



Original research article

Benefit or burden? Perceptions of energy efficiency efforts among low-income housing residents in New York City[☆]



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ARTICLE INFO

Article history:

Received 25 November 2014

Received in revised form 28 April 2015

Accepted 30 April 2015

Keywords:

Energy efficiency

Weatherization

Low-income housing

Energy insecurity

ABSTRACT

Low-income households contend with high energy costs and poor thermal comfort due to poor structural conditions and energy inefficiencies in their homes. Energy efficiency upgrades can potentially reduce energy expenses and improve thermal comfort, while also addressing problematic issues in the home environment. The present mixed method pilot study explored the impacts of energy efficiency upgrades in 20 households in a low-income community in New York City. Surveys and interviews were administered to the heads of household in a variety of housing types. Interviews were also conducted with landlords of buildings that had recently undergone upgrades. Findings indicate that energy efficiency measures resulted in improved thermal comfort, enhanced health and safety and reduced energy costs. Participants reported largely positive experiences with the upgrades, resulting in direct and indirect benefits. However, results also indicate negative consequences associated with the upgrades and further illustrate that weatherization alone was insufficient to address all of the issues facing low-income households. Moreover, qualitative results revealed differing experiences of low-income renters compared to homeowners. Overall, energy efficiency upgrades are a promising intervention to mitigate the energy and structurally related challenges facing low-income households, but larger scale research is needed to capture the long-term implications of these upgrades.

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1. Introduction

Often consigned to the least efficient housing units, low-income householders experience disparate energy burden as they also allocate a disproportionate share of household income to energy expenditures. Inefficiencies often occur on accord of long-term disinvestments and poor maintenance by landlords as well as the use of lesser quality materials and less efficient appliances [1]. In addition, the impact of cost burdens associated with energy varies substantially by socioeconomic status. For instance, residential energy expenditures represent just 3 percent of the average after-tax income of households that earn more than \$50,000 annually compared to 33 percent for low-income householders making less than \$10,000 a year [2]. The sum of these conditions and the

disproportionate amount of household income devoted to utility-based expenditures can lead to a phenomenon known as energy insecurity.

Energy insecurity is associated with inefficiencies in the housing structure, such as drafty windows, poor insulation and less efficient heating systems and appliances. The resulting discomfort in extreme home temperatures and high energy costs are burdensome particularly for low-income households [3,4]. Poor building conditions and high energy costs also create a situation wherein families must negotiate competing priorities and expenses, such as having to choose whether to pay for their utility bills or for food or medical care. Evidence suggests that children residing in energy-insecure households are more likely to also experience food insecurity, endure fair or poor health, and have been hospitalized at least once since birth [5]. Of particular concern in low-income housing is the occurrence of cumulative housing problems that include not only energy insecurity, but also health and safety risks [6,7].

Energy efficiency and weatherization interventions are often considered 'low-hanging fruit' with potential to concurrently address structural deficiencies and high energy costs at the household level and also impacting energy independence and climate change mitigation more broadly. While we know these 'fruit'

[☆] This work was supported by the Columbia University Provost's Grant Program for Junior Faculty Who Contribute to the Diversity Goals of the University, February 2013.

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produce definite and high yielding benefits compared to other proposed energy conservation or climate change strategies, the full range of potential benefits associated with energy efficiency remain largely unexplored [8]. Studies by Southwell et al. have demonstrated that there is interest among low-income households to learn more about weatherization, and that people who understand weatherization and share that knowledge within their social networks are more likely to weatherize [9,10]. In spite of the obvious and considerable financial, environmental and probable health benefits, low-income householders face crucial barriers in adopting home energy efficiency and weatherization measures due to large upfront costs and limited decision-making authority for renters.

The present article seeks to demonstrate the impacts of energy-efficiency interventions on the thermal comfort, health, and socio-economic well-being of disadvantaged households. While this study focused on households in New York City, the issues addressed in this intervention are experienced globally. A 2003 study looking at excess winter mortality in Europe found that countries with high energy efficiency standards for homes – Sweden, Norway, and Finland – had lower levels of winter mortality than countries like Ireland, UK, Portugal, and Greece, countries whose homes have lower levels of insulation and energy efficient windows [11]. Another study from England suggested that the lower levels of excess winter mortality seen in Norway, as compared to England and Wales may be because heating in Norway is usually included in rent, and that low-income UK households may have cooler indoor temperatures in the winter based on financial hardships [12]. Far less work on such housing- and energy-related issues have been conducted in the US context. Therefore, the thermal comfort and energy efficiency benefits resulting from the energy efficiency upgrades identified in the present study hold significant relevance. Moreover, New York City offers a useful case study as it is one of the most socioeconomically diverse, densely populated, and least affordable cities in the nation and world. The Bronx, in particular, is the least affordable New York City borough for rental tenants that encounter concentrated poverty, housing instability and poor housing conditions routinely accompanied by high utility costs. Therefore, the present study context is ideal to further investigate these pressing housing and energy issues.

2. Methods

This study is based on a mixed-method pilot project with low-income householders enrolled in a program that facilitates efficiency upgrades and health and safety improvements to low-income housing units. In collaboration with the Association for Energy Affordability (AEA), a community-based weatherization provider, the project examined housing, thermal comfort, and economic conditions to assess the impact of energy efficiency upgrades and other home improvement measures in low-income households in the South Bronx. AEA protocol prior to intervention is to conduct a comprehensive housing audit in order to determine which upgrades are necessary and would be most effective in conserving energy consumption and costs.

AEA staff members identified homeowners and buildings that had recently undergone energy efficiency upgrades and were trained to screen potentially eligible participants for study recruitment purposes.¹ Once identified, eligible study participants were informed of the study purpose and protocol and were subsequently invited to participate. Enrolled participants completed informed

consent, survey and interview protocols with the principal investigator (PI) or research coordinator. Additionally, the PI interviewed two landlords to explore relevant issues involving energy efficiency upgrades and related property investments.

The guiding research question for this project was, “What are the economic, energy, and health impacts of energy efficiency upgrades to low income housing units?” This pilot project sought to gain a deeper understanding of the impacts of the energy efficiency intervention at baseline and during a wintertime follow-up interview using a mixed method approach. Study participants were asked to describe household conditions related to thermal comfort, energy efficiency, and maintenance. They were also asked to complete the following assessments at baseline (a) a retrospective utility audit to review energy consumption and costs, (b) budget audit with itemization of competing household expenses, and (c) a health survey to measure householder health status and healthcare utilization patterns. In addition, qualitative interviews were conducted with the head of household in order to explore experiences with energy insecurity and its connection to health and economic hardship. Very few energy security studies utilize qualitative data collection methods, even though they offer important insights about the nature of household energy insecurity [13]. Furthermore, an exhaustive review of contemporary energy studies research by Sovacool found a lack of social science based approaches to understanding energy use behaviors and attitudes, even though they have “immense potential to enhance the understanding of consumer behavior” [14]. While the small sample size and non-randomized sampling procedure may limit the generalizability of results, they allowed for greater exploration into the experiences of the participants surrounding the initial research question, while also addressing the gaps in the literature mentioned by Sovacool and others.

Baseline data was collected on an ongoing basis from September through November 2013 and the wintertime follow-up interviews occurred between January and March 2014. Using a case study approach, 20 AEA-participating households were analyzed using quantitative and qualitative data collection methods. Inclusion criteria for this pilot study included participants who: (1) own or rent a home in the South Bronx; (2) have a household income between 50 and 150 percent of the federal poverty level (100% is currently \$23,050 for a family of 4); and (3) 12-month consecutive residence in current housing and plans to stay at least 6 months after the baseline assessment.

The wintertime follow-up interviews were used to assess the impacts of the intervention during the heating season. The wintertime follow-up interviews were timed when issues associated with energy insecurity are most likely to affect vulnerable households. The interviews consisted of an abridged version of the utility audit, information about participant’s level of thermal comfort and how they were experiencing the heating season post-energy efficiency upgrades as compared to previous heating seasons.

Two landlords were invited to participate in separate in-depth interviews to examine barriers and facilitators to conducting energy efficiency upgrades to low-income housing units. The landlord interviews also explored the process and challenges of funding and implementing the upgrades, as well as the benefits of the upgrades for both the tenants and the landlords themselves. Landlord A oversaw upgrades in three large multi-family buildings. He met with the researchers at his office for the in-depth interview. Landlord B owned a smaller multi-family building that had recently undergone upgrades. He participated in the interview via telephone. Landlord A’s buildings were owned by his family for nearly 20 years, and landlord B had owned his building for about 7 years at the time of the interviews. These interviews added an important perspective to the study design, allowing us to garner the viewpoints of homeowners, renters, and landlords. The resulting data

¹ AEA personnel did not participate in the research process past the recruitment phase and the present research project did not constitute an evaluation of their services.

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