APPLYING AN ANALYTIC HIERARCHY PROCESS TO CREATE A NEW MEASURE OF FUEL POVERTY

ABSTRACT

Fuel poverty affects 4.5 million homes in the UK and is receiving increasing attention internationally. It has significant health, economic and social impacts, yet less than 25% of expenditure on fuel poverty reaches fuel poor homes in the UK. Current measures maintain a technical view of the issue, rejecting social factors. This paper implements an Analytic Hierarchy Process to weight qualitatively obtained social practice factors of fuel poverty in the UK. It identifies 27 social practice factors nested in four tiers that contribute to the existence of fuel poverty in the UK. It marks the first attempt to quantify social practice factors of fuel poverty. It provides a methodological approach that can be applied internationally, to incorporate qualitative evidence in a quantifiable policy model for use in citizen centred policy making which aids in the identification of novel sites for policy intervention.

Keywords: Analytic Hierarchy Process, AHP, fuel poverty, social policy, social practices

1. Introduction

Fuel poverty, most simply defined as when a household lacks the socially and materially necessitated level of energy services in the home affects 4.5 million homes in the UK. The concept is gaining increasing attention internationally due to its economic, social and health impacts. This paper explores how applying an Analytic Hierarchy Process (AHP) to quantifying dimensions of fuel poverty enables the creation of a more socially representative understanding of the issue that can allow for better policy design and intervention targeting.

2. Literature Review

Analysis has shown that less than 25% of expenditure on Fuel Poverty schemes is reaching fuel poor homes in the UK. This has been attributed to the flawed definition of fuel poverty that has been used (Hills, 2012). Despite a review of the UK Fuel Poverty Strategy (Hills, 2012) the new definition adopted in the UK maintains a focus on technical factors and fails to reflect social indicators of fuel poverty. There is therefore a need to revisit the determinants of fuel poverty to understand how incorporating social practices may indicate the existence of fuel poverty more accurately and to develop a tool with which to incorporate these factors in a new measure of the issue. The UN states that social policy should bring people "into the centre of policy-making" (Ortiz, 2007, p.6). The application of AHP to this social issue, enables the inclusion of citizenry in the policy design process, delivering improved policy making (Saaty, 2007). This overcomes the limitations of current approaches to the issue and facilitates the inclusion of qualitatively defined social practices in a quantitative model of fuel poverty in the UK.

3. Hypotheses/Objectives

This study sought to ascertain the relative importance of previously identified social practice factors of fuel poverty in the UK through the application of AHP. The AHP would be completed by residents rather than subject matter "experts" in order to reflect the UN's aim of including citizens in the policy-making process.

4. Research Design/Methodology

The AHP model was developed by inductively coding focus group transcripts on the use of energy in the home completed with residents in 5 major cities in the UK. The transcripts were thematically coded and subjected to second coding with Cohen's Kappa calculated to ensure an acceptable inter-coder agreement was achieved. The identified factors were grouped in to a hierarchy through the coding process. Factors were subjected to pair-wise comparison by participants from the original focus groups. Priorities were obtained via telephone survey to allow the researcher to assess judgment consistency and discuss judgments to ensure consistency at point of collation. Individual judgments were aggregated utilizing the Geometric Mean Method.

5. Data/Model Analysis

The coded focus group data delivered a 27 factor model nested in to four tiers. Tier 1 aggregated judgment matrices are shown below:

	Food	Energy	Social Engagement	Domestic Practices	4th root	Priority Vector
Food	1.00	3.807	3.789	3.774	2.72	0.551
Energy	0.26	1.00	1.037	1.795	0.84	0.170
Social Engagement	0.26	0.96	1.00	2.268	0.87	0.177
Domestic Practices	0.26	0.56	0.44	1.00	0.51	0.102
Sum	1.792	6.328	6.267	8.837	4.929	**1.000**
Sum * PV	0.987	1.073	1.108	0.905		
λ Max*	4.075					
CI**	0.025					
CR***	0.043					

λ Max is the maximal eigenvalue of the matrix (Ishizaka and Labib, 2011)

** CI is the Consistency Index for the matrix to be calculated $CI = \dfrac{\lambda_{max} - n}{n - 1}$

*** CR is the Consistency Ratio calculated by dividing the CI value by the relevant value from Saaty's Random Index (RI)

6. Limitations

This study is based upon factors identified from focus groups in five cities in the UK. Whilst the aggregated judgments are representative of the views of the AHP participants, they may not fully reflect those of the UK population more broadly. This work should be seen as exploratory in nature, proving the principal of the methodological approach and application and provides a strong platform for future assessments of broader validity.

7. Conclusions

The model of fuel poverty realised by this study combines rich qualitative evidence with detailed quantitative understanding to verify the validity of the outcome and demonstrate

relevance both to academic thinking and practical application. The study shows that fuel poverty results from a complex network of inter-related practices. Understanding the relationship between these practices is vital to understanding how the relative strength of one practice over another affects the existence of fuel poverty in the UK. This study offers the first attempt to quantify social practices of fuel poverty and delivers a new model of fuel poverty that aids in the identification of novel sites of intervention for policy design. The methodology utilized offers the opportunity for future studies to replicate this approach for other policy issues at local, national and international scale.

8. Key References

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