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Exposure and risk to fuel poverty in France: Examining the extent of the fuel precariousness and its salient determinants

Fateh Belaïd

University Paris-Est Scientific and Technical Center for Building, 14 Boulevard Newton, Champs-sur-Marne, 77447 Marne la Vallée cedex 2, France

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ABSTRACT

Millions of households experience fuel poverty around the world, commonly defined in broad terms in the early 1990s to cover households whose total energy bills exceeded 10% of their net income. First, this paper outlines the measurement of fuel poverty using the Low Income High Costs indicator (LIHC) and examines the main characteristics of fuel poor households in France based on multidimensional statistical analysis using a new micro-level survey data. It then explores the salient determinants of fuel poverty risk using logistic regression. About 3.18 million households are estimated to be in fuel poverty, representing 12% of all French households. The hierarchical classification suggested four distinct profiles, which shed light on the main features of fuel poor households. Additionally, results show that the risk of being fuel poor and the depth of fuel poverty increase significantly with lower EPC rating house and confirm the existence of a social gradient in fuel poverty. Recognition of this aspect can be helpful for developing economically efficient policies to address fuel poverty. This study does not aim to be exhaustive in policy implications terms, but rather to present a new way of thinking about fuel poverty solutions by targeting different household groups.

1. Introduction

The International Energy Agency estimates that 1.2 billion people lacked access to electricity, representing about 17% of the world's population in 2013 (WEO, 2015). Otherwise, a recent Buildings Performance Institute Europe report (BPIE, 2014) estimates that the fuel poverty rates in Europe fluctuate from 9.7% to 15.11% depending on the country.

According to the European fuel Poverty and Energy Efficiency report (EPEE, 2009), between 50 and 125 million people are unable to keep their home in a satisfactory thermal comfort level in Europe's 27 countries. Therefore, interest in fuel poverty has received considerable attention over the last few years and as a result there have been various studies into both the measurement of the phenomenon and its definition (Healey and Clinch, 2004; Hills, 2011; Pachauri and Spreng, 2011; Moore, 2012; Hills, 2012; Savacool, 2015; Teller-Elsberg et al., 2016). The issue is becoming important and the subject of new political awareness.

According to Thomson et al. (2016) the terms “energy poverty” and “fuel poverty” are used interchangeably within the same context. The term “Fuel poverty” is mainly used in the UK, New Zealand and Ireland, while the term “energy poverty” is sometimes used in Eastern Europe. In addition, the terms have been used interchangeably in a number of key EU policy documents (Thomson et al., 2016). In addition, Bouzarovski and Petrova (2015) stated that all forms of fuel and energy poverty, in both developed and developing countries are underpinned by a common condition: “the inability to attain a socially and materially necessitated level of domestic energy services”. This paper adopts the last standpoint and refers mainly to fuel poverty given the widespread acceptance of the term throughout the industrialized countries (Liddell et al., 2012).

Households’ daily life in housing accounts for more than a third of the total energy consumption and more than a fifth of greenhouses gas emissions in France (Belaïd, 2017; Lévy and Belaïd, 2018). The impact of limited income and rising energy costs on people's ability to ‘keep warm’ in their homes has been the subject of much recent debate in France. Over the past decade, significant attention has been paid to the issues of fuel poverty, as evidenced by the creation of the French National Fuel Poverty Monitoring Agency in 2011. Fuel poverty therefore represents an important research area for generating the knowledge needed for the improvement of fuel poverty interventions (Bair et al., 2017).

Recently, the French government has had in place a number of measures that are designed to tackle fuel poverty, including the “Better Living”[1] program, introduced in 2010, and the French National Fuel Poverty Monitoring Agency (ONPE) founded on March 2011. This has

E-mail addresses: fateh.belaid@cstb.fr, fateh.belaid@univ-littoral.fr.

[1] “Habiter Mieux” in French.

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been part of an attempt to reconsider the actual fuel poverty policies and set a durable framework for future programs aiming to tackle the phenomena.

Fuel poverty is associated with cold homes and negative health outcomes. Nevertheless, France's residential dwellings stock is composed of relatively energy inefficient housing units, which can result in houses that are challenging or costly to heat (Lévy et al., 2014; Belaïd, 2016; Belaid and Garcia, 2016). Despite the lack of coherent and clearly standard definition, the relevance of the issue as well as the harmful health effects of cold homes are extensively recognized, including respiratory problems, excess winter deaths, increased risk of poor mental health and circulatory problems (Liddell and Morris, 2010; Shortt and Rugkåsa, 2007; Howden-Chapman et al., 2012).

Analyzing fuel poverty problem is crucial to improve the formulation of future policies and important for programs required to deal with energy poverty. However, this study aims to provide information that answer to the following questions: How should we quantitatively measure fuel poverty? What are the main features of fuel poor households in France? What are the salient factors affecting the risk of being fuel poor?

This article particularly focuses on the challenges of measuring the extent and understanding the impact various houses and socio-economic factors have on the risk of being fuel poor under the LIHC measure. More precisely, the logistic model allows us to predict a probability and calculate how a change in a set of known characteristics (socioeconomic characteristics and habitation attributes) affects the odds of being fuel vulnerable.

The fuel poverty indicator used in this study is based on household energy bill and income (incomes calculated after housing costs). The foundation for our approach is inspired by the ground-breaking study of Hills in the UK (Hills, 2012). It is based on PHEBUS,[2] a recent survey containing a wealth of information on the household attributes, occupants' energy uses and behaviors, dwelling characteristics as well as on all aspects of energy precariousness (housing and transport).

In embarking on this path, this study contributes to the literature on fuel poverty in several ways. Firstly, it measures the level of fuel poverty and gives a detailed description of households' profile that suffer from fuel poverty and gives an update on the typical fuel vulnerable household in France based on a very recent and rich survey. Clusters are especially helpful in examining policy opportunities oriented towards specific household groups. Secondly, it explores the household and dwelling attributes that are prominent in driving households to a precarious energy situation. Thirdly, this paper contributes to enriching knowledge on the salient drivers of fuel poverty in France, which can be subsequently used to support decision making in energy policy design. In fact, there is a shortage and non-availability of individual micro-data on household energy demand, to the best of our knowledge, and empirical research on dwelling- and household-related factors that affect fuel poverty is rather limited. Furthermore, from a policy-making point of view, this approach provides a framework to developing more effective energy policies and ambitious fuel poverty reduction schemes geared towards specific households (e.g. refurbishment of the existing dwellings, helping households living in poorly insulated homes, additional information and data on household lifestyle and behaviors, etc.).

The remaining part of this paper is built up as follows: Section 2 gives a brief overview and discusses the prior literature relating to fuel poverty. Section 3 describes the data and the modeling procedure. We present our empirical results and discuss their implications in Section 4. Section 5 concludes and provides some possible policy implications of our main findings.

[2] PHEBUS is a French acronym: Performance de l'Habitat, Équipements, Besoins et USages de l'énergie corresponding to "Housing performances, equipment, needs, and usages of energy".

2. Overview of fuel poverty and literature review

2.1. Fuel poverty overview and definition

Fuel poverty is an issue that is growing in both recognition and prevalence across the world. Over the last decades, fuel poverty has been recognized as a form of environmental inequality and as an unacceptable feature in contemporary society (Boardman et al., 1999; Wilkinson et al., 2007; Walker and Day, 2012; Sovacool, 2015). Nevertheless, determining whether a household is fuel poor is a complex issue strongly related to a large number of inter-connected factors, including income, fuel bills as function of the rate of energy price increases, and domestic energy needs (dependent on dwelling energy efficiency, behavior and the lifestyle of householders).

Fuel poverty first arose in the late 70 s and early 80 s in the UK and knowledge on fuel poverty and related concepts is primarily focused in the UK and Ireland. The first studies on fuel poverty phenomenon focused, in principal, on the definition and quantitative measurement of fuel poverty levels.

Many authors attempted to define fuel poverty since the 1980s (e.g. Lewis, 1982; Bradshaw and Hutton, 1983; Boardman, 1991, 2012; Buzar, 2007; Moore, 2012; Bouzarovski et al., 2012; EESC, 2013; Thomson et al., 2016). According to Papada and Kaliampakos (2016), these definitions can be summarized as the difficulty or inability of a household to afford an adequate coverage of its energy needs due to high energy bills, low incomes, and the dwelling's energy inefficiency. Richardson (1978) is credited with being among the first to draw the first definition of fuel poverty, characterizing it as a situation where people lack the resources to "*afford the cost of the fuel they need for heating, lighting and cooking*". In 1991, fuel poverty was given a more tangible definition by Brenda Boardman. Under this definition, a household is considered to be fuel poor if its expenditure on energy services exceeds 10% of its net income.

The 10% measure was criticized as being inappropriate since it relies on observations made more than 25 years ago by Boardman (1991) and is strongly sensitive to changes in fuel prices (Moore, 2012). According to Moore (2012), the 10% threshold does not target those most in need. Moore (2012) asserted that the income composition and thresholds govern the distribution of the target populations and the relative importance of the main drivers of fuel poverty.

According to Thomson et al. (2016), fuel poverty studies in the rest of Europe is less developed, even if a wider range of single country studies have been conducted. Thomson et al. (2016) stated that the multiplicity of both concepts and definitions of fuel poverty is problematic and argued that a broad common definition is crucial for raising the profile of fuel poverty and ensuring it is recognized as a policy issue by the EU member countries. The authors highlighted that contrary to the European Commission's stance, many of the EU institutions are in favor of a common EU definition of fuel poverty, and have been arguing for the establishment of a definition for at least seven years.

In France, greater importance has been accorded to the issue of fuel poverty since the middle of the past decade. However, policy and action in this area is still partial. The main efforts focused on discussing the results of fuel poverty (e.g. gas and electricity debts) rather than dealing with its causes.

The problem of energy affordability entered the political debate in 2004, as a result of increases in domestic energy prices. A primary impetus lies on creating a network of fuel poverty actors in 2007, called RAPPEL.[3] Then, the fuel poverty problem was discussed at the Grenelle roundtable. This resulted in a first wave of studies aimed at assessing the extent of fuel poverty in France. The results of these studies indicated that approximately 3.4 million households were in fuel poverty in France. The resulting legislation led to the inclusion of fuel poverty in

[3] Réseau des Acteurs de la Pauvreté et la Précarité Energétique dans le Logement.