Which households are energy insecure? An empirical analysis of race, housing conditions, and energy burdens in the United States

Abstract

Energy insecurity refers to a household’s inability to meet its basic energy needs. Previous research has shown that this type of material hardship can lead to negative mental and physical health outcomes, especially for children and the elderly. This study analyzes a state-representative sample of low-income households to evaluate if households of color are more likely than white households to be energy insecure, and, if the reasons are either poor housing conditions or higher energy burdens. We find that energy insecurity is widespread. Over a year period, 30 percent of respondents were unable to pay at least one energy bill, 33 percent received at least one disconnection notice, and 13 percent were disconnected from their electric utility service. Regression analysis further suggests that Black and Hispanic households are more likely than white households to be energy insecure. Additionally, deficient housing conditions and higher energy burdens are both independent predictors of household energy insecurity. Through a mediating variables analysis, however, we find that housing conditions and energy burdens only explain a small proportion of the association between race and energy insecurity. These results indicate that there remains considerable uncertainty about the reasons that households of color experience energy insecurity at higher rates than white households and that future research is needed to uncover the mechanisms underlying these disparities.

Introduction

The concept of energy justice was first introduced to academic scholarship in 2013, [1] and it has continued to attract increased attention in the literature (see i.e., [2], [3], [4], [5], [6], [7], [8]). Energy justice is based on the foundation that all individuals should have access to safe (i.e., does not compromise human health or wellbeing), affordable (i.e., all individuals have the ability to pay for it), and sustainable (i.e., consumption and production today does not compromise future generations) energy. Energy justice also means that people should have the ability to engage in democratic decision-making processes about energy rates, consumption, and production that impact their communities [6].

An important dimension of energy justice is energy security, or the ability of households to meet their basic energy needs [9], [10]. While energy policy scholarship has featured energy (in)security since the 1970s, specifically as it pertains to national and international supply of energy (see e.g. McGowan [11]), the present analysis focuses on the household level and a family or individual’s ability to pay its energy bills and keep its power on. Over the last fifteen years, public health scholars have primarily led discussions about residential energy insecurity [9], [12], [13], [14], with additional scholarly contributions from social scientists that explore correlates of residential energy insecurity [15], media portrayal [16], and possible policy solutions [17]. Studies have also revealed that household energy insecurity adversely affects mental and physical health [18]. Specifically, households that cannot afford to pay their energy bills are more likely to suffer from depression and anxiety [19], [20], physical discomfort, including increased rates of asthma and respiratory infection [13], and, in more extreme but certainly not rare situations, lower life expectancies [14] or premature death [21].

Energy insecurity within the U.S. is an immense, growing, and underappreciated problem [22]. Data gathered in the American Community Survey (ACS) and the Residential Energy Consumption Survey (RECS) suggest that energy insecurity is a significant burden on low-income households. In-depth studies in U.S. cities [23], [24] and an analysis conducted at the U.S. Census Division level [25] revealed that certain demographic populations are more likely to be energy insecure, including households of color, those without a college education, and the chronically underemployed. A recent national survey of low-income U.S. households similarly found that Black and Hispanic households, those that live in deficient housing conditions, as well as those that rely on an electronic medical device are all more likely to be energy insecure [15]. Additionally, scholars have noted the importance of applying an intersectional approach [26] to energy insecurity because households may have multiple indicators (e.g., race and gender) that could overlap to deepen issues related to energy insecurity [27], [28].

These studies have raised important questions about energy insecurity, including whether these patterns exist broadly across the U.S. and why households of color are more likely to be energy insecure. Regarding the latter, several studies have found that households of color are more likely to have higher energy burdens (i.e., pay a higher share of their income on energy costs) [29], [30], [31] as well as live in older and less energy efficient dwellings [32], both of which may explain a statistical association between households of color and energy insecurity. Whether energy burden and inefficient housing conditions lead directly to energy insecurity, however, has yet to be empirically tested in the scholarly literature.

Accordingly, in this article, we ask two research questions: are households of color more energy insecure than white households and, if so, is energy insecurity driven by deficient housing conditions and higher energy burdens? In addressing these questions, our contributions to the literature are two-fold. First, this study evaluates the correlates of energy insecurity using a research design that offers new analytical leverage. Specifically, we designed an original survey administered to a state representative sample of 2000 low-income households in the state of Indiana, enabling us to investigate energy insecurity among a population that is particularly vulnerable to energy insecurity. The survey provides measures of numerous household and individual level characteristics that allow us to control for factors that might otherwise confound the relationship between race and energy insecurity. Second, we apply a mediating variable analysis to empirically explore if deficient housing conditions or higher energy burdens explain why some households are more likely to experience energy insecurity than others.

We find that 30 percent of the low-income households in the sample could not pay an energy bill in at least one month of the previous year; 33 percent received at least one disconnection notice from their utility provider due to lack of payment; and 13 percent were disconnected at least once from the electricity grid. Empirically, we find that Black and Hispanic households are more likely to be energy insecure than white households. Additionally, our results reveal that those that live in degraded, broken, or inefficient housing conditions and have higher energy burdens are also more likely to be energy insecure. The mediating variable analysis, however, suggests that neither housing conditions nor energy burdens explain a substantial proportion of the association between the racial composition of a household and its energy insecurity. In other words, our empirical results do not support the expectation that deficient housing conditions or higher energy burdens explain why Black and Hispanic households are more likely than white households to experience energy insecurity. Therefore, we conclude that the reasons remain unexplained for why households of color uniquely suffer from energy insecurity and encourage scholars to consider further quantitative scholarship to explore the drivers of energy insecurity across the U.S.

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Section snippets

Background

The academic literature on energy insecurity in the U.S. is relatively new [6], despite the fact that utilities rank in the top four spending categories for an average U.S. household (following shelter, pensions and insurance, and food) [33]. In foundational work, Hernández [9] operationalized the concept of energy insecurity through three core dimensions – economic, physical, and behavioral. Economic energy insecurity represents the financial hardship that low-income families face when paying

Data

To conduct this analysis, we collected an original, representative survey of 2000 adults in the state of Indiana with household incomes at or below 200 percent of the Federal Poverty Line (FPL). Indiana is a large, midwestern U.S. state with both major urban centers and a sizeable rural population. The state typically has four seasons, with hot and humid summers, cold winters, and fairly moderate temperatures during the autumn and spring months. Indiana experiences thunderstorms, tornadoes,

Results

A descriptive evaluation of the survey results reveal that energy insecurity is prevalent among low-income households in Indiana. At least once in the last year, 30 percent of households were unable to pay an electricity bill, 33 percent received a disconnection notice, and 13 percent had been disconnected from the electric grid.

The objectives of the proceeding empirical analysis are twofold: to determine if households of color are more energy insecure than white households, and, if so, to

Conclusion

This study analyzes original survey results from low-income households in the state of Indiana to empirically measure if households of color are more energy insecure than white households and, if so, to determine if deficient housing conditions and higher energy burdens explain these racial disparities. Our first set of results find evidence that racial disparities exist, with Black and Hispanic households less likely to be able to pay an energy bill and more likely to receive a disconnection