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Fuel poverty, excess winter deaths, and energy costs in Vermont: Burdensome for whom?

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HIGHLIGHTS

- Those spending 10 percent of their monthly income or more on energy services are in "fuel poverty".
- In this study we analyze the energy burden in Vermont by household income deciles.
- We calculate that excess winter deaths caused potentially by fuel poverty kill more Vermonters each year than car crashes.
- We conclude with implications for energy planners and policymakers.

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ABSTRACT

Energy, whether from electricity, natural gas, heating oil, propane, kerosene, or wood, is essential for the well-being of many Americans, yet those who spend more than 10 percent of their income of energy services can be considered "fuel poor." This study assesses the extent and severity of fuel poverty in Vermont. It analyzes energy burdens in Vermont by household income deciles, using data from the Census Bureau's American Community Survey. Approximately 71,000 people suffered from fuel poverty in Vermont in 2000, and in 2012 the number rose to 125,000, or one in five Vermonters. Startlingly, fuel poverty grew 76 percent during this period. Excess winter deaths, caused potentially by fuel poverty, kill more Vermonters each year than car crashes. The article then provides 12 policy recommendations based on a small sample of elite semi-structured research interviews. These include suggestions that the Vermont legislature better fund investments in weatherization among low-income households; that community groups and social service agencies scale up the training of energy efficiency coaches; that state agencies endorse improvements in housing efficiency and appropriate fuel switching; and that utilities and fuel providers offer extra assistance for disconnected households and allow for on-bill financing of efficiency improvements.

1. Introduction

In many ways, the green, small state of Vermont is known for being an innovative laboratory for progressive energy and climate policies.[1] Readers unfamiliar with Vermont may be surprised to learn that it was recognized for "sustained excellence" by the U.S. Environmental Protection Agency (EPA) for its contribution to the Energy Star efficiency program and that Harvard University named Efficiency Vermont one of the five best government programs in the United States. Vermont's electricity sector is the cleanest and least fossil fuel intensive in the nation. Vermont has also pursued one of the most proactive smart grid policies in the United States. The Vermont Electric Cooperative (VEC) exemplified this leadership by installing advanced meters in roughly ninety percent of homes by the end of 2011.

Yet such advances may have begun to come with certain costs, especially as they relate to the affordability of energy services for the poor and vulnerable. Energy, whether from electricity, natural gas, heating oil, propane, kerosene, or wood, is essential for the well-being of all Vermonters. We need it for warmth during much of the year, to cook our food, and to power the appliances in our

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[1] Sovacool et al., 2014.

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homes. More of us are coming to depend on air conditioning in the summer. Energy is essential not merely to a modern standard of life, but to physical and mental health. The expense required for the purchase of energy can be a significant burden, especially for those with relatively low incomes.

In this study, we investigate the extent and severity of fuel poverty in Vermont. We analyze energy burdens in Vermont by household income deciles, using data from the Census Bureau's American Community Survey. We find that approximately 125,000 Vermonters, or one in five, live in fuel poverty. We also calculate that approximately 72 percent of Vermonters in the lowest income decile suffer from fuel poverty. Alarmingly, fuel poverty grew 76 percent .from 2000 to 2012. The article then provides 12 policy recommendations based on a small sample of elite semi-structured research interviews.

To be sure, while we hope our study is of value to planners in Vermont and the rest of the United States, it also offers broader value beyond North America for three reasons. First, it hammers home the point that the affordability of energy services is not a function merely of price. For the same quantity of energy, rising prices impose a greater burden when incomes fail to rise as fast. In other words, what matters to users of energy is not the price, per se, but the size of the energy bill and how it compares to income. Though people with smaller incomes generally use less energy and have smaller bills in absolute terms, our study shows how they must spend a larger fraction of their income on this energy than households with greater income. This means that the financial burden for lower-income households is more severe even with reduced consumption of energy, a finding with clear implications for both energy affordability as well as energy justice.[2]

Second, our study reveals how one particular household energy security concern, affordable warmth, is also a significant public health issue. People who lack sufficient energy to keep warm in winter face serious, if sometimes subtle, health risks. For example, in a review of the research on the connection between fuel poverty and human health, Liddell and Morris[3] list risks including stroke, heart attack, pulmonary embolism, influenza, pneumonia, asthma, arthritis, depression, anxiety, and accidents within the home, which are presumed to result from reduced mobility and flexibility, especially for those with arthritis or similar conditions. Together, these health impacts result in an effect known in the public health community as “excess winter mortality.” When homes are cold and damp, children appear more likely to miss school and to have respiratory problems.[4] In their review of US-based research regarding children 3 years old and younger, a vicious cycle for poor families in cold climates can occur: children require more calories to maintain healthy development if they are in cold conditions, yet poor families must balance food purchases against fuel purchases. Liddell and Morris lastly found that poor families reduced food intake by an average of 10 percent (measuring in terms of calories) during winter, shifting money toward heating fuels.[5] It is not surprising that another study comparing low-income households that did or did not receive winter fuel subsidies found that infants in households without the subsidies were less developmentally advanced, had lower weight-to-age measure, and faced an increased chance of requiring emergency medical care.[6] The elderly are another group at greater risk to fuel poverty, given that they are likely to be retired and/or on fixed incomes yet spend large periods of time in their homes where they wish to keep comfortable and have greater demands for winter warmth.[7,8] One study even found that to some older people, “heating is more important than food.”[9]

Third and lastly, given these health concerns, this study shows how the co-benefits to investing in energy efficiency, especially among the poor, can become quite large. Over the years 1999–2011, Vermont averaged 172 excess winter mortalities per year.[10] This represented 3.3 percent of all deaths in that period, more than double the rate of deaths from automobile and other transportation accidents.[11] Our analysis does not allow us to definitively identify the causes of death, and therefore to fully attribute these excess winter mortalities to fuel poverty. Nonetheless, fuel poverty appears to be the most likely explanation for the consistent increase in wintertime death rates in Vermont. That means that eradicating fuel poverty produces huge savings in avoided mortality and morbidity, a potent reminder that low income energy efficiency programs can pay for themselves quite quickly, producing measurable benefits (which are not often or always monetized) that can far exceed costs.[12]

2. Definitions and research methods

This section of the paper defines fuel poverty and introduces the primary and secondary methods utilized in the study, namely a quantitative analysis of Census data to determine energy burdens and qualitative research interviews to determine policy recommendations.

2.1. Defining fuel poverty

Generally, those who spend more than 10 percent of their monthly income of energy services can be considered “fuel poor” or suffering from “fuel poverty.” The World Health Organization defines minimum adequate warmth in the home as 21 °C (69.8 °F) in the main living space and 18 °C (64.4 °F) in other rooms.[13] Though readers may consider this a surprisingly warm standard, keep in mind that the standard must account for those who are most vulnerable, including young children, the elderly, and those with chronic or otherwise serious health conditions.

Different writers have adopted different methods to identify the fuel poverty threshold.[14] The earliest definition in the research literature set the fuel poverty threshold at twice the median—that is, if median expenditure is X percent of household income, then households are in fuel poverty if they spend $2X$ percent or more of their income on household energy.[15] For reasons of analytical and explanatory simplicity, we adopt the definition of fuel poverty as occurring when more than 10 percent of income goes toward energy purchases.[16] In the UK, where significant research into fuel poverty has occurred, the twice-median measure has generally given similar results to the 10 percent measure, though they do sometimes diverge.[17]

Readers should be aware of another nuance in fuel poverty definitions. UK researcher Brenda Boardman's definition, in her landmark 1991 book *Fuel Poverty: From Cold Homes to Affordable Warmth*, focused on the amount that a household would “need to spend” to maintain acceptable conditions (specifically with regard

[2] Sovacool, 2013; Jones et al., 2015.
[3] Liddell and Morris, pp. 2988 and 2992.
[4] Liddell and Morris, pp. 2991–2992.
[5] Liddell and Morris, p. 2992.
[6] Liddell and Morris, p. 2992.
[7] Warriner, 1981.
[8] Wright, 2004.
[9] O'Neill et al., 2006.
[10] We define “winter” as December through March. Data from Centers from Disease Control.
[11] Centers for Disease Control.
[12] Sovacool, 2015.
[13] World Health Organization, 2007, p. 4.
[14] Liddell, et al., and Sovacool, p. 44.
[15] Liddell, et al., p. 27–28.
[16] Liddell, et al., p. 28, and Sovacool, p. 44.
[17] Liddell, et al., p. 28–29.