Profile differences between differing fuel poverty groups.^a

	+10% & Gone without (6.3%)	+10% & Not gone without (10.9%)	–10% & Gone without (17.6%)	–10% & Not gone without (65.3%)	Sig
Housing and appliances					
Hours of direct sunshine	5.49	6.28	6.08	6.43	.000
Household size	3.08	2.74	3.18	1.41	.000
Age of house	Pre1978			+2000	.000
Main heating	Wood burner	Wood burner	Coal burner; open fires; portable gas heaters	Heat pump; hrv/dvs	.000
Installing double glazing			Would actively consider	Already have	.000
Insulation of hot water pipes		Never; unlikely	Would actively consider		.005
Ceiling insulation	Never; unlikely		Would actively consider	Already have	.000
Wall insulation	Never; unlikely		Would possibly or actively consider	Already have	.000
Under floor insulation			Would actively consider	Already have	.007
Seal drafts doors windows			Would actively consider	Already have	.005
Installing energy efficient heating			Would actively consider	Already have	.000
Dishwasher	Do not have		Do not have	Have and use	.000
Separate deep freeze		Have and use	Do not have		.002
Clothes drier	Do not have		Do not have	Have and use	.004
Lcd/led tv	Do not have		Do not have	Have and use	.000
Tubular tv ^b			Have and use	Do not have	.007
Video recorder	Do not have	Have and use			.009
DVD player	Do not have			Have and use	.035
Laptop	Do not have	Do not have		Have and use	.000
Heated towel rail	Do not have		Do not have	Have and use	.000
Electric blanket	Do not have	Have and use	Do not have		.021
Washing machine	Cold water	Hot water	Cold water	Warm water	.000
Energy behaviours					
Reduce heat in unoccupied rooms	Always		Always	Rarely	.000
Full load of washing	Always	Sometimes	Always	Sometimes	.000
Put on more clothes before turning heat up	Always		Always	Rarely; sometimes	.000
Keep heating low to save energy	Always	Sometimes	Always	Rarely	.000
Line dry laundry	Always	Always	Always	Sometimes; often	.041
Take shorter showers	Always		Always	Rarely	.000
Time away from home	4.60	4.99	6.10	6.36	.000
Attitude to energy use	Reduce to save money; increase consumption		Reduce to save money	Happy no change; happy but more efficient	.000
Demographic characteristics					
Household size	3.08	2.74	3.18	1.41	.000
Working situation	No paid work	No paid work; Work from home		Work out of home	.000
Rent or own	Rent from private, Housing NZ or council	Own debt free	Rent from private or Housing NZ	Own debt free or with mortgage	.000
Region	Taranaki; Otago	Gisborne/Hawkes Bay	Canterbury	Auckland	.000
Family life stage	School age children, solo parents; older alones	Retired couples and older alones	Pre-school children	Older or no children at home still working	.000
Age		60+	35–44		
Median per capita income	11,667	14,622	24,559	32,054	.000

^a Three items are included where the significance tests do not meet our threshold but they are consistent with other items and add to the general description.

^b NZ broadcasting has been fully digitised since our survey so the distinctions on TVs and recorders would no longer be current.

3.1. Estimated over 10% expenditure and recorded as going without power (6.3%)

This group are recorded as in fuel poverty on both our measures. They have the lowest per capita income of all four groups (median=\$11,667) and include more solo parent families and elderly living on their own than other groups. They spend more time at home (almost 20 h per day) in houses that are likely to be rented and to receive less direct sunshine than houses occupied by other groups. Their houses are less likely to have insulation and they are more likely to follow practices to reasonably economise on fuel usage such as washing in cold water, waiting for full loads

before washing and putting on extra clothes before heating. They pay most attention to their electricity bill and would like to either reduce consumption to save money, or actually increase consumption to be more comfortable.

3.2. Estimated over 10% but not recorded as going without (10.9%)

The archetypical household in this group is an older couple, over 60. They have a median per capita income of \$14,622 but own their own house debt free. Consistent with this profile they own a limited range of appliances which are typically based on older technologies – for example hot fill washing machines, desktop

computers as opposed to laptops and many still have video recorders. They pay slightly less attention to their electricity bill than other groups and make few efforts to specifically save power, for example not always waiting for full loads to do washing.

3.3. Estimated under 10% but recorded as going without (17.6%)

This group has the largest household size (3.18), normally with school age children. They have an median per capita income of \$24,559, include many living in rental accommodation and they are more likely to have older, inefficient forms of heating such as open fires, coal burners and portable gas heaters. Many of their energy practices seem orientated towards economising on fuel usage (putting on extra clothes instead of turning up heating, only heating their main living area, turning off unused lights, cold washing for clothes and line drying laundry). This group also show the most active level of interest in improving their homes with features like ceiling and wall insulation and installing double glazing.

3.4. Estimated under 10% and not recorded as going without (65.3%)

The people who do not figure in either approach to judging fuel poverty do appear to have a much more comfortable existence. They have the highest median per capita income (\$32,054) and many are still working but without dependent children. They live in newer houses that they are more likely to own. Many homes are built after 2000, with more double glazing and insulation and are more likely to have heat pumps or ventilation systems. These households are more likely to heat a greater proportion of their home and to indulge in fewer energy saving behaviours while running a greater variety of household appliances than others.

4. Discussion

The overall results and descriptions of four groups demonstrate that different ways of assessing fuel poverty may be needed to provide policymakers with ideas to provide a full range of appropriate policy interventions. The situations and characteristics of the four groups are quite different from each other. Those experiencing fuel poverty on both our measures appear to be in genuinely straightened circumstances with low incomes and poor accommodation from an energy efficiency perspective.

While our second group appear to be in fuel poverty based on spending more than 10% of their income it seems that they are still able to afford the fuel they want and so are not currently at risk of health impacts from lack of access to fuel. Clearly though, if fuel is a large proportion of household income, the group are vulnerable to situations such as changing prices or health requirements (especially as an older group), which may mean that they could easily tip into a situation where they have to deprive themselves of fuel. There is also a major research question that should be asked in relation to this group as to whether they are prioritising fuel expenditure and rendering them impoverished in other ways. It seems that this group are making a choice to afford the fuel that they need but since they have low incomes it is easy to speculate that this could be at the expense of some other requirement like eating adequately, or social interaction. It is worth noting that the median income is still low and the group does not generally include rich people who are voluntarily spending more than 10% of their income on fuel. The chance of misdiagnosing affluent people voluntarily spending a lot as being in fuel poverty has been expressed as a concern with using actual expenditure instead of required expenditure. One possibility, which may affect why some people are recorded in this group as opposed to group 1, is that

they may have low expectations regarding fuel usage. For example, they expect their bedrooms to be cold and do not recognise that this might be considered as going without fuel.

Our third group are of also of concern. They are not recorded as in fuel poverty on our income based measure but report going without fuel because they cannot afford it. At 17.6% of our sample this could indicate a large proportion of the population with unidentified fuel poverty concerns. The fact that this is a group largely characterised by families with school age children actually fits with other data released in New Zealand in the last two years about increasing levels of inequality and the growing incidence of poverty as a phenomenon affecting families, even those with employment (Rashbrooke, 2013, pp. 4–5). This group do display an active interest in improving many aspects of their housing, policy interventions such as subsidised heating and insulation grants may well benefit people in this group extensively. An open question is whether this group might be restricting expenditure on fuel to a small proportion of their income so that they can afford other items including necessities such as food or school uniforms.

From a fuel poverty perspective there is obviously less to comment on regarding the final major group in the study but it is interesting to note that their attitudes and efforts to be energy efficient do indicate some room for improvement. It appears that they do not need to worry about these issues because they can afford to do what they want. In a larger picture of a world with constrained resources this is not ideal and policy developments, like ensuring minimum energy performance standards, could actually improve the whole population's situation without actually attempting the difficult task of engaging people to change behaviour when there is no personal imperative for them so to do.

5. Conclusions

Two important conclusions emanate from our short paper. Firstly, the people who we estimate spend more than 10% of their annual household income on fuel are generally different from those people who admit to going without fuel because they say they cannot afford it. The fact that people are different between the two measures raises the question of understanding the trade-offs that people might be making as to whether or not they are choosing to spend money on fuel from a limited budget. Being able to understand fuel poverty more exactly in the context of wider approaches to poverty would assist this greatly.

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