Developing a Social Practice Theory Picture of Fuel Poverty in England

By

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Thesis Summary

Fuel Poverty, defined most simply as “the inability to afford adequate warmth” (Lewis 1982, p.1) emerged as an issue in England following the oil crisis in 1973-1974 but remained a topic of interest only to special interest groups and failed to impact upon official government policy. Following the passing of the Warm Homes and Energy Conservation Act (2000), the topic of fuel poverty has received increasing interest within the academic community both within England and increasingly further afield. Fuel poverty has been shown to be closely related to increased Excess Winter Deaths, morbidity and mental health issues, and is predicted to affect 2.34 million homes in England in 2015; demonstrating that despite 15 years of schemes designed to tackle fuel poverty in England, the social issue is far from being eradicated.

This research develops a new approach to understanding, modelling and targeting fuel poverty in England in order to contribute to efforts to eradicate the issue. Through examination of the extant literature a novel three stage methodology was developed to respond to this aim. An analysis of fuel poverty and Index of Multiple Deprivation statistics demonstrated that current measurement approaches capture a distinct social issue with significant localised variation, contributing to the inefficiency of current intervention targeting approaches. This enabled the development of a novel Lower Super Output Area (LSOA) classification matrix that facilitates improved intervention targeting (study 1). This was utilised to identify areas to complete focus groups examining the role of energy in homes around England. The focus groups adopted a Social Practice Theory (SPT) perspective and enabled the identification of SPT factors of fuel poverty, demonstrating that fuel poverty was a much broader concept than that captured in current government policy (study 2a). Finally these factors were weighted through an application of the Analytic Hierarchy Process to develop a novel model of the SPT factors of fuel poverty (study2b). The resultant model shows that when fuel poverty is considered from a SPT perspective food, energy, domestic practices and social engagement determine the likelihood of living in fuel poverty. The final model provides practitioners with new sites of intervention and tools for change to encourage the alteration of practices which have a detrimental effect on fuel poverty and the emergence of new practices to reduce the existence of fuel poverty in England.

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List of abbreviations

ABC	Attitude Behaviour Choice
AHC	After Housing Costs
AHP	Analytic Hierarchy Process
BHC	Before Housing Costs
BRE	Building Research Establishment
BREDEM-12	Building Research Establishment Domestic Energy Model
CDT	Community Development Trust
CERT	Carbon Emissions Reduction Target
CESP	Community Energy Savings Programme
CI	Composite Indicator
CI	Consistency Index
COA	Census Output Area
CR	Consistency Ratio
CRC	Carbon Reduction Commitment
DCLG	Department for Communities and Local Government
DECC	Department of Energy and Climate Change
DEFRA	Department for Environment Food and Rural Affairs
DOE	Department of Environment
DTI	Department of Trade and Industry
ECO	Energy Company Obligation
EEC	Energy Efficiency Commitment
EHCS	English Housing Condition Survey
EID	English Indices of Deprivation
EPC	Energy Performance Certificate
EU	European Union
EWD	Excess Winter Deaths
FP	Fuel Poverty
GHG	Green House Has
GIS	Geographic Information Systems
GMM	Geometric Mean Method
GOR	Government Operating Region
HBAI	Households Below Average Income
IMD	Index of Multiple Deprivation
ISMI	Income Support for Mortgage Interest
LA	Local Authority
LIHC	Low Income High Costs
LSOA	Lower Super Output Area
MHLG	Ministry of Housing and Local Government
MP	Member of Parliament
NAO	National Audit Office
NHS	National Health Service
OECD	Organisation for Economic Co-operation and Development
OFGEM	Office of Gas and Electricity Markets
ONS	Office of National Statistics

PTA	Parent Teacher Association
QDA	Qualitative Data Analysis
SAP	Standard Assessment Procedure
SO	Supplier Obligation
SPT	Social Practice Theory
UK	United Kingdom
UN	United Nations
VAT	Value Added Tax
WHECA	Warm Homes and Energy Conservation Act
WHO	World Health Organisation

1 Introduction

1.1 The importance of fuel poverty in England

At its most basic level, fuel poverty is defined as "the inability to afford adequate warmth" (Lewis 1982, p.1). The concept emerged following the oil crisis in 1973-4 (Johnson and Rowland 1976) gaining recognition amongst special interest and campaign groups (Bradshaw and Harris 1983) but failing to garner official political acknowledgement until 1997 (Boardman 2010). Since 2000, there has been an increased level of political attention focussed on the issue, with a large scale investigation in to the topic undertaken on behalf of the last UK government (Hills 2012) stimulating a further upturn in interest in the issue.

Fuel poverty has only in recent years received widespread attention within mainstream academic and policy literature (Bouzarovski and Petrova 2015), but has now been seen to have come of age (Liddell 2012), perhaps reflecting the increase in political recognition and interest in the topic since 1997. Academic analysis has sought to prove that fuel poverty is a distinct form of poverty requiring discrete policies to tackle its existence (Campbell 1993; Boardman 1991; Palmer et al. 2008; Hills 2012). Despite the passing of the Warm Homes and Energy Conservation Act (WHECA) in 2000 requiring the eradication of fuel poverty "as far as reasonably practicable" (Warm Homes and Energy Conservation Act 2000, sec.2(1)) in England by 2016, the issue still affects 2.35 million households (DECC 2015). With the failure of policy and intervention schemes to meet the eradication targets outlined in the WHECA (2000), The Fuel Poverty (England) Regulations (2014) were subsequently introduced with the objective of ensuring "as many as is reasonably practicable of the homes in which such persons live have a minimum energy efficiency rating of Band C as determined by the Fuel Poverty Energy Efficiency Rating Methodology" (The Fuel Poverty (England) Regulations 2014, sec.2(2)). Despite this new target, projections show that there are likely to be 2.36 million fuel poor homes when statistics for 2014 are published, reducing marginally

to 2.34 million homes in 2015 (DECC 2015). Fuel poverty remains a significant issue despite fifteen years of legislative and political action, affecting around 10.4 per cent of English households (DECC 2015) and impacting upon the health and daily lives of individuals and communities across England.

Traditionally conceived as an issue relating to the combination of three factors, household income, price of energy and energy efficiency of the home (Boardman 1991), this thesis examines the implications and limitations of conceiving fuel poverty in such a manner. By capturing fuel poverty as the interaction between three structural factors, the range of policy options available to tackle the issue are limited to those which tackle one or more of these three factors. The implication of a narrow conception of the issue is that our understanding of those identifiable as fuel poor is equally narrow, failing to capture those who may be struggling with being able to heat their home adequately, but aren't defined as fuel poor in a measure that focusses on issues of structuration alone. Issues are also raised in being able to accurately identify those households that are fuel poor, with complex decisions required around what should be included in calculating household income (Fahmy et al. 2011; Moore 2012) as well as challenges with matching household energy data with other social statistics (Boardman 2010). The inability to accurately identify the fuel poor has contributed to ineffective targeting of resources designed to tackle the problem in England with less than 25 per cent of expenditure being directed to those actually living in fuel poverty (Boardman 2010).

Accurately identifying those affected by fuel poverty is important if the issue is to be eradicated, or at least the effects of fuel poverty are to be reduced. Whilst fuel poverty is defined by a measure dominated by three structural issues, the impacts of fuel poverty upon society are much more wide ranging. Cold homes are associated with increases in both

mortality and morbidity (Marmot Review Team 2011) as well as mental health issues (Gilbertson and Green 2008). The literature exploring the social and societal implications of fuel poverty has begun to note links to social disorder, unemployment levels (Gibson et al. 2011), increased truancy (Liddell and Morris 2010) and challenges in forming social relationships due to cold homes (Heyman et al. 2011).

The social impacts of fuel poverty are thus far under-reported within academic literature (Thomson et al. 2001). Much of the evidence available focusses upon the health (either physical or mental) implications of fuel poverty with only minimal reference to broader social implications as outlined above. This thesis responds to this identified lack of evidence and examines fuel poverty from the perspective of those affected by issues of affordable warmth, in order to develop an understanding of the broader social implications of fuel poverty. The work presented in this thesis contends that our understanding of fuel poverty, reflecting Shove's (2010a) critique of climate change policy, is too narrow and fails to capture much of the social world. Current policy fails to capture and engage with the broader social implications of fuel poverty, providing little opportunity for agency and structure to interact to reduce the issue in England (Middlemiss and Gillard 2015).

In order to overcome the limitations of current policy configurations, this thesis adopts the epistemological foundations offered by Social Practice Theory (SPT). This enables consideration of both issues of structuration, such as those emphasised in the current conception of fuel poverty in official government policy, alongside issues of agency incorporating the broader social impacts of fuel poverty. Adopting this approach enables the recognition of the importance that both of these positions contribute (Hargreaves 2011) to the existence of fuel poverty in England. Despite the opportunities that SPT offers to capture a broader and more detailed understanding of fuel poverty in England, SPT approaches have

failed to gain traction amongst strategic planners and policy designers. The methodological approaches utilised thus far when analysing social phenomena from a SPT perspective have not provided the numerical data that practitioners prefer to work with (Browne et al. 2013). Therefore this thesis develops a novel methodological application of SPT in its examination of fuel poverty which captures the lived experience of the fuel poor in line with the epistemological and ontological assumptions of this approach whilst also offering numerical insights of relevance to the practical policy sphere.

Over the last eight years, there has been a general increase in domestic gas and electricity prices in England, with the UK government noting that the only likely way for the consumer to reduce their energy costs being through improving the energy efficiency of their home (Bolton 2014). If fuel poverty is understood from a broader perspective than the narrow conception currently adopted in government policy, the opportunity exists to identify new and novel sites of intervention, drawing upon both human action and structural factors; enabling a greater range of opportunities to tackle energy affordability and fuel poverty in England. This thesis contributes to the development of understanding and identification of sites of intervention, developing a more holistic understanding of fuel poverty to the benefit of policy makers, academic enquiry and fuel poor communities.

1.2 Aims and Objectives

This research aims to develop a new approach to understanding, modelling and targeting fuel poverty in England through the creation of a new model of fuel poverty drawing upon the epistemological principles of Social Practice Theory (SPT). By adopting a SPT approach to exploring this issue, energy is no longer conceived as a result of social systems, but as a component of practices enacted by society (Shove and Walker 2014). In this sense, energy is not something that is consumed but a part of the material components of practices. By

considering energy in this manner, this study moves away from the idea that the consumption of energy is related to fuel poverty and instead attempts to identify the practices (which may contain energy usage) that facilitate the existence of fuel poverty. As Shove and Walker suggest "there is no reason to suggest that energy has any special status as a driver of practice" (2014, p.49). The new model of fuel poverty will capture a broader conceptualisation of fuel poverty than that currently represented in official government policy representing a "bottom-up" conceptualisation of the issue developed in conjunction with fuel poor communities across England. In doing so this research seeks to examine the possibility for SPT approaches to be adopted in understanding fuel poverty in a manner that provides insights and outcomes that bear relevance to strategic planners and policy designers as well as academic knowledge creation.

In order to achieve this aim, the following objectives for the research have been identified.

1. **Statistically examine the independence of fuel poverty**. Does the current approach to measuring fuel poverty in England captures a distinct form of poverty which requires independent policy responses or does the current approach provide another measure of general deprivation?

2. **Develop an approach to classifying geographic regions of England according to their fuel poverty – deprivation relationship.** Identify different geographic regions of England to examine the lived experiences of the fuel poor in areas with differing strengths of the relationship between deprivation and fuel poverty.

3. **Develop a methodological approach that enables the Social Practice Theory perspective to be utilised in the policy design domain.** Create a methodological approach to capturing meanings, materials and competences that facilitate the

existence of fuel poverty in England which respects the epistemological and ontological underpinnings of Social Practice Theory and meets the data needs of policy designers and strategic planners.

4. **Capture the broader societal and social effects of fuel poverty.** Utilising appropriate methodology explore the lived experiences of the fuel poor in England in order to capture the meanings, materials and competences that combine to facilitate the existence of fuel poverty in England. How are these characterised and expressed by those affected by fuel poverty?

5. **Present a SPT model of fuel poverty that provides evidence of relevance to policy designers and strategic planners.** Having captured the lived experiences of those living in differing levels of fuel poverty in England , translate this data in to a format that meets the quantitative, modelling needs of fuel poverty practitioners in England.

1.3 Outline of the thesis

The current chapter, chapter 1, presents a broad introduction to the research presented within this thesis. It outlines the importance and relevance of the topic to theoretical, methodological and policy development before presenting the aims, objectives and overall structure of the thesis (see Figure 1).

Chapter 2 provides a detailed examination of fuel poverty, the central element of interest within this thesis. It examines the extant literature to develop an understanding of the historical development of fuel poverty, the drivers of fuel poverty in England and its impacts and effects. It then assesses current approaches to measuring fuel poverty before critiquing historical and current policies for tackling the issue in England.

Having outlined how fuel poverty is currently conceived within England, chapter 3 outlines the epistemological basis of the thesis demonstrating the need for adopting a SPT perspective within the research, the implications of this perspective for the consideration of energy and therefore contributes to meeting research objective 5. This is utilised to justify the adoption of a mixed-methodological approach to data collection and analysis before presenting a broad methodological overview for the thesis, linking together the specific methodological approaches outlined in each of the individual studies presented in subsequent chapters and supporting all five research objectives.

Chapter 4 responds to objectives 1 and 2. Initially it examines the independence of fuel poverty and deprivation in the existing literature before undertaking a statistical analysis of the issue utilising the most recent social datasets. The outcome of this analysis is then utilised to develop a classification matrix of the relationship across England. The findings of the statistical analysis and classification approach are then critically discussed with relation to policy and legislative instruments as well as the extant literature, demonstrating the relevance of the analysis at different geographic levels to policy and theory.

Chapter 5 theoretically justifies the use of social practice theory for understanding the broader social and societal impacts of fuel poverty, contributing to meeting the requirements of objective 3 and 4. It then utilises the classification framework developed in chapter 4 in order to identify specific geographic regions in England in which to examine the lived experience of the fuel poor, meeting the requirements of objective 2. This chapter presents two studies, firstly capturing the lived experiences of the fuel poor from a SPT perspective by convening a number of focus groups across England (study 2a), meeting the needs of research objective 4. These are then analysed to identify the common social practices that contribute to the existence of fuel poverty across England. The identified factors are finally

weighted by the fuel poor communities identified in the first study through the application of the Analytic Hierarchy Process (AHP) in order to deliver a group AHP defined and weighted model of social practice factors of fuel poverty in England meeting the requirements of objective 5 (study 2b).

Finally in chapter 6 the SPT model of fuel poverty developed in chapter 5 is examined in relation to the full breadth of literature considered within the overall thesis. The chapter concludes with an evaluation of the key findings, contributions to knowledge, practice and policy, limitations and future research directions identified as a result of this research.

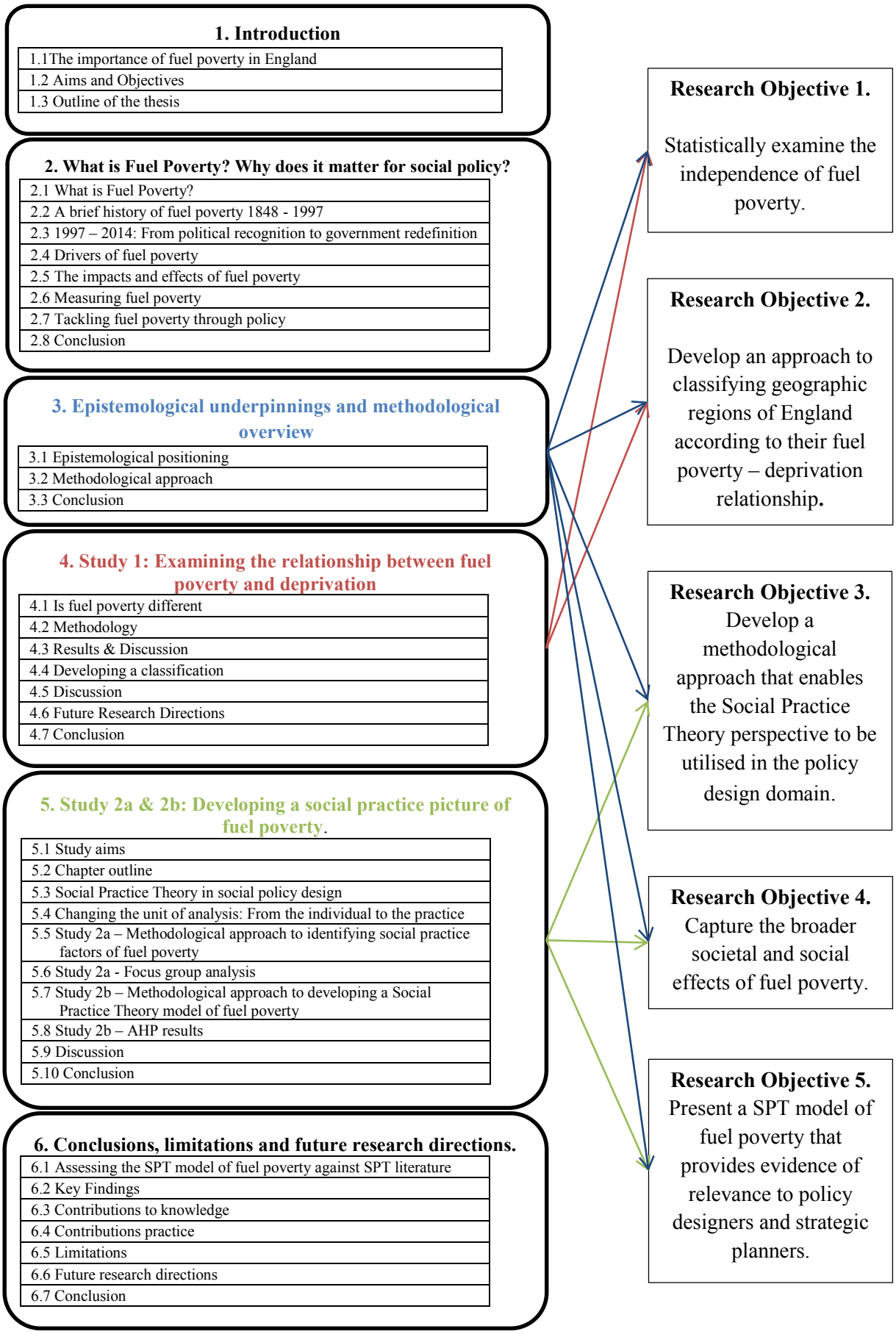


Figure 1 Overview of the thesis structure and its relationship with individual research objectives

2 What is Fuel Poverty? Why does it matter for social policy?

2.1 What is Fuel Poverty?

2.1.1 A working definition of fuel poverty

In order to discuss and critique fuel poverty and its related policies it seems pertinent to open by defining a working definition of the term in order to provide a point of reference. As stated within the previous chapter, this work focusses solely on England in its exploration of fuel poverty measurement from a social practice theory perspective, the suitability of current forms of policy, and related issues with respect to fuel poverty. This is because the devolved administrations that make up the United Kingdom each have individual overall responsibility for fuel poverty within their respective nations, with Scotland and Northern Ireland adopting slightly differentiated approaches to fuel poverty measurement and definition to that used in England.

Until recently, all fuel poverty policy in England has been based upon the definition of fuel poverty as defined within the terms of the Warm Homes and Energy Conservation Act (2000), which states that:

> *"…a person is to be regarded as living "in fuel poverty" if he is a member of a household living on a lower income in a home that cannot be kept warm at reasonable cost."*
>
> (Warm Homes and Energy Conservation Act 2000, p.1)

Although this definition provides some understanding as to what fuel poverty means, many aspects of the definition are left open to interpretation. This was deliberately designed into the act, allowing room within the strategy that the act required government to develop, to deliver a much more tightly defined definition of fuel poverty. The subsequently published UK Fuel Poverty Strategy (DEFRA & DTI 2001) defines a fuel poor household thus:

> *"A household is in fuel poverty if, in order to maintain a satisfactory heating regime, it would be required to spend more than 10% of its income (including Housing Benefit or ISMI) on all household fuel use."*
>
> (DEFRA & DTI 2001, p.30)

The development of this definition of fuel poverty forms the major component of this chapter, and it is this definition as stated in the UK Fuel Poverty Strategy (DEFRA & DTI 2001) that will be used as a working definition within this body of work.

2.1.2 Fuel Poverty within an international context

The term fuel poverty was first coined in England but is now recognised and utilised in a number of countries across the world including New Zealand (Howden-Chapman et al. 2007), France (Dubois 2012; Legendre and Ricci 2015) and Austria (Brunner et al. 2012). Although increasingly prevalent in energy policy literature, fuel poverty is only officially defined in three European Union member states, the United Kingdom, Republic of Ireland and France (Thomson and Snell 2013). Despite a lack of formal definition in many countries, or an international agreement as to what precisely constitutes fuel poverty, there is an increasing body of work exploring the prevalence of this issue within specific nation contexts, with a particular body of work focussing on Eastern European nations including Macedonia (Buzar 2007b; Buzar 2007a) Ukraine (Petrova et al. 2013) and Hungary (Tirado Herrero and Ürge-Vorsatz 2012), following the liberalisation of the energy market of these post-communist states. There are also two studies which take a broader pan-European analysis of the issue, one completed prior to the expansion of the EU member states (Healy 2004) and a much more recent study examining the situation across all EU-27 states (Thomson and Snell 2013). In seeking to overcome the lack of an internationally agreed definition of fuel poverty, Bouzarovski and Petrova (2015) offer the first global perspective on the issue. Their work adopts a definition of energy deprivation that is relevant to both developing and developed nations, namely "the inability to attain a socially and materially

necessitated level of domestic energy services" (Bouzarovski and Petrova 2015, p.31). Unlike the working definition of fuel poverty adopted for critique and reference within this thesis, this definition reflects not only the technical but also the socially necessitated level of domestic energy. This position reflects the discussions presented in this thesis surrounding the relevance of social practice theory as an epistemological lens (chapter 3) and fuel poverty policy as a form of social policy (chapter 5), both of which, this thesis contends, necessitate the consideration of both the social and technical (agency and structural) aspects of fuel poverty in examining this social issue.

While fuel poverty is starting to be explored more regularly within a global context, there is a much richer fuel poverty literature and academic tradition within the United Kingdom, which has formed the basis of enquiry around the globe. The prevalence of studies in England can be attributed to the geographic roots of the term as previously alluded, as well as more specifically to the seminal work of Brenda Boardman. Boardman's thesis (Boardman 1988) and subsequent book (Boardman 1991) positioned her as an early pioneer in fuel poverty research and the pre-eminent scholar in the field.

As fuel poverty starts to grow in prominence in academic research, policy development, and practical relevance both within the UK and abroad, it is important to explore the development of the term itself and the evidence upon which the current understanding is based. Prior to the publication of the recent UK government commissioned enquiry in to fuel poverty (Hills 2012) our political understanding was solely based on a derivation of Boardman's definition formalised in her 1991 book. As Liddell, Morris, McKenzie and Rae note, "understanding more about the origins of this threshold yields a more critical understanding of why fuel poverty targets in England have not been reached, and enables a more informed approach to setting realistic targets for the future." (2012, p.27).

There is only a small body of literature which examines the historical development of the fuel poverty concept. The topic is considered in some detail by Boardman in her original book (Boardman 1991) and it's follow up text (Boardman 2010). There have also been two articles in a special edition of Energy Policy (Liddell et al. 2012; Moore 2012). This chapter seeks to succinctly examine the available evidence as to how the current understanding of fuel poverty has developed within an English context and highlight how this evidence should be considered when seeking to create and pursue suitable policy responses to the issue of fuel poverty.

2.2 A brief history of fuel poverty: 1848-1997

2.2.1 1848 – 1961: Early warnings and the roots of fuel poverty in England.

Whilst the challenge of maintaining an adequately heated home at a manageable outlay to the household is likely to have long been a matter of concern for households in England and further afield, the concept of fuel poverty and its formal definition is a post-industrial, 20th century invention. Although the phrase itself has only relatively recently been accepted as common parlance within the corridors of Whitehall and the British political establishment; the roots of the issue can be traced back as far as the population growth and migration of the industrial revolution and the associated public health policies, attitudes and beliefs of the time.

The first Public Health Act (A bill for promoting the public Health 1848), with respect to housing, did not focus on warmth, but instead emphasised the importance of sanitation. Subsequent legislation similarly focussed on sanitation as well as the provision of light, suitable ventilation and avoidance of damp (Boardman 1991). The early legislative emphasis in areas other than warmth and the substantial expansion in domestic building to meet the housing requirements of the new and expanding industrial towns following the industrial

revolution resulted in a large housing stock which failed to recognise the importance of thermal efficiency (Rudge 2012).

The thermal shortcomings of turn of the century homes were first documented by the German architect Muthesius in 1904. Translated into English in 1979 his book, The English House, attributed the challenge of maintaining a warm home to "the insubstantial structure of the English house, especially the meagre thickness of the walls, the absence of cellars, [and,] of double-glazed windows" (Muthesius 1979, p.67). His concerns were not reflected or officially recognised by the English political establishment, nor did they appear to be of concern to the populace more generally.

In 1946 the historical failings with respect to housing construction were formally recognised in a report by the government's Fuel and Power Advisory Committee, known as the Simon report (Ministry of Fuel and Power 1946). The report noted that "the principal faults of the past have been to neglect heat insulation in the construction of the house and to limit space heating to one or two rooms." (Ministry of Fuel and Power 1946, p.50). The report also noted that "in our inconsistent climate space heating is required at most times of the year" (ibid 1946, p.22) and emphasised the importance of minimising heat loss in the home such as through the installation of well-fitting windows and doors and lagging all pipework, echoing the sentiments of Muthesius' assessment of English homes over 40 years previously. The Simon report presented a thorough précis of the structural and thermal deficiencies of the English housing stock. It offered a number of recommendations most importantly building a case for the improvement of space and water heating provision within the home, moving consensus away from the importance of fresh flowing air as had previously been the case, instead emphasising the importance of warmth and insulation in the home.

15 years later, the Ministry of Housing and Local Government (MHLG) released a new report exploring the current and future state of housing in England (Ministry of Housing and Local Government 1961) known as the Parker Morris report. Despite the evidence presented in the previous Simon report, it is apparent from the Parker Morris report that the recommendations made in 1946 had not been enacted to an extent that had resulted in improving the levels of energy efficiency in the general housing stock (Boardman 1991). The Parker Morris report continued to emphasise the importance of space and heat and developed further upon the thermal standards recommended in the Simon report. The Parker Morris standards, although abolished by the Conservative government in 1980 by the Local Government, Planning and Land Act (1980; HC Hansard 1980), continued to be seen as a benchmark for housing design guidelines by housing associations (Boardman 1988) and were utilised as part of the UK Fuel Poverty strategy published in 2001 for defining under-occupancy of housing (DEFRA & DTI 2001).

2.2.2 1961 – 1997: From social recognition to political acceptance

The Parker Morris recommendations were largely accepted by government and the minimum recommendations for heating requirements (discussed later in this chapter) were made compulsory for local government. The requirements however, only came in to force in 1969, eight years after the publication of the original report, leaving a large number of homes to be constructed throughout the 1960's, still without any minimum thermal standards (Boardman 1991). Similarly, the standards only applied to social housing and housing built in new towns, minimising their effect on English housing more broadly.

The impact of low thermal quality housing would be felt across England in the 1970's. Since the compulsory introduction of the Parker Morris standards in 1969, fuel prices had been declining in real terms (Bradshaw and Harris 1983). The oil crisis of 1973 – 1974 saw

the cost of oil rise sharply, with major consequences for those who had already been struggling with the cost of energy (Campbell 1993). In 1978, only 3 million out of the 14 million homes in the UK with accessible lofts, had insulation that met the requirements of the 1974 building regulations (Osbaldeston 1984). As thermal standards had only recently become a requirement, it was predominantly only those households with disposable income that had received this intervention, focussing the burden of increasing energy prices on lower income households (Johnson and Rowland 1976).

The oil crisis of 1973 – 1974, combined with the decision to phase out state subsidy of the electricity and gas industries (Johnson and Rowland 1976) provided the necessary accelerants to highlight the social impacts of fuel expenditure, and propel fuel poverty out of the shadows, to stand as a distinct issue that needed attention and a solution (Bradshaw and Harris 1983). Recognition was however restricted to special interest and campaign groups who sought to make the issue a focus of government policy (Bradshaw and Harris 1983), whilst the UK government continued not to acknowledge the existence of fuel poverty. This was the *de facto* position of the political establishment over the ensuing years, punctuated with public dismissals of the existence of fuel poverty, including from the then future Prime Minister John Major (Boardman 1991). The Conservative party domination of UK politics from 1979 until 1997 maintained this position as well as introducing value added tax (VAT) on household energy to significant public criticism (Boardman 2010).

In 1979, Department of Health and Social Security economists, Isherwood and Hancock were amongst the first to identify the fuel poor (Osbaldeston 1984). Utilising data from the 1977 Family Expenditure Survey, they defined the "victims of fuel poverty" as "households with high fuel expenditure as those spending more than twice the median (i.e. 12%) on fuel, light and power" (Isherwood and Hancock (1979) *cited in* Osbaldeston, 1984, p. 368). In

1980, Richardson offered a situation specific definition of fuel poverty. "…the situation where following recent fuel price increases, people are unable to afford the fuel they need for heating, lighting and cooking" (Richardson (1980) cited in Osbaldeston 1984, p.368).

Little attention was paid to fuel poverty over the next decade (Liddell et al. 2012), as can be seen in Figure 2 which depicts the evolution of the fuel poverty concept from birth to political acceptance in 1997. Bradshaw and Hutton (1983) framed fuel poverty as a social problem, seeking to differentiate the issue from that of poverty more generally. Within the campaign literature a further basic definition, as the inability to afford adequate warmth in the home was created by the National Right to Fuel Campaign (Lewis 1982, p.1) and they also offered a more detailed definition in the same year

> *"the inability to afford adequate warmth at home. It arises when low income is combined with high heating costs. It is not the same as poverty itself. Some poor families who have cheap and efficient heating systems are not in fuel poverty. On the other hand, many families who have incomes above normal definitions of poverty cannot afford adequate warmth.*
>
> *Fuel poverty is a state of existence known to hundreds of thousands of UK citizens who have homes that are too cold for their health and comfort because their income is inadequate to purchase the fuel they need"*
>
> (Lewis (1982) cited in, Bradshaw and Harris 1983)

Whilst the oil crisis of 1973-74 brought the challenge of fuel poverty to the forefront within special interest groups, the refusal of government to accept its existence resulted in a disconnect between energy and social policy, despite the closely related nature of the issues at hand and the potential for complimentary solution for the benefit of both (Bradshaw and Hutton 1983). Although the issue of fuel poverty was not recognised by government, the Select Committee on Energy had by the early 1980s, started to explore the importance of energy conservation. The select committee on energy recommended "a publicly funded conservation programme for the poorest consumers" (HC 401-i 1982, p.xxix) and acknowledged that energy conservation had a disjointed presence across government

departments that lacked suitable resource, recommending a specifically funded division of government to work on energy conservation. However, within government energy conservation was seen as a means of guaranteeing energy supply (Osbaldeston 1984), and the findings of the select committee failed to recognise the potential social benefits to a notable degree, instead focussing on economic payback (Bradshaw and Hutton 1983).

Figure 2 Development of the fuel poverty concept 1973 – 1997

The formal quantification and definition of fuel poverty was driven forward by the work of Brenda Boardman. Building on the work of her doctoral thesis (Boardman 1988), Boardman's now seminal work (Boardman 1991), clarified and confirmed the first quantifiable definition of fuel poverty. In it Boardman states that fuel poverty should be defined as:

> *"...the inability to afford adequate warmth because of the inefficiency of the home"*
> (Boardman 1991, p.221)

This definition moved forward the previously widely accepted "negative definition of fuel poverty" (Boardman 1991, p.200) which did not include any reference to the inefficiency of the home. In proposing this definition, Boardman made an important distinction between the definition of fuel poverty and that of general poverty, and in doing so sought to respond to the repeated assertions of government ministers who argued that fuel poverty did not exist; as demonstrated by John Major in this statement to parliament:

> *"I must take issue with the hon. Member for Ceredigion and Pembroke, North about the term "fuel poverty". It is a phrase which is often used these days, and upon examination it is a rather curious concept…We do not hear a great deal about clothes poverty, or food poverty, but fuel poverty appears in a rather curious fashion to have developed a life of its own. (…)*
>
> *(…)but it is often misleading to talk about fuel poverty as if it were some special breed of poverty that necessarily requires different measures from those that are generally used to support the less well-off"*
>
> (HC Hansard 1985, col.135)

Returning to Boardman's definition, she sought to define what was meant by the term 'affordability'. One of the important considerations in this definition was the reference to affording warmth rather than affording fuel. The decision to focus on warmth recognised that simply affording fuel would not necessarily lift a household from fuel poverty and steered the debate from a solely income support solution. Boardman emphasised that warmth requires interventions to ensure the energy efficiency of both the house itself and the heating system it employs. In making this distinction, Boardman demonstrated that it is possible that those who are fuel poor may not also be considered economically poor.

Defining affordable warmth was a challenge that had received little attention (Boardman 1991). Whilst the definition of fuel poverty moved the debate away from the ability to afford fuel to the ability to afford warmth, the need to provide a practical measure of fuel poverty necessitated a return to the ability to afford the necessary expenditure on fuel that delivered the required warmth.

Boardman's research found that

> *"…the poor spend twice as much [on fuel], as a proportion of income, as the rest of the population"*
>
> (Boardman 1991, p.201)

She concluded that the only way to reduce the poor's expenditure on fuel below their current mean expenditure of 10% of income would be to double their income, which would mean a costly support programme. Through consideration of two alternative proposed measures of affordable warmth for low income households Boardman identified the normal average expenditure on fuel at 6% of income. This study also found that if additional money was not available to a low income household, the minimum standard of heating would not be realisable when spending only 10% of income. For this reason, affordable warmth was set at 10% of total household income. Interestingly this figure was similar, though slightly lower than that identified by government economists Isherwood and Hancock, who had identified in 1979 the mean expenditure on fuel was 6% of income, and defined affordability at 12% (Osbaldeston 1984).

As well as defining what was meant by affordability, a definition of 'adequate warmth' was also necessary. Boardman's work considered multiple studies in an area that was receiving wide spread attention and finally proposed that the kitchen and bathroom should be kept at 21°C for 13 hours a day for the first occupant with a further room added for each subsequent occupant when present. At night the recommendations were more complicated suggesting 16°C for bedrooms and 14°C for all other rooms. This suggested regime would achieve a mean indoor temperature of 18°C. Boardman's suggestions showed some similarities to those of the World Health Organisation (WHO) (World Health Organisation 1987) although it should be noted that the night time temperatures are lower than those recommended by WHO.

Whilst the work of Boardman is now widely cited and accepted by academics and practitioners, the Conservative party led governments of the early nineties continued to deny the existence of this separate form of poverty. Official reports circumvented this position by instead referring to affordable warmth, a phrase first used in government documents in the English House Condition Survey (EHCS) of 1991 (Boardman 2010).

2.3 1997 – 2014: From political recognition to government redefinition

With the ascension to government of the Labour party in 1997, fuel poverty was finally adopted in government terminology (Owen 2010) and was officially recognised as a problem by the administration (Boardman 2010). Whilst government policy was to tackle fuel poverty, it was a private members bill, brought by the Conservative MP David Amess, the Warm Homes and Energy Conservation Act (2000), that brought legislative requirements to ensure that fuel poverty was ended 'as far as is reasonably practicable' by 2016 (Boardman 2010). In November 2000 the Warm Homes and Energy Conservation Act became law, requiring the Secretary of state for England and the National Assembly of Wales "to publish and implement a strategy for reducing fuel poverty; to require the setting of targets for the implementation of that strategy; and for connected purposes" (Warm Homes and Energy Conservation Act 2000, p.1). The publication of the UK Fuel Poverty Strategy in November 2001 (DEFRA & DTI 2001) allowed the UK government to meet this requirement and for the first time fuel poverty was recognised in legislation and government strategy (Fahmy et al. 2011).

Over the remaining years of the Labour government, significant sums were invested in tackling fuel poverty through central government funding, local government funding and supplier obligations. Between 2000 and 2009 Boardman (2010) calculated that almost £5 billion was spent on energy-efficiency capital programmes associated with fuel poverty

reduction. These policies are discussed in more detail later in this chapter. Despite significant investment in fuel poverty reduction, there was an overall increase in the number of households in fuel poverty in this period, from 1.7 million in 2001, to 3.5 million by 2010 (DECC 2012a).

In 2010 the Conservative party formed a new coalition government with the Liberal Democrat party at a time of significant financial austerity in England. By October 2010 the coalition announced a wide ranging spending review to consider the expenditure of every area of government. Within this the review, it was announced that

> *"The Government therefore intends to initiate an independent review of the fuel poverty target and definition before the end of the year."*
>
> (HM Treasury 2010, p.62)

On 14th March 2011 the government announced the appointment of Professor John Hills to lead the independent review (DECC 2011a). The terms of reference for the review were to consider fuel poverty from its basic principles, identify whether fuel poverty is a distinct problem from general poverty, how it should be measured if it is a distinct problem, whether the current approach is appropriate and what the implications for policy in tackling this problem would be (Hills 2011).

The review immediately called for evidence from any interested parties which received in excess of 60 responses from energy companies, regulators, campaign groups, local councils, National Health Service (NHS) Trusts and academics (Hills 2011). The evidence was considered and incorporated into an interim report in October 2011 (Hills 2011) which asked for feedback on specific questions to feed in to the final report. The final report was published on 15th March 2012 (Hills Fuel Poverty Review 2012). An examination of the review and its findings is provided later in the chapter. With such broad terms of reference the report analysed many areas of evidence, and marked the next major step in the evolving

definition of fuel poverty in England. Professor Hills and his team recommended that households should now be considered fuel poor if:

> *"They have required fuel costs that are above the median level; and*
>
> *Were they to spend that amount they would be left with a residual income below the official poverty line"*
>
> (Hills 2012, p.175)

In suggesting this definition, Hills sought to retarget the definition towards the general definition of fuel poverty provided in the WHECA (2000), focussing on those with low income and high energy costs, a feature that was not reflected in the UK fuel poverty strategy definition adopted in 2001. Following further public consultation on the final report by Professor Hills, the coalition government published Fuel Poverty: A Framework for Future Action (DECC 2013), a document that sought to bridge the gap between the Hills review and the new fuel poverty strategy that the government intended to create. The document set out the governments provisional plans for a new fuel poverty strategy and provided a new definition of fuel poverty reflecting the findings of the Hills review:

> *"This new indicator (which is depicted in Figure 1) finds a household to be fuel poor if:*
>
> - *Their income is below the poverty line (taking into account energy costs); and*
> - *Their energy costs are higher than is typical for their household type."*
>
> (DECC 2013, p.11)

Shortly after the framework for future action was published, the Energy Act (2013) was ratified in to law. National Energy Action, the leading fuel poverty charity in England had lobbied for changes to the Energy Act which would guarantee a fuel poverty strategy beyond the 15 year commitment required in the WHECA (2000). The Energy Act (2013) provided for amendments to the WHECA, requiring the creation of a new fuel poverty strategy and fuel poverty target. In response to these requirements, the government published "Cutting the cost of keeping warm- a consultation to prepare for a new fuel poverty strategy for England"

in July 2014 (HM Government 2014). This public consultation provided the government's platform for engaging with stakeholders to develop and deliver the new fuel poverty strategy for England, building upon the interim Framework for Future Action. The Energy Act (2013), set the legislative framework for a new approach to tackling fuel poverty, which was subsequently outlined in The Fuel Poverty (England) Regulations (2014). A new objective was set so that "as many as is reasonably practicable of the homes in which such persons live have a minimum energy efficiency rating of Band C as determined by the Fuel Poverty Energy Efficiency Rating Methodology (dated 17th July 2014)" (The Fuel Poverty (England) Regulations 2014, sec.2(2))

Emerging in the mid 1970's, it took over 20 years for fuel poverty to be acceptable parlance within the UK government and almost 30 years for legislative action to be enacted for its eradication. Whilst the term found prominence amongst campaign groups in the 1970's, and increasing academic support through this period to the modern day, Boardman rightly points out that "[f]uel poverty was the new name for an old problem" (Boardman 1991, p.25). As demonstrated in Figure 3, there has been significant development in the fuel poverty concept since the turn of the century, with increased attention over the past 4 years. As interest in the topic increases, so too has the evidence base to support our understanding of the importance of fuel poverty as a social policy issue. This section has sought to explore how we have arrived at the current level of political interest in the concept of fuel poverty. We now turn our attention to considering why fuel poverty is so prevalent in England today.

Figure 3 The development of the fuel poverty concept since 1997

2.4 Drivers of fuel poverty

Although governmental recognition *and* legislative requirement for effective eradication of fuel poverty is only fourteen years old, there is significant evidence to suggest that many of the root causes of fuel poverty are found much further back in Britain's heritage than even the work of campaign groups in the mid nineteen seventies.

Rudge (2012) builds upon the work of Boardman (1991), identifying four drivers of fuel poverty that are peculiar to Britain, the mild climate, the domestic building heritage, the

nation's historical preference for open fires and fresh air, and evolving thermal expectations amongst the British public.

2.4.1 Britain's mild climate

Britain's climate is considered to be generally mild (Rudge 1996) although the effects of the Gulf Stream and Atlantic winds contribute to significant variability between the regions (Rudge 2012). This regional variability can be demonstrated through consideration of heating degree days across the country. Heating degree days are calculated as the extent to which the external temperature falls below a base level (Rudge 2012), which is usually 15.5°C in Britain on the basis that incidental gains in the house are around 2.8°C giving an internal temperature of 18.3°C (Boardman 1991). This can result in an average of 2623 degree-days in the south-west of England compared with 3900 degree-days in north-east Scotland when 18°C is taken as the base level (Rudge 2012). Orton (1988) defines a cold climate as one with more than 3000 degree-days per year demonstrating significant regional variation in the British climate, although the majority of the UK would be considered mild as opposed to cold. As can be seen in Figure 4 below, there was a broad north-south divide in heating degree days between 1971 and 2000.

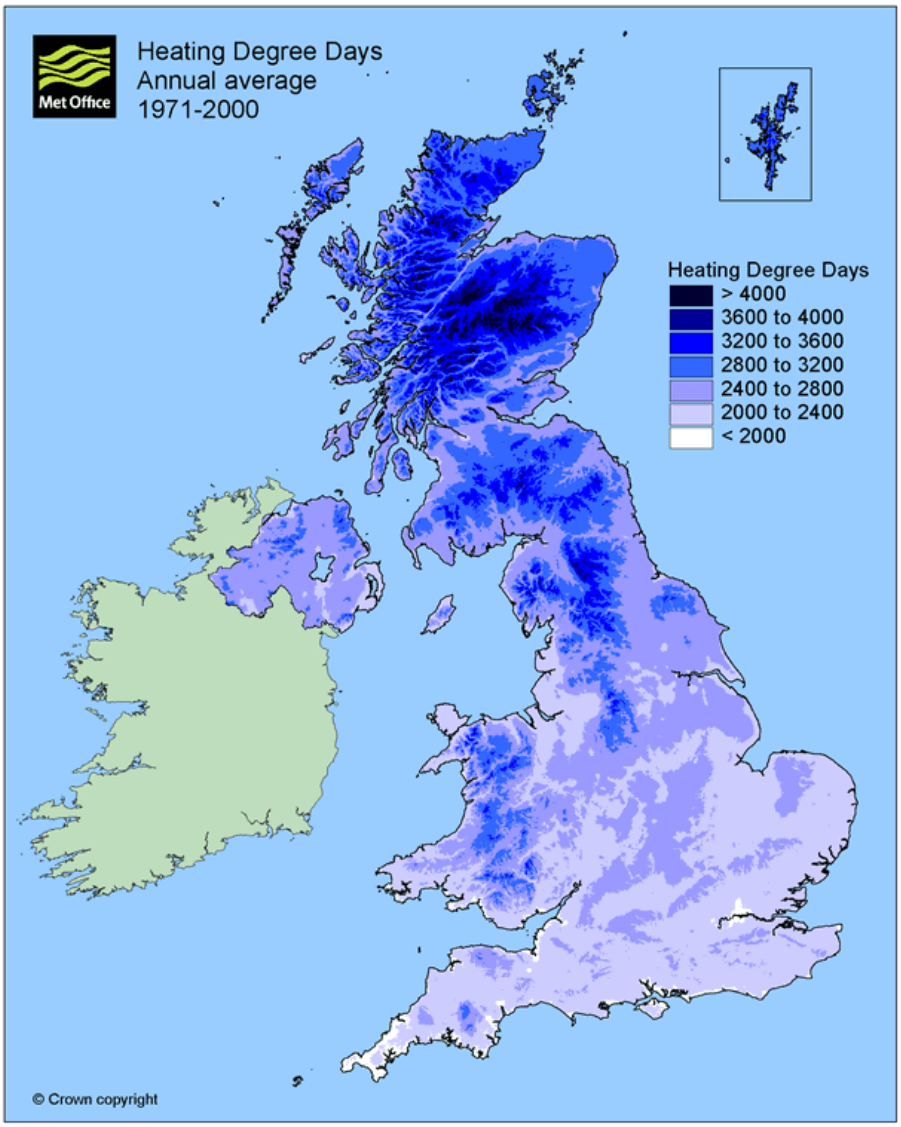


Figure 4 Heating Degree Days (below 15.5°C) in Great Britain Annual Average 1971 – 2000 (Met Office, 2010)

The relatively mild climate and low seasonal variation in temperature, in contrast with mainland Europe has been cited as a traditionally strong driver for the slow development of energy efficiency regulations in the UK (Rudge 2012) which were seen as unnecessary until recently. Yet the UK has a relatively long heating season, commonly regarded as running from October till April (Hulme et al. 2013). When this is considered in parallel with the other drivers of fuel poverty identified by Rudge (2012) it seems surprising that the UK has taken

so long to introduce stringent building legislation to reduce heat loss through inefficient building fabric.

2.4.2 Domestic building heritage

As highlighted in section 2.2.1, there were many issues with the design of British homes, particularly following the rapid expansion in construction following the industrial revolution. These shortcomings were recognised by Muthesius (1979) but not the political establishment who continued to focus on provision of sanitation and lighting, avoidance of damp and ensuring suitable ventilation with regards to homes (Boardman 1991). These priorities remained the focus of subsequent housing legislation, particular that with regards social housing (Boardman 1991). The 1948 report 'Domestic Fuel Policy' (Ministry of Fuel and Power 1946) substantiates this finding, noting that

> *"In this country the principal faults of the past have been to neglect heat insulation in the construction of the house and to limit space heating to one or two rooms…In cold weather the British home is the smallest in the civilised world."*
>
> (Ministry of Fuel and Power 1946, p.50)

Despite these warnings and those in the subsequent "Homes for today and tomorrow report" (Ministry of Housing and Local Government 1961) chaired by Sir Parker Morris, there were no national building regulations prior to 1965 and insulation was only required within the building fabric from 1974 (Boardman 1991). The focus on damp reduction, space and air movement up until 1974, rather than warmth has had a significant impact upon the current British housing stock, with much of the population living in potentially thermally inefficient houses.

According to the English Housing Survey headline report 2013 – 2014 (DCLG 2015b) 56.3% of English homes were built prior to the introduction of the first building regulations in 1965, with a fifth of the total English housing stock having been built prior to 1919 (see

Table 1). Unless significant renovation and improvement has been undertaken on these properties, there is no requirement for these homes (in the private sector) to have been brought in line with any subsequent thermal or building regulations, indicating that the English housing stock is, as suggested by the Environmental Change Institute, "one of the oldest and least efficient housing stocks in Europe" (Boardman et al. 2005, p.38)

Dwelling age	Owner Occupied	Private Rented	Local Authority	Housing Association	All dwellings
pre 1919	19.8	32.3	4.2	9.5	**20.0**
1919-44	18.8	15.5	15.6	8.8	**16.9**
1945-64	18.4	11.3	40.9	25.5	**19.4**
1965-80	20.6	16.0	30.0	21.2	**20.5**
1981-90	8.3	7.1	7.2	12.5	**8.4**
post 1990	14.2	17.8	2.1	22.5	**14.9**
All ages	**100**	**100**	**100**	**100**	**100**

Table 1 Percentage of domestic housing in England built in different age periods, 2013 (DCLG 2015a)

Blame cannot be solely aimed at the inadequacies of legislation. The industrial revolution brought mass population movement towards the new industrial centres, necessitating a move away from traditionally well built houses, to economically driven construction. This resulted in reduced building standards, thinner walls compared with pre-industrial building techniques, poorer quality components and ill-fitting windows and doors which led to potential for draughts and lack of air-tightness (Rudge 2012). As previously noted, the movement of air around the house and the presence of fresh air in the house was considered important for public health reasons (Boardman 1991), suggesting that lack of air-tightness and ill-fitting components were unlikely to be of major concern to the government.

2.4.3 Historical preferences for open fires and fresh air

Muthesius (1979) hypothesised that fireplaces were used in British homes more as a means of ventilation then a form of heating, noting that although almost all rooms in the

houses of that period had a fireplace, the fires were rarely lit. The government advised that flues were useful as a source of ventilation as late as 1927 and rooms that did not have a means of permanent ventilation often suffered from damp and condensation (Rudge 2012).

It has not been established why largely unused fireplaces were installed, but prior to the introduction of off-peak electricity tariffs in 1950 (Boardman 1991), houses were primarily heated by solid fuels (Rudge 2012). Solid fuels require significant ventilation provision, which was commonly provided, though not through deliberate design, as a feature of the sub-standard construction of industrial revolution housing, though as noted by Wright (1964) this meant that the efficient stoves that were common for home heating in Europe, would not provide suitable heating in Britain.

Despite significant attention being paid by the sciences to improve the thermal efficiencies of open fires and the stove from the eighteenth century onwards (Shove 2003), Britain tended to resist their adoption (Rudge 2012). There were concerns that bringing pre-heated air into rooms was harmful (Wright 1964) and the affordability of cheap servants who could maintain a fire throughout the night prevented the need for British homes to adopt a change of heat provision (Rudge 2012).

Following the Clean Air Act 1956, the conversion to less polluting fuels, combined with the introduction of off-peak energy tariffs and subsequent development of domestic gas provision saw a move towards central heating in the home, particular in non-traditional local authority homes built to accommodate the increasing numbers of households (Boardman 1991). In 1964, central heating only existed in 13% of UK homes, though by 1996 it had spread to 88% of homes (Rudge 2012). Whilst central heating grew in popularity, thermal insulation standards developed slowly (Boardman 1991), which has today resulted in a large

proportion of UK homes that have the means to heat their rooms, but often at significant cost with historically energy inefficient homes.

2.4.4 Evolving thermal expectations

Thermal conditions inside the home have changed significantly over the past 100 years (Shove 2003). In 1880, temperatures of between12°C and 20°C were recommended in living rooms and a minimum of 4°C was considered acceptable in the bedroom (Cowan 1978) . Internal temperatures have gradually increased since this time as can be seen in Figure 5 , with a corresponding decrease in amount of clothing worn by householders, demonstrating that whilst British people do value warmth, and whilst technology has made it cheaper to heat homes (Rudge 2012) benefits are not always taken in reduction of energy expenditure. Instead, rebound effects often deliver increased internal temperatures at the expense of Green House Gas (GHG) and energy consumption reduction (Druckman et al. 2011; Hong et al. 2009).

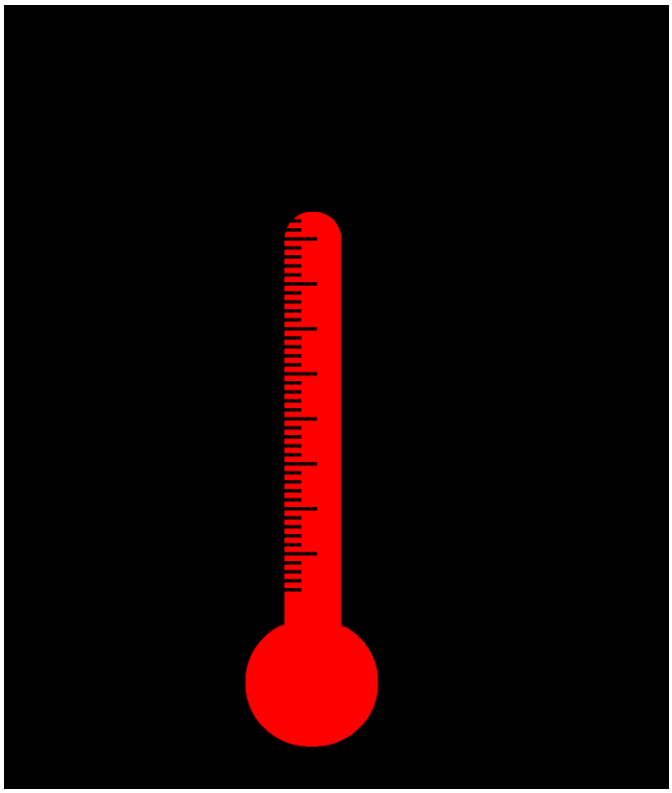


Figure 5 Changing thermal expectations 1880 - 1987

The current guidelines offered by the World Health Organisation (WHO) suggest a temperature of 21°C in living areas and 18°C in bedrooms (World Health Organisation 1987), which is very similar to those proposed by Boardman (1991). Notably, although the living space temperature suggested is similar to that suggested in 1880 (Cowan 1978), the bedroom temperature is 14°C greater under the WHO guidelines.

Thermal comfort is a component of a number of factors, both physical and psychological (Ormandy and Ezratty 2012), thus it is not surprising that internal temperatures have increased in both centrally heated and non-centrally heated homes (Rudge 2012), with possible social effects and expectations driven through experiences in workplaces and other homes. The WHO temperature guidelines have however received criticism for their lack of transparency as to their provenance (Ormandy and Ezratty 2012).

Despite these criticism, the temperature ranges suggested are similar to the widely cited work of Collins (1986) who suggested that an indoor temperature range between 18°C and 24°C was comfortable and would provide no risk to health. His work also noted that temperatures below 18°C increased the risk of respiratory illness, below 12°C could result in temporary blood pressure increases and below 9°C could increase risk of hypothermia after two hours. These findings have been widely corroborated in other research (Clinch and Healy 2003) and also provide some justification for the increased thermal expectations of the British public, demonstrating the association of low indoor temperature with potential health risks.

The evolution of building regulations and improvements in thermal technologies such as central heating and insulation has not run in tandem with the evolution of the British home. An outdated housing stock, characterised by a lack of air-tightness fails to enable modern technologies to operate at their most efficient. When combined with the British climate which necessitates a long heating season, though fails to experience the extremes that occur

elsewhere in Europe, it is apparent that our failure to instigate thermal legislation as early as was the case in Scandinavia (Rudge 2012), to re-develop our housing stock, and the increased evidence of the benefit of warm homes, have combined to provide Britain with a legacy of thermally inefficient homes - and thermal expectations - that only serve to exacerbate the current problem of fuel poverty.

2.5 The impacts and effects of Fuel Poverty

There is a strong link between indoor household temperature and health. The inability to maintain the home at an acceptable temperature as a result of fuel poverty is therefore a significant cost to both the individual and also the wider society with extra pressure placed upon local authorities, social services and the NHS in particular.

This section will explore in more detail the impacts not only upon the physical health of the individual, but also the psychological, social and environmental implications associated with fuel poverty. In doing so, demonstrating the significant financial and social burden that fuel poverty places upon British society, and justifying the need for accurate measurement of fuel poverty and targeting of policy interventions.

2.5.1 Health effects

> *"Energy is a critical, yet hugely neglected, determinant of human health…Energy is as important as any vaccine or medicine."*
>
> (Horton 2007, p.921)

The UK has one of the highest excess winter mortality rates in Europe (Bone et al. 2010). Excess Winter Deaths (EWDs) are higher in the UK than in countries with significantly colder winters, such as Finland which can drop as low as -20°C in winter (Howieson and Hogan 2005). It has been shown that for every degree drop in temperature in the winter

months there is a corresponding increase of 3500 Excess Winter Deaths (EWD's) (Laake and Sverre 1996) with an increase in excess deaths of 19% each winter in England.

Whilst not all EWD's can be directly attributed to fuel poverty, it is generally accepted that the large majority of these deaths can be prevented if the elderly can be kept warm in their homes over the winter (Howieson and Hogan 2005). As noted previously, Collins (1986) has shown that low indoor temperatures increase the risk of illness. The young and the elderly both suffer from a reduced ability to regulate their body temperature, which means particular care must be given in protecting these groups from external temperature fluctuation through suitable building and heating system design and construction (Rudge 1996). It is important to note that cold homes do not simply increase risk of mortality, but there is also an increase in morbidity.

The widely cited Health impacts of Cold Homes and Fuel Poverty report (Marmot Review Team 2011) summarises the major literature in this area. As well as further emphasising the link with EWD's, Marmot also notes that the cold is associated with increased circulatory diseases such as heart attacks, and respiratory problems particularly amongst children. Further health issues associated with the cold include heightened risk of complications with diabetes, duodenal ulcers, osteoarthritis knee pain and increased hip fracture occurrence (El Ansari and El-Silimy 2008).

As well as physical health issues, there is a strong association with mental health problems, particularly amongst the adolescent population (Marmot Review Team 2011). In adults, the likelihood of suffering from anxiety or depression was 50% lower for those with bedroom temperatures at the recommended 21°C compared to those below 15°C. The result is even more marked for those suffering from self-reported fuel poverty. Householders that expressed great difficulty in paying their fuel bills were over four times more likely to suffer

from anxiety or depression as measured on the EQ5D health survey (Gilbertson and Green 2008), Within the adolescent population, 28% of those who had lived in fuel poor homes for a prolonged period suffered mental health problems and 10% felt unhappy in their family (Liddell and Morris 2010).

2.5.2 Associated social impacts

Whilst significant attention has been paid towards the health impacts associated with fuel poverty, the literature on associated social impacts is less developed (Thomson et al. 2001). A number of studies have reflected the benefits to health of the individual and the household following fuel poverty intervention schemes (cf. Gilbertson et al. 2006; Shortt and Rugkåsa 2007; Heyman et al. 2011) but social benefits have been predominantly anecdotal and unverified and require further investigation (Thomson et al. 2001).

Limited studies have noted relationships between neighbourhood and health. They note that poorer neighbourhoods tend to experience higher crime levels, increased social disorder, reduced access to amenities and employment, and that these neighbourhoods may be viewed negatively by residents and non-residents alike. These factors have been shown to contribute to lower levels of health (Gibson et al. 2011). Scott et al. (2014) found that where a whole community approach to energy efficient retrofit of housing is adopted, not only is the energy efficiency of the housing improved, but also the levels of pride in the local community expressed by residents. Liddell and Morris (2010) report that adolescents living in hard to heat homes were significantly more likely to truant, be expelled or excluded from school or be in trouble with police when compared with adolescents in homes with affordable warmth. Similarly, Cornwall Council, in their submission of evidence to the interim report of the Hills Review (Hills 2011) stated that following energy efficiency retrofit in one of their most

deprived communities, there were notable reductions in anti-social behaviour, dysfunctional families and teenage pregnancy (Cornwall Council 2011).

Reviewing the extant literature has thus far uncovered little peer-reviewed evidence of the wider societal impacts of fuel poverty (Thomson et al. 2001). Anecdotal evidence such as that reported by Cornwall Council and academic literature, often primarily focussing on health implications have demonstrated the potential for significant fuel poverty effects beyond the realm of the individual. Drawing parallels with Shove's assertion that current approaches to climate change policy are based upon 'a characteristically thin account of the social world' (Shove 2010b, p.277) it seems likely that this lack of evidence has been influenced by current approaches to policy development. In order to fully understand the impact of fuel poverty, an understanding of both the personal and social impacts of fuel poverty is required and this signifies a notable gap in the current literature.

Research Gap 1: What are the broader societal and social effects of fuel poverty? How are these characterised and expressed by those affected by fuel poverty?

Whilst there has been little research that considers the impact of energy efficiency interventions in terms of health, societal and economic benefits, there are a number of benefits that have been evidenced including greater use of available space and better household relationships (Heyman et al. 2011). Yet even this focus only on the individual household and does not consider the wider community. There is an urgent need to understand the potential benefits of energy efficiency intervention and fuel poverty reduction, as the financial cost to society is significant. It has been estimated that for every 1°C drop in temperature *below the average winter temperature* there are 8000 EWD's in the United Kingdom (National Heart Forum et al. 2003). Whilst many of these are an avoidable social tragedy, the cost to society associated with these deaths is both emotionally and financially significant. It is estimated that for each extra winter death there are also around eight extra

hospital admissions, thirty two outpatient visits and thirty social service calls (Age UK 2012) which amounts to a significant financial cost to the tax payer.

With notable social impacts associated with fuel poverty and poorer neighbourhoods more generally (Kling et al. 2007) it is vital that credence is given to Heyman et al's (2011) call for increased investigation of the social costs of fuel poverty. The financial impact of reduced educational attainment, increased crime and anti-social behaviour and reduced civic pride is significant, and this cost is compounded by the costs associated with EWD's. The need to understand and tackle both individual *and* social effects of fuel poverty is evident if the aims of removing fuel poverty by 2016 (DEFRA & DTI 2001) are to be realised.

2.5.3 Housing development implications

The thermally inefficient and outdated British housing stock has had a significant impact upon the existence of fuel poverty within the UK (Boardman 1991). The most notable effects of fuel poverty have been documented within the health literature with an increasing recognition, in line with the social practice approach undertaken in this work, of the wider effects upon society. The prevalence of fuel poverty in the UK also impacts upon policy considerations and legislation in other areas, particularly in considerations of housing and development.

Britain has a very low rate of demolition, with new builds adding only 1% to the housing stock each year (Hamza and Gilroy 2011). In fact, it is estimated that at the current rate of demolition it will take nearly 1,300 years for a complete turnover of the UK housing stock (Boardman et al. 2005) indicating that if Britain is to tackle fuel poverty it will need to either substantially increase its demolition and building rate or instead focus on approaches to retrofitting the current stock. Power (2008) suggests that the British public find retaining the

current housing stock to be more socially acceptable than demolition and that it is possible to achieve high energy efficiency standards through renovation.

Legislation has been put in place through the Energy Act (2011) to make it a requirement for all rental homes to meet a minimum energy efficiency rating, and with the introduction of new government schemes such as the Green Deal and the Energy Company Obligation (ECO), also brought in with the Energy Act (2011), the focus on retrofit in the UK is likely to increase.

Retrofitting has received significant attention within the academic literature, with studies from a broad range of countries including those traditionally associated with fuel poverty research such as the UK (Hong et al. 2006; Scott et al. 2014; Marchand et al. 2015) Ireland (Clinch and Healy 2003) and New Zealand (Howden-Chapman et al. 2005), but also countries such as Canada (Guler et al. 2001) and China (Yan et al. 2011). Work to date has considered the health benefits of retrofit (Preval et al. 2010), occupant-behaviour effects (Pilkington et al. 2011), the benefits to fuel poor social housing (Jenkins 2010), challenges for architects (Davies and Osmani 2011) and consideration of specific retrofit interventions such as lighting (Mahlia et al. 2005) and insulation (Howden-Chapman et al. 2005).

In order to reduce the incidence of fuel poverty, significant legislative and practical efforts must be directed towards the thermal efficiency of the housing stock, and it seems likely that this must be predominantly focussed upon retrofit of the existing housing stock (Marchand et al. 2015). Although the government initially moved to increase required standards for new homes including that by 2016 all new build homes must be rated as zero-carbon (Catto 2008) and has introduced legislation for the private rental sector as discussed above, given current demolition rates, the low proposed efficiency requirements for the rental sector and the cessation of the zero-carbon requirement for new build homes in July 2015

(HM Treasury 2015), it seems unlikely that current proposals will go far enough to help meet fuel poverty reduction requirements.

2.6 Measuring Fuel Poverty

The measurement of fuel poverty plays a vital role in meeting the requirements of the WHECA to eradicate fuel poverty by 2016. How fuel poverty is measured makes a significant impact upon its depth and how it is distributed both socially and spatially across the UK (Fahmy et al. 2011). The use of indicators and particularly Composite Indicators (CI's) has increasingly been recognised as a useful policy making tool (Cherchye et al. 2007), particularly given the opportunity they afford the policy maker to compare the performance of one country with another (Saisana et al. 2005). The use of composite measures enables consideration of the multiple social, individual and technical dimensions that influence the existence of a particular phenomenon in a given area (Richardson et al. 2010).

Through adopting a composite indicator approach to measuring it is possible to more accurately capture the extent of a social problem than if a unidimensional measure is adopted (Richardson et al. 2010), though the use of CI's is not without challenges. Accurate construction of a CI is essential to avoid delivering inaccurate policy messages and prevent misuse of the measure (Nardo et al. 2008). Further challenges are summarised in Saisana et al. (2005), an area of particular concern lies in the potential for significant influence on the resulting measure as a result of the subjective judgments made in the design of the indicator, particularly weightings applied to the different components of the composite indicator.

Whilst the current approach to measuring fuel poverty may not be described as a composite indicator, it shares many of the characteristics. As will be discussed it is built from a number of sub-indicators and suffers from accusations over the relative weighting of different components (such as how income is captured in the model). Whilst the academic

literature now suggests a number of approaches to reduce the influence of the composer upon the composite indicators design through techniques such as Data Envelopment Analysis, Robustness Analysis, Analytical Hierarchical Process (AHP) and others (cf. Cherchye et al. 2007; Nardo et al. 2008), this has as yet not been adopted in the current approach or in alternatives suggested in the extant literature, although Fahmy et al. (2011) emphasise the importance of understanding the relative weights of both a low income and a thermal inefficiency component of fuel poverty.

Gathering of official fuel poverty statistics is a relatively recent occurrence, with formal definition and measurement growing out of the English Housing Condition Survey 1996: Energy Report published in 2000 (Boardman 2010). This approach adopted Boardman's (1991) definition of fuel poverty but extended it to be based upon required energy expenditure rather than actual energy expenditure (Moore 2012).

Given the multiple causes of fuel poverty including low incomes, thermally inefficient houses, high fuel costs and inefficient space heating, combined with the challenge of measuring low indoor temperatures on a large scale, defining an appropriate measure of fuel poverty to find the fuel poor, rather than simply the poor is challenging (Dubois 2012).

The UK government's definition of fuel poverty, as discussed below, has led the academic literature to suggest three possible approaches to its measurement, namely, energy expenditure, household subjective measurement and expert objective measurement (Fahmy et al. 2011). The following section considers the current measure of fuel poverty as used by the UK government before comparing with some key alternative measures that have been suggested in the literature.

2.6.1 The "10%" definition of fuel poverty

Although interest in the measurement of fuel poverty is receiving increasing attention internationally, particularly within New Zealand (O'Sullivan et al. 2011) and Europe (Moore 2012), approaches to its measurement still focus predominantly on the current UK government measure as laid out in the UK Fuel Poverty Strategy, which defined a fuel poor household as

> *"…one which needs to spend more than 10% of its income on all fuel use and to heat its home to an adequate standard of warmth".*
>
> (DEFRA & DTI 2001, p.6)

This definition was the official UK definition since its inception and formed the basis of the fuel poverty strategy eradication targets set out in the Fuel Poverty strategy (Liddell et al. 2012) until 2014. In order for adequate measurement to be achieved significant extra detail to the above definition must be added. Boardman (2010) summarises the specific components of this fuel poverty definition, providing reference to their sources within policy, Table 2.

Fuel poverty statistics are captured from a number of sources, with the bulk of information collected in the English Housing Survey (EHS), though fuel price information is collected from the DECC quarterly energy tariff census, Office of National Statistics monthly coal, oil and smokeless fuel price data and all other fuels from the Sutherland tables (DECC 2010). Modelling for fuel prices is achieved through the Building Research Establishment Domestic Energy Model (BREDEM-12), although despite continued methodological improvements, this method is thought to lack empirical robustness with a particular lack of direct measurement of dwelling temperatures and energy tariff data; the likely result of which is a significant underestimation of fuel poverty levels (Fahmy et al. 2011).

Fuel poverty statistics are reported annually and are recognised as official national statistics (Hills 2012). Whilst the reported statistics provide figures for the UK as a whole,

due to methodological differences in data capture or definition, such as those highlighted in Table 2 and discussed in the Fuel Poverty Methodology Handbook (DECC 2010), it is difficult to draw comparisons between English figures and those from other member nations of the UK. There is significant variation in fuel poverty figures between the constituent nations of the UK, with rates roughly double that of England for both Northern Ireland and Scotland (Liddell et al. 2012). For this reason, this study will focus on fuel poverty as measured and reported in England.

Component	Description	Source
Temperature	21°C in the living room* 18°C elsewhere	England: DOE (1996, pp.129, 83) UK: DEFRA & DTI (2001, p.6)
Hours of Heating	9 hours a day for those at work or in full-time education; 16 hours for those likely to be at home all day	England: DOE (1996, pp.129, 83)
Proportion of house	All rooms unless under-occupied (i.e. more space and bedrooms than the Parker Morris standard), in which case only half the space is heated*	DEFRA & DTI (2001, p.144) England: (2010, p.30)
Energy for all energy services	Based on Building Research Establishment Domestic Energy Model (BREDEM), related to number of people and/or size of dwelling	England: DOE (1996, pp.379–380) DEFRA & DTI (2001, p.30)
Need to spend	Calculated in the fuel poverty model	UK: DEFRA & DTI (2001, p.6)
Proportion of income	10% of income (however income is defined)	Boardman (1991, p.227) UK: DEFRA & DTI (2001, p.6) England: DEFRA & DTI (2001, p.30)
Definition of income	Full income, including housing benefit and Income Support for Mortgage Interest (ISMI). Scotland only includes up to two household members.	England: DEFRA & DTI (2001, pp.30, 108) Scotland: DEFRA & DTI (2001, p.50)
Vulnerable	Householders aged 60+, families with children, disabled or with long term illness	UK: DEFRA & DTI (2001, pp.8–9)

*Note: * Scotland uses a higher temperature of 23°C for the elderly and infirm and does not adjust for under occupancy*

Table 2 Constituent parts of the definition of fuel poverty, adapted from (Boardman 2010, p.23)

The greatest strength of this measure was is its use of modelled energy needs, rather than actual energy expenditure, meaning that households that choose to under heat their homes were not wrongly captured as not being in fuel poverty and vice versa (Hills 2012). A further

strength was its basis upon a combination of household income, energy requirements and costs, thus it was sensitive, to some extent, to all three of these factors (Hills 2012).

Despite its strengths, this measure suffered from a number of limitations and weaknesses. The primary criticism concerns the measures' sensitivity to price fluctuation in the energy market (Hills 2012). At the point of the measures inception, energy prices had been showing a downward trend, however since 2003 there has been a significant increase in fuel prices, with an effective real increase in fuel prices between 2000 and 2009 of 84% for the average household (Boardman 2010).

As can be seen in Figure 6 there is a strong correlation between fuel price and the level of fuel poverty under the current definition. Fuel Poverty rose from 5.9% of households in 2003 to 18.4% of households in 2009, more than tripling the number of households in fuel poverty(DECC 2011c). Over the same period domestic gas prices rose 105% and domestic electricity prices rose 60% (DECC 2012d). Responsiveness to fuel prices fluctuations unduly dominated the 10% measure of fuel poverty (Hills 2012) when compared to changes in household income and energy efficiency levels, the two other main drivers of fuel poverty (DECC 2012a) with fuel price rises accounting for a large proportion of the increases in fuel poverty figures (Fahmy et al. 2011).

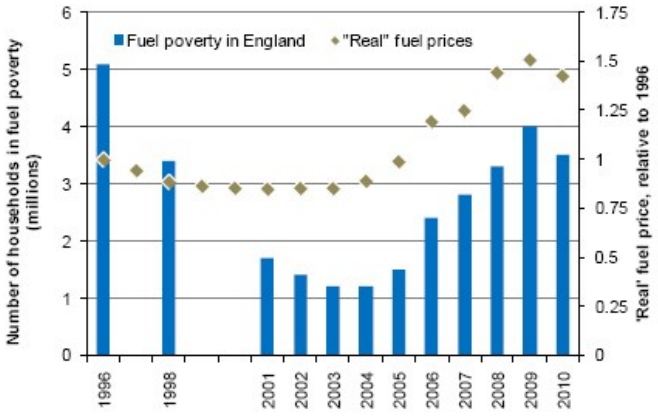


Figure 6 The relationship between fuel poverty and real fuel prices (DECC 2012a)

Another significant criticism is the decision to use the 10% cut off for defining a fuel poor household. Justification was provided within the UK Fuel Poverty strategy, though this is somewhat vague stating that,

> *"It was assumed by researchers in the fuel poverty field that this could be taken as representing the amount that low-income households could reasonably be expected to spend on fuel"*
>
> (DEFRA & DTI 2001, p.108)

The decision to base this cut off on the work of Boardman (1991), thereby utilising 1988 household expenditure data, when more recent data was available at the time of developing the strategy is unclear, but has significant knock-on effects for current fuel poverty estimates (Liddell et al. 2012).

Liddell et al. (2012) demonstrated that although a 10% threshold was used in the UK fuel poverty strategy, actual double median expenditure on energy up until 2006 would have been around 7%, This has a twofold effect, firstly the official definition vastly underreported the extent of fuel poverty, only capturing those in severe fuel poverty, and secondly meant that it was almost impossible for the UK to meet the targets of the UK Fuel Poverty Strategy.

Further criticisms were highlighted in the interim (Hills 2011) and final (Hills 2012) reports of the Hills review, commissioned by the UK government in 2010. Hills notes that that current measure fails to capture the full extent of fuel poverty, with households close to the 10% threshold being grouped with households spending a far greater proportion of their income. This reflects a further criticism that under the current measure high income households can be identified as fuel poor. An article in the Financial Times announcing that "The Queen heads for fuel poverty" (Blair 2011) demonstrates one extreme of this issue and suggests that the British public are likely to agree that this current definition needs revisiting.

One final, more contentious criticism of the current approach to measuring fuel poverty is the manner with which income is dealt with. Currently, the fuel poverty figures report based on both full and basic income measures (Moore 2012) defined as

> *"Basic income: includes all income, but excludes income related directly to housing (i.e. after housing costs, or AHC)*
>
> *Full income: the basic income plus all benefits relating to housing including housing benefit, income support for mortgage interest (ISMI) and council tax benefit (i.e. before housing costs, or BHC)"*
>
> (Boardman 2010, p.29)

Boardman notes that many low income households on means tested benefits receive housing benefit, which would be considered as part of the total household income in the full income measure utilised in the 10% measures of fuel poverty. An increase in rent would (potentially) also mean an increase in benefit, thereby increasing the household income, the result of which could be to raise this poor household out of fuel poverty as a result of a rent increase (Boardman 2010).

Income (whether full or basic) is not equivalised under the 10 per cent measure which is different to how income is treated in other poverty definitions (Moore 2012). Equivalisation takes into account differences in household composition and size (Fahmy et al. 2011) reflecting the fact that larger households need a higher income than smaller households to achieve a comparable standard of living (Moore 2012). Fahmy et al. (2011) argue that the failure to equivalise runs counter to UK and European Union (EU) agreements that income should be equivalised using the modified Organisation for Economic Co-operation and Development (OECD) scales as well as approaches to income consideration in other governmental surveys, making comparison across other indicators challenging. Others argue that, as energy costs are calculated using actual household and dwelling size, equivalisation is not necessary (Moore 2012)

2.6.2 The Hills Review

As discussed previously, following the government spending review announced in 2010 (HM Treasury 2010), Professor John Hills was appointed to undertake an independent review of fuel poverty, with the remit to consider fuel poverty from its basic principles, identify whether fuel poverty is a distinct problem from general poverty, how it should be measured if it is a distinct problem, whether the current approach is appropriate and what the implications for policy in tackling this problem would be (Hills 2011). The final report was published on 15th March 2012 (Hills Fuel Poverty Review 2012) and captured many of the criticisms of the current measure as discussed above. In responding to the terms of reference, the report made seven main recommendations and five technical recommendations for improvements to the current approach to fuel poverty. These are summarised in Table 3.

The report sought to remove the ability for High Income, High Cost households to be considered as fuel poor, refocusing the measure upon Low Income High Cost (LIHC) households. In doing so, Hills made a conscious effort to bring the measure in line with the terms of the WHECA (2000) which states

> *"For the purposes of this Act, a person is to be regarded as living "in fuel poverty" if he is a member of a household living on a lower income in a home which cannot be kept warm at reasonable cost."*
>
> (Warm Homes and Energy Conservation Act 2000, p.1)

As well as refocusing the measure on LIHC households, another key recommendation of the Hills review was the introduction of a measure of the depth of fuel poverty, which Hills calls the fuel poverty gap. The fuel poverty gap (as demonstrated in Figure 7) gives a measure of the extent to which a house is in fuel poverty (i.e. how much greater their energy costs are than the acceptable level) which could then be used for targeting purposes, enabling policy makers to identify those households that are potentially having to make the biggest sacrifices to meet their energy costs.

Main recommendations	Technical recommendations
1. The Government should change its approach to fuel poverty measurement away from the current '10 per cent' ratio indicator	1. The Government should compare data that are due to become available in future on actual consumption patterns in homes with modelled spending requirements for the same households in order to identify the kinds of household that are at greatest risk of living at low temperatures and to provide information that would allow refinement of the way in which energy needs are currently modelled.
2. The Government should adopt a new indicator of the extent of fuel poverty under which households are considered fuel poor if: • They have required fuel costs that are above the median level; and • Were they to spend that amount they would be left with a residual income below the official poverty line. The Government should count the number of individuals in this position as well as the number of households they live in.	2. The Government should reinstate a component to its surveys that allows an up-to-date assessment of contemporary behaviour in terms of the temperatures of people's homes. The information this provides should be used in the development of the fuel poverty measurement methodology
3. The Government should adopt a new indicator of the depth of fuel poverty as represented by the average and aggregate 'fuel poverty gap', defined as the amounts by which the assessed energy needs of fuel poor households exceed the threshold for reasonable costs.	3. Once this is done the evidence of the health effects of cold temperatures should be examined to establish whether it implies the need for separate temperature standards that allow for the particular vulnerability of the elderly and infants, and of some groups affected by disability and long-term illness.
4. The Government should measure incomes for fuel poverty purposes after housing costs and adjusted for household size and composition. The threshold should be set at 60 per cent of median income plus calculated household energy requirements.	4. Based on data available in future, the Government should examine the case for a more direct assessment of the tariffs actually paid by low-income households within the fuel poverty measurement methodology.
5. The Government should set the reasonable costs threshold at the level of the contemporary median energy requirements for the population as a whole. The modelled bills for individual households should be adjusted for household size and composition – using a specific set of adjustment factors – when comparing them to this threshold. 6. The Government should use the Low Income High Cost (LIHC) indicator and fuel poverty gap as the basis for operational target setting. The fuel poverty gap in particular gives the best focus on the scale of the problem and progress in tackling it. 7. The Government – not just DECC but also other Departments– should set out a renewed and ambitious strategy for tackling fuel poverty, reflecting the challenges we lay out in this report and the framework we have developed for understanding them.	5. Government should assess whether removing extra cost benefits such as Disability Living Allowance from the calculation of income in the fuel poverty measurement methodology would be appropriate.

Table 3 Summary of recommendations from the Hills review 2012. *Source* (Hills 2012)

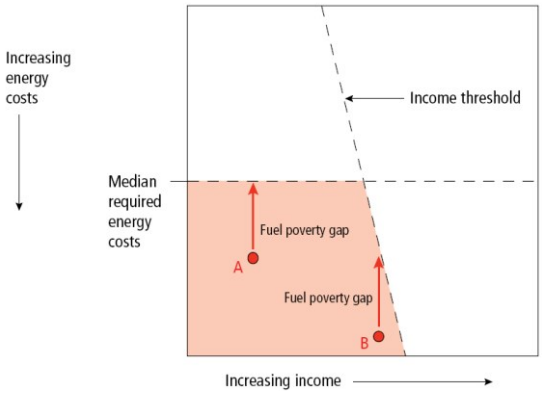


Figure 7 The extent, depth and fuel poverty gap, graphically represented. *Source* Hills (2012)

In moving towards a LIHC measure of fuel poverty, the decision to move away from the 10% ratio indicator was seen as critical. The report recommended the use of a low income qualification and a high energy cost threshold. Reasonable energy costs were deemed to be the median energy bill, equivalised for household size and type. Low income was defined as 60% of the median income plus calculated energy requirements and unlike the previous approach, income was equivalised. This introduced a moving threshold instead of the previously fixed 10% threshold and reduces the measures sensitivity to fuel price changes according to the review (Hills 2012). A moving threshold measured in this way moves in line with the Households Below Average Income (HBAI) threshold used by the Department for Work and Pensions which would make the figures more comparable with other indicators and ensures alignment with contemporary income and expenditure for the household. This approach can be easily understood graphically as shown in Figure 7

The report utilised its recommended approach and modelled its effect upon the fuel poverty figures and therefore the likelihood of meeting the terms set on in the UK Fuel Poverty strategy. This demonstrated, that whilst the underlying fuel poverty figure remains significantly more stable under the LIHC approach at between 2.6 million and 3.0 million households in 2016, if the current approach to measuring fuel poverty were to remain there would be between 3.1 million and 9.2 million households in fuel poverty in 2016.

As a recent development in the fuel poverty debate, there has thus far been little peer-reviewed evidence to critique the proposed alterations. The one piece to consider this topic so far makes a scathing assessment of the Hills proposals based upon the interim report (Hills 2011). This work argues that the proposals were overly complex, lacking in transparency, set the median energy cost threshold too high thus excluding low thermal efficiency properties from being defined as fuel poor and hides the impact of rising fuel prices on fuel poverty (Moore 2012). As well as providing suggestions as to how he feels the Hills measure should be improved, Moore also suggests that the decision to use a relative measure of fuel poverty, utilising medians as thresholds, was motivated by the current economic climate and a wish to deliver an immediate and significant cut in the fuel poverty figure.

Despite these criticisms, the significant variation in projected fuel poverty figures contained within the Hills report demonstrates the relevance of fuel poverty measurement investigation. The report highlights that current approaches to conceptualising, measuring and tackling fuel poverty are inadequate and will fail to enable the UK to meet the requirements of its fuel poverty strategy.

The recommendations of the Hills review were subsequently adopted by the UK government as the basis for the development of a new approach to measuring and tackling fuel poverty. In 2013 this approach was outlined by the government (DECC 2013) adopting the Low Income High Costs measures suggested by Hills (2012). This marked a notable departure from the aim of the Warm Homes and Energy Conservation Act (2000, sec.2(1)) which sought the eradication of fuel poverty "as far as reasonably practicable", instead choosing to aim to "mitigate and reduce the extent of fuel poverty" (DECC 2013, p.12). This aim was formally legislated for in the The Fuel Poverty (England) regulations (2014), with a revised UK fuel poverty strategy to be created to meet the new definition and target.

2.6.3 The Townsend Approach

The work of Fahmy et al. (2011), building on original research by the Centre for Sustainable Energy in conjunction with The Townsend Centre for International Poverty Research (William et al. 2003) emphasises that following the introduction of national indicators and local targets for targeting fuel poverty in 2009, the need to identify fuel poor households at a local level has not been met by the current indicator, but will be vital for the appropriate targeting of local fuel poverty reduction programmes.

As previously discussed, Fahmy et al. (2011) identify three approaches to measuring fuel poverty, household expenditure on fuel, expressed subjective experience of fuel poverty and 'objective' needs based measurement. Recent research suggests that there is little overlap in terms of households identified as being fuel poor under these three different approaches (Waddams Price et al. 2012; Healy and Clinch 2004).

One suggestion for this lack of overlap may be that drivers and characteristics of fuel poverty vary by location, and this is not captured by current approaches to measurement. Unfortunately the models created by Fahmy et al. (2011) fail to investigate this assumption as they assume that predictors of fuel poverty are spatially invariant, which they contend is unlikely to be true.

The focus of their work however does attempt to model fuel poverty at a local scale, through a technique enabling modelling at any level down to Lower Super Output Level (LSOA). They utilise synthetic modelling to combine data from the 2001 census and the 2003 English House Condition Survey combined with other statistical analysis techniques to arrive at models of fuel poverty based on both Households Below Average Income (HBAI) income modelling and Building Research Establishment (BRE) income modelling as utilised in the current fuel poverty measure, which they compare with subjective reporting of fuel

poverty. Their findings demonstrate as mentioned in the literature that there is little overlap between objective and subjective measures of fuel poverty, and they warn that caution should be taken when considering 'objective' measures of fuel poverty in the absence of dwelling temperature measurements and fuel tariff data.

The most significant contribution of this work was to demonstrate the effects of different approaches to considering income. The authors strongly support the motion that income in fuel poverty research should be equivalised in line with national and international standards as discussed previously. The effects of changing between the BRE and HBAI approach within their small area estimates model provide some interesting results.

If income is modelled as in other governmental surveys, the HBAI approach, the concentration of fuel poverty changes dramatically. Differences in household composition (larger households tend to be concentrated in urban areas) alter the equivalisation calculations used in HBAI calculations, which result in a concentration of fuel poor households in urban areas and reduces the levels in rural communities when compared to the BRE income method. The utilisation of the Before Housing Costs (BHC) approach almost eradicates fuel poverty in urban areas as a result of the increased housing costs which inflate estimated income which therefore reduces fuel poverty estimates. Fahmy et al. argue that as housing related income cannot be spent on anything else, the After Housing Costs (AHC) approach is likely to be "a more accurate indicator of underlying fuel poverty vulnerability" (Fahmy et al. 2011, p.4374)

2.6.4 Conclusions on approaches to measuring fuel poverty in England

As demonstrated in the work of Hills (2012), Fahmy et al. (2011) , Healy and Clinch (2004) and Waddams Price, Brazier and Wang (2012), the different approaches to fuel poverty that have thus far been developed all provide a different picture as to the extent and

depth of fuel poverty. This is a significant challenge for fuel poverty policy makers, as accurately identifying the fuel poor is central to targeting intervention policies (Dubois 2012). The influence of how income is measured, what is deemed an acceptable household expenditure on fuel, alternative methods of data capture (both objective and subjective) and conceptualisations of factors that influence fuel poverty, make it difficult to justify whether one approach is a more acceptable measure of fuel poverty than another. Table 4 summarises the approaches taken to measuring fuel poverty by the three approaches discussed in this chapter and demonstrates a number of similarities and differences in their conceptualisation of fuel poverty measurement.

	The Current Approach	**The Hills Approach**	**The Townsend Approach**
Definition of fuel poverty	"…one which needs to spend more than 10% of its income on all fuel use and to heat its home to an adequate standard of warmth".	"…households are considered fuel poor if they have required fuel costs that are above the median level; and were they to spend that amount they would be left with a residual income below the official poverty line."	"…those needing to spend more than 10% of their total household income before housing costs (BHC) on all fuel used to heat their homes to an acceptable level"
Income Measurement	Full income, including housing benefit and Income Support for Mortgage Interest (ISMI). Not equivalised	AHC and equivalised in line with HBAI approach.	AHC and equivalised in line with HBAI approach
Data Sources	• English Housing Survey • DECC Quarterly Energy census • Sutherland Tables	• English Housing Survey • DECC Quarterly Energy census • Sutherland Tables	• 2003 English Housing Condition Survey • 2001 UK Census
Level of concern/focus	National Indicator with data available at LSOA level	National Indicator	Identification of fuel poor households at a local level
Objective and subjective data use	No consideration of subjective data in final measure	Rejects use of subjective data	Reports both objective and subjective FP levels

Table 4 Similarities and differences in the current and alternative approaches to fuel poverty measurement

One fact remains almost universally uncontested, that fuel poverty is a different concept to income poverty (Boardman 1991; Hills 2012). However, as Fahmy et al. (2011) contend that

> *"fuel poverty as well as its social and spatial distribution becomes more like (but not identical to) the risk of income poverty—and therefore subject to similar policy interventions to alleviate it."*
>
> *Fahmy et al.*(2011, p.4376)

It is apparent that there is little evidence within the literature of any attempt to quantify whether the current approach actually measures anything other than a proxy of income poverty. Whilst the author agrees that fuel poverty is a distinct problem from fuel poverty, it is unclear whether the current economical and technologically based measure, actually captures a phenomenon distinct from income poverty. This identifies the next research gap; does the current approach measure anything other than poverty?

Research Gap 2 – Does the current UK government's approach to measuring fuel poverty capture a distinct poverty problem, or is it correlated in a statistically significant manner with the current measure of poverty and deprivation?

In critiquing current approaches to measuring fuel poverty, it is possible to see similarities with Shove's (2010b) assertion that current energy policy is based on a narrow and overly economic understanding of the social world. The current approach to fuel poverty is highly technical and economically focussed, and with Hills rejecting calls to include subjective measures of fuel poverty, due to difficulties in utilising such opinions in policy formulation (Hills 2011), it is unlikely that current approaches will fully capture the complexity of the fuel poverty problem that is rooted within the systems of delivery and home heating practices within which the individual operates.

2.7 Tackling Fuel Poverty through policy

Defining and measuring fuel poverty really provides the opportunity to identify a target for policy (Bradshaw and Hutton 1983). This section considers the development of policy responses to fuel poverty and their relationship with current approaches to measuring fuel poverty, before discussing the latest policy developments, the Green Deal and the Energy Company Obligation (ECO).

2.7.1 From Warm front, CERT and CESP, to the Green Deal and the ECO

From the 1960's and throughout the oil crisis in the early 1970's, energy policy and social policy was disjointed (Bradshaw and Hutton 1983). The primary focus of energy policy was to safeguard a continued energy supply and to ensure energy demand was met rather than to reduce energy demand to match a reduced (fossil fuel based) energy supply level (Osbaldeston 1984). In 1994, the UK became the first European country to introduce customer end energy reduction, Supplier Obligations (SO's), on its energy suppliers (Rosenow 2012) a step towards combining fuel poverty reduction with energy policy. As fuel poverty was not recognised by the Conservative administration at the time (Boardman 2010) it is unlikely that this was a conscious decision in the design of the policy at this time.

Within the domestic sector, SO's are the primary policy instrument for delivering energy reductions and carbon savings (Rosenow 2012). There has been a succession of SO's since 1994 and all broadly follow the same formulation, an energy savings target is set by central government, administered by the energy regulator (in the UK this is the Office of Gas and Electricity Markets, OFGEM) and must be achieved by the energy suppliers through a variety of means including subsidy of energy efficient measures, installation of measures in social housing and direct engagement with houses.

Often the targeting of these programmes has been poor as a result of a mismatch between the definition of the fuel poor and those who are eligible to partake in the programmes (Boardman 2010). Boardman's work shows that a large majority of the money used in schemes such as the Energy Efficiency Commitment (EEC) was not spent on those in fuel poverty, further emphasising the need for an accurate measurement and definition of fuel poverty for successful targeting of policy. However it should be noted that the focus of these policies has not been specifically to reduce fuel poverty but to reduce energy consumption, which has latterly (since the introduction of the Carbon Emissions Reduction Target (CERT)) been refocused to reduce carbon emissions.

A further policy that impacts upon the existence of fuel poverty is the Decent Homes Standard, first published in 2002. It took a much stricter definition of a vulnerable household than that used in the fuel poverty strategy, defining them as one which received a principal means-tested or disability-related benefit (Boardman 2010). As Boardman notes, the programme focussed on social housing and required all social housing to reach a minimum standard by 2010, which includes energy efficiency higher than band F or G on an Energy Performance Certificate (EPC) as well as other (non-energy) performance requirements.

The primary programme aimed at the fuel poor was the Warm Front, a publically funded energy intervention initiative, which focused on the energy efficiency of the home and was solely aimed at the private sector. It aided homes on mean-tested benefits to install energy-efficiency measures and ensure they were receiving the correct benefits (Boardman 2010). The scheme spent around £2.8 billion assisting 2.3 million houses and was phased out through the 2012-2013 financial year (Hills 2012). Although significant amounts were spent on the scheme it has been accused of inefficient targeting of resources by both Boardman

(2010) and the National Audit Office (NAO) (2009), with Hills (2012) arguing that this is significantly influenced by the currently flawed definition of fuel poverty.

As with the SO discussion above, inefficient targeting of policies has resulted in the delivery of policies that have failed to reach those most at need of intervention. In both cases, the literature suggests that a significant influencing factor in this result is the inappropriate definition of fuel poverty. As the Warm Front, CERT and Community Energy Savings Programme (CESP) schemes all ceased at the end of 2012 attention must be drawn to the policies that replaced them to consider their impact upon this situation.

Moving forward the two main policies that sought to increase energy efficiency, reduce carbon emissions and tackle fuel poverty were the Green Deal and the Energy Company Obligation (ECO). The provisions for these schemes were made in the Energy Act (2011) and developed as the Conservative-Liberal Democrat coalition government's response to the legally binding carbon reduction targets set out in the Climate Change Act (2008). The primary focus of the Green Deal was not to tackle fuel poverty. Initially, it was considered unlikely to see much uptake from those in low income or fuel poor households (Guertler 2012). In recognition of this fact, the coalition government also introduced the ECO which would provide "a subsidy for hard to heat homes, and those in fuel poverty" (Huhne 2011) and would run in tandem with the Green Deal.

Unlike the Warm Front, the Green Deal shifts the financial burden away from the state and towards private sector finance providers and the individual household. At a time of economic restraint, the budgetary benefits for the government are clear to see, the budget for the Warm Front scheme was £345 million in 2010/2011 (Hills 2012). The scheme was designed to enable and incentivise households to improve the energy efficiency of their homes at zero upfront cost. Following a home assessment, a range of interventions are

recommended to the household that will bring about expected financial savings in the fuel bills greater than the costs attached to the fuel bill, this rule is known as the "Golden rule" (DECC 2011b). The household will be able to install the package of interventions at no upfront cost to themselves, instead paying back the loan over up to 25 years to the Green Deal finance provider through an additional payment added on to the household's electricity bill (Hills 2012)..

The ECO replaced CERT and CESP as the new supplier obligation. If a package of interventions would not meet the golden rule, then an energy supplier may have been able to provide ECO assistance to help meet the costs and bring the package below the golden rule threshold, whilst also allowing the energy supplier to count the entire carbon reduction against their Carbon Reduction Commitments (CRC's) (Hills 2012). A large range of energy efficient interventions that are most beneficial for low income and fuel poor households fail to meet the golden rule, especially in meeting the expense of installing solid wall insulation (Guertler 2012).

Whilst the Green Deal and ECO seem to be a simple and beneficial package (Guertler 2012), their potential impact on reducing fuel poverty is far from certain. Modelling undertaken by both Guertler (2012) and separately by Hills (2012) demonstrated prior to the full launch of the scheme that with the Green Deal and supporting policies as they are that the majority of benefits will be felt by those in higher income brackets. Indeed for these policies to successfully assist in meeting the 2016 fuel poverty targets Hills (2012) suggested that half of the funding set-aside in the ECO would need to be focussed on fuel poor households rather than the proposed 25 percent. Despite the introduction of the ECO to support hard to treat homes and the fuel poor, Green Deal, uptake has been poor across the whole of the UK, irrespective of income group (Marchand et al. 2015), questioning the suitability of market

based interventions in delivering energy efficiency improvements and tackling fuel poverty (Powells 2009)

2.7.2 Conclusions on attempts to tackle fuel poverty through policy

If fuel poverty targets are to be met, even if increased ECO support is directed towards the fuel poor, success will lie with accurately measuring fuel poverty, identifying the affected households and targeting interventions appropriately.

In order to tackle fuel poverty it therefore seems vital that a more accurate picture of internal household temperatures is captured, along with a combination of other objective and subjective measures for the creation of a more complex measure of fuel poverty (Fahmy et al. 2011). Whilst Hills (2012) rejects the use of subjective measures of fuel poverty for policy formulation and targeting it has been demonstrated that there is a lack of overlap between those objectively defined as fuel poor and those who subjectively report as experiencing fuel poverty (cf. Fahmy et al. 2011; Waddams Price et al. 2012; Healy and Clinch 2004). The lack of overlap lends credence to the adoption of a social practice approach in an attempt to break the self-fulfilling circle of the current policy development cycle which is so dominated by the homo economicus research paradigm. This will be examined further in chapter 5

As successive policies have failed to achieve a significant reduction in fuel poverty figures, partially as a result of inefficient targeting and a mismatch between eligibility requirements and fuel poverty definition (Boardman 2010) the need for an accurate measure of fuel poverty that can be consistently applied in line with policy is evident. In order to target Green Deal and ECO measures precisely and ultimately improve cold home related health and reduce the numbers in fuel poverty a more holistic and accurate measure of fuel poverty, combining both objective measures and subjective reporting of fuel poverty experiences is required.

2.8 Conclusion

This chapter sought to examine how the current understanding of fuel poverty has developed within an English context and how this should be considered when seeking to create and pursue suitable policy responses to the issue of fuel poverty. In doing so it has explored not only the emergence of the term in policy circles but also the historical structural factors (legislative, physical and climatic) which have been commonly associated with creating an environment in which fuel poverty can exist in England.

Despite a focus on structural factors in the definition and measurement of fuel poverty, namely household income, energy efficiency of the home and cost of energy; the examination of the drivers of fuel poverty undertaken in this chapter demonstrates that issues of agency also influence the existence of the issue. Thermal expectations in the home have changed significantly over the past 100 years (Shove 2003) with households being generally warmer often thanks to improvements in thermal technology (Rudge 2012). Rebound effects however often have not necessarily reduced energy consumption, but instead afforded inhabitants the opportunity to take back the benefits by wearing fewer layers of clothing in the home. Similarly, despite recognition that England has an old and thermally inefficient housing stock (Boardman 1991), there is little social appetite to increase rates of demolition and build new homes (Power 2008). This chapter also reviewed the links between fuel poverty and health, noting links with excess winter deaths, morbidity (Marmot Review Team 2011) and mental health issues (Liddell and Morris 2010).

The literature review has demonstrated the focus of current research on the impact of fuel poverty in England (and further afield) upon the individual, but has shown the examination of the impacts upon the broader social realm to be underdeveloped (Thomson et al. 2001). In order to fully understand why fuel poverty exists in England it is vital to understand in more

detail the social as well as the individual impacts of fuel poverty. The literature reviewed in this chapter has shown that fuel poverty relates closely to issues of building design, temperature expectations and health but that the current literature fails to capture the social impacts adequately. This demonstrates a notable gap in the current literature and has driven the development of research gap one and objective 4, to capture the broader societal and social effects of fuel poverty (see chapter 1)

Research Gap 1: *What are the broader societal and social effects of fuel poverty? How are these characterised and expressed by those affected by fuel poverty?*

In moving from considering the emergence of the fuel poverty concept in England to current approaches to measurement and policy responses to the social issue, the literature review outlined the challenges related to measuring and identifying the fuel poor. Both the approach to measuring fuel poverty outlined in the original fuel poverty strategy (DEFRA & DTI 2001) and the new approach proposed by Hills (2012) and adopted by the UK government (The Fuel Poverty (England) Regulations 2014) are economically and technically focussed, reliant upon the tri-factor picture of fuel poverty (household income, energy efficiency of the home and price of energy). They fail to capture the broader social impacts of fuel poverty as discussed above and there is little overlap between those identified as fuel poor objectively using these kind of approaches and those who self-identify (subjectively) as fuel poor (Waddams Price et al. 2012). Therefore, despite academic agreement that fuel poverty is a distinct issue to that of poverty more generally (Boardman 1991; Hills 2012), further examination is required to understand whether the current approach to measuring fuel poverty in England captures a distinct issue given Fahmy et al's warning (2011) that objective fuel poverty measurement results in the risk of fuel poverty being similar to the risk

of income poverty. This examination of the literature highlights the second research gap identified in this chapter which drove objective 1 (see chapter 1).

Research Gap 2 – *Does the current UK government's approach to measuring fuel poverty capture a distinct poverty problem, or is it correlated in a statistically significant manner with the current measure of poverty and deprivation*?

Building upon the research gaps highlighted in this chapter, the thesis progresses to outline the epistemological and methodological approach adopted in this research. It then continues in chapter 4 to address objective 1 (research gap two) in order to examine whether the current measure of fuel poverty in England captures a distinct issue of fuel poverty, or rather captures a sub-measure of deprivation

3 Epistemological underpinnings and methodological overview

Chapter 2 presented a detailed examination of fuel poverty in England, positioning the issue as one derived from complex historical, political, and structural factors that impact notably upon society and the individual. Thus far, policy responses to tackling fuel poverty have had limited success, with the NAO (National Audit Office 2009) and academic authors noting significant inefficiency in targeting of resources (Boardman 2010), driven by a "flawed" definition of fuel poverty (Hills 2012, p.8). Building from this critique of current approaches to measuring fuel poverty and targeting policy design in England, this chapter outlines the epistemological basis upon which the thesis develops a more comprehensive understanding of fuel poverty in England. After presenting our epistemological position the chapter concludes with a high-level description of the overarching methodology, linking together the detailed methodological approaches outlined in each of the individual studies presented in chapters 4 and 5.

3.1 Epistemological positioning

In order to alter our approach to understanding why fuel poverty exists in England and subsequently develop new approaches to identify and target this social issue, this thesis seeks to better understand this social problem. This will not only improve our understanding of fuel poverty from a theoretical perspective, but also suggest potential new approaches to tackling the problem for the benefit of householders, policy makers and practitioners, i.e. to deliver a contribution not only to academic theory, but also everyday practice. It has been argued that within the social sciences, there is currently an increasing gap between theory and practice (Sandberg and Tsoukas 2011) with theoretical development failing to reflect the realities of everyday practice. It is therefore vital to work to reduce the distance between theory and practice to ensure that academic enquiry delivers outcomes that not only develop theoretical understanding but that these insight bear relevance to lived experiences and practice as well.

3.1.1 An issue of structure and agency

Defining and identifying an appropriate epistemological position with which to undertake the exploration of fuel poverty is central to achieving this double-headed ambition. Chapter 2 outlined the broad range of factors which have historically been seen to influence the existence of fuel poverty in England. These included a lack of policy emphasis on household energy efficiency until the mid-1970's, Britain's mild climate, a focus on fresh air and open fires in English housing, and evolving thermal expectations in the home (Rudge 2012). Fuel poverty was also shown to have implications for multiple quality of life issues including mortality and morbidity (Marmot Review Team 2011), a child's school attendance and likelihood of being in trouble with the police (Liddell and Morris 2010), and anecdotal evidence of links to increased teenage pregnancy, anti-social behaviour and dysfunctional families (Cornwall Council 2011). Evidence was also presented to show that where the energy efficiency of the home is tackled in an holistic whole house, whole community manner, not only is home energy efficiency (and therefore fuel poverty) improved, but so is pride in the community (Scott et al. 2014).

This evidence base demonstrates that fuel poverty is impacted by and impacts upon aspects of both structure (sets of rules and social structures) and agency (human action). In understanding fuel poverty as a concept that is born out of and impacts upon societal rules and structures which are perpetuated and reproduced through the flow of everyday life, this thesis rejects the position that fuel poverty exists solely through the individualistic choices of human action (commonly grouped under the banner of 'homo economicus') or solely through the collective norms and values embodied within societies structures (the 'homo sociologicus' viewpoint). Instead this thesis contends that in order to reflect the broad range of factors which combine to allow fuel poverty to exist in England, it is necessary to draw epistemological influence from the vocabulary of cultural theories which began to emerge in

the twentieth century (Reckwitz 2002). Cultural theories embody a collection of theories that seek to explain structure and agency by "referring to symbolic and cognitive structures and their 'social construction of reality'."(Reckwitz 2002, p.246). Specifically this research adopts a Social Practice Theory (SPT) perspective in its methodological approach and epistemological underpinning.

3.1.2 Social Practice Theory

As Warde (2014) contends, theories redact large chunks of reality in order to allow the detailed exploration of evidence considered relevant to the phenomena of interest. Therefore the adoption of different theoretical approaches will emphasise different aspects of lived experience. Practice theory approaches have been utilised to explore a broad range of issues from diverse perspectives, resulting in no singular definition of the practice approach (Schatzki et al. 2005; Halkier 2010). Despite a lack of consensus, social practice theory approaches all adopt a middle ground between agency and structure, noting the importance that both of these aspects contribute (Hargreaves 2011), offering an epistemological position that can overcome the singularity of alternative social theories.

The roots of Social Practice Theory can be found in the work of Wittgenstein and Heidegger (Reckwitz 2002; Shove et al. 2012). Building upon these early philosophical foundations, work by Bourdieu, Giddens, Foucalt, Latour, Taylor and Schatzski further developed the field (Reckwitz 2002). Reckwitz's (2002) paper marked the first attempt to identify the commonalities amongst the diverse Social Practice approaches that had been developed to date (Shove et al. 2012), with work by Schatzki (2005) and Warde (2005) contributing to the first attempts at applying SPT to analysis of social life (Halkier 2010).

Unlike other cultural theories, Social Practice Theory takes the practice itself as its analytical focus (Hargreaves 2011). Individuals are instead seen as carriers of practice (Shove

et al. 2012) who facilitate practices' existence through performance of practices in their daily lives (Hargreaves 2011; Warde 2005; Shove et al. 2012). The most commonly cited definition of practice is offered by Reckwitz:

> *A 'practice' (Praktik) is a routinized type of behaviour which consists of several elements, interconnected to one other: forms of bodily activities, forms of mental activities, 'things' and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge. A practice – a way of cooking, of consuming, of working, of investigating, of taking care of oneself or of others, etc. – forms so to speak a 'block' whose existence necessarily depends on the existence and specific inter- connectedness of these elements, and which cannot be reduced to any one of these single elements.* (2002, pp.249–250)

This definition is not unilaterally supported by all SPT theorists (Hargreaves 2011). However Shove, who's work this thesis draws upon in exploring the relevance of SPT to policy utilises the definition provided by Reckwitz (2002) to develop her contention "that practices are defined by interdependent relationships between materials, competences and meanings" (Shove et al. 2012, p.24). This "streamlined" (ibid) definition of practices, demonstrates that when fuel poverty is considered from a SPT perspective, it necessarily requires the understanding of the interwoven linkages between materials (objects, infrastructure, tools), competence (knowledge and understanding) and meaning ("the social and symbolic significance of participation at any one moment" (Shove et al. 2012, p.23)) that combine to facilitate the existence of a social practice.

In relation to the examination of fuel poverty in England undertaken in this thesis this means that adopting a social practice theory perspective will broadly require understanding the materials such as the objects (radiators, boilers, household appliances) and energy infrastructure in England; competences in terms of the knowledge and understanding of householders and communities with regard to energy use; and meanings that are placed upon performing these practices. Visually, this is represented in Figure 8.

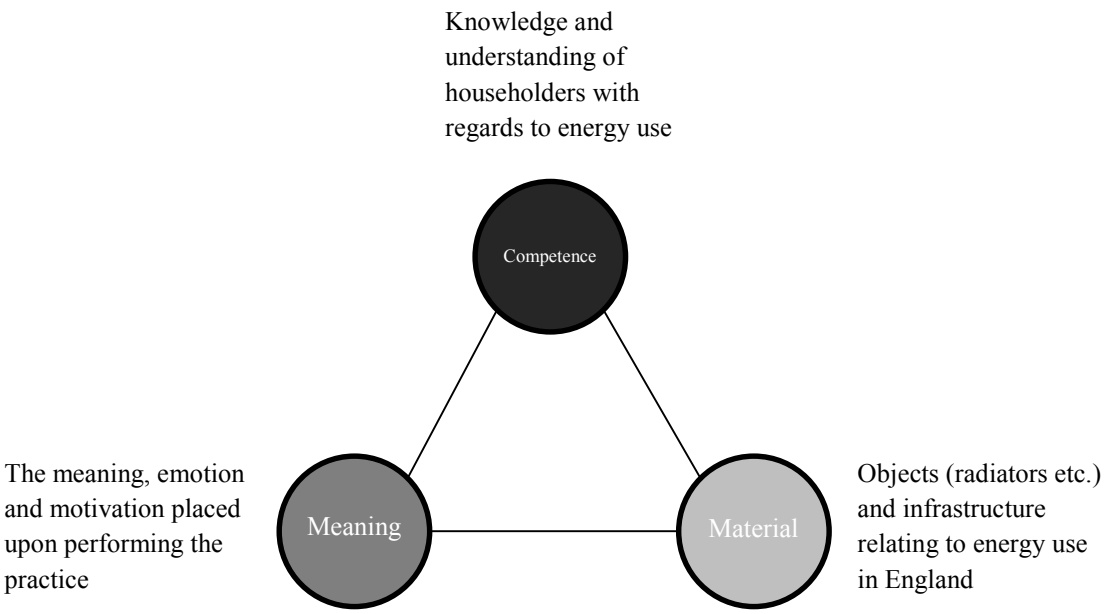


Figure 8 Areas of interest in exploring Fuel Poverty from a SPT perspective (adapted from Shove, Pantzar and Watson (2012. page 25)

3.1.3 A holistic consideration of structure and agency

Shifting away from a focus on the agency of the individual or the role of structure marks a significant departure from the dominant understanding of the social world perpetuated in current policy design. The potential role of Social Practice Theory in policy design has been questioned due to the fact that policy makers are themselves carriers of practice (Jackson 2005). The dominance of individualistic approaches to policy design which focus on Activity, Behaviour and Choice (ABC) have served to marginalise the potential impact of SPT in policy debates to date (Shove 2010a) and has led to the conclusion that "paradigms and approaches which lie beyond the pale of the ABC are doomed to be forever marginal no matter how interactive or how policy-engaged their advocates may be" (Shove 2010b, p.1283).

A more detailed examination of the role of SPT in policy design and energy policy specifically is provided in chapter 5. Despite the concerns of Shove (2010a; Shove 2010b),

adopting SPT as an epistemological underpinning to the methodological and analytical approach in this thesis allows the adoption of a number of theoretical benefits to the breadth and depth of the data collected whilst also developing the applied potential of SPT to policy design. Whilst the embedded nature of actors within practices is highlighted as a concern by Jackson (2005) in the potential for the approach to influence policy design, in line with the writings of Reckwitz utilising SPT allows fuel poverty to be positioned within "a social world which inevitably implies a political and ethical dimension" (2002, p.257). In recognising the embedded nature of actors within practices that are sought to be influenced by policy, this study does not attempt to lift itself up by its own bootstraps (Jackson 2005), but instead acknowledges the social nature of societal problems and social policy, "offering a broader and more holistic conceptualization" (Hargreaves 2011, p.80) of the issue. It is hoped that through adopting this approach that this thesis can contribute to the "latent promise…for social theory to make a difference" (Shove et al. 2012, p.1) by expanding not only our theoretical understanding of the field, but by responding to Shove's assertion that SPT studies have thus far failed to impact upon practice (Shove 2010a).

3.1.4 "Energy" in Social Practice Theory

The position and the use of the term 'energy' in SPT research is a complex and contested issue. Hards (2013) refers to the term "domestic energy practices" in her examination of how such practices may be status-enhancing or stigmatising. Here she defines the term as:

> *"Domestic energy practices are understood here as practices within the home that involve significant consumption of energy (e.g. lighting, cooking, heating/cooling rooms, heating water), or involve attempting to conserve energy (e.g. getting insulation, using efficient products) or involve generating energy (e.g. installing solar panels). This is a convenient grouping used by policy-makers and researchers, and not necessarily a way in which individuals understand their own practices."* (Hards 2013, p.451)

Within this definition Hards contends that practices consume energy or conserve energy. This position is not ubiquitous within SPT studies. Shove and Walker (2014) argue that

practices do not consume energy, rather that energy is a component of practice. They accept the separation of the material components of practice (energy sources, infrastructure and devices) from the practice itself to facilitate analysis, given variation in temporality between materials, meanings and competences. They warn that materials should not be externalised as independent from power. Reflecting this, Urry notes that "Energy systems and social systems are often highly interconnected" (2014, p.4). To understand why energy is demanded, necessarily requires consideration of what energy is for (Walker 2014).

The adoption of a SPT approach enables the consideration of what energy is used for (Nicholls and Strengers 2015) and how citizens are involved (Smith et al. 2015), moving the focus away from the cost of energy as considered in the traditional tri-factor model of fuel poverty towards understanding and identifying the practices which demand energy. Therefore, whilst some authors refer to domestic energy practices, this thesis adopts the terminology of practices involving energy, reflecting the position of Shove and Walker (2014) that energy is a component of practice.

3.2 Methodological approach.

As demonstrated visually in Figure 8, by adopting SPT as an epistemological basis for the research process, a specific set of data is mandated for collection. In order to develop a SPT understanding of fuel poverty the project adopted a three stage methodology, presented here within two distinct but closely linked studies. This section examines the broad methodological motivation for this approach, outlining the reasoning for adopting a mixed methodological research process in order to capture the meaning, materials and competences that combine to facilitate the existence of fuel poverty in England, as well as presenting a high-level overview of the overall research structure, demonstrating the linkages between the constituent studies, supporting the methodological detail provided within each chapter.

3.2.1 Mixed Methodology in social research

Fuel poverty is receiving increasing attention amongst the academic community. The topic has been considered from a number of angles including for example, defining or comparing the issue from different nation contexts (Tirado Herrero and Bouzarovski 2014; Petrova et al. 2013; c.f. Bouzarovski et al. 2012; Howden-Chapman et al. 2012; Dubois 2012; Thomson and Snell 2013; Brunner et al. 2012; Healy 2004; Buzar 2007b; Tirado Herrero and Ürge-Vorsatz 2012), fuel poverty and health (Allmark and Tod 2014; Howden-Chapman et al. 2007; Tanner et al. 2013; Dear and McMichael 2011; Bambra et al. 2010; Gibson et al. 2011; Gilbertson et al. 2006; Hong et al. 2009) and identifying and targeting fuel poverty interventions (Walker et al. 2014; Walker et al. 2012; Fahmy et al. 2011). Despite the growth of research within the field, there is a lack of research examining fuel poverty from a SPT perspective. Much of the research to date has focussed on winter warmth practices of the elderly (Hitchings and Day 2011; Day and Hitchings 2011), the status and stigma implications of energy practices (Hards 2013), shifting energy use practices in time and space (Higginson et al. 2013; Powells et al. 2014) and the role design can play in facilitating thermal comfort (Kuijer and Jong 2012). Whilst this research has helped to develop the prominence of SPT's utilisation within energy research, this body of work has not considered a bottom-up examination of the construction of fuel poverty within a SPT framework.

In seeking to respond to this gap in the current literature, the research presented within this thesis has necessarily adopted a predominantly exploratory rather than confirmatory approach. Drawing upon evidence presented within the existing fuel poverty, SPT and literature exploring practices involving energy, a three stage, mixed methodological approach was devised to facilitate access to the relevant data required to build a SPT conception of fuel poverty in England.

Mixed methods is a relatively new methodological approach, and has been seen as being both confusing and unknown to many researchers (Leech and Onwuegbuzie 2009). Many different research designs have been proposed with some authors seeking to utilise these to develop a typology of mixed methodology (Leech and Onwuegbuzie 2009). The definition of what constitutes a mixed methods study provided by Hurmerinta-Peltomäki and Nummela (2006) captures the commonly agreed tenants of mixed methodological research

> *"…we define a mixed method study as one that combines qualitative data collection and/or analysis with quantitative data collection and/or analysis in a single study. The data may be collected concurrently or sequentially and combined at one or more stages in the research process"*
>
> (Hurmerinta-Peltomäki and Nummela 2006, p.441)

Through the use of both quantitative and qualitative methodological approaches it is possible to attempt to answer both exploratory and confirmatory research questions that would not traditionally be able to be examined within the same research inquiry (Venkatesh et al. 2013). Greene et al. (1989) noted five broad purposes for utilising mixed method research designs, triangulation (corroborating results from different methods), complementarity (enhancing one methods results with those from another method), development (utilising results from one method to develop another method), initiation (identifying paradoxes or contradictions that challenge the framing of results) and expansion (extending the breadth of inquiry through the use of different methods for different components of the study).

A visual representation of the overarching methodological approach is presented in Figure 9. The outcomes from each constituent study provide inputs that inform and develop the approach utilised in the subsequent study, providing a sequential, methodologically plural research process which draws upon both the developmental and expansion drivers identified by Greene et al. (1989).

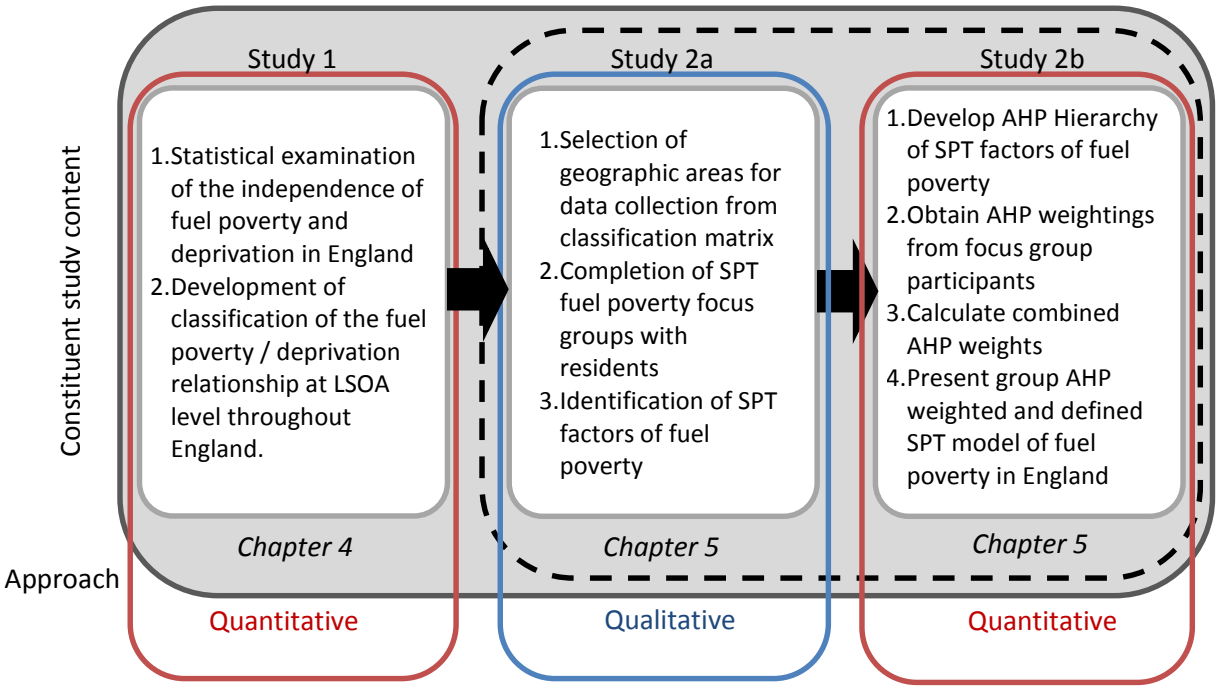


Figure 9 Overview of methodological approach and internal links to constituent studies.

In order to collect the most appropriate forms of data to deliver the relevant outputs for each study, it was deemed that adopting a mono-method approach would not be suitable. By combining quantitative, deductive, statistical analysis of the relationship between fuel poverty and deprivation in study 1; qualitative, inductive, focus group exploration of social practice factors of fuel poverty in study 2a; and quantitative, exploratory Analytic Hierarchy Process (AHP) factor weighing in study 2b, the research combined different research strategies to draw upon complementary strengths of these methodologies to deliver a superior, more comprehensive understanding of the issue than would have been possible had a mono-method design been utilised. By taking advantage of this methodologically pluralistic approach to understanding fuel poverty from a SPT perspective, it was possible to capture a more "complete knowledge" (Johnson and Onwuegbuzie 2004, p.21) that would be able to inform not only theoretical development but also provide practical insights.

Browne et al. (2013) note that social practice theory has failed to gain traction within the practice and policy sphere due to a general focus on the use of qualitative methodologies. Such approaches do not provide the numerical data that is preferred by strategic planners and policy designers, limiting the practical relevance of the approach to date. It is therefore important to seek to develop SPT methodologies which can provide policy relevant insights. The nature of required understanding of a given phenomenon necessitated by the SPT perspective, combined with the theory's rejection of positivist positions (Browne et al. 2013) implies that a move to a purely quantitative methodology would fail to meet the epistemological and ontological assumptions which underpin SPT, despite the clear benefits in translating the outcomes to practitioners. It was therefore apparent that adopting a mono-method approach would fail to meet the needs of practice and the ontological and epistemological underpinnings of SPT. By pragmatically implementing a mixed-methodological approach, it was therefore possible to overcome the limitations of mono-method research design (Molina-Azorin 2011) and deliver insights that bear relevance to the needs and wishes of theory, policy, and practice. In doing so, this research hopes to deliver results to a question that could not have otherwise been answered (Leech and Onwuegbuzie 2009). Furthermore, as an emerging area of research, the adoption of a mixed methodological approach helps to ensure that appropriate theoretical roadmaps are developed to navigate the exploration of the field, utilising appropriate methods that reflect the reality being examined and ensure robust and reliable insights are developed by the study (Hurmerinta-Peltomäki and Nummela 2006).

3.2.2 Study overview

The adoption of a Social Practice Theory epistemological basis for this thesis, combined with the aim to deliver insights that would inform and develop both academic knowledge as well as practice defined the need to utilise a mixed-methodological approach to research. As

outlined in Figure 9, three inter-related studies were defined in order to meet this aim. The precise theoretical and methodological approaches to each of these constituent studies are outlined in their respective chapters; however this section presents a brief overview of the methodological approach adopted and seeks to outline the linkages between the studies.

The initial study sought to confirm the commonly held belief that fuel poverty was a distinct issue to that of deprivation more generally and to examine whether the current approach to fuel poverty measurement in England captures a distinct issue. As discussed in chapter 2, historically the political establishment in England did not agree that the two concepts were different, despite academic debate and quantification that argued to the contrary (Boardman 1991; Campbell 1993; Bradshaw and Hutton 1983). Whilst authors have subsequently undertaken studies to quantify the difference between fuel poverty and poverty (Boardman 1991; Palmer et al. 2008), the data utilised in these studies does not reflect recent developments in policies designed to tackle fuel poverty and energy efficiency or other contemporary factors. Study 1 (chapter 4) therefore sought to update this analysis for the present day and to develop our understanding of the link to the broader concept of deprivation rather than the narrower measure of economic poverty (income). This study then utilised the statistical analysis of England's fuel poverty and Index of Multiple Deprivation (IMD) datasets, to develop a classification of different geographic areas of England according to the relationship between Fuel Poverty (FP) and IMD that could be utilise to help target the most appropriate interventions to tackle fuel poverty in different areas of the country.

Drawing upon the FP/IMD classification matrix developed in study 1, study 2a and 2b (chapter 5) had a combined aim of developing a more accurate conception of the practices that facilitate the existence of fuel poverty in England. In study 2a, the classification matrix enabled the identification of clusters of Lower Super Output Areas in England within which

to complete focus groups with local residents. The aim of these focus groups was to explore and identify common practices involving energy across England that could be seen to influence the existence of fuel poverty. In doing so two main outcomes were achieved, firstly a methodological advancement within SPT methodologies, enabling the utilisation of focus groups to identify social practices obtaining and secondly a novel understanding of the social practice factors of fuel poverty in England.

In order to meet the aim of delivering insights for both practice and academia, the second study in chapter 5 (study 2b) sought to develop a socially weighted model of social practice factors of fuel poverty. By achieving this, it facilitated the inclusion of SPT approaches in the development of social policy, which had not previously been possible. Utilising the SPT factors captured in study 2a, the factors were arranged in to a hierarchy of factors. The hierarchy was then presented to the focus group participants from study 2a and through the use of an AHP survey, factor weightings were collected to deliver the first socially defined, socially quantified, social practice measure of fuel poverty in England.

3.3 Conclusion

Through the adoption of a Social Practice Theory perspective and a mixed-methodological research design it is possible to draw upon a broad range of methodological approaches and a diverse set of data to develop a more encompassing and comprehensive understanding of fuel poverty in England than those currently utilised within policy practice. Social Practice Theory necessarily requires a broader examination of fuel poverty, in order to understand the socially derived competences, meanings and materials (Shove et al. 2012) that underpin fuel poverty in England. It allows our enquiry to look beyond the traditional tri-factor model of fuel poverty presented in chapter 2 to examine how both agency and structure

combine in the home, community and self to create practices which may strengthen or weaken the existence of fuel poverty.

Despite the benefits of this epistemological position, methodological pragmatism and methodological development is required to enable this approach to influence policy design. SPT has tended to favour qualitative research approaches (Browne et al. 2013), failing to deliver data in a language of relevance to policy makers and practitioners. This methodological overview has briefly outlined the approach taken within each constituent study of this thesis. In chapters 4 and 5, study 1, 2a and 2b are presented, demonstrating how this work has built upon the strengths of the epistemological position and mixed-methodological design, justified within this chapter, to deliver an integrated body of work which provides insights that meet the needs of policy makers whilst respecting the epistemological and ontological underpinnings of SPT.

4 Study 1: Examining the relationship between fuel poverty and deprivation

As discussed in chapter 2, whilst the concept of fuel poverty emerged in England in the 1970's and gained recognition within the academic and social rights campaign community, political support was less forthcoming. Despite academic articles and publications since the mid 1980's (Bradshaw and Hutton 1983; c.f. Boardman 1991; Hills 2012) demonstrating the independence of fuel poverty from poverty more generally, the ruling Conservative governments up until 1997 failed to recognise fuel poverty as a distinct issue.

This chapter briefly explores the literature and evidence available since the emergence of fuel poverty as a concept, with regards to the independence of the fuel poverty concept from the academic and grey literature, building upon the work presented in chapter 2. Subsequently we move on to undertake a statistical examination of fuel poverty as an independent concept through exploring the relationship between the English Indices of Deprivation (EID), more commonly known as the Index of Multiple Deprivation (IMD), a composite indicator of poverty within England; and the annually published, official fuel poverty statistics. Both of these data sets are modelled at the Lower Super Output Area (LSOA), allowing a direct comparison of fuel poverty and general poverty at the same geographic area. We then present a classification matrix which categorises all LSOA's in England according to the statistical relationship between fuel poverty and general poverty. The results are then mapped with the use of Geographic Information Systems (GIS) technology to present a visual representation of the relationship. This map is subsequently utilised to identify geographies of interest for further in depth investigation of the social determinants of this relationship, the results of which are presented in study 2a (chapter 5). Finally the chapter concludes by discussing the implications of this analysis and subsequent classification framework for the delivery of fuel poverty interventions across England. We

suggest that by understanding the strength of the relationship between fuel poverty and poverty in each LSOA it is possible for local councils, third sector providers and national government to deliver tailored interventions aimed at the root causes of the major contributor to social issues in that area (either poverty, or fuel poverty). By targeting in this fashion, notable related benefits will be realised for the reduction of both issues, helping to reduce the incidence of poverty and fuel poverty whilst also allowing legislative targets to be more readily met.

In considering the literature on the relationship between fuel poverty and deprivation to date, and examining this relationship statistically, the work presented here seeks initially to answer the primary research question, is there a relationship between fuel poverty and deprivation in England? After exploring this question we progress to discuss two further research questions, can geographic areas with different relationships between the two concepts be identified, and if so, is it possible to develop a meaningful classification framework to enable identification of these areas for research, policy and practical intervention? Through answering these research questions the study adds statistical evidence to support the arguments of many fuel poverty researchers that the issue is a distinct and separate form of poverty to more general measures of deprivation. Furthermore, this work introduces a new methodology that can be used by local councils, the third sector and national governments for identifying specific, local geographies and applying the most appropriate forms of intervention to significantly reduce the incidence of fuel poverty in the area; either through general deprivation reduction support or traditional fuel poverty reduction interventions focussed around home energy efficiency.

4.1 Is Fuel Poverty Different?

4.1.1 Defining deprivation and fuel poverty

To explore the uniqueness of the fuel poverty concept, it is first prudent to define precisely what we mean by the terms "fuel poverty" and "deprivation", as well as examine why we have chosen to utilise the terminology of deprivation rather than poverty. The definitions of fuel poverty were presented in chapter 2. Due to the data sets used in the subsequent statistical analysis, this research utilises the definition of fuel poverty laid out in The UK Fuel Poverty Strategy:

> *"A fuel poor household is one that cannot afford to keep adequately warm at reasonable cost. The most widely accepted definition of a fuel poor household is one which needs to spend more than 10% of its income on all fuel use and to heat its home to an adequate standard of warmth. This is generally defined as 21ºC in the living room and 18ºC in the other occupied rooms - the temperatures recommended by the World Health Organisation"*
>
> (DEFRA & DTI 2001, p.6)

This study consciously utilises the terminology of deprivation rather than poverty. This decision was taken in order to reflect the difference in focus of the two terms in their application within policy and legislation in England and across Europe. In England and throughout the European Union (EU), households are classified as poor according to a relative measure of income. The European Council define those at risk of poverty as,

> *"The proportion of individuals living in households where equivalised income is below the threshold of 60% of the national equivalised median"*
>
> (Council of the Europen Union 2004, p.13)

This definition has been criticised for being without scientific basis and failing to reflect the needs of individuals, but convenient and simple to apply for interested bodies (Gordon et al. 2000). Within Europe, the focus of the poverty concept is upon household income, rather than a broader spectrum of indicators of deprivation. In this setting, income is seen as an indicator of likely access to other resources, but makes the assumption that lack of income necessarily precludes access to the wider resource base. Basing poverty indicators solely on

income below a set threshold fails to recognise the localised, societal needs of individuals and their circumstances.

Despite the limitations of an income focused relative measure of deprivation, taking a relative measure of poverty (in some form) is more appropriate throughout Europe, where (in general) poverty levels are not as extreme as those experienced in other areas of the world. In the global context, an absolute measure of poverty such as that adopted by the United Nations (UN) is more appropriate for targeting those at need of the greatest level of governmental and policy support.

> *"Absolute poverty is a condition characterized by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information. It depends not only on income but also on access to social services."*
>
> (United Nations 1995, p.41)

The UN's definition of absolute poverty is significantly different to the relative measure adopted by the EU, and of particular relevance to this discussion is the difference in focus between the provision of basic human needs in the UN definition, to a focus on income in the EU definition. Moving to consider the difference between poverty and deprivation, the UN definition of absolute poverty draws a closer comparison to Townsend's definition of deprivation, which he states is

> *"…applied to conditions (that is, physical, environmental and social states or circumstances) rather than resources and to specific and not only general circumstances, and therefore can be distinguished from the concept of poverty"*
>
> (Townsend 1987, p.125).

Townsend's distinction that the concept of deprivation is relevant to conditions rather than resources is of particular relevance to the consideration of the independence of the fuel poverty concept. As Boardman contends, the product being consumed by households when heating their home, "is warmth, not fuel" (Boardman 1991, p.221). Warmth is a condition, whereas fuel is a resource. By aligning Townsend's definition of the application of

deprivation, with Boardman's understanding of the products being consumed in heating a home, it is clear to conclude that this study is examining the relationship between concepts of deprivation, rather than concepts of poverty.

Given the influence of Townsend's work (c.f. Townsend 1979; Townsend 1987) on the definition of deprivation used in the English Indices of Deprivation (Mclennan et al. 2011), which is analysed as part of this study, we adopt the definition of deprivation offered by Townsend (1979).

> *"People can be said to be deprived if they lack the types of diet, clothing, housing, environmental, educational, working and social conditions, activities and facilities which are customary, or at least widely encouraged or approved, in the societies to which they belong"*
>
> (Townsend 1979, p.413)

This definition of deprivation highlights the multiple conditions that combine to result in deprivation as opposed to the singular, income focus of the current relative income focussed measure of poverty used in English policy. Relating this definition to fuel poverty suggests that by conceiving fuel poverty as a measure of relative deprivation, rather than poverty, it can be seen that fuel poverty may be better conceived as an issue of energy deprivation, reflecting the argumentation of Bouzarovski and Petrova (2015) surrounding the multi-dimensional nature of energy vulnerability.

4.1.2 Why does the independence of fuel poverty matter?

To understand the distinctiveness of the fuel poverty concept from that of a more general measure of deprivation is vital for government, local authorities and the third sector. If fuel poverty has been misrepresented as an independent concern, it fundamentally alters the nature of the interventions designed to reduce the impact of cold homes upon individuals and society more broadly. At the most basic level, if fuel poverty is nothing more than an alternative way of indicating general deprivation, there may no longer be a need for the

government to divert resources and policy responses to fuel poverty reduction, and instead it will be more pertinent to utilise these funds to tackle the root causes of general deprivation.

The debate over the independence of the fuel poverty concept has existed since the inception of the issue in the mid 1970's. Successive Conservative governments did not recognise fuel poverty as an independent issue, noting that we did not recognise food poverty or clothing poverty as distinct forms of poverty (HC Hansard 1985). Though recognised by government from 1997, with the ascension to power of Tony Blair's Labour party, the return of the Conservative party led coalition in 2010 brought about a major spending review (HM Treasury 2010) and subsequently the Hills review (Hills 2012) which was tasked (amongst other aspects) to once again review the independence of the fuel poverty concept. A full examination of the historical development of the fuel poverty concept in England is provided in chapter 2. Here we briefly summarise the evidence provided throughout this period, before moving on to present our analysis of the situation using currently available data.

4.1.3 The literature to date

In 1983 Bradshaw and Harris observed that the National Right to Fuel Campaign's definition of fuel poverty (as cited in chapter 2) implied that fuel poverty and poverty were distinct and different concepts.

> *"Poverty is a relative lack of resources. Fuel poverty is a lack of sufficient resources to buy adequate heat and light. Some people are poor but can afford adequate warmth. Others are not in poverty but nevertheless cannot afford adequate warmth – because their houses are very difficult or expensive to heat"*
>
> (Bradshaw and Harris 1983, p.73)

The reasoning utilised by Bradshaw and Harris was echoed by Boardman, who developed this analysis further to argue that the existence of fuel poverty was as a result of a lack of capital investment in the housing stock as opposed to a lack of income support (Boardman 1991). The demarcation of fuel poverty from general deprivation along the lines

of capital investment level, Boardman argues, relies upon an understanding that households are seeking to purchase an adequate supply of warmth. This requires two forms of capital investment – an efficient heating system and an efficient building system. If either of these systems, realised through capital investment, is inefficient then fuel poverty has the ingredients to exist. By 1993 Ron Campbell went as far as to declare "Uniquely among such manifestations, fuel poverty can be resolved through capital investment; in this case investment is a cure, not a palliative" (Campbell 1993, p.58).

Whilst the role of capital investment, that is to say, investment in the building fabric either by the householder, home owner or the state, as viable means for reducing or eradicating the issue, differentiates fuel poverty from that of poverty more generally; the (sometimes significant) financial implications of capital investment serve to theoretically align the two concepts fairly closely. To realise the necessary levels of capital investment to ensure an efficient heating or building system, requires significantly larger levels of finance than are normally provided through income support measures for other forms of deprivation reduction. Particularly with reference to low income groups, often living within rented accommodation or social-housing, their ability to influence, alter or improve the efficiency of the heating system or building fabric is beyond their reach (Boardman 1991). Unsurprisingly, lower income households were found to be more likely to live in non-decent housing than wealthy households (Gilbertson et al. 2006), and the degree of this difference (double the likelihood) is significant. The regulated energy system which low income households are forced to utilise (such as the inefficient under-floor heating systems, or electric storage heating systems installed in much of the social housing of the 1960's (Bradshaw and Harris 1983)) have been designed for the capital benefit of the installer and serve to further disadvantage the low income consumer (Buzar 2007b), those that need the most support.

Despite the theoretical distinction between fuel poverty and poverty, the close practical association of the issues has historically been substantiated through empirical examination of monitoring statistics. This examination has tended to show that fuel poor households are often also poor households (De Haro and Koslowski 2013). A study for the New Policy Institute (Palmer et al. 2008) demonstrated that this relationship had started to change over the last decade. In 2005, roughly three quarters of fuel poor homes were also income poor (see Figure 10), but by 2007 this figure had fallen to roughly two-thirds of fuel poor homes, driven by an increase in domestic gas prices of between 31-33% and electricity prices by 21 – 25% (Palmer et al. 2008, p.14). Palmer et al (2008) argue that as the strength of relationship between the two concepts decreases, tackling poverty will have a reduced benefit for fuel poverty reduction.

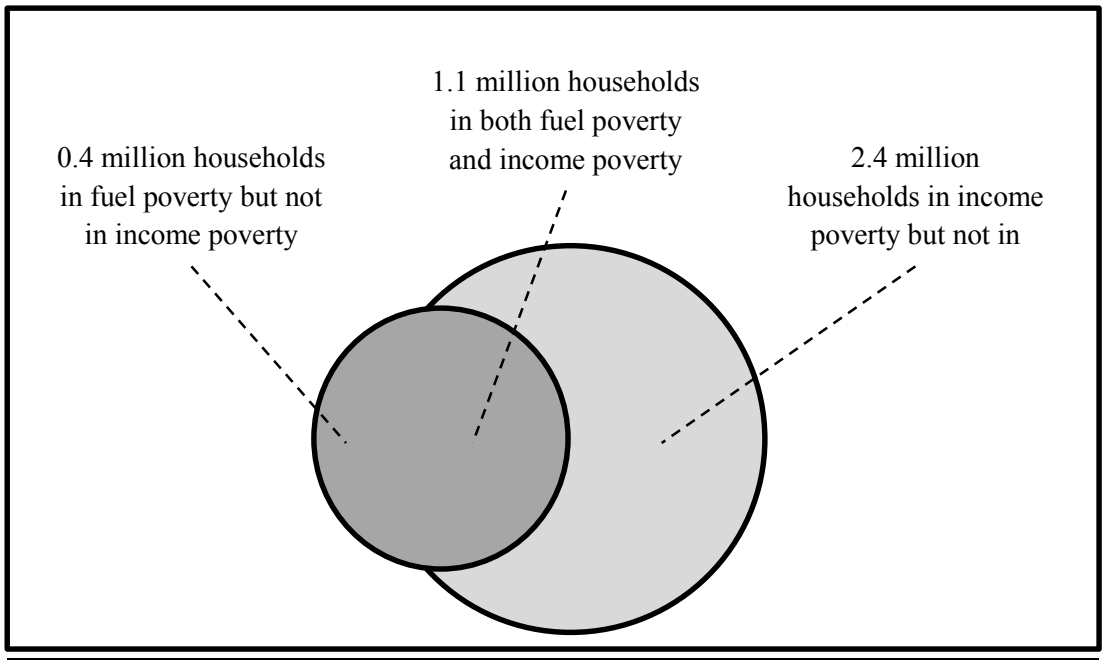


Figure 10 The overlap between fuel poverty and income poverty in 2005 (Palmer et al. 2008, p.14)

Palmer et al's (2008) analysis of fuel poverty and income also undertook analysis of the relationship of fuel poverty with a number of other indicators including unemployment, number of vulnerable households and area deprivation. These indicators are often associated with poverty and for reasons of simplicity and ease, utilised as proxies. Whilst Palmer et al's

(2008) study has similarities with the work presented in this chapter, the focus of the two studies are subtly, yet importantly different. Our earlier discussion on the difference between poverty and deprivation, reflects the main methodological and philosophical distinction between our work and that presented by Palmer et al (2008). Their work is centred on the relationship of fuel poverty with *low income*, and although comparisons are made with other indicators of deprivation including workless households, vulnerable households and households in deprived areas, and household type characteristics (Standard Assessment Procedure (SAP) rating, floor space, household type (single or couple, with or without children, working age or pensionable age), type of area (urban or rural), housing tenure, geographic location), this is not their primary focus. Furthermore, their work does not make its methodological approach clear to the reader, particularly regarding their analyses with deprivation indicators, including which datasets were used and which analysis techniques were employed. By examining the relationship from a deprivation rather than a poverty perspective, and providing explicit detail surrounding the methodological and analytical techniques used, we seek to enhance the contribution offered by Palmer et al (2008), by exploring the relationship with a broader set of multiple deprivation indicators, updating the analysis with more up-to-date datasets in order to enhance and develop the minimal literature and analysis on the subject to date.

Yet the degree of overlap between fuel poverty and geographies classified as deprived was only slightly greater than the overlap between fuel poverty and non-deprived areas. Palmer et al. (2008) suggest that this may be due to the fact that inhabitants in deprived areas tend to live in smaller properties and more efficient homes. This seems a reasonable explanation, substantiated by the impact of the Decent Homes programme. The programme, first proposed in the Housing Green Paper in 2000 (DETR 2000), brought significant investment in England's social housing sector, and was the primary programme for tackling

fuel poverty in social housing (Environment Food and Rural Affairs Committee 2009). The programme required all social housing to be of decent condition by 2010, and delivered significant improvements in amongst other aspects, the energy efficiency of the homes measured by their SAP rating. Therefore it is not surprising that much of the housing in deprived areas is more efficient than in other, less deprived areas.

The analysis provided by Boardman (1991) and that of the New Policy Institute in 2008 (Palmer et al. 2008) are notable in the rigour of their analysis, but also that they are the only two significant examinations of the independence of the fuel poverty concept. Against a background of significant national budgetary pressures, the 2010 spending review (HM Treasury 2010) paved the way for the first thorough governmental examination of fuel poverty since the creation of the fuel poverty strategy in 2001 (DEFRA & DTI 2001). The report by Hills (2012) in to fuel poverty was specifically mandated to re-examine the independence of the fuel poverty concept from first principles. Hills reported his analysis of this question of independence in the interim report on fuel poverty (Hills 2011) considering the question from three different perspectives, poverty, health and well-being and carbon reduction and energy saving.

As with the analysis of Palmer et al. (2008), Hills concluded that "there is considerable overlap between those in fuel poverty and those in income poverty" (Hills 2011, p.90). The report acknowledged, as with the discussion above, that although fuel poverty is distinct from poverty, separating the two issues is a complex task. Hills' analysis reaffirmed that income is a predictor of fuel poverty, but as with the analysis of Boardman, emphasised that the energy efficiency of the home was also key.

Chapter 2 discusses in more detail the main drivers of fuel poverty as identified so far in the academic, governmental and practitioner literature. The drivers identified within this

review demonstrate that there is a complex web of factors that have combined within England to facilitate the existence of the fuel poverty phenomenon. In line with the conclusion of Hills (2012) and other authors, it is the complex and messy nature of the interacting factors that serves to identify fuel poverty as a unique issue for policy responses. Fuel poverty sits at the intersection between issues of carbon reduction targets, closely associated with home energy efficiency; poverty reduction strategies, closely associated with household income; and health policy, which also draws significant influence from the poverty and energy efficiency realm. To deliver successful fuel poverty policy and interventions requires an understanding of the impact of these multifarious factors upon the unique nature of fuel poverty in England.

4.1.4 The importance of independence for policy targeting and delivery

The independence of the fuel poverty concept has been examined by a number of studies from the 1980's onwards (Bradshaw and Hutton 1983; Boardman 1991; Palmer et al. 2008; Hills 2011; Hills 2012). These studies each demonstrated that fuel poverty and poverty were separate concepts from both a theoretical and statistical standpoint.

Despite this understanding of the independence of the concept, analysis by the National Audit Office in 2003 highlighted concerns over the accuracy of targeting of funds to tackle fuel poverty. By 2006, less than 25% of fuel poverty expenditure was successfully being spent on fuel poor homes (Boardman 2010). Improving the accuracy of targeting is vital for achieving tangible reductions, and eventual eradication of fuel poverty in England. The over simplification of utilising poverty indicators as a proxy measure for identifying fuel poor homes has not served to help the situation (Boardman 2010). In taking this approach and ignoring the impact of schemes such as the Decent Homes Standard, designed to achieve improvements in the building fabric of England's social housing and therefore increasing the

energy efficiency of low-income households' homes, the complex intricacies of the underlying drivers of fuel poverty have been ignored in favour of procedural simplicity.

Palmer et al's (2008) analysis provides a strong platform from which to understand some of the key relationships between fuel poverty and other indicators which may be utilised for the delivery of policy responses. The analysis provided in their report utilises data from the English House Condition Survey (EHCS) (now the English Housing Survey (EHS)) to compare the relationship across a diverse range of indicators. Their report, whilst making a general analysis for the whole of the United Kingdom to start with, focusses a significant proportion of its content on low income households. These are, as Hills (2012) states, the group of relevance for fuel poverty policy when considering the initial wording of the Warm Homes and Energy Conservation Act which stated that the fuel poor were from a "household living on a lower income" (Warm Homes and Energy Conservation Act 2000, p.1). By highlighting potential risk flags such as SAP score, floor space or tenure, the report provides those assisting with fuel poverty policy delivery a number of practical proxy indicators that may make it easier to identify households living in fuel poverty. Whilst the potential overlaps with other indicators may provide simple proxies for local councils and other policy providers to identify *potentially* fuel poor households, the approach is still susceptible to the inaccuracies of the current targeting methodology (Fahmy et al. 2011). The fuel poor are always a minority group within any other form of indicator, be they social characteristic or simply income levels (Boardman 2010). Utilising proxy measures always carries a significant likelihood of mismatch between fuel poor recipients and unintended beneficiaries. As Boardman warns:

> *"This demonstrates the problems of using social characteristics or income levels as the main indicators of fuel poverty"*
>
> (Boardman 2010, p.67)

4.1.5 Towards a more accurate fuel poverty targeting methodology

There is agreement amongst the academic and practitioner literature, and recognition from government that fuel poverty is a distinct issue which requires its own policy and legislative responses in order to achieve the desired eradication of fuel poverty in England. Despite the recognition of the concepts' independence, a historically close relationship with income poverty (c.f. Palmer et al. 2008; Boardman 2010) has resulted in the use of proxy indicators for practical targeting of fuel poverty policy in England. As this relationship has weakened following significant increases in energy prices (Palmer et al. 2008), the suitability of utilising income levels or other social indicators for targeting of schemes can be questioned (Fahmy et al. 2011).

Identifying fuel poor homes is a major barrier to successful fuel poverty reduction programmes (Boardman 2010; Dubois 2012) and improved targeting is an increasing priority for delivery of these programmes (Walker et al. 2012). In response to these concerns a growing body of work is emerging that seeks to develop area based approaches to identifying the fuel poor (c.f. Fahmy et al. 2011; Walker et al. 2012; Walker et al. 2014). It is intended that by identifying the fuel poor at smaller geographical regions, the accuracy of programme targeting is improved, reducing unnecessary expenditure (Walker et al. 2012), for example on households that do not need support. This study aims to contribute to this literature on geographically based identification of fuel poor households, driven by analysis of extant government data sets, to support increasingly accurate delivery of effective policy interventions that help achieve a significant reduction of fuel poverty in an effective and efficient manner.

Improving the accuracy of policy delivery and therefore also the effectiveness of social expenditure on fuel poverty eradication is a clear priority given the legislative requirements

to eradicate fuel poverty "as far as is reasonably practicable" (Warm Homes and Energy Conservation Act 2000). In supporting the publication of the Hills review (Hills 2012), Edward Davey MP emphasised the importance of accurate measurement of fuel poverty, stating:

> *"The evidence is overwhelming that improving the way we measure fuel poverty is integral to delivering the right policy outcomes. Without the right measure it will not be possible to focus available resources in the most effective way, proving that measurement matters"*
>
> (Davey 2012, p.1)

This chapter moves on to present a new methodology for identifying and prioritising households in England for fuel poverty policy delivery, a direct response to the stated importance of the Hills fuel poverty review, as well as Edward Davey MP of developing an accurate measure of fuel poverty in England. Within the body of this thesis, it also delivers a practical process for identifying communities of interest for examining the social practices that contribute to the existence of fuel poverty, the results of which are presented in chapter 5 (study 2a). We continue by outlining and justifying the methodological approach undertaken in developing a new identification and prioritisation framework, before presenting the results of our analysis of the relationship between fuel poverty and deprivation in England. Finally this analysis is discussed before the key contributions to policy making, intervention targeting and our understanding of what fuel poverty in England is are presented and explored.

In doing so, this chapter integrates and brings up to date the analysis and findings of Palmer et al (2008), explores in more detail the extent of the overlap between deprivation and income poverty as discussed by Hills (2012) and seeks to provide a practical tool for identifying and targeting fuel poor communities in England, a need highlighted by the government (Davey 2012). We present a detailed understanding of the current relationship between deprivation and fuel poverty, whilst reflecting the impact of various government intervention schemes that have run in recent years (such as the Decent Homes Standard

(DETR 2000), as well as the Warm Front, (National Audit Office 2009), CESP and CERT which ceased to exist in 2012 (DECC 2012c)). This builds our understanding of the impact of these schemes upon the relationship between general deprivation and fuel poverty in the period since the work of Palmer et al (2008) and to an extent therefore, how effective the policy targeting has been as well as how it could be improved.

4.2 Methodology

Although the predominant view of academic authors, fuel poverty practitioners and the English government (at this current time) is that fuel poverty is a distinct issue, evidence submitted to the Hills fuel poverty review demonstrates that this view is not universal. Milton Keynes Council declared in their submission that "[n]o- one who is otherwise well off has problems meeting their fuel bill" (Hills 2011, p.90). The Hills review refuted this point of view, reflecting the work of both Palmer et al (2008) and Boardman (2010) who's analyses presented evidence to the contrary.

It is pertinent however to revisit the issue, especially as Palmer et al. (2008) demonstrated that as fuel prices have risen, the relationship between fuel poverty and income deprivation has resulted in a reduction in the overlap between the two concepts, increasing the number of non income-poor households who are still fuel poor. Understanding the *current* relationship is important for delivering relevant policy responses, rather than relying on outdated analyses. If the relationship between the two different forms of deprivation is once again close, the concerns of Boardman (2010) and Fahmy (2011) with regards accuracy of proxy measures are lessened. If the relationship has weakened, this body of work will demonstrate the need to provide a practical tool with which to accurately measure fuel poverty for the delivery of policy.

Reflecting the findings and central recommendation of Hills (2012) that the fuel poor are those that are both low income households *and* have high fuel costs, the core aspect of this statistical analysis focusses on exploring the relationship between deprivation level and fuel poverty severity. This is similar to the work of Palmer et al. (2008), but deviates from their chosen methodology by utilising the Index of Multiple Deprivation (IMD) score from English Indices of Deprivation (EID), a composite indicator of deprivation, instead of the income poverty flag contained within the English Housing Condition Survey as a measure of deprivation for statistical comparison. Reflecting the discussion presented in section 4.1.1, we have chosen to utilise the IMD measure rather than a purely income deprived poverty score for comparison with fuel poverty because fuel poverty refers to the consumption of a condition, warmth, rather than consumption of a product, fuel. As such, the poverty score does not reflect the condition being investigated, whereas by utilising a deprivation score we can more accurately represent the nature of the condition of fuel poverty in relation to a comparable, though more encompassing, measure of deprivation.

4.2.1 Choice of datasets for analysis

4.2.1.1 Primary or secondary data?

In order to explore the relationship between the two concepts (fuel poverty and poverty) it was decided that using secondary data would be most appropriate. As an exploration of the current state of an existing and defined social issue, utilising secondary data is the most relevant source of information and provides a number of benefits to the researcher which includes:

- **Ease of access.** Secondary data of relevance is publically available and immediately accessible reducing the cost and time involved to gain appropriate data

- **Sample size.** Secondary data offered a large data set with over 32,000 different data points sampled from across England. This would have been very difficult to achieve if primary data were collected by the investigator themselves.

- **Statistical reliability.** Utilising official government datasets ensures robust collection methodology, particularly when utilising certified official national statistics

- **Transparency of analysis.** As the dataset is easily publically available, it is possible to replicate the analysis to ensure accuracy of findings and conclusions.

(Adapted from Bryman and Bell (2011, pp.313 – 320)

A particular aim of the research was to seek to join a growing conversation within the practitioner and academic realm surrounding the current state of fuel poverty measurement in the UK. Reflecting the economic background against which the independent review of fuel poverty had been commissioned, it became apparent that for the work to be of interest to DECC and the government, the focus should be on the use of existing data, rather than requiring collection of further primary data[1]. This cemented the decision that the use of secondary data was most appropriate for this stage of analysis.

4.2.1.2 Data sources.

As an exploration of the current relationship between fuel poverty and deprivation utilising existing data sources, the decision was made to utilise the official government fuel poverty statistics. The annual report on fuel poverty statistics, published each year by DECC,

[1] It had been possible to discuss an early version of the proposed methodology with those working in the field, including senior fuel poverty policy staff at DECC during a conference in 2013.

details the level of fuel poverty in England two years prior to the reports publication (i.e. the 2014 report, reports on 2012), and is a certified national statistic receiving the quality mark of the UK Statistics Authority. This means that the figures at a national and regional level are all considered to meet the requirements of the UK statistics authority. In support of the annual report, DECC also publish sub-regional fuel poverty data sets, though these are not designated as National Statistics. The sub-regional statistics are modelled statistics, utilising a binary variable identifying whether a house is fuel poor or not in the English Housing Survey as the dependent variable and matching against data from the most recent census (amongst other sources) as the independent variable, in a logistic regression (DECC 2014). This dataset reports on fuel poverty levels at English region, county, parliamentary constituency, local authority and Lower Super Output Area (LSOA) level, aggregating up from the Census Output Area to provide figures at larger geographies. In previous years the dataset also reported the figures at Census Output Area (COA) but following a review of the methodology used to produce the dataset in conjunction with the Office of National Statistics (ONS), the figures were deemed too unreliable at COA level, and it was also warned that the figures should be treated with caution at LSOA level (DECC 2014) .

Deprivation statistics were sought from the EID, more commonly known as the IMD. As a composite indicator the IMD captures multiple forms of deprivation across 7 domains, Income Deprivation, Employment Deprivation, Health Deprivation and Disability, Education Skills and Training Deprivation, Barriers to Housing and Services, Living Environment Deprivation, and Crime (DCLG 2011). In measuring deprivation across multiple domains, the IMD allows the examination of any of the domains discretely, or by utilising the aggregated deprivation score a much broader picture of deprivation in England can be captured, rather than solely focussing on the financial aspect of income poverty, although it should be noted that in the weighted aggregated IMD score, the income deprivation domain carries 22.5% of

the total score weighting, which is equal with the employment deprivation score (Mclennan et al. 2011), demonstrating the significant emphasis still placed upon income in the deprivation score. The relative weights of the seven sub-domains of the IMD are summarised in Table 5 .

Table 5 Weights used in the Index of Multiple Deprivation 2010 (Mclennan et al. 2011, p.18)

	Domain Weight
Income Deprivation	22.5%
Employment Deprivation	22.5%
Health, Deprivation and Disability	13.5%
Education, Skills and Training Deprivation	13.5%
Barriers to Housing and Services	9.3%
Crime	9.3%
Living Environment Deprivation	9.3%

This will undoubtedly deliver differing results to the analyses undertaken by Palmer et al. (2008), who used poverty flags contained within the EHCS for their analysis of the relationship with income poverty. Fahmy et al (2011) note that the method utilised for gathering income data in the EHCS differs from that used in other government surveys of income which may result in an inaccurate picture of income levels if utilised in this analysis and further justifies using an alternative measure of deprivation in the study. The last dataset for the EID was published in 2010 and was based on data from 2008. There have been no further editions of the EID since 2010 with the Department for Communities and Local Government (DCLG) currently working to update the indices for publication in 2015. As a result, it was necessary to utilise the statistics published in 2010 for this body of work.

Using IMD scores moves the debate forward in considering the relationship between fuel poverty and deprivation in a more holistic manner. In utilising a more holistic measure of deprivation it is felt that the statistical analyses will offer insights into the relationship between fuel poverty and other aspects of deprivation considered to be unacceptable in England today. It also encourages relevant parties to consider the multifarious influences on

the existence of fuel poverty. A significant body of work has been completed that utilises the perspectives offered by Social Practice Theory, qualitatively demonstrating that fuel poverty and energy related issue are driven by, and experienced in, a much more dynamic and social manner than considered by the current technically driven measure of fuel poverty (Hitchings and Day 2011; Strengers 2012; Tweed 2013; c.f. Hards 2013). By simply comparing this narrow measure of fuel poverty with a narrow measure of deprivation we fail to recognise the systemic nature of fuel poverty whose root causes are found in many aspects of current society and social life. By analysing a multi-dimensional measure of deprivation alongside the current fuel poverty statistics it is possible to develop a more thorough understanding of how fuel poverty is distributed in England and its relationship with deprivation. In doing so, this new statistical analysis drives further in-depth analysis of the issue and statistical quantification that enables policy makers and planners to include a more representative picture of fuel poverty to be utilised in England.

4.2.1.3 Selection of specific datasets

It was decided to use the most recently available statistics for each domain (fuel poverty and deprivation) at the time of the analysis to reflect as closely as possible the current state of both domains in England. This resulted in the fuel poverty statistics for 2010, published in January 2013, being used to compare with the 2010 English Indices of Deprivation statistics based on data from 2008. It was also decided that the 2010 Fuel Poverty dataset was most appropriate to use due to the consistency of geographical boundaries between the two datasets. The 2011 census was utilised to restructure the boundaries of LSOA's and as such, utilising more recent fuel poverty datasets would introduce a lack of consistency of geographical boundaries in the two datasets. This inconsistency would prevent the comparison of subsequent analyses at the LSOA level and invalidate any conclusions drawn.

4.2.2 Research process

Having identified the data sources for the study, a suitable research process was developed, an outline of which can be seen in Figure 11. The process was defined by three key decision points in the flow. These decision points provided fundamental research questions, the answers to which drove the direction of subsequent levels of analysis.

Initially, a correlation analysis was completed on the aggregated national level of the datasets (a discussion of the statistical methodology follows in section 4.2.4). Following the completion of the correlation analysis, the study seeks to answer the primary research question:

> ***RQ1. Is there an obvious (statistical) relationship at the national level between the English Indices of Deprivation (EID) and sub-regional Fuel Poverty (FP) datasets?***

If there is a strong, significant statistical relationship, the study proceeds to present the results and discussion of this outcome. Should a relationship not be observable at the national level, the analysis is re-run at the Government Operating Region (GOR) level. In completing the analysis at a regional level we hope to explore our second research question, whether there are differing relationships between deprivation and fuel poverty across England at a smaller geographical area or whether there is still a lack of identifiable relationship at this area:

> ***RQ2. Can geographical areas be identified with differing relationships between Fuel Poverty and deprivation.***

If at GOR level, relationships between the two concepts still cannot be identified, the analysis is repeated at Local Authority (LA) level, again looking for identifiable geogrpahical areas with distinct fuel poverty/deprivation relationships. However, if distinct relationships are identified at GOR level, regions of interest are then identified for further analysis at the LA level. This analysis is then utilised to answer our final research question:

RQ3. Can a classification framework be developed that allows categorisation of the geographies identified from research question 2?

To answer this research question, outputs from RQ1 and 2 will be utilised to develop an understanding of the statistical relationships at these different geographies, from which a system of categorisation can be developed. Finally the results of the research process will be presented and discussed.

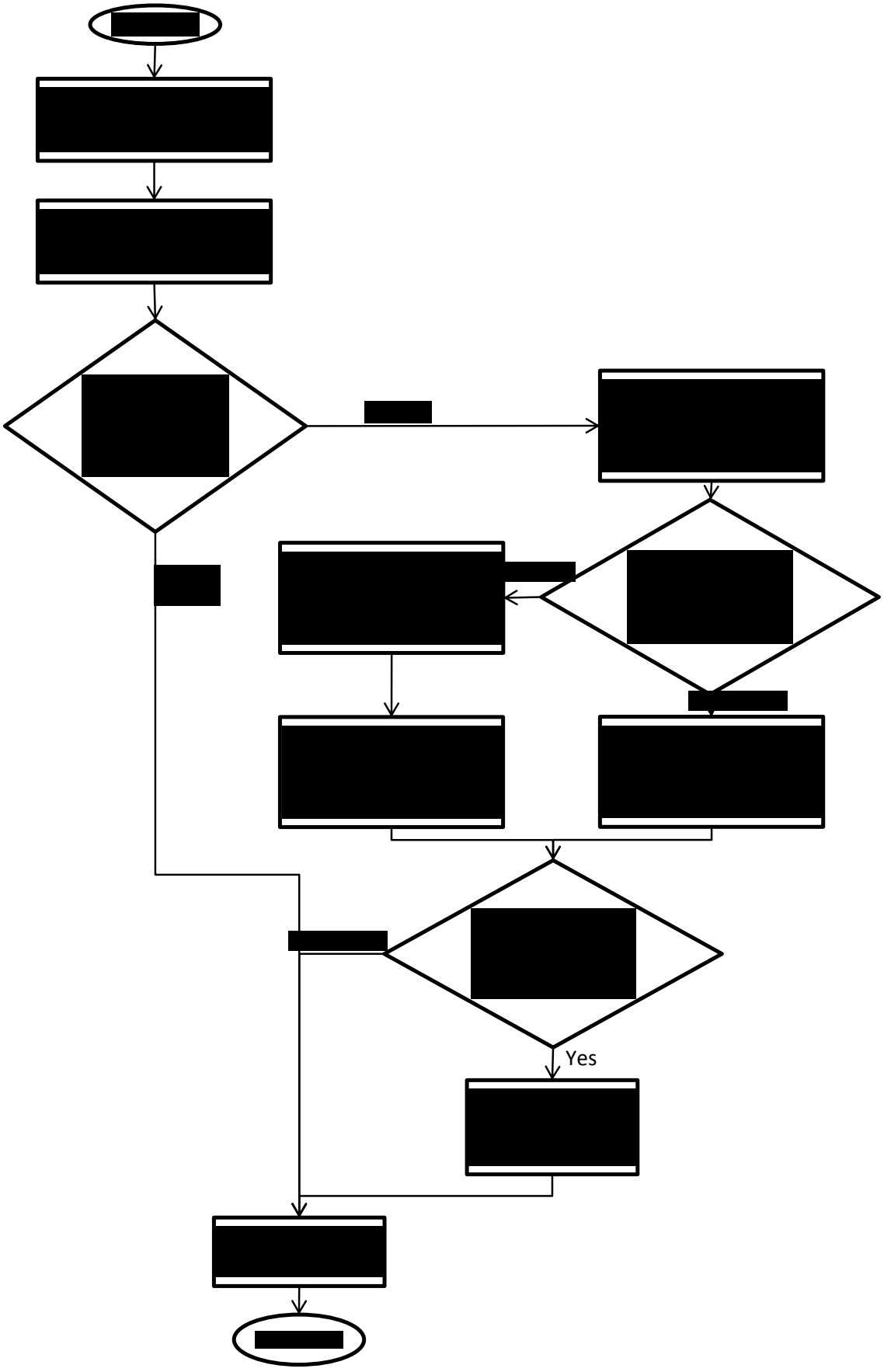


Figure 11 Study 1 research process flow chart

4.2.3 Geographical levels of examination

The nature of the chosen datasets provides the opportunity to explore the relationship between the two phenomena at differing geographic levels, defined by the statistical methodology used to build the two data sources. As highlighted in section 4.2.1.2, the sub-regional fuel poverty dataset provides data at the LSOA, LA, parliamentary constituency, county, and English region level. This enables direct comparison with the English Indices of Deprivation dataset at LSOA, LA, and English region level, as well as at an aggregated national comparison. As can be seen from the flow diagram (Figure 11), whilst the datasets can be cut at different geographical levels of output, the decision as to which level of output is used is driven by the outcomes of the statistical analysis. The statistical analyses are initially completed at the aggregated national level; containing all 32482 LSOA's in England, with smaller area analyses completed as necessary to develop a full understanding of the relationship between fuel poverty and deprivation.

Both the EID and sub-regional fuel poverty statistics are available down to LSOA level allowing direct comparison of these related issues at the same geographic output area. Lower Super Output Areas were created using 2001 census data (Neighbourhood Statistics 2007), and although they were updated after the 2011 census, this analysis uses the 2010 boundaries as there has been no update to the English Indices of Deprivation since the 2010 report. Each LSOA contains roughly 650 households, representing around 1500 inhabitants (Neighbourhood Statistics 2007). Utilising the 2001 LSOA boundaries gave 32,482 LSOA's in England for the data sets being considered.

Walker et al (2012) reflect the concerns of the latest annual report on fuel poverty statistics (DECC 2014) that sample sizes are too small in the English Housing Survey (EHS) to support local area targeting approaches. The EHS, which provides the data used to

calculate the annual fuel poverty statistics, draws upon a two stage methodology, with 13,300 households initially interviewed of which 6,200 properties are then physically inspected for the 2012 – 2013 EHS (Department for Communities and Local Government 2014). Whilst this provides a broad enough sample to statistically model representative figures of area characteristics at the national and regional level, the sample is not large enough to reliably estimate fuel poverty at lower geographic areas such as Local Authority area or Lower Super Output Area (DECC 2014).

In calculating the fuel poverty figures for 2010 (as utilised in the analysis presented in this chapter), a logistic regression model was created (DECC 2012a). As discussed in section 4.2.1.2 this is due to the small sample size utilised in the EHS. In 2010 16,000 households were surveyed for the EHS meaning that there are too few survey responses to estimate fuel poverty at Local Authority level or below directly from this data. In order to estimate fuel poverty levels at lower geographic areas two logistic regression model were created by BRE on behalf of DECC . Information on whether a household was fuel poor or not in the EHS (a binary dependent variable) was matched with data available at smaller output areas from sources such as the 2001 census to estimate the levels of fuel poverty across England (DECC 2012a). Stepwise selection was used to identify variables with the greatest explanatory power which included dwelling age, lifestyle characteristics and English region (DECC 2012a). Two models were created, one for private housing and one for social housing due to suggested differences in fuel poverty distribution in the two housing sectors (DECC 2012a). The combination of the two models enables more accurate modelling. The models deliver the estimates of the percentage of households considered in fuel poverty at COA level which are then applied to estimates of number of households from the 2001 census and ONS data on total number of households at LSOA level to deliver the number of households considered fuel poor (DECC 2012a).

There are implications of utilising estimates of the level of fuel poverty such as those calculated by DECC (2012a). As Walker et al (2012) highlight, the figures are based upon an insubstantial primary dataset, relying upon modelling to deliver small area estimates. Primarily, concern focusses on the accuracy of the statistics, which has particular implications for policy targeting. Utilising modelled statistics may result in "exclusion error" (Walker et al. 2013) with LSOA's incorrectly being identified as not being in fuel poverty. For the analysis being undertaken in this chapter, it was important to be aware of this limitation, a potential implication being that theoretical levels of fuel poverty identified from the dataset would not necessarily match accurately with the actual levels of fuel poverty experienced in a given geography. Whilst the logistic regression model matches against other data sets in creating its estimates of fuel poverty at COA level, the geographical indicators it is argued are "a rudimentary comparison of urban and rural prevalence, and some broad regional disaggregations" (Walker et al. 2012, p.640).

This study acknowledged these concerns and recognised the potential source of inaccuracy in any subsequent analysis. However, if the statistical analysis dictates the need to examine the relationship at Lower Super Output Area, the statistical outcome were to be used to identify localities of interest for further detailed investigation, rather than the creation of a statistical model in itself. This reduced the levels of concern regarding potential inaccuracies in the modelling of the data which would be subsequently explored in future research. In respect to potential practical application of this analysis, the current political appetite as highlighted through personal communication with relevant parties in the civil service as previously discussed, was to improve the ability to identify fuel poor households using existing datasets rather than require the collection of more data. Whilst the sampling procedure utilised to capture fuel poverty statistics was not detailed enough to provide the most robust figures at LA or LSOA level, given our focus on the insights gained being used

as a platform for subsequent, localised qualitative data collection, the political wish to minimise expenditure on further data collection and the evidenced need to improve targeting of fuel poverty policy and interventions; the decision was taken that utilising data at these geographic levels provided the necessary insights and understanding to deliver a practical insight that could lead to improvements to the current efficiency of expenditure for fuel poverty eradication.

4.2.4 Statistical analyses

The study utilises correlation analysis to scrutinise the relationship between the English Indices of Deprivation, 2010 and the sub-regional Fuel Poverty statistics, 2012. Correlation analysis is a simple but powerful statistical procedure which provides a strong understanding of the nature of the numerical relationship between the phenomena examined. As well as undertaking the correlation analysis between Fuel Poverty and the Index of Multiple Deprivation score, analyses were also carried out between Fuel Poverty and the seven sub compionents of the IMD as identified in section 4.2.1.2.

Prior to completing the analyses, the datasets will be subjected to tests of normality, skewness and kurtosis in SPSS. These tests ensure the fundamental assumptions required to complete a valid correlation analysis are met, and will inform whether a Pearson's correlation or Spearman's Rho correlation are used. If the normality test results demonstrate that the dataset meets the assumptions of normality, the correlation analysis will be completed using a Pearson product moment correlation. However if non-normality of data is observed, a Spearman's rank order correlation coefficient will be calculated as this non-parametric tests makes no assumptions of the normality of the data. After identifying which form of correlation analysis to use, the tests will be run with the results measured for statistical significance at both the 0.01 and 0.05 level.

4.3 Results & Discussion

4.3.1 Correlations at the national level

4.3.1.1 Normality checks

Scatterplots were created to examine the linearity of the relationship between relevant pairs of variables in the Fuel Poverty against IMD dataset. The scatterplots suggested the presence of linearity between the variables, indicating that correlation analysis was appropriate, though there were a notable number of outliers, indicating potential for non-normal distribution of data.

When considering the scatterplots of the number of households considered fuel poor (as defined by the original 10 per cent indicator of fuel poverty) against IMD (see Figure 12), and the percentage of households considered fuel poor (as defined by the original 10 per cent indicator of fuel poverty) against IMD (see Figure 13), the generally linear relationship between the variables is visually apparent. Whilst this relationship was broadly observable from the plot, the R^2 values of 0.121 and 0.172 suggest a relatively weak relationship between the variables, supporting the visual presence of a number of outlier points in the scatterplots and emphasising the potential for non-normal distribution of data. Although the scatterplots were created to analyse the data to determine the appropriate form of correlation analysis to be completed, a more detailed examination of the key variables of interest (IMD aggregate score, number of households considered fuel poor and percentage of households considered fuel poor) allowed for a preliminary assessment of the expected outcomes from the subsequent correlation analysis. Given the dispersion of the scatterplots with a broadly linear, but week relationship as indicated by the respective lines of best fit, it was expected that the correlation analysis would deliver a broadly positive but weak correlation between the variables of interest. In order to complete this assessment, further verification of the non-normality of the data distribution was required.

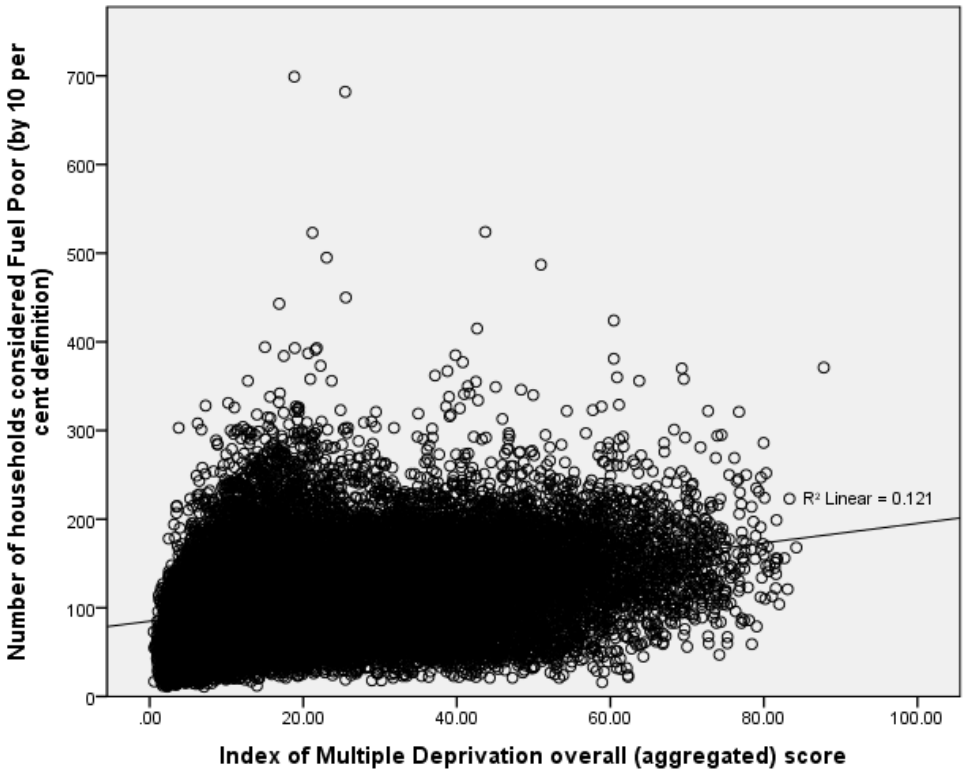


Figure 12 Scatterplot of IMD (aggregated) score against Number of households considered fuel poor (Each circle represents one LSOA)

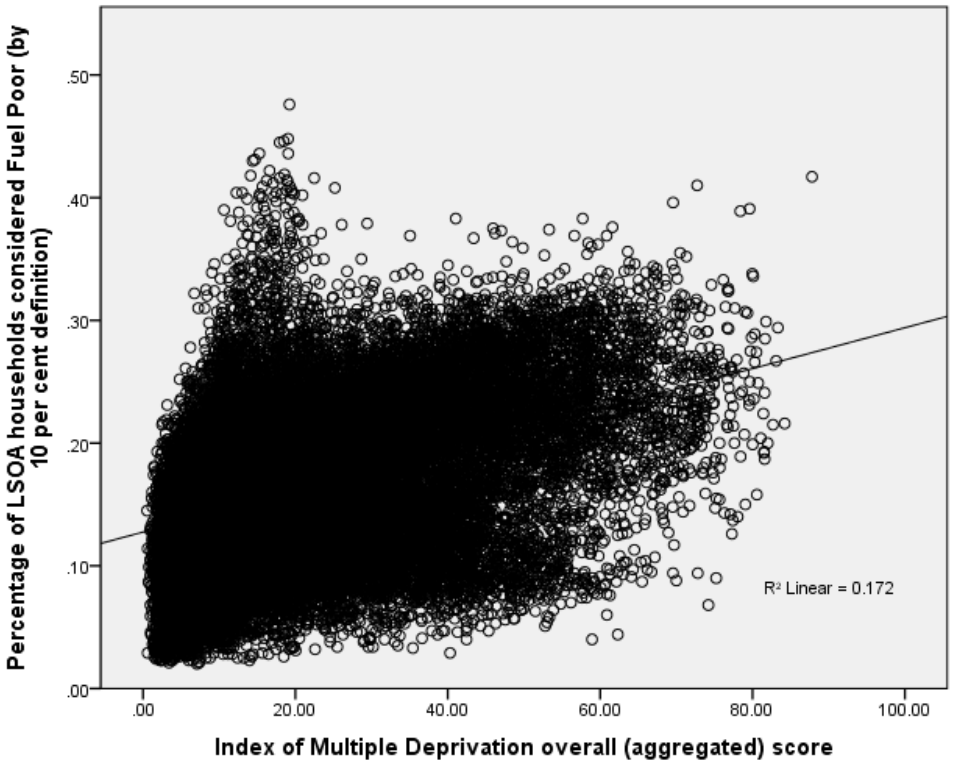


Figure 13 Scatterplot of IMD (aggregated) score against percentage of households considered fuel poor (Each circle represents one LSOA)

The datasets were subjected to the Kolmogorov-Smirnov test to assess the normality of the data. As the dataset population size was considered large (n = 32482) it was not appropriate to use the Shapiro-Wilk test and similarly, the results of the Kolmogorov-Smirnov test are not conclusive for testing normality and must be combined with visual methods such as Q-Q plots, box plots, and numerical methods such as skewness and kurtosis coefficients (Razali and Wah 2011). With such a large dataset it was expected that tests would indicate non-normality of data with the existence of skewness and kurtosis. This was confirmed with the Kolmogorov-Smirnov (K-S) test (see Table 6) with all variables returning significance values of 0, which is less than 0.05, indicating non normality of data (Field 2013), and Q-Q plots and box plots of variables all demonstrating a visual representation of skewness and/or kurtosis existing for each variable in the dataset.

Table 6 Kolmogorov Smirnov tests of normality and Skewness and Kurtosis values for the fuel poverty and Index of Multiple Deprivation dataset

	Kolmogorov-Smirnov[a]						
FP IMD Dataset variable	Statistic	df	Sig.	Skewness	S.E.	Kurtosis	S.E.
Number households in LSOA	**.117**	**32482**	**.000**	**7.078**	**0.014**	**190.159**	**.027**
Number households FP	**.060**	**32482**	**.000**	**1.067**		**3.169**	
% LSOA considered FP	**.046**	**32482**	**.000**	**.422**		**.019**	
IMD aggregate score	**.114**	**32482**	**.000**	**1.097**		**.696**	
IMD income score	**.146**	**32482**	**.000**	**1.204**		**1.012**	
IMD employment score	**.149**	**32482**	**.000**	**1.448**		**2.725**	
IMD Health, Deprivation and Disability score	**.016**	**32482**	**.000**	**.113**		**-.152**	
IMD Education, Skills and Training score	**.125**	**32482**	**.000**	**1.283**		**1.264**	
IMD Barriers to Housing and Services score	**.055**	**32482**	**.000**	**.577**		**-.114**	
IMD Crime and Disorder score	**.013**	**32482**	**.000**	**-.004**		**-.191**	
IMD Living Environment score	**.116**	**32482**	**.000**	**1.091**		**.014**	

a. Lilliefors Significance Correction

The combined results of these tests indicated significant departures from normality within the dataset and therefore that a Pearson product-moment correlation analysis would be invalid. For example, considering the variable, Number of Households in LSOA, as noted by the values in Table 6, the K-S test returned the value D (32492) = 0.117, p >0.05 indicating

non-normality of data. Skewness and Kurtosis for this variable were 7.078 and 190.159 respectively, both non-zero by a notable degree, indicating non-normality. Consideration of the Q-Q plot for IMD overall (aggregated) score (see Figure 14) also confirmed notable non-normality with significant deviation from the expected plot line which was further emphasised through consideration of the box plot (see Figure 15). Similar results were also observed for all other variables, confirming that the use of parametric tests would be inappropriate for this data.

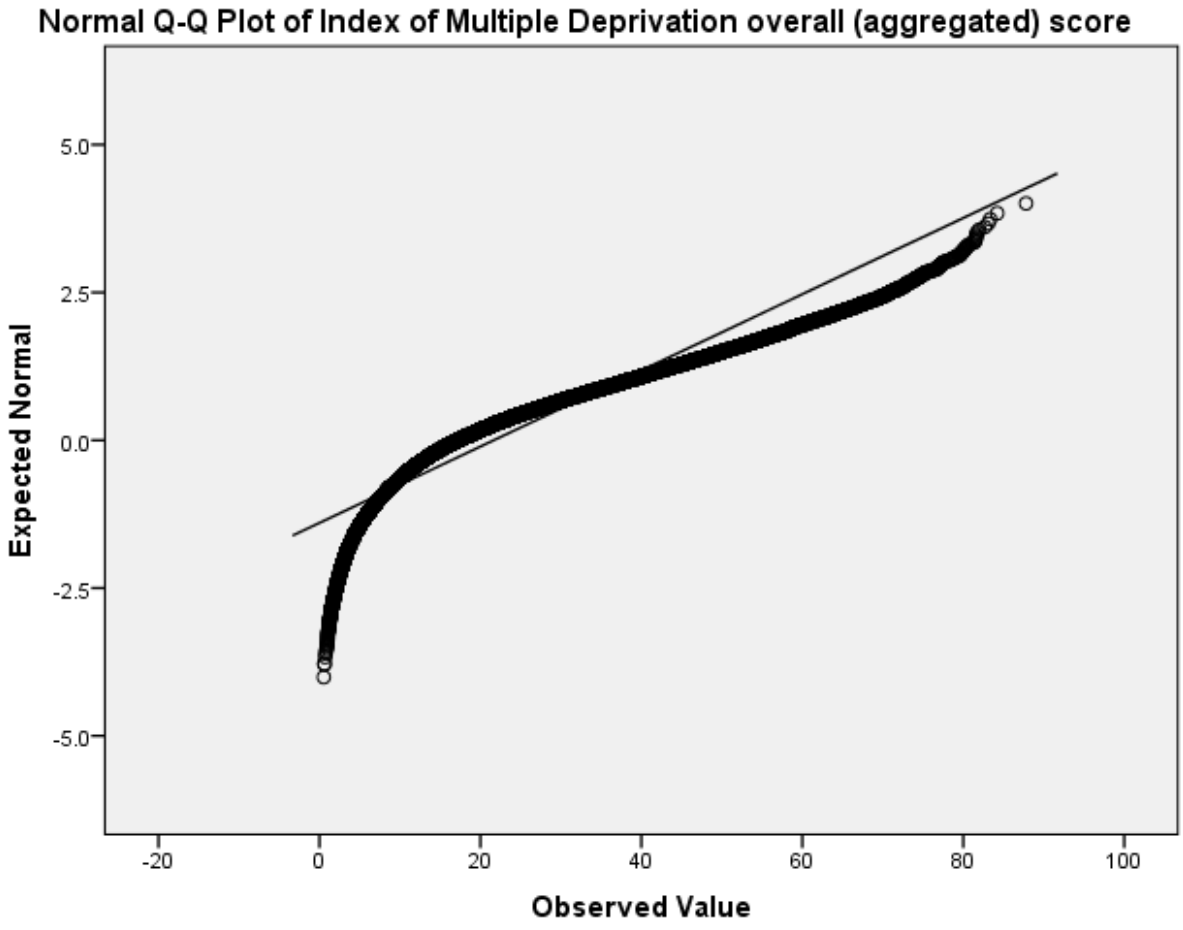


Figure 14 Q-Q Plot of IMD overall (aggregated) score (Each circle represents one LSOA)

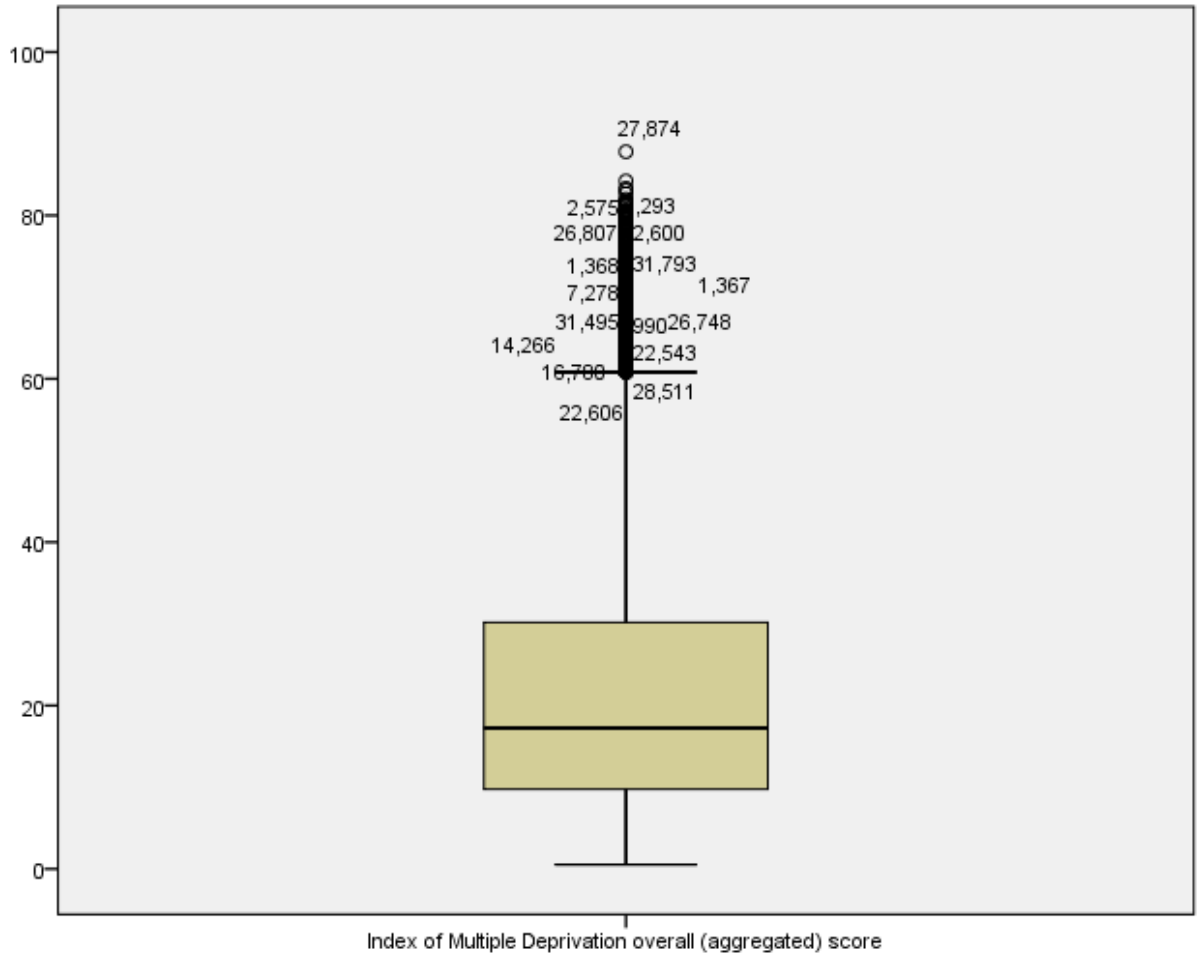


Figure 15 Box Plot of IMD overall (aggregated) score

Instead nonparametric testing was chosen with a Spearman's rank order correlation coefficient (i.e. Spearman's rho) calculated to assess RQ1 (as stated in section 4.2.2) at the national level of the dataset. Full results of the correlations between the aggregated IMD score, percentage of LSOA considered fuel poor and number of households in LSOA considered fuel poor against all variables in the dataset are presented in appendix 8.1. For clarity, selected correlations are reported in Table 7 focussing on the variables of greatest interest relating to fuel poverty and deprivation. In order to assess the validity of the correlation coefficients, 95% and 99% confidence intervals were calculated through use of the bootstrapping procedure in SPSS, 100 bootstrap samples were utilised to calculate these values.

Table 7 Nonparametric correlations between fuel poverty and selected components of the English Indices of Deprivation at the aggregated National level

			Index of Multiple Deprivation overall (aggregated) score	% LSOA considered FP	Number households FP
Index of Multiple Deprivation overall (aggregated) score	Correlation Coefficient		**1.000**	.410**	.380**
	95% Confidence Interval	Lower	**1.000**	.400	.370
		Upper	**1.000**	.420	.390
	99% Confidence Interval	Lower	**1.000**	.397	.367
		Upper	**1.000**	.423	.394
% LSOA considered FP	Correlation Coefficient		.410**	**1.000**	.895**
	95% Confidence Interval	Lower	.400	**1.000**	.892
		Upper	.420	**1.000**	.898
	99% Confidence Interval	Lower	.397	**1.000**	.891
		Upper	.423	**1.000**	.899
Number households FP	Correlation Coefficient		.380**	.895**	**1.000**
	95% Confidence Interval	Lower	.370	.892	**1.000**
		Upper	.390	.898	**1.000**
	99% Confidence Interval	Lower	.367	.891	**1.000**
		Upper	.394	.899	**1.000**

**. Correlation is significant at the 0.01 level (2-tailed).

b. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

The Spearman's rho coefficients demonstrated that there was a statistically significant relationship between all variables examined, though there was a varying strength of relationship. The 95% and 99% confidence intervals were in all cases very narrowly banded around the correlation coefficients calculated, one percent either side of the correlation coefficient value for the 95% confidence interval. This suggests that correlation values calculated can be considered with strong confidence as containing the population correlation value. Although the correlation was reported for all components of the IMD and FP dataset, RQ1 is explicitly interested in understanding whether there is a significant statistical relationship between Fuel Poverty and the Index of Multiple Deprivation score. In order to gauge the strength of the correlation, categories were adopted from those set out by Dancey and Reidy (2014) as set out in Table 8.

Table 8 Strength of correlation classifications according to Dancey and Reidy (2014)

Value of the Correlation Coefficient	Strength of Correlation
1	Perfect
0.7 – 0.9	Strong
0.4 – 0.6	Moderate
0.1 – 0.3	Weak
0	Zero

The analysis revealed a moderate, positive, statistically significant relationship between the aggregate IMD score and the percentage of households considered Fuel Poor under the 10% definition of fuel poverty (r_s[32482] = .41, p<.01). If we consider the relationship between the number of fuel poor households in the LSOA and the aggregate IMD score, the coefficient becomes a weak, positive, significant relationship (r_s[32482] = .38, p<.01). When these scores are considered in conjunction with their scatterplots, it is apparent that given the relatively low strength of the correlation coefficients and the significant spread of the plots, there is not an obvious statistical relationship between fuel poverty and deprivation at the English national level.

4.3.2 Correlation at Government Operating Region (English Region) level

The process therefore moved to consider RQ2 "Can geographical areas be identified with differing relationships between Fuel Poverty and deprivation", as per the process flow in Figure 11. SPSS was used to split the dataset according to Government Operating Region before a Spearman's rho coefficient was calculated across the same variables as in RQ1. The full results can be found in Table 9.

Unlike the results presented for the National level analysis in Table 7, 95% and 99% confidence intervals were not calculated for this level of analysis. Large sample sizes tend to "reduce the width of a confidence interval" (Gardner and Altman 1986, p.749). The samples size used in this study is very large with data for 32482 separate LSOA's utilised. As can be seen from the analysis presented in Table 7, the 95% and 99% confidence intervals were

narrow. Given the demonstrated narrow nature of the confidence intervals from the national analysis and the large sample size utilised for the analysis it was felt that the calculation of confidence intervals at the regional and local authority level would not be necessary.

Resultant coefficients varied across England with all coefficients apart from that between IMD aggregate score and percentage fuel poverty in London (which was not statistically significant), significant at $p<0.01$. The weakest statistically significant coefficient was found between the number of fuel poor homes and IMD aggregate score in London (r_s [4765] = .094, p<.01) with the strongest coefficient for that relationship found in the North East (r_s [1656] = .562, p<.01). The coefficient for the relationship between percentage fuel poverty and IMD aggregate score for the North East was stronger still (r_s [1656] = .695, p<.01). The strongest statistical relationship was found between these two variables in the East Midlands region (r_s [2732] = .696, p<.01). Examination of the coefficients contained within Table 9 demonstrates the possibility to identify differing relationships between deprivation and fuel poverty across England at the Government Operating Region level. The results also demonstrate the existence of a broad north-south divide in the relationship between deprivation and extent of fuel poverty with a general trend for an increasing strength of correlation from the south to the north of England. Southern regions range from a non-significant negative correlation between percentage of LSOA's considered fuel poor and IMD aggregate score in London of -2.4% (r_s[4765] = -.024) to a moderate positive correlation in the South East of 37.8% (r_s[5319] = .378, p<.01). Northern regions (including the Midlands) ranged from a lower limit of strong positive 51.7% correlation in Yorkshire and the Humber (r_s [3293] = .517, p<.01) to strong positive 69.6% correlation in the East Midlands region (r_s [2732] =.696, p<.01). The correlations in the northern regions did not demonstrate a geographical relationship (i.e. the correlation strength did not increase as more

northerly regions were considered), but were all notably stronger correlations than those demonstrated in southern regions.

Table 9 Nonparametric correlations between fuel poverty and components of the Index of Multiple Deprivation split by Government Operating Region

Government Operating Region Name		Number households FP	% LSOA considered FP
East Midlands	IMD aggregate score	.556**	.696**
	% LSOA considered FP	.815**	1.000
	Number households FP	1.000	.815**
East of England	IMD aggregate score	.372**	.376**
	% LSOA considered FP	.833**	1.000
	Number households FP	1.000	.833**
London	IMD aggregate score	.094**	-.024
	% LSOA considered FP	.688**	1.000
	Number households FP	1.000	.688**
North East	IMD aggregate score	.562**	.695**
	% LSOA considered FP	.817**	1.000
	Number households FP	1.000	.817**
North West	IMD aggregate score	.499**	.591**
	% LSOA considered FP	.803**	1.000
	Number households FP	1.000	.803**
South East	IMD aggregate score	.400**	.378**
	% LSOA considered FP	.839**	1.000
	Number households FP	1.000	.839**
South West	IMD aggregate score	.378**	.372**
	% LSOA considered FP	.840**	1.000
	Number households FP	1.000	.840**
West Midlands	IMD aggregate score	.453**	.585**
	% LSOA considered FP	.800**	1.000
	Number households FP	1.000	.800**
Yorkshire and The Humber	IMD aggregate score	.367**	.517**
	% LSOA considered FP	.776**	1.000
	Number households FP	1.000	.776**

4.3.3 Correlation at the Local Authority level

To further explore the geographic variation in the relationship, the analysis was repeated at the next smallest geographic area available in the dataset. The constituent Local Authorities of six of the English regions previously analysed were identified to provide a small area picture of the relationship. As with the prior analyses, SPSS was used to split the dataset and extract the relevant Government Operating Regions in order to analyse the Local authorities using the Spearman's rank order correlation analysis. The GOR's chosen were East Midlands, London, North East, North West, South West and Yorkshire & the Humber. These GOR's were identified as they contain all of the English cities that are members of the

UK core cities group, as well as the English capital city of London. These cities and their constituent urban areas are the "most economically important English cities outside of London" (DCLG 2012) and represent around 27% of the English economy and one third of England's population (Core Cities 2013). By focussing on these core cities as well as London (which is home to 16% of the English population (Office for National Statistics 2013) and accounts for around 26% of the English economy (Office for National Statistics 2014a)), this analysis captures the major population centres of England, allowing an understanding of the fuel poverty-deprivation relationship amongst the largest proportion of the population. In terms of developing policy, by focussing on the major population centres, this methodology enables the greatest impact on the widest range of the English population. Full results of the Local Authority analysis, broken down by focal GOR are presented in appendix 8.2.

At the Local Authority (LA) level, the strength of the correlation coefficients within each English region varied to a large extent as did the number of significant coefficients. The number of statistically non-significant Local Authority correlation coefficient results is reported in Table 10. As with the results reported in section 4.3.2, a clear difference between the results in northern and southern English regions can be seen, with no non-significant results in the North East compared to 63% of coefficients being non-significant in London.

Table 10 Number of constituent Local Authorities with non-significant correlation coefficients for correlations with IMD aggregate score

English Region	Number of households considered fuel poor	Percentage of LSOA considered fuel poor
East Midlands	5 (40)	1 (40)
London	20 (33)	21 (33)
North East	0 (12)	0 (12)
North West	4 (39)	5 (39)
South West	17 (37)	20 (37)
Yorkshire & the Humber	4 (20)	3 (20)

Number of constituent local authorities are shown in brackets

Although results varied within each region, the broadest range of coefficients was found in London. Excluding non-significant results, coefficients between IMD and both the number of fuel poor households within the constituent LSOA's and the percentage of households considered fuel poor within the constituent LSOA's were found with both negative and positive correlations. This was not found in either of the northern regions, and only one example found in the South West region in Christchurch for the correlation between IMD aggregate score and the percentage of LSOA considered fuel poor ($r_s[30] = -.466$, $p<.01$) .

4.3.3.1 Correlations in the London region

In London the strongest negative correlation was found in Bexley for the correlation between IMD aggregate score and the percentage of LSOA considered fuel poor (r_s [146] = -.543, $p<.01$). Similar negative correlations were found in Brent (r_s [174] = -.410, $p<.01$), Hackney (r_s [137] = -.392, $p<.01$), Islington (r_s [118] = -.226, $p<.01$), Newham (r_s [159] = -.277, $p<.01$), Sutton (r_s [121] = -.237, $p<.01$) and Waltham Forest (r_s [145] = -.327, $p<.01$). Fewer than 33 per cent of correlation coefficients between IMD score and number of households were positive, with only 18.18% of correlation coefficients between IMD score and percentage of LSOA considered fuel poor positive in London. The strongest positive coefficients were found in Haringey with IMD against number of Fuel Poor households a weakly positive correlation (r_s [144] = .351, $p<.01$) and a weakly positive correlation between IMD aggregate score and percentage of LSOA considered fuel poor (r_s [144] = .330, $p<.01$)

4.3.3.2 Correlations in the South West region

As with the London region, non-significance of correlations was common throughout the dataset, with 45.9 per cent of correlation coefficients between IMD and Number of households considered fuel poor being non-significant and 54 per cent of correlation coefficients between IMD and percentage of households considered fuel poor non-significant.

Amongst those results that were significant, the South West demonstrated a more consistently positive relationship between fuel poverty and deprivation as previously discussed. Of the 37 Local Authorities considered, the weakest correlation was between IMD aggregate score and number of fuel poor households in Bournemouth (r_s [107] = .190, p<.05) and this relationship was only significant at the .05 level. At the .01 level Cornwall Unitary Authority had two weak positive correlations, with IMD against number of fuel poor households presenting a 20.1 per cent correlation (r_s [327] = .201, p<.01) and IMD against percentage of fuel poor households presenting a 19.2 per cent correlation (r_s [327] = .192, p<.01).

Despite a generally weaker strength of correlation in the south western region than demonstrated in northern regions the local authority of Gloucester demonstrated a strong positive relationship in both domains; (r_s [74] = .742, p<.01) for IMD against number of households fuel poor, and (r_s [74] = .692, p<.01).

4.3.3.3 Correlations in the North East region

The North East was the only region analysed where all correlations were statistically significant with all bar one coefficient greater than 50 per cent. Durham Unitary Authority had the weakest correlation of 48.8 per cent (r_s [320] = .488, p<.01) between the IMD score and the number of households considered fuel poor. Stockton-On-Tees returned the strongest correlation in both categories of interest; (r_s [117] = .735, p<.01) for IMD score against number of households considered fuel poor and (r_s [117] = .858, p<.01) for IMD score against percentage of households considered fuel poor.

4.3.3.4 Correlations in the North West region

As with Yorkshire and the Humber (discussed in section 4.3.3.5) the North West region offered a broad range of strength of correlations across the two focal relationships (IMD against number of households in fuel poverty and IMD against percentage of households in

fuel poverty). Around 11% of results in these two categories were not statistically significant, but in keeping with all northern regions analysed, no negative correlations were observed.

Pendle had a particularly strong correlation between IMD aggregate score and percentage of LSOA considered fuel poor (r_s [57] = .874, p<.01), though only a moderate strength correlation between IMD aggregate score and number of households in LSOA considered fuel poor (r_s [57] = .609, p<.01). Rossendale had a similar split in strength of correlation between percentage of LSOA considered fuel poor (r_s [44] = .778, p<.01) and number of households considered fuel poor (r_s [44] = .778, p<.01), whereas Wigan was more consistent with (r_s [200] = .769, p<.01) and (r_s [200] = .703, p<.01) respectively.

The region's two core cities of Liverpool and Manchester both demonstrated statistically significant but weak correlations across both of the measures of fuel poverty being considered, around the .40, p<.01 level. Precise figures are given in appendix 8.2. Lancaster returned the weakest statistically significant correlations across both factors. When considering IMD aggregate score against Number of households in the LSOA considered fuel poor the result was (r_s [89] = .321, p<.01) and IMD against percentage of LSOA considered fuel poor was (r_s [89] = .277, p<.01). The lowest statistically significant correlation was returned in Blackburn with Darwen between IMD and number of fuel poor houses, (r_s [91] = .263, p<.05), which is 5.8% weaker than the relationship between these two factors in Lancaster, although is only significant at p=0.05.

4.3.3.5 Correlations in the Yorkshire and the Humber region

Similar to the North West Region, Yorkshire and the Humber demonstrated a great diversity of results compared to the other regions analysed at local authority level. It contained a small number of non-significant results and no negative correlation coefficients. The range of coefficients was broader than those demonstrated in the North East, though not

as great as the North West or East Midlands, with the weakest relationship in the local authority of City of Kingston Upon Hull (r_s [163] = .230, p<.01) between IMD score and the number of households considered fuel poor and (r_s [163] = .329, p<.01) between IMD score and the percentage of households considered fuel poor. The local authorities of Sheffield and Scarborough (who had the weakest relationship between IMD score and percentage fuel poverty (r_s [71] = .297, p<.01)) also had particularly weak correlation coefficients.

Whilst some particularly weak correlations were evident within Yorkshire and the Humber, some strong relationships were also noted. East Riding of Yorkshire had a correlation coefficient of 67.4 per cent (r_s [209] = .674, p<.01) between IMD score and number of fuel poor households, and 70.1 per cent (r_s [209] = .701, p<.01) between IMD and percentage fuel poverty. Relationships of a similar strength were found in Wakefield and a number of authorities returning correlation coefficients around the 50 per cent figure for one or both of the correlations of interest.

4.3.3.6 Correlations in the East Midlands Region

Whilst the East Midlands region was the source of the largest significant correlation between percentage of homes considered fuel poor and IMD score in England; the correlation figures for the constituent Local Authorities of the region were far more varied. Again, there were few non-significant results, although interestingly these were weighted to the correlations between the number of homes considered fuel poor and IMD, with only one Local Authority returning a statistically non-significant correlation between percentage of homes considered fuel poor and IMD score.

Once again, the correlations for each of the constituent Local Authorities offered a range of strength of correlations, although they were narrower than those returned within Yorkshire and the Humber, and similar to those in the North West of England. The Local Authority of

Ashfield returned the strongest correlation coefficient between percentage of homes considered fuel poor and IMD overall score (r_s[74] = .829, p<.01), slightly weaker than that experienced in Pendle in the North West, but still a strong statistical correlation. The weakest correlation between these two factors in the region was experienced in the Derbyshire Dales (r_s [43] = .388, p<.05), although this was only significant at the 5% level.

The correlations between number of homes considered fuel poor and IMD aggregate score were much more closely bounded, generally fitting in the range of 0.4-0.7. There was one exception to this in West Lindsey which demonstrated the weakest statistically significant result in the region (r_s [53] = .288, p<.05).

Unlike many of the local authorities in the region that experienced notable differences in the two different correlation coefficients (in the region of 10 – 20%, full results can be seen in appendix 8.2), the region's core city of Nottingham returned a much more balanced set of coefficients, (r_s[176] = .532, p<.01) for IMD against number of homes considered fuel poor and (r_s[176] = .536, p<.01) for IMD against the percentage of homes considered fuel poor.

4.3.4 Summary of the FP/IMD correlation analysis

Having analysed the relationship between fuel poverty and deprivation at Local Authority, Government Operating Region and National levels, the results demonstrate that there is not a consistent relationship between the two concepts across England at any of these geographic levels. Broadly speaking a north-south divide is evident with an increasing strength of correlation coefficients as you move north through the country. Despite this general trend, the relationship is strongest in the East Midlands rather than in the North East or North West of England as you might otherwise expect.

As the analysis increased in granularity to consider the relationship within the constituent local authorities of six GORs identified as they contain each of England's core cities, the

analysis also demonstrated that there was notable variation in the relationship between fuel poverty and IMD within each focal GOR. Thus, whilst the strength of the relationship tended to be stronger in the north of England, when considering a finer level of geographic detail it was apparent that there were pockets of Local Authorities with very weak correlations between the concepts (such as City of Kingston Upon Hull ($r_s[163] = .230, p<.01$) between IMD score and the number of households considered fuel poor) and others with very strong correlations (for example Stockton-On-Tees ($r_s[117] = .735, p<.01$) for IMD score against number of households considered fuel poor).

The lack of consistent relationships at all geographic levels suggests that instead of seeking to treat the issue with a consistent approach across England, it would be more appropriate to understand the relationship between fuel poverty and poverty in a more localised manner.

4.4 Developing a classification framework

The breadth of variation in the relationship between IMD and fuel poverty demonstrated by the statistical analysis drove the research to RQ3 in the process flow (Figure 11) seeking to develop a classification framework for the different geographies identified.

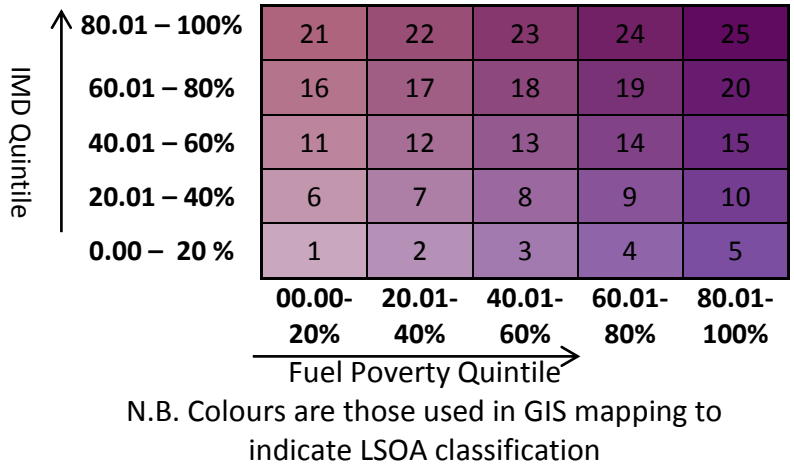
The English Indices of Deprivation, often referred to as the Index of Multiple deprivation, is utilised as a measure of deprivation for many public policy decisions. Although all LSOAs are ranked within the dataset, it is common for the dataset to be split by quartile, quintile or even decile depending upon the needs of the analyst. In order to provide a classification of the LSOA's in England, it was decided to reflect this approach in the classification development.

SPSS was used to classify each LSOA according to its IMD quintile and percentage of households considered fuel poor quintile. Quintiles were chosen as they allow for comparison

of different levels of deprivation and affluence, and are a common level of separation used for setting public health targets and in local authority poverty profiling. The use of quintiles creates 25 different categories of depth of deprivation and depth of fuel poverty, providing a detailed level of separation for each of the 32482 LSOA's in England, without being as large and potentially too nuanced as would be achieved with using deciles (i.e. 100 different categories).

Quintiles were not weighted to reflect the distribution of scores, but were instead created by dividing the two datasets into equal sized categories. This gave 25 categories as demonstrated in Table 11. The IMD values and Fuel Poverty values are given in Table 12

Table 11 IMD and Fuel Poverty classification matrix. Cell numbers represent individual classification categories based on Fuel Poverty and IMD quintile



N.B. Colours are those used in GIS mapping to indicate LSOA classification

Table 12 Quintile values for IMD score and percentage fuel poverty

Quintile	IMD score range	Percentage fuel poverty range
0-20%	0 – 8.49	0 –10.9%
21 – 40%	8.5 – 13.79	10.91% – 14.10%
41-60%	13.8 – 21.35	14.11% – 17.60 %
61-80%	21.36 – 34.17	17.61% – 21.70%
81 – 100%	34.18 +	21.71% +

Matrix classification categories results were then mapped back using SPSS on to each of the LSOA's contained in the dataset. This dataset was then loaded in to ArcGIS and mapped on to the official Office of National Statistics maps for the LSOA boundaries in England for 2010. The resultant map for the whole of England can be seen in Figure 24. In order to demonstrate different degrees of homogeneity of region observable throughout England, a selection of more detailed local geographic area maps are provided for Birmingham, Bristol, Craven, Herefordshire, London, Newcastle, North Cornwall and Sheffield in Figure 16 to Figure 23. As can be seen, some areas demonstrate a much greater homogeneity of classification than others, with city areas tending to show greater variation than rural zones. This will be considered in more detail in the discussion.

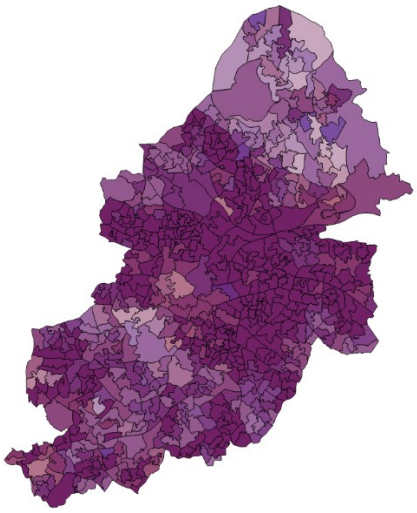


Figure 16 Map of IMD, FO classification matrix values for Birmingham LSOA's

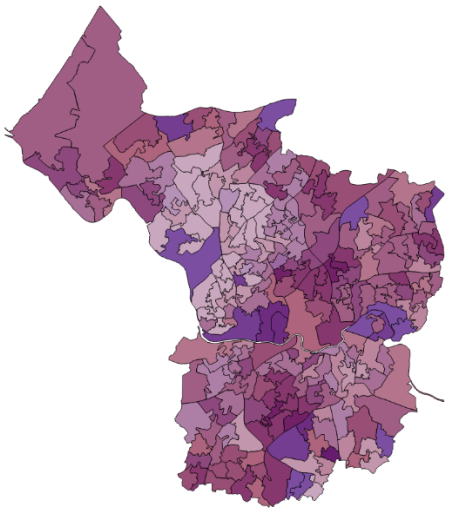


Figure 17 Map of IMD, FP classification matrix values for Bristol LSOA's

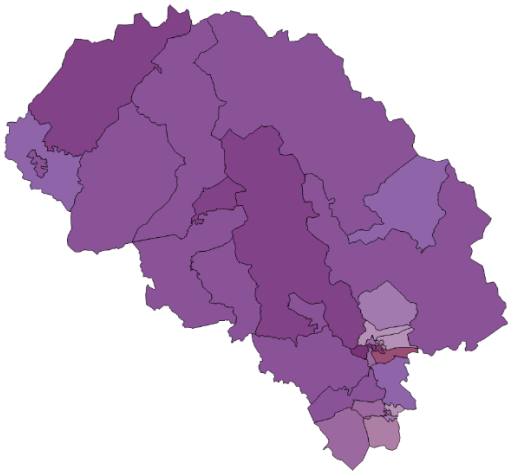


Figure 18 Map of IMD, FP classification matrix values for Craven LSOA's

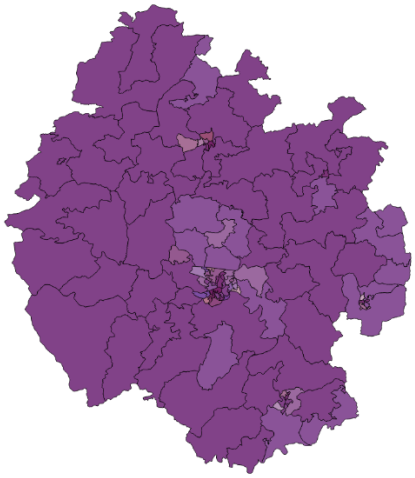


Figure 19 Map of IMD, FP classification matrix values for Herefordshire LSOA's

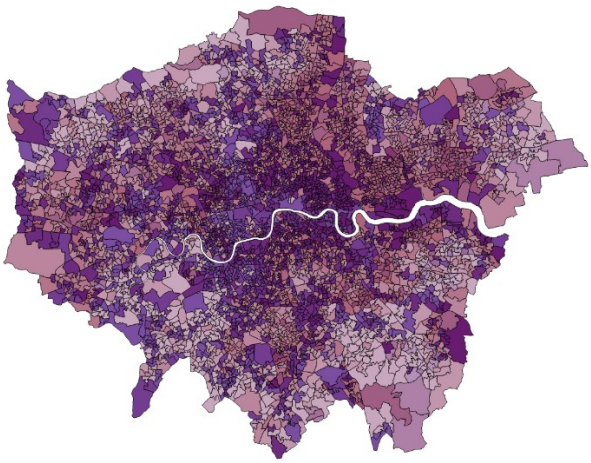


Figure 20 Map of IMD, FP classification matrix values for London LSOA's

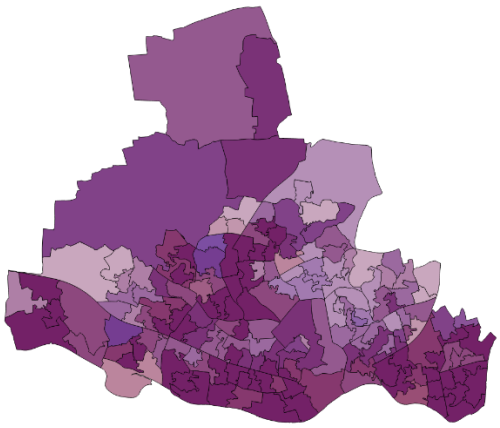


Figure 21 Map of IMD, FP classification matrix values for Newcastle LSOA's

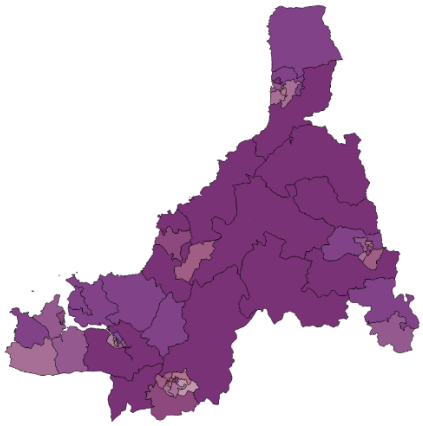


Figure 22 Map of IMD, FP classification matrix values for North Cornwall LSOA's

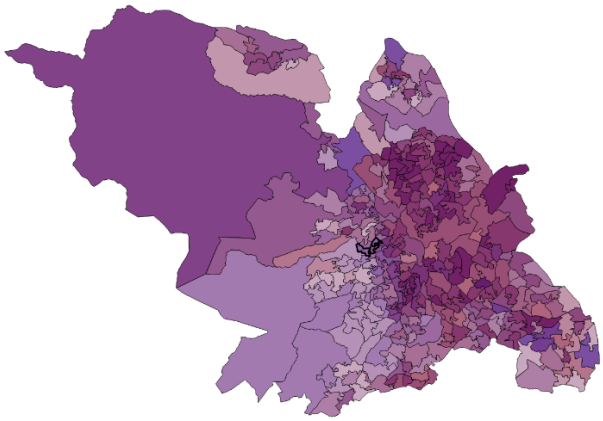


Figure 23 Map of IMD, FP classification matrix values for Sheffield LSOA's

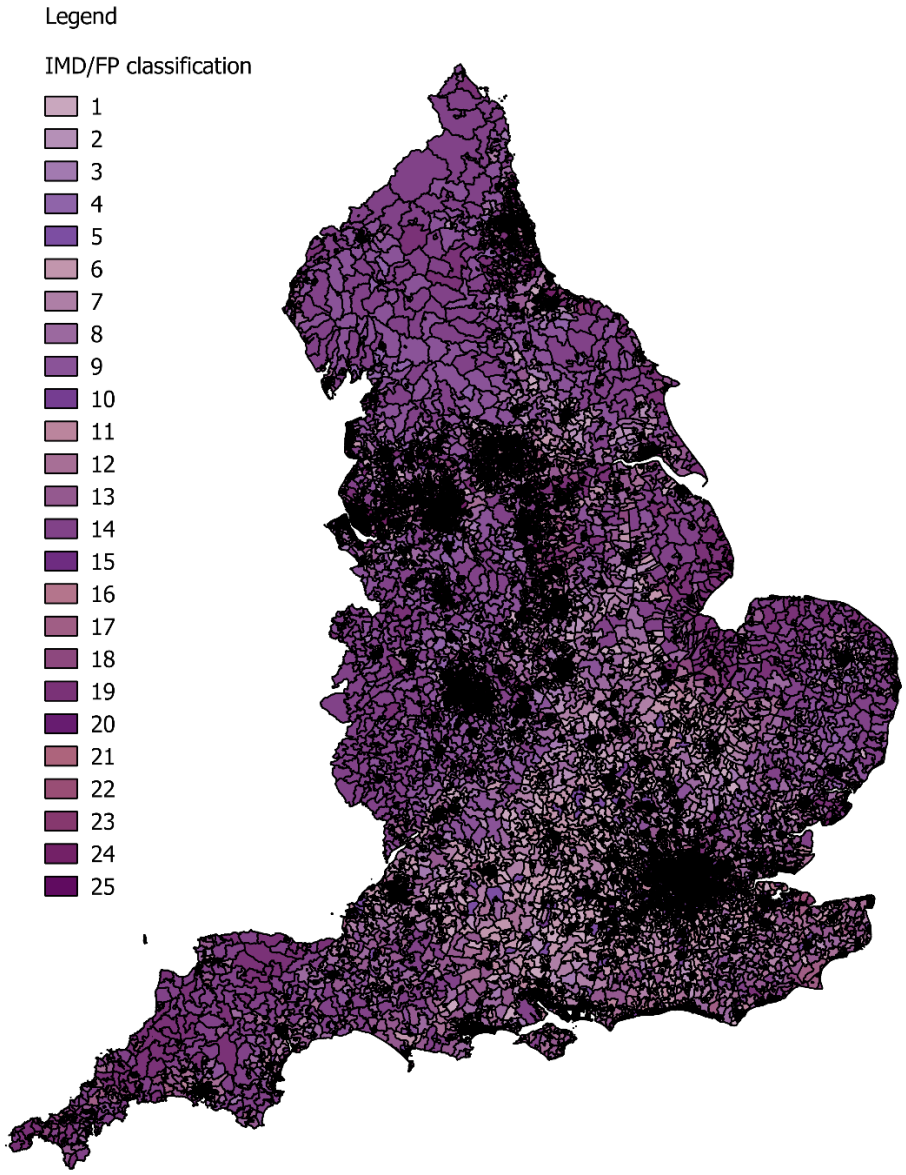


Figure 24 Map of Fuel Poverty & IMD correlations in England at LSOA level, classified by quintile correlation matrix.

4.5 Discussion

This study set out to empirically examine the assertions made in the academic literature (Bradshaw and Hutton 1983; Boardman 1991; Campbell 1993), grey literature (Palmer et al. 2008) and government research (Hills 2012) that fuel poverty is a distinct issue from that of general deprivation. The last study to explore this was published in 2008 (Palmer et al. 2008) and was based on data from 2005 with forward projections made, it also used data from only one source, the English Housing Survey. Since 2005, there have been three supplier funded programmes to improve household energy efficiency, the Energy Efficiency Commitment wave 2, CERT and CESP (Rosenow 2012; Rosenow et al. 2013) as well as the continuation until January 2013 of the Warm Front scheme, and the on-going Decent Home programme of improvements. It is therefore important that a reassessment of the relationship between fuel poverty and deprivation is completed to understand the impacts of these schemes since 2005 and to clarify the current nature of the relationship. This study meets this need, updates and improves our understanding of the relationship between fuel poverty and deprivation.

Accurately understanding the relationship between fuel poverty and deprivation enables successful policy targeting, ensuring resources are distributed in the most appropriate way to those that need the greatest support. As Boardman (2010) notes, much of the expenditure to date has not been spent on those who can be classified as living in fuel poverty, and the use of proxy indicators for identifying the fuel poor has resulted in further inaccurate targeting of resources (Fahmy et al. 2011).

In order to progress our understanding of the relationship between poverty and fuel poverty, examining whether it is empirically correct to separate the two concepts, this study compared deprivation as identified in the IMD, and measures of fuel poverty from the sub regional Fuel Poverty statistics. This marks a departure from the methodology utilised by

Palmer et al (2008) by exploiting a multi-dimensional aggregate measure of deprivation from a separate dataset, rather than utilising deprivation flags within the same dataset as that which derives the fuel poverty flags. By applying simple bivariate correlational analysis to variables contained within these datasets, it was possible to explore the relationship between the two concepts at different geographical areas of interest, providing a geographically nuanced understanding as to the relationship between the concepts that verifies whether the perceived wisdom that fuel poor households are also poor households (De Haro and Koslowski 2013) is justified.

At the national level, a moderate, positive correlation between percentage of LSOA considered fuel poor and deprivation score was discovered of 41%. Whilst this demonstrated that there is a relationship between the two concepts, it is also showed that utilising deprivation measures as a proxy for likelihood of fuel poverty existence is unlikely to result in accurate identification of fuel poor homes. This is in line with the current (Fahmy et al. 2011) and historic (Boardman 1991; Campbell 1993) academic literature. The Decent Homes Standard (DETR 2000) which required a minimum standard of housing conditions for all social housing in England, has resulted in a good quality of housing amongst deprived communities. This policy responds to the concerns of Boardman (1991) that those from deprived backgrounds have little ability to influence the thermal efficiency of their homes. The scheme stands as the primary policy to tackle fuel poverty and energy efficiency in the social housing sector, providing the necessary capital expenditure to realise the necessary improvement programmes. It is likely that the impact of the legislative requirements to improve social housing energy efficiency and quality by 2010 under this scheme has affected the correlation between fuel poverty and poverty, reducing the relationship between deprivation and poverty within the social housing sector. With no similar requirement yet in place in the private rented sector, the relationship between deprivation and fuel poverty is

likely to be different to that within the social housing sector. Exploration of the English House Condition Surveys shows that private rental houses are more likely to fail to meet the minimum housing standards set out in the Decent Homes Standard (Kemp 2011). It was beyond the scope of this study to explore the relationship between the two concepts considered according to occupancy tenure, but understanding the impact of tenure on the correlations considered would be a useful direction for future research. With the introduction in the Energy Act (2011), of the minimum energy efficiency standard in the private rented sector from 2018 it is likely that this relationship will change again. If, as the Energy act (2011) legislates, private rental homes with an Energy Performance Certificate rating of F or G, are no longer eligible to be rented out to tenants, the strength of the correlation between poverty and deprivation is likely to weaken further still.

4.5.1 Geographic analysis of the fuel poverty – deprivation relationship

By exploring the relationship at different geographic areas, the analyses have demonstrated the geographic diversity of the relationship between fuel poverty and deprivation in England. Broadly speaking there is a north-south divide evident in the relationship, with northern regions (i.e. above and including the midlands regions) presenting a stronger positive correlation than southern regions. This can be seen in Figure 24, where those categories with high levels of fuel poverty and high levels of deprivation are more prevalent in the north than in the south of England.

London presented one particularly interesting correlation coefficient with a negative relationship between percentage fuel poverty and deprivation; although admittedly this result is statistically non-significant, and a very weak relationship between the number of households considered fuel poor and deprivation. This is a counter-intuitive relationship, running in the opposite direction to that expected from the literature review and demonstrated

in other regions. Further research is required to understand the factors driving this unexpected result. Whilst this study does not seek to examine the influences resulting in this situation we would hypothesise that factors including housing ownership levels, the level of social housing occupancy (i.e. housing that is likely to have been brought up to meet the Decent Homes Standard and is therefore more energy efficient), weather patterns (urban environments tend to be warmer and temperatures in southern England tend to be higher than northern England) and income may impact upon this result.

At the regional level, it starts to become apparent that they are distinct geographies of fuel poverty and deprivation relationships in England. The broadly north-south divide in the strength of the relationship from r_s [4765] = -.024 in London (a non-significant result) to r_s [1656] = .695, $p<.01$ in the North East region, demonstrates that there is not uniformity of relationship between fuel poverty and deprivation across the country. This suggests that centralised policy responses are unlikely to support the most efficient intervention schemes for the eradication of fuel poverty and provides a potential insight to the reasons that roughly three quarters of the money spent on fuel poverty policy interventions fails to reach those that are fuel poor (Boardman 2010). These findings imply that if policy were designed in a way to reflect the relationship between deprivation and fuel poverty in each specific geographic area, focussing on the relative strength of deprivation of fuel poverty in the locality, it would be possible to develop interventions that were more suitable for the area and more likely to succeed in reducing fuel poverty for that community.

The sub-analysis of six regions of England further strengthens this finding. Examining the relationship within each of the regions chosen at Local Authority level found a large number of non-significant correlation coefficients and negative relationships in London. Both London local authorities and the South West's local authorities had predominantly weak

correlation coefficients and a large number of non-significant coefficients when compared to the northern regions of Yorkshire and the Humber, the North East and the North West. Within the local authorities themselves there was notable variation in correlation coefficients, demonstrating that beyond the influence of income on fuel poverty deprivation, other factors are influencing the existence of the fuel poverty phenomenon. As with the regional level analysis, this is an important finding which can be used to drive further future analysis in to the underlying factors that influence the variance in fuel poverty and deprivation correlation coefficients throughout England.

In terms of improving the targeting of policy and interventions to tackle fuel poverty as well as driving research in to the field of fuel poverty, the development of the Lower Super Output Area classification framework marks a contribution to the academic and policy realm. The analysis of the relationship between deprivation and fuel poverty at national, regional and local authority level indicates the need for localised approaches to understanding the existence of fuel poverty within the differing geographic areas and therefore also for the effective targeting of interventions to reduce fuel poverty. This principle applies at both the local authority and regional level.

By categorising geographic areas according to the relationship between fuel poverty and deprivation (in quintiles), a simple, yet useful classification of areas for intervention targeting is created. The bivariate examination of these closely related socio-economic issues suggests that in seeking to design the most appropriate intervention for each area, understanding the balance between deprivation and fuel poverty more precisely could deliver substantial benefits to policy makers. Classifications which demonstrate high levels of deprivation and fuel poverty (such as those areas classified as “25” in the matrix presented in Table 11) are likely to see a greater reduction in fuel poverty levels as a result of policies tackling the

general deprivation in the area, improving the householder income which can subsequently contribute towards energy bills. Similarly, areas classified as low fuel poverty but high deprivation (e.g. area "20") would be better suited to deprivation intervention measures. High fuel poverty low deprivation areas such as areas classified as "5" will see little benefit in terms of fuel poverty reduction from the application of general deprivation interventions, but applying energy efficiency improvements in to this region would have a much greater return.

Through examination of some of the small area GIS mapping of the LSOA classifications (Figure 16 - Figure 23) and also the full map of England (Figure 24), a clear visible representation of the variability in heterogeneity and homogeneity in different areas of England is apparent. Areas such as North Cornwall (Figure 22), Herefordshire (Figure 19) and Craven (Figure 18) demonstrate significant homogeneity in their constituent LSOA's, providing a more straightforward opportunity for the Local Authorities in these areas to design a wide scale scheme that is likely to deliver significant improvements in fuel poverty or deprivation. However, in more urban areas such Birmingham (Figure 16), Bristol (Figure 17), Newcastle (Figure 21) and Sheffield (Figure 23), the heterogeneous nature of their constituent LSOA's makes targeting a much more challenging task. Comparison of these two areas indicates the differences in the homogeneity of the relationship between fuel poverty and deprivation in more rural local authorities and urban local authorities, resulting in differing challenges in the delivery of intervention programmes. Understanding the root causes of these variations (both technical and social) will be important for achieving fuel poverty eradication across all regions and localities of England.

At a time when government resources are highly scrutinised with a limited budgetary reach, this classification approach enables appropriate targeting of resources to maximise social and economic return as opposed to the highly inefficient targeting of interventions that

has been realised to date (Boardman 2010). The classification approach provides a deeper understanding of the strength of the relationship between fuel poverty and deprivation in a small area, helping to inform the decisions of policy makers locally and nationally. It also highlights disparities between different localities which will need to be understood in greater detail if policy is to be targeted in the most efficient manner.

4.6 Future research directions

Study 2a (chapter 5) seeks to explore the underlying socially rooted drivers of fuel poverty in specific, identified LSOAs across the regions analysed in this study and may provide some insight as to some of the influencing factors behind the north-south divide demonstrated in this analysis at the regional level, and within the variations observed at the Local Authority level of analysis. Aside from the social practice based influences upon the relationship explored by this research, further studies should be undertaken to examine the structural, economic and ecological factors influencing the relationship between fuel poverty and deprivation; as well as understanding the causes in their variance in different areas of England.

This study has not sought to explain the multifarious influences that have resulted in the local, regional and national variation in the relationship between fuel poverty and deprivation experienced in the UK. There are likely to be a number of technical, atmospheric and social reasons that will contribute to the north-south divide in the relationship and further academic research is required to confirm whether factors such as geographic variation in temperature (as demonstrated in the variation in heating degree days across the country presented in the chapter 2), household wealth, property ownership levels, form of household tenancy (owned, private rented, socially rented) and local rurality, or other causes are contributing to this variation.

4.7 Conclusion

This study progresses the initial work of Boardman (1991) and subsequent work by Palmer et al. (2008) to understand the difference between fuel poverty and deprivation. Despite the now accepted view that fuel poverty and deprivation are distinct issues, the over-simplified practice of using proxy-indicators to identify fuel poor homes, often by identifying homes for interventions based on their household income, has resulted in less than 25% of fuel poverty reduction expenditure being spent on fuel poor homes (Boardman 2010) utilising current targeting methodologies. In responding to this criticism, this study has differentiated between poverty and deprivation, to consider (reflecting the work of Townsend (1987)) the multidimensional influences of deprivation rather than the singularly monetary focus of UK poverty definitions within its comparison. In doing so it demonstrates that the two concepts are distinct as found in previous work, but furthermore there is significant heterogeneity in the two concepts relationship across England. This has implication for the development of successful policy interventions in support of the eradication of fuel poverty in England.

In developing the fuel poverty - deprivation classification matrix, this work met the aims of objective 2 as outlined in chapter 1 and established a picture of the fuel poverty - deprivation relationship across England which showed that the current approaches to tackling fuel poverty are unlikely to respond to the criticisms and accuracy issues highlighted above. The focus on supplier side Energy Efficiency Commitments (EEC's) and winter warmth payments (as discussed in chapter 2) which are both capital focussed interventions, predominantly targeted at low income households, is unlikely to succeed in reducing fuel poverty figures as these interventions will not benefit many households that are not captured through the current technically and financially focussed measure of fuel poverty. This validates the views of Boardman (2010) concerning the current approaches to tackling fuel poverty and reflects the inherent structural complexities with EEC's highlighted by Powell's

(2009) that have to date suffered from unintended policy overflows with unplanned or unexpected consequences.

The classification matrix proposed in this chapter is a powerful yet simple tool that offers decision makers and support providers with a novel ability to understand the relative importance of fuel poverty or general deprivation issues for different geographic regions of interest. It also highlights the presence of significant geographic nuances in the existence of fuel poverty which must be understood in order to begin to craft an approach to tackling the issue that can meet the needs of both centralised governmental policy makers, and those working with affected communities on a local scale as well as tackling fuel poverty to the benefit of affected householders and citizens.

In order to begin to understand the localised picture of fuel poverty in England, the classification matrix developed within this chapter provides a tool for identifying specific communities of interest for detailed investigation of the social practice factors of fuel poverty, presented in chapter 5.

5 Study 2a & 2b: Developing a social practice picture of fuel poverty.

Chapter 4 advanced the arguments of Hills (2012), Palmer et al. (2008) and Boardman (1991) by exploring the relationship between fuel poverty and deprivation at the National, Regional and Local Authority level; and in agreement with these authors the analysis demonstrated that the relationship between fuel poverty and deprivation was not simple and that the two issues should still be considered distinct. We then sought to move the debate on from simply considering the independence of the fuel poverty concept to start to explore ways through which interested parties could identify different geographies of fuel poverty and deprivation throughout England through the creation of a classification matrix for each LSOA in England, based upon the depth of deprivation and severity of fuel poverty in the LSOA.

Despite the visual simplicity of the small area GIS mapping realised as a result of this classification matrix, targeting methodologies can be improved further by responding to the knowledge gaps highlighted in the previous chapter. As a societal issue, the existence of fuel poverty and its relationship with deprivation is influenced by a multitude of social, technical and environmental issues as well as the everyday praxis of those it affects. Reflecting the philosophical framework of the study (as set out in chapter 3), it is therefore necessary to develop an understanding of fuel poverty which has moved on from the technically focussed, tri factor model of fuel poverty considered under the current definition (household income, household energy efficiency, and cost of fuel), through an exploration of the social practices of communities with different fuel poverty – deprivation relationships. Doing so allows an understanding as to how practices influence the existence of fuel poverty within different communities to be developed and potentially propose ways in which to alter the current approaches to measuring and tackling fuel poverty in England.

5.1 Chapter Aims

This chapter presents two inter-related studies (study 2a and 2b) in order to build upon the evidence base developed in chapter 4 surrounding the independence of fuel poverty in England, by firstly seeking to understand the social practices that bear influence upon the existence of fuel poverty within identified communities throughout England in study 2a. It also aims to quantify these factors in a manner that will enable policy makers and strategic planners to utilise the SPT perspective in policy design in study 2b, helping to meet objectives 3 and 4 as outlined in chapter 1.

Adopting an explorative qualitative approach in study 2a (as outlined in chapter 3) this work examines the household practices involving energy of community members in order to identify SPT factors of fuel poverty in order to start to develop a model of fuel poverty from a social practice theory perspective. The chapter then continues to develop the model in study 2b, by undertaking an application of the Analytic Hierarchy Process (AHP) approach to weight the factors identified in study 2a. In doing so, this study hopes to demonstrate that by understanding the social practices that combine to facilitate fuel poverty's existence in England, a more accurate model of fuel poverty can be created for the benefit of eradicating the issue whilst also developing an approach that can ultimately enable qualitative evidence to be utilised within policy decision making cycles more widely.

In achieving this aim, the study also contributes to an under-developed body of work seeking to move Social Practice Theory approaches on from purely qualitative methods (as highlighted by Browne et al., (2013)), allowing this philosophical and methodological lens to challenge the dominant Attitudes, Behaviour, Choice (ABC) framework favoured in social policy design currently (Shove 2010a).

5.2 Chapter outline

The identification of the social practice factors of fuel poverty in England (study 2a) and subsequent weighting of these factors utilising AHP in order to develop a model of fuel poverty that captures qualitatively defined social practice factors of fuel poverty in a quantitative, policy friendly manner (study 2b), has necessitated a detailed and extensive chapter. Whilst two separate but related studies are offered, they are presented within one combined chapter in order to facilitate the integrated analysis of the results of both studies. The conjoint analysis and discussion presented in section 5.9 ensures the validity of the results from both studies by cross-validating their outcomes and enables an evaluation of the resultant social practice model of fuel poverty that expands beyond the compartmentalised factors of fuel poverty suggested by examination of the AHP weightings alone.

This chapter continues by briefly returning to the literature on social practice theory as discussed in chapter 3, initially positioning this study within the field of social policy research more broadly before focussing on the use of Social Practice Theory specifically within an energy and energy consumption context. Having outlined the theoretical justification for the two constituent studies presented in this chapter, section 5.5 outlines the methodological approach undertaken by study 2a in order to identify the social practice factors of fuel poverty in England. Subsequently, section 5.6 outlines the results of the focus groups undertaken in study 2a. Having examined the methodology and results of study 2a, the chapter turns to consider study 2b by firstly presenting the methodological approach to developing before outlining the results of the AHP. In section 5.9 the results of study 2a and 2b are brought together for conjoint analysis and discussion before finally outlining their implications within the context of this thesis as well as within the wider context of social practice theory development and policy analysis.

5.3 Social Practice Theory in social policy design

5.3.1 Defining social policy

Thus far this thesis has highlighted its focus on the field of fuel poverty measurement and policy design without positioning this specific field within a wider policy remit. In order to adequately frame this study and afford the opportunity to consider its contribution to the wider social policy field it is necessary to clarify our conception of the policy framework within which fuel poverty policy exists.

Social Policy is both an academic field of study and a practical tool of governance. As an academic field, whilst couched within theoretical foundations it is inherently related to practical action. In defining what we mean by social policy, it is therefore important to reflect both the theoretical and practical aspects of the field, to understand how this is reflected in the evaluation of social policy design that is critiqued within this study. Dean (2012) conceives that:

> *"Social Policy entails the study of the social relations necessary for human wellbeing and the systems by which wellbeing may be promoted. It's about the many and various things that affect the kinds of life that you and I and everyone can live"* (2012, p.1).

Of particular note is the phrase "the social relations necessary for human wellbeing". This links closely with the concepts of social practice theory and emphasises the importance of moving away from the individually focussed nature of the predominant Attitude, Behaviour, Choice (ABC) framework. In developing his definition of social policy, Titmuss (1974, p.24) examines the definition of the two constituent words individually and in doing so reflects the position taken in this work that policy is both "action oriented" and "problem oriented". He points out that defining the term 'social' is much more contentious, and in line with the above definition provided by Dean (2012), Titmuss (1974) concludes that the use of the term social echoes a rejection of the homo economicus models of human behaviour, often associated with economic or psychological schools of thought, and embodied by models such

as the ABC framework commonly utilised for policy design (Shove 2010a). Titmuss (1974) takes great care to emphasise that the existence of social policy does not necessarily imply that the policy delivers (or seeks to deliver) social equality, but is rather a tool by which government can deliver redistributive social interventions to individuals and communities to reflect its social aims and ideals. Indeed, his work suggests that through adopting the predominant "mechanistic theories of orderly man and society" (Titmuss 1974, p.26), social policy is relegated to the shadows, with government instead relying on the power of market forces to deliver self-regulated equilibria, suggesting a failure of these approaches to deliver what he (and this study) chooses to conceive as social policy. His work suggests that accepting and utilising principles such as those espoused within the ABC framework and the arguments of the homo economicus approach means ignoring both the problem and action oriented nature of policy and a rejection of the social relations required for a functioning society as espoused by Dean (2012). In short, Titmuss' work can be seen to imply that by adopting individualistically focussed frameworks, such as the predominant ABC approach to policy design, necessarily signals a rejection of the social nature of social policy.

The concerns of Titmuss (1974) and the beliefs of Dean (2012) are reflected in the United Nations (UN) definition of social policy which encapsulates both the practical and theoretical aspects of the field and reflects the participatory principles of social practice theory, emphasising the importance of citizenship involvement in policy design.

> *"Social policy is an instrument applied by governments to regulate and supplement market institutions and social structures. Social policy is often defined as social services such as education, health, employment, and social security. However, social policy is also about redistribution, protection and social justice. Social policy is about bringing people into the centre of policy-making, not by providing residual welfare, but by mainstreaming their needs and voice across sectors, generating stability and social cohesion."* (Ortiz 2007, p.6)

This study therefore adopts the UN definition of social policy as the framework against which it seeks to develop an understanding of the social practices which drive the existence

of fuel poverty in England. The methodology that we adopt throughout this work seeks to develop an approach which enables the voice of those affected to be heard and reflected in the design of policy responses to fuel poverty (bringing people in to the centre of policy-making), delivering social justice in the form of fuel poverty reduction and eradication, resulting in warmer, healthier homes (protection) across England (social cohesion).

5.4 Changing the unit of analysis: From the individual to the practice.

Drawing upon Shove's (2010a; Shove 2010b) critique of current approaches to climate change policy; a policy field which relates closely to the field of fuel poverty policy particularly with the focus on improving the energy efficiency of the home; it is apparent that the dominance of the ABC approach to policy design is resulting in social policy which fails to capture the complex, socio-technical networks which combine to drive consumption within England and further afield. Approaches to policy design to date have been heavily focussed on the role of the individual, framed within discussions of impacting individuals Attitudes, Behaviour and Choices (Shove 2010a). As such, current social policy can be seen to draw upon a "characteristically thin account of the social world" (Shove 2010b, p.277), and risks delivering unjust outcomes through its failure to consider context (Catney et al. 2013), or where it is acknowledged, labelling it as a barrier to individual behaviour change rather than recognising it as a driver in its own right (Shove 2010a).

Extrapolating out from the definition of social policy adopted by this study and outlined in section 5.3.1, it is apparent that accepting the use of the ABC framework for policy design implies an acceptance that social policy is in fact not social. That is to say the redistributive, protective and social justice qualities associated with appropriately designed social policy are not important. Instead, echoing the views of neo-liberal economics and reflecting the critique of Titmuss (1974), if this approach is accepted, this implies that the best approach to tackling

issues such as fuel poverty is to allow market forces and market based policy instruments to balance to the equilibrium. As Powells (2009) demonstrates, this approach to policy design has tended to result in marginalisation of groups, limiting their access to resources of use; as well as delivering unexpected outcomes (externalities or "overflows" as Powells terms them) "in which that which was repressed now returns reconfigured" (Powells 2009, p.2355). Adopting market based interventions does not serve to eradicate the issue, but instead sees it reappear in another guise, delivering further marginalisation. In the case of the fuel poor this simply means a continuation of their inability to access suitable levels of warmth in the home and a continuation of the failure to realise the social component of social policy.

Social practice theory offers an alternative lens to the "undersocialized [sic] methodological individualism of the behavioural models" (Hargreaves 2011, p.82). Shifting focus away from the choices, beliefs and values of individual actors; social practice theory instead utilises everyday actions of doing that incorporate unconscious consumption as the unit of interest. When applied to the field of fuel poverty, this concept can be visually represented as can be seen in Figure 25.

This approach sees the practice as the unit of analysis, rather than the actions, behaviour and choices of the individual. In doing so we begin to conceive that it is the practice that changes the individual (i.e. the practice brings the social phenomenon in to existence), reducing the agency of the individual and thus minimising the ability of the individual to bear influence on the phenomenon's existence. This fundamental reconceptualization of the roots of consumption implies that in order to design a policy to eradicate fuel poverty, policy makers and academic should not focus on understanding the role of the individual in bringing about a reduction in fuel poverty, but instead understanding how social practices have caused the existence of fuel poverty and how these can be changed in order to reduce fuel poverty.

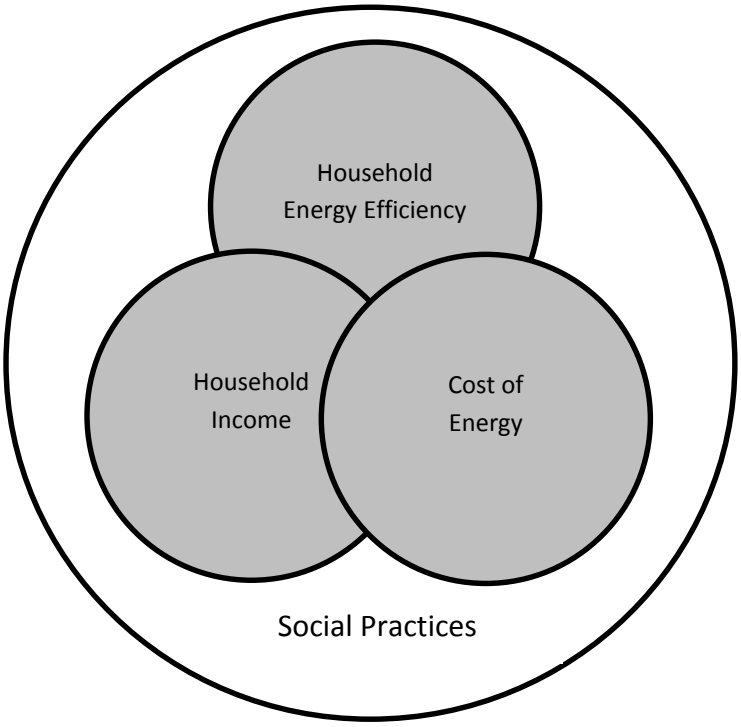


Figure 25 Reconceiving the factors influencing fuel poverty from a Social Practice Theory perspective

5.4.1 Social Practice Theory in policy work

Despite the benefits of adopting a social practice theory lens for understanding the wider influences behind the existence of a phenomenon (or in other words, the social rather than individual stimulus of social issues) the approach has failed to gain significant traction outside of the academic field of enquiry. The successful translation of academic policy research in to practical policy outputs is not a recent issue (c.f. Friedmann and Abonyi (1976)), although more translational success has been afforded within research adopting ABC based methodological approaches. Shove's (2010a) critique of the dominance of ABC approaches, characterises this success as a self-fulfilling circle of commissioning and research; caused by a failure of the model to capture root causes adequately and subsequently necessitating the commissioning of further studies, in the same fold, to try to find an answer. Others have suggested that the ABC model lends itself to perpetuate the dominance of top-down policy design (Catney et al. 2013) which fails to empower citizen participation in decision making and social change, instead inviting their participation only in public

consultation directed from “a locus of power to a general citizenry” (Bloomfield et al. 2001, p.501)

Despite the limited success Social Practice Theory has experienced in impacting upon practical policy outcomes, there is a growing and rich body of theoretical research exploring multiple social phenomena from the Social Practice Theory perspective. Academic research has covered a wide variety of topics such as water consumption (Browne et al. 2013), shopping habits and household cleaning practices (Shove 2003), health (Maller 2015), household retrofit (Tweed 2013), knowledge (Kuhn and Jackson 2008) and thermal comfort (Hitchings 2009). The challenge for researchers adopting this lens is moving the field beyond an area of theoretical research to one which also impacts, influences and informs social policy, reflecting the practical and academic nature of the field. This is one of the key aims of this study has highlighted in 5.1.

5.4.2 Social Practice Theory in Energy research

Energy consumption in the domestic setting has implications for national and international climate change, security of energy supply and the prevalence of fuel poverty (Hards 2013). As such this area is receiving increasing attention from academic authors. Studies have examined how domestic practices involving energy may enhance ones status or carry social stigma (Hards 2013), how utilising building monitoring data can support the understanding of practices involving energy (Foulds et al. 2013), the role of community networks in understanding these types of practices (Catney et al. 2013), how we might alter when energy is consumed (Higginson et al. 2013), how the elderly manage warmth in winter (Hitchings and Day 2011), the links between health and cooling (Strengers and Maller 2011), and how social practices shape electricity demand (Powells et al. 2014).

Energy issues are inherently political and social, and therefore seeking to tackle them through individualistic approaches will result in responses that are socially regressive, and environmentally inadequate (Paterson and Stripple 2010). Adopting the Social Practice Theory lens, particularly for research based within the energy sector, enables the investigator to "overcome common dualisms which manifest themselves in the energy and resource sectors, such as supply and demand, consumption and production, and behaviour and technology" (Strengers 2012, p.227). In doing so the debate moves away from considering the social phenomena as an issue of structuration, individual agency and legitimacy, and focusses enquiry on how social practices facilitate the existence of the focal issue.

Whilst it is argued that there are a number of benefits to adopting a social practice perspective in understanding matters surrounding energy consumption, studies to date have been predominantly undertaken utilising a qualitative research methodology (Browne et al. 2013). Dominant social practice theory authors have, argued that social practices are so habitual, that those carriers of the practice (in this case householders) are unlikely to be able to talk about them (Hitchings 2012). If this argument is to be adhered to, the methodological options available to those seeking to explore social practices are limited to observational and ethnographic approaches. Hitchings (2012), in exploring the validity of these assumptions, notes how this belief had at times caused him unease when considering the techniques he has employed in his research resulting in attempts to reframe his approach within language more readily accepted by those in the field of study. However Halkier (2010, p.74) suggests that "participant observation data, focus group data and individual interview data all can be seen as social practitioners' performances in different contexts", challenging the belief that participants may not be able to talk about their practices and opening the opportunity for other forms of methodological inquiry to be considered.

As highlighted in section 5.3.1, social policy is both "action oriented" and "problem oriented" (Titmuss 1974, p.24). If social practice theory is to find traction within social policy design generally, and energy policy more specifically; it must be able to provide adequate analysis of the problems and realistic solutions for action. Although the qualitative studies to date have collected a large body of evidence of different energy related issues, they have not served to provide this evidence in a language which is accessible to policy makers (Browne et al. 2013). There is an 'evidence-action' gap in existence where, despite an evolving literature that captures many practices which combine to influence the existence of fuel poverty in England, there has been little or no translation of this evidence in to actionable interventions and policy formulations. Shove (2010a) suggests that this is due to the dominance of the ABC methodologies in policy design, requiring evidence in a format that can be easily managed and manipulated. A more pragmatic view point echoes this view, noting that social practice theory based investigations to date lack the quantitative evidence policy makers perceive as necessary to formulate and evaluate appropriate policy responses (Browne et al. 2013).

Although some social practice theorists suggest that quantitative approaches lack the ability to capture all that happens in the performance of a practice (Hargreaves 2011), it is the position of this thesis, in line with the work of Browne et al. (2013) that a degree of methodological pragmatism must be employed if the language of social practice theory is to move from a position of policy irrelevance (Shove 2010a) to one of policy influence. A failure to accept a degree of methodological and theoretical pragmatism will ensure that social practice theory remains little more than an academic lens of enquiry. Adopting carefully considered concessions to the purest form of the theoretical approach will allow the social practice approach to start to be heard within the policy world, providing problem solutions and action that challenge the norms currently accepted in decision making circles. As a relatively new methodological and theoretical field it is important to experiment with the

tools available to the researcher in order to develop social practice theory's ability to deliver practice insights that could allow tangible benefits and improved policy interventions to benefit the whole of society. In line with research objective 3 outlined in chapter 1, it is the intention of this study and the overarching thesis to develop a new approach to applied social practice theory, developed in the test bed of fuel poverty policy, seeking to understand the potential application of social practice theory in policy practice.

5.5 Study 2a – Methodological approach to identifying social practice factors of fuel poverty

Responding to the need for social practice theory approaches to gain traction in influencing policy design in England and reflecting the assertion of Hitchings that "people can talk about their practices" (2012, p.61), this study (study 2a) adopts a qualitative, semi-structured, focus group approach to explore householder practices involving energy. In doing so this work adopts a methodologically pragmatic approach to capturing social practices across different geographical locations. The results of this study will be utilised in the subsequent study (study 2b) in order to assist in the development of a quantitative social practice model of fuel poverty. A broad overview of the research process undertaken in both study 2a and study 2b, demonstrating the relationship between the two studies is provided in Figure 26.

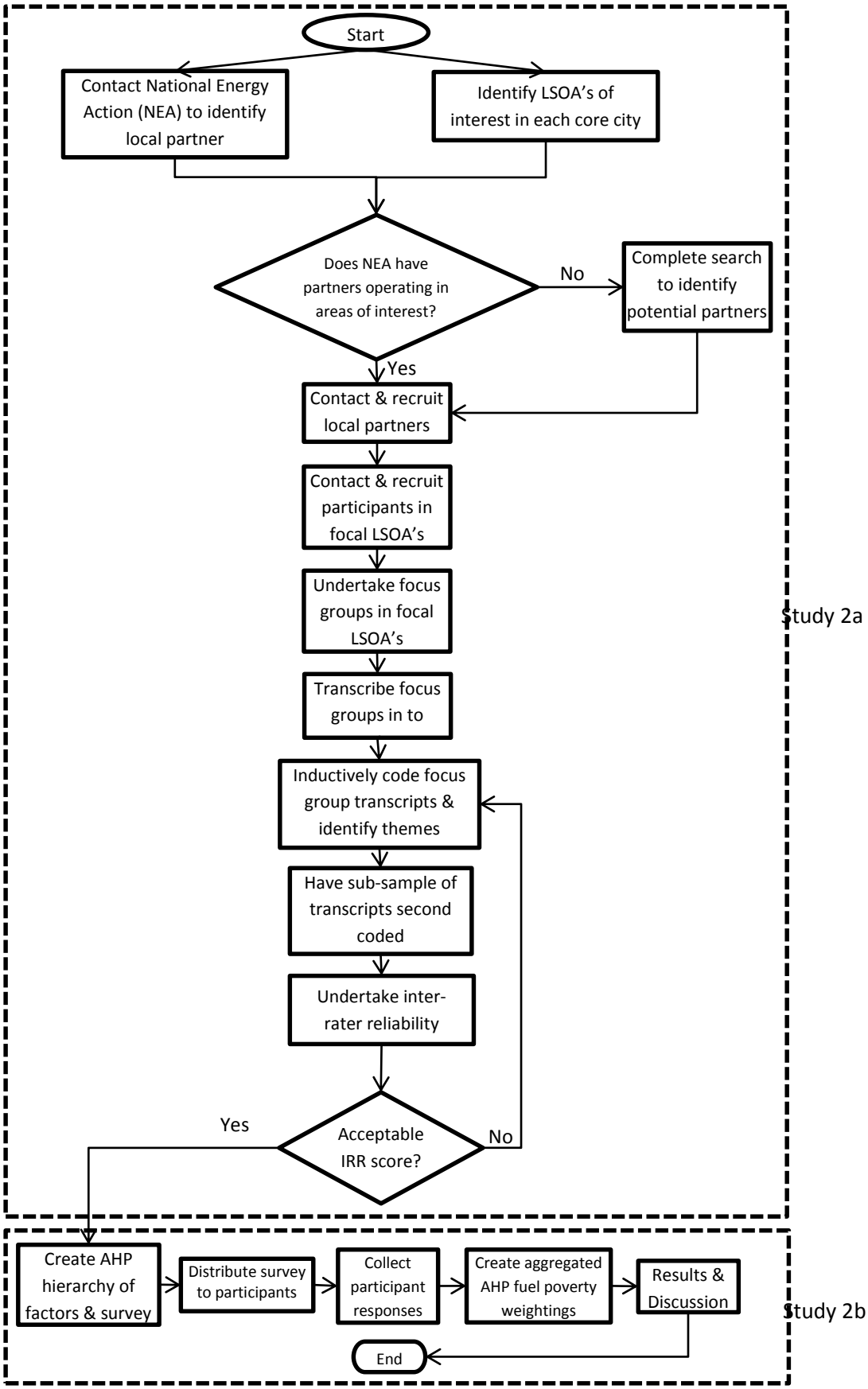


Figure 26 Chapter 5 research process flow chart for study 2a and study 2b

5.5.1 Utilising focus groups in social practice theory studies.

Focus groups as a form of methodological enquiry have not found a common footing in social practice theory based studies with theorists concerned that verbal inquisition alone fails to capture the detail and nuance of different practices (Hargreaves 2011). However, as noted by Browne (2013), as long as methodological approaches to social practice theory inquisition are undertaken with an appropriate degree of reflection and reflexivity, it is possible to ensure that the ontological and epistemological foundations of the underlying theoretical approach are maintained.

Whilst the focus group method has not been commonly applied within the social practice lens, the technique offers a number of potential benefits to the researcher. Focus groups or group discussions elicit information in relation to the context in which it occurs. It is possible to examine the practices of the participants in relation to everyday life whilst also enabling points of comparison with other group members to gain an insight in to broader social norms, meanings and practices (Flick 2006). They also offer an economic alternative to the ethnographic methodologies favoured by the Social Practice Theory field, enabling data and insights to be collected from a much broader participant base than might otherwise be achieved (Bloor et al. 2001).

The importance of citizen involvement in the decision making process is widely accepted, though the mechanisms with which to achieve this are still not clear (Abelson et al. 2003). There is concern from some individuals that true public participation has not yet been achieved as the commonly preferred approach of public consultation reflects engagement from those holding the decision making power to the general public, rather than a process by which no actor holds any greater power than another (Bloomfield et al. 2001). Within the context of this study, examining household practices relating to energy via a focus group

mechanism allows for broader public participation in the research (Bloor et al. 2001) enabling the insights and outcomes to deliver a more representative input to the design of a new method of capturing fuel poverty for social policy design. The methodology matches more closely with the nature of social policy as discussed in section 5.3.1 than adopting the individualistic approaches of participant observation, diary studies or other observational approaches that have traditionally been preferred in social practice theory studies. Due to the separation of the researcher and the focus group participants from the policy process, no actors within the focus group hold any greater power over the process than another and as such the use of focus groups within this study's context can be seen as an attempt to create a more inclusionary process in designing a policy response to fuel poverty.

Methodologically, drawing upon focus group conversations as a means of eliciting pictures and understandings of practice is fairly controversial as discussed in section 5.4.2. In order to address these concerns the work of Hitchings (2012) was drawn upon to understand the practical applicability of adopting a solely verbal method of exploring household practices involving energy. In adopting a focus group approach to exploring such practices this project reflected the common application of focus groups as a method of capturing insights for policy design (Krueger and Casey 2009), and draws upon Hitchings view that different methodological approaches should be attempted in social practice research, rather than dismissed outright as unsuitable on the basis of epistemological theorizing (Hitchings 2012).

Whilst Hitching (Hitchings 2012) utilised interviews rather than focus groups to discuss practices there are significant similarities in the two approaches which allow for the insights provided by Hitchings to be applied to the focus group context. Equally, the social dynamics of a focus group scenario are notably different to those of a one on one interview (Flick

2006), allowing for an interesting comparison with the work of Hitchings whilst also providing a logical methodological expansion of his interview approach into the social practice theory field. Hitchings notes how "comparison proved very effective in identifying why the practices of our respondents were similar or different to others" (Hitchings 2012, p.66). By moving the method of exploration from a two-way conversation to a multi-actor discussion, it is therefore possible to encourage multiple points of comparison between the focus group participants (Flick 2006) that enables the development of an even richer and more detailed understanding of how and why household practices involving energy develop, are sustained and potentially also die out.

As highlighted in the discussion of the nature of social policy and in alignment with research objective 3 (outlined in chapter one) to develop a methodological approach that enables the SPT approach to be utilised within policy design, the focus group methodology was deemed to be appropriate given its ability to enable public participation in the policy design process (Bloor et al. 2001) and for generating insights for exploration and testing with other research methods (Flick 2006). The application of focus groups to the exploration of household practices involving energy, and social practice theory is previously undocumented and as such forms a novel contribution to the academic field whilst also responding to Hitchings (2012) observation that more interview work should be taken as it may "confound our expectations" (Hitchings 2012, p.66).

5.5.2 Developing the focus group design

In designing the question framework for the focus groups the study drew heavily upon accounts of practices involving energy in the home in the current academic literature. Whilst this was not a deductive study, and it was not the intention to seek out the practices identified in the extant literature but rather explore these practices from a neutral standpoint; utilising

this approach allowed the researcher to deepen their understanding of the use of a social practice lens in field research. Furthermore it ensured that a framework for open discussion amongst focus group participants was created in a way that would facilitate conversation that would elicit the materials, competences and meanings (Shove et al. 2012) that combine to form household practices involving energy.

The focus groups followed a multiple-category design (Krueger and Casey 2009) with a focus group held in each of the locations identified in section 5.5.3. Questions were designed to be generally applicable to all potential participants irrespective of location of the focus group and given that the composition of the focus groups was unknown at the time of question development, the questions were created to be free from presuppositions surrounding the participant, their background, their beliefs and their understanding of the concepts being discussed.

5.5.2.1 Identification of focus group topics and questions

Topics were drawn from and influenced by existing literature on the use of social practice theory in energy research. As noted in chapter 2, utilising the conception of fuel poverty set out in the UK fuel poverty strategy (DEFRA & DTI 2001) resulted in the majority of households identified as fuel poor as being the elderly, whereas by capturing fuel poverty by the Low Income High Costs (LIHC) methodology set out by the Hills review (Hills 2012) and now adopted by the UK government, the fuel poor are more likely to be identified as families and lone parents. Studies to date have focussed on the elderly (Hitchings and Day 2011; c.f. Day and Hitchings 2011) perhaps due to the nature of the fuel poverty definition used at the time of inquiry. It is pertinent to draw and build upon this body of evidence, and to update the understanding of the field to reflect the current state of fuel poverty in England. Practices are dynamic, reflecting changing links between competences, materials and

meanings (Shove et al. 2012). Clues to current practices can be discovered from the components of historical practices and therefore drawing upon the insights created in previous studies does not limit the potential discovery of current and emerging practices, but provides a framework of discovery upon which our understanding of the practices that help fuel poverty to exist in England can be built.

The question framework drew upon key themes identified from studies which had sought to understand practices involving energy of different social groups. The studies had drawn on the warmth and heating strategies of the elderly (Hitchings and Day 2011), the potential for stigma to affect how households approach heating their home (Day and Hitchings 2011), or equally how these behaviours may be status enhancing (Hards 2013), the role of everyday life and lived experiences in developing unconscious environmentally friendly actions (Hitchings et al. 2015) and calls for understanding how the location of the individual (e.g. at home, work or shopping) alters their energy expectations (Hitchings 2009). The literature utilised was predominantly written by Hitchings, with collaborators. The decision to focus primarily on themes identified in the work of Hitchings was influenced by the authors engagement with energy and social practice topics as well as his expressed opinion that oral examination of practices is possible (Hitchings 2012).

As with the guidance of Bloor et al. (2001), due to the fact that participants were not receiving individual payment for their participation the question schedule was designed to ensure that the focus group lasted for no more than 90 minutes. Six broad sections of questions were created:

1. Setting the scene
2. Thinking about others
3. How the home is used

4. Opinions on warmth
5. Balancing the books
6. The Green consumer?

The focus group questions were intended to create discussion rather than provide a prescribed order that must be followed with each repetition of the focus group across the focal cities. In delivering the focus group it was important that the six broad topics were discussed, but their order and precise content was to be driven by the discussion and participants, in a similar format to a semi-structured interview, rather than by the question schedule and the facilitator (Bloor et al. 2001).

5.5.2.2 Examining the role of the home

It was not intended that participants were to necessarily be drawn from any pre-formed homogenous groups and therefore, in order to create an atmosphere that would encourage discussion and an understanding of the topic being explored, one defined question was utilised at the start of the focus group. Participants were asked to describe their typical day to the group. This ice-breaker question was designed to ensure all focus group participants were used to contributing from the outset and would feel at ease discussing their perspectives with the other participants (Krueger and Casey 2009). The opening section then sought to explore the role of the home to each participant, both literally in terms of time spent there but also more figuratively by seeking to examine what the house meant to the participant. Probes were prepared in order to help stimulate the discussion given the figurative and indirect nature of the question and to elicit further detail to support any assertions made (Krueger and Casey 2009). The second question in this section was created to start to explore the meanings that may exist within some of the household practices involving energy (Shove et al. 2012) that would be uncovered through the focus group and to encourage reflection in future questions not only of the literal responses, but also on the hidden and unconscious factors that the

participant hadn't previously given thought to influencing their actions, helping to ensure rich contextual data providing relevant information for drawing out examples of practice in the subsequent analysis.

5.5.2.3 Developing an understanding of the importance of social involvement

The second section, *about others*, moved the focus of discussion away from the individual participants to considering how the social environment in which they exist day to day affects the practices involving energy they enact in their lives. Again, this section opened with a more general question exploring involvement in social groups (either formal or informal) before developing into an examination of shared beliefs, understandings and values. A specific probe exploring how participants related themselves to these shared values was offered if the natural discussion did not cover this area. Within a social practice framework, this question was intended to create a picture of how those participants interact with others and how this influences their day to day life, examining the social versus individual determinants of household energy practice.

5.5.2.4 Exploring practices in the home

Returning to a focus on the participant and their household, the third section was intended to explore actions within the home. Having developed a picture of their daily routine and how the social environment influences participants daily lives, the third section was a more direct probe of previously studied areas of practice related to the home other than those relating to household warmth, such as washing, preparation of food, environmental attitudes (in this case embodied in a discussion of household rubbish), before introducing a discussion surrounding warmth generating/ energy saving behaviours. It was hoped that by this point participants would be much more reflexive in considering their responses and therefore

probes were designed to examine the role of historical practices (i.e. the influence of parents, or practices they observed when they were growing up) as well as allowing for discussion of financial and practical motivators to their actions.

5.5.2.5 Understanding home heating practices

The question framework had deliberately avoided discussion of space heating as a focus in the first three sections. As the study was seeking to uncover social practices rather than individual attitudes, behaviours and choices, enabling questions in sections one to three were developed to help participants direct their conversation towards discussion of practice and the contextual information surrounding their practices, rather than focussing internally on their personal decision making process. Section four was anticipated to be half-way through the focus group and it was hoped that participants would naturally be discussing responses to the questions in a manner that was more likely to uncover the meanings, competences and materials that combine to form their heating practices by this point, even though they had not been explicitly provided with any information on the social practice theory underpinning the focus group questioning.

Having developed the participants understanding of the importance of a broad and contextual discussion over the first three sections, the fourth section introduced an explicit discussion surrounding attitudes to warmth in respect to both personal heating and space heating. Questions explored whether participants sought to manage their energy bills or whether they felt the bill was out of their control. Their responses were examined more thoroughly by probing their use of energy regulating actions such as only heating the rooms people are in, utilising timers on heating controls or choosing to wear extra clothing rather than turn on a heat source. After developing a picture of the participants private approach to energy management, the second question then examined whether this approach was altered

by the presence of guests at the home. Influenced by Day and Hitchings (2011) the intention was to understand whether concerns emerged surrounding social stigma when others were in the home either expectedly (for example children returning from school) or unexpectedly (a neighbour coming round unannounced). Similarly the question was designed as an opportunity for respondents to express examples of how their household heating decisions could be status enhancing (Hards 2013), perhaps for example, being the house that all their friends chose to come to because it was always warm.

5.5.2.6 Practices involving energy and finance

The penultimate section was focussed on financial considerations surrounding home practices involving energy. As the focus group was not following a strict, structured group interview format, it was anticipated that many of the areas covered in this section were likely to have been discussed in the previous four sections. Depending upon the depth of coverage already achieved in the focus group and the amount of time taken up to this point, this section was not designed to necessarily be explicitly included at all. However it provided an opportunity to explore prior responses in more depth, and to develop an understanding of coping strategies respondents had developed. This was driven by previous research undertaken by the team that had elicited examples of individuals utilising public spaces such as shopping centres or libraries to keep warm, so that they didn't need to heat their home. The intention was to examine whether this was a common phenomenon, and therefore to understand more fully the influence of the location of the individual upon their thermal expectations (Hitchings 2009) as well as whether participants sought to offset their energy expenditure through engagement in social settings or public spaces.

5.5.2.7 The importance of being green

Finally, the questioning schedule examined whether the participants considered themselves to be green consumers. Drawing upon Hitchings et al. (2015) this section supported an understanding as to whether participants practices were influenced by an overt wish to be environmentally friendly, or whether their green practices were coincidental externalities to their daily lives. Similarly, it allowed the examination of potential motivation for involvement in the focus group to ensure insights weren't solely being sought from those already engaged in environmental initiatives, as was the case in the study by Hards (2013). This was initially probed by discussing their energy suppliers (both of gas and electricity) before a discussion surrounding their shopping practices. The intention was to examine whether participants chose to buy particular products due to environmental credentials, or whether factors such as cost, familiarity or family pressure ("the kids want it") were a greater influence in their shopping decisions. Finally an opportunity was offered for participants to say anything that they felt was relevant but they hadn't been given the chance to discuss or to ask a question of the facilitator if they wanted to understand more about the study. A copy of the focus group question schedule is provided in appendix 8.3.

In support of the data collected from the focus group discussion a pre-group self-completion questionnaire (Bloor et al. 2001) was designed. The questionnaire collected basic socio-demographic information that would help to establish the homogeneity or heterogeneity of participants in each focus group and between all of the focus groups as well as a comparison with national level statistics. This information would be particularly important for understanding the generalizability of focus group insights to the general population of England. As well as capturing socio-demographic information, the questionnaire asked participants about their home including what type of building it was (flat, semi-detached house, terrace etc.), how many rooms it has and how many people live there. This

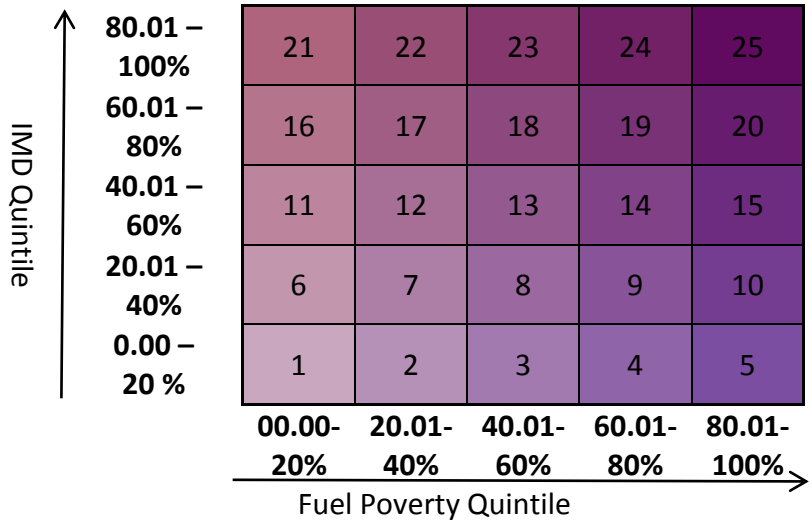
information would allow us to understand how responses differed by household composition and size. Finally, respondents were asked to provide their best estimate of their last gas and electricity bill as well as what period of time this covered and their method of payment. Combined with the household information this would allow a broad understanding of their level of energy consumption to be developed (low, medium or high) as well as to capture differences between different payment methods. A further practical benefit to the pre-group self-completion questionnaire was to provide participants with a task to complete whilst waiting for all focus group members to arrive and an opportunity to distribute the focus group information sheet and informed consent forms for completion prior to the commencement of the focus group.

5.5.3 Identifying geographies of interest for focus groups

Building upon the statistical analysis provided in chapter 4 it was decided to recruit focus group participants from Lower Super Output Areas (LSOA's) within the administrative boundaries of the eight English core cities of Birmingham, Bristol, Leeds, Liverpool, Manchester, Newcastle Upon Tyne, Nottingham and Sheffield (Core Cities 2013), as well as the English capital, London. This provided continuity of analysis and allowed the study to develop upon the insights created from the correlation analysis completed at Local Authority area for each of the English regions which contain one or more of the core cities.

In order to provide insights from a robustly selected group of participants, it was decided to identify LSOA's in each of the focal cities based upon their classification from the fuel poverty/deprivation (FP/IMD) matrix developed in chapter 4. Due to the limited resources available it was not possible to run focus groups in areas from each of the 25 identified FP/IMD categories across each of the focal cities. Instead five classifications identified as 'outlier categories' were selected from the 25 potential categories depicted in Table 13.

Table 13 IMD and Fuel Poverty classification matrix



N.B. Colours are those used in GIS mapping to indicate LSOA classification

These categories had either the highest quintile (81 – 100%) of IMD aggregate score or the highest quintile of Fuel Poverty score, or both. By following this logic, five classifications of interest were identified as laid out in Table 14. Having identified the IMD/FP classification scores of interest, GIS maps overlaid with the classification matrix values at LSOA level were utilised to ascertain specific LSOA's of interest in each core city.

Table 14 Focal LSOA's identified from IMD/FP classification matrix

IMD/FP Classification number	***IMD quintile***	***Fuel Poverty quintile***
5	*00.00 – 20%*	*80.01 – 100%*
15	*40.01 – 60%*	*80.01 – 100%*
21	*80.01 – 100%*	*00.00 – 20%*
23	*80.01 – 100%*	*40.01 – 60%*
25	*80.01 – 100%*	*80.01 – 100%*

To provide a point of comparison it was decided to attempt to recruit a total of 10 focus groups, two for each classification of interest. Given the geographic distribution of the core cities this would allow for a split of 5 more northerly focus groups in Leeds, Liverpool,

Manchester, Newcastle upon Tyne and Sheffield, and 5 more southerly focus groups in Bristol, Birmingham, London and Nottingham (with one city hosting 2 focus groups).

The decision as to which classification was recruited from each city was decided by the practicality of identifying LSOA's of each value within the focal cities. It was particularly challenging locating areas categorised as 5 in the IMD/FP classification matrix (lowest quintile IMD score, highest quintile fuel poverty score). Of the nine cities utilised for the study, only Nottingham and Sheffield had any LSOA's meeting the category 5 classification.

The practical challenge of identifying LSOA's within each city meant that it was not possible to recruit from a consistent number of LSOA's in each city. Doing so would also not have meant that the potential participants were being drawn from a consistently sized population pool as LSOA boundaries are based upon numbers of households rather than number of inhabitants within the geographic area, and the number of households varies between generally 400 and 1000 households per LSOA as discussed in chapter 4.

In order to maximise the potential participant pool in each area, the largest possible number of LSOA's meeting the classification criteria were identified. This process ran in tandem with active discussion with local partners (discussed in section 5.5.4), such that LSOA's were chosen within consistent areas or suburbs of the city. The chosen suburbs were defined by the local knowledge provided by the local partners who were already operating in these areas and thus could help facilitate access to and recruitment of participants. The use of GIS mapping software ArcMap made it possible to identify specific LSOA's according to their IMD/FP classification and local geography, and subsequently identify the relevant LSOA code. As with the analysis undertaken in study 1 (chapter 4), this was based upon the 2001 LSOA boundaries as the underlying data in the IMD/FP classification matrix utilised data that drew upon the 2001 boundaries rather than the redrawn 2011 boundaries.

Undertaking this process provided the list of LSOA's in Table 15. Although this had allowed the specific geographic areas to be identified in collaboration with local partners, and had allowed the creation of the maps shown in Figure 27 to Figure 35, practical targeting of participants was not possible with the use of LSOA codes. The Office of National Statistics (ONS) Postcode Directory from May 2013 was utilised to convert the identified LSOA (2001) codes in to current postcodes. This enabled specific streets to be identified and helped to facilitate discussions with local partners in identifying potential venues to host the focus groups as well as targeted recruitment of participants which will be discussed further in section 5.5.5.

Table 15 Target LSOA's and IMD/FP classification score for Focus Group participants in each city

City	IMD/FP classification score	Relevant LSOA codes
Birmingham (Moseley)	15	E01009023, E01009030, E01009031, E01009032, E01009034, E01009036, E01009041, E01009042, E01009046, E01008885, E01008948, E01008951, E01008955, E01008967, E01008969, E01009008, E01009068, E01009126, E01009162, E01009189 E01009230, E01009253, E01009261, E01009264, E01009285, E01009286, E01009287, E01009293, E01009296, E01009318, E01009462, E01009473, E01009504, E01009519, E01009521
Birmingham (Nechells)	25	E01008899, E01008901, E01009201, E01009202, E01009203, E01009401, E01009478, E01009479, E01009482, E01009483, E01009484, E01009485
Bristol	23	E01014594, E01014595, E01014596, E01014597
Leeds	21	E01011467
Liverpool	25	E01006540, E01006541, E01006542, E01006544, E01006545, E01006546, E01006547, E01006548, E01006558, E01006559, E01006561, E01006562, E01006565, E01006569, E01006573, E01006604, E01006605, E01006606, E01006614, E01006615, E01006616, E01006618, E01006690, E01006691, E01006692, E01006694, E01006695, E01006696, E01006697, E01006698, E01006699, E01006700, E01006711, E01006712, E01006713, E01006714, E01006715, E01006718, E01006746, E01006759, E01006760, E01006761, E01006762, E01006763, E01006764, E01006765, E01006766, E01006767, E01006768,
London Islington	21	E01002694, E01002708, E01002709, E01002710, E01002712, E01002713, E01002715, E01002761, E01002765, E01002767, E01002790, E01002795
Manchester	23	E01005061, E01005105, E01005232
Newcastle upon Tyne	15 (primary focus)	E01008352, E01008358, E01008359, E01008393, E01008433, E01008458
	14 (backup LSOA's)	E01008306, E01008315, E01008343, E01008347, E01008351, E01008363, E01008374, E01008397, E01008416, E01008452
Nottingham	5	E01013975
Sheffield	5	E01007960, E01008064, E01008074

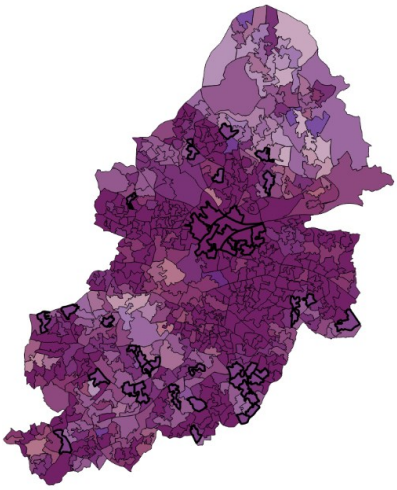


Figure 27 Map of LSOA's targeted for focus group participant recruitment in Birmingham

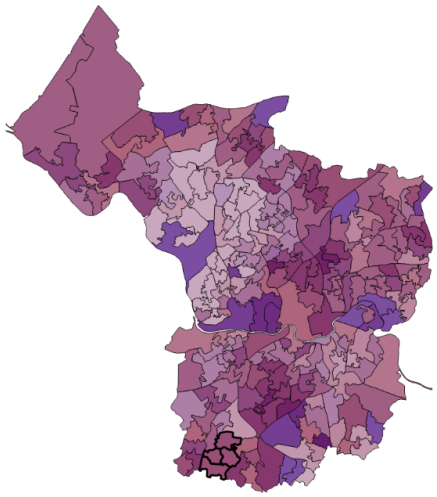


Figure 28 Map of LSOA's targeted for focus group participant recruitment in Bristol

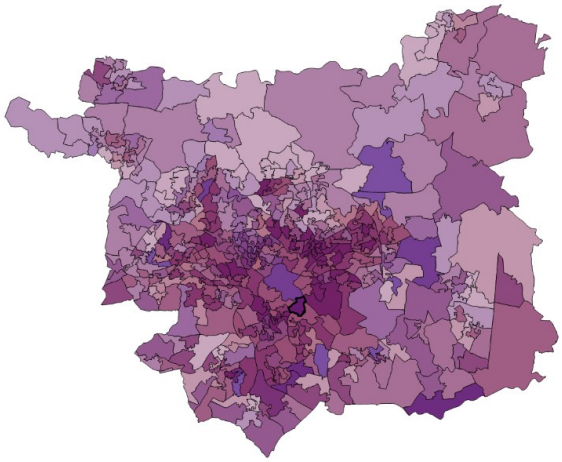


Figure 29 Map of LSOA's targeted for focus group participant recruitment in Leeds

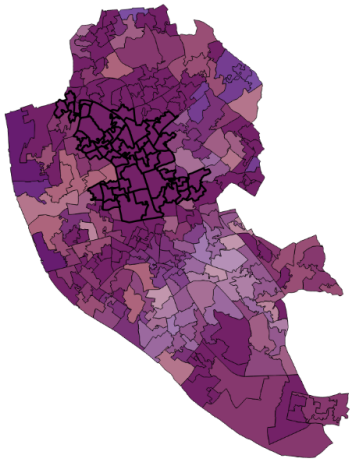


Figure 30 Map of LSOA's targeted for focus group participant recruitment in Liverpool

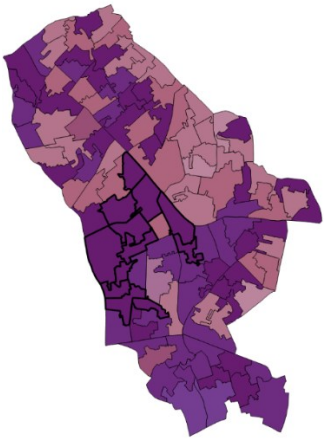


Figure 31 Map of LSOA's targeted for focus group participant recruitment in London Islington

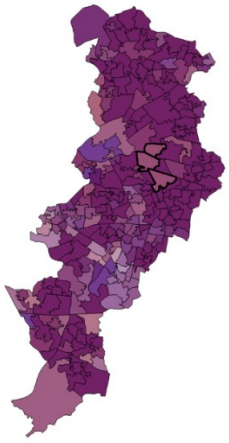


Figure 32 Map of LSOA's targeted for focus group participant recruitment in Manchester

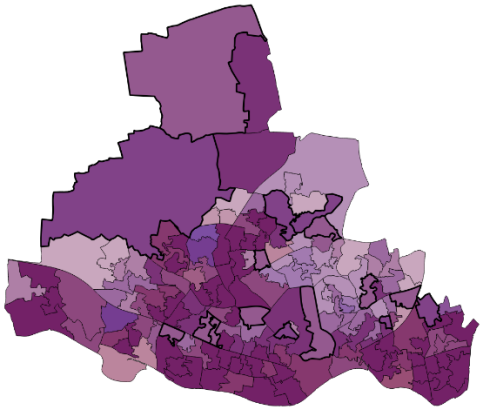


Figure 33 Map of LSOA's targeted for focus group participant recruitment in Newcastle upon Tyne

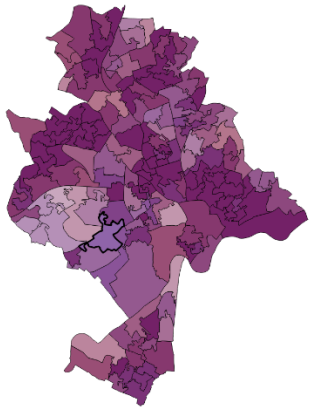


Figure 34 Map of LSOA's targeted for focus group participant recruitment in Nottingham

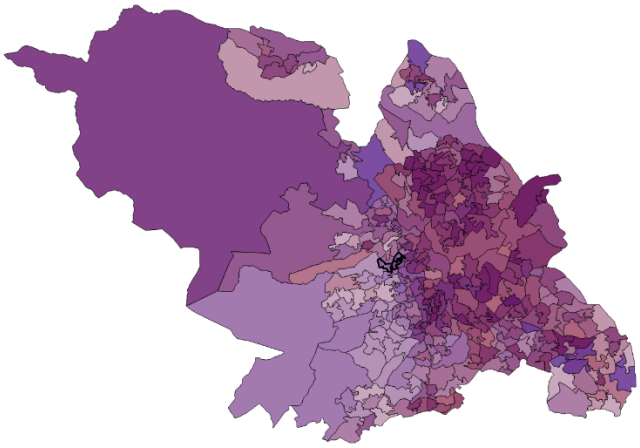


Figure 35 Map of LSOA's targeted for focus group participant recruitment in Sheffield

5.5.4 Identifying and recruiting local partner organisations

Given the geographical dispersion of the cities of interest to this study it was decided that it would be appropriate to seek practical support from local partner organisations for a number of reasons.

Primarily, the use of local partner organisations would provide a source of understanding and local knowledge that would not have been available to the project if it had been undertaken solely by the researcher. This made practical tasks such as identifying venues for hosting the focus groups, organising refreshments and the actual recruitment of participants far more achievable. It was also decided that the use of a local partner would help to add

legitimacy to the project in the eyes of potential participants and it was intended that this would encourage greater levels of interest and participation from the focal LSOA communities. Potential focus group participants may question why a researcher from Sheffield were undertaking research in their community and feel unwilling to participate unless a local organisation which they recognised and trusted was also involved.

Although there were a number of potential benefits to working with local partners, it was acknowledged that this must be managed carefully so as to minimise any potential negative impacts upon the research process. Recruitment via an intermediary can be a very successful approach for generating an adequate pool of focus group participants, but considerable thought must be given to the impact and influence of the intermediary chosen (Bloor et al. 2001). If the project were too reliant on local partners (for example, allowing the identification of target areas to be solely driven by the partner for practical simplicity, resulting in a departure from the statistically identified LSOA categories) there would be a significant chance that the participants recruited would reflect the image that the partner organisation was trying to project rather than being simply a member of the local community. There was also potential that the choice of partner may result in potential participants being less willing to become involved in the project due to their preconceived perceptions with respect to the partner organisation.

Initial contact was made with National Energy Action, a national charity that seeks to improve and promote energy efficiency and aims to eradicate fuel poverty (National Energy Action 2014). The organisation operates in all nine English regions with regional co-ordinators representing the charity in each of these areas. After contacting the policy and research team at the national headquarters, an initial email was sent to each of the relevant regional co-ordinators setting out a basic outline of the project aims, objectives and proposed

methodology, with a more detailed project information sheet appended to the email (see appendix 8.4). The regional co-ordinators were asked if they were able to help facilitate access to local residents in the focal LSOA's either directly or through their network of local organisations. Unfortunately, none of the regional co-ordinators were able to support the project as they did not have contact with any local organisations working in the focal LSOA's.

In order to overcome this barrier, an online search was undertaken to identify and contact potential local partners directly. The terms "fuel poverty" and then the city of interest were inputted in to an online search engine to identify the fuel poverty projects and organisations in place in each of the focal cities. This information was then filtered down by identifying which area of the city the project and or organisation were operating from either the information provided in the project website or through direct contact with the organisation of interest. This process enabled the identification of potential partners in each of the nine focal cities as set out in Table 16.

Table 16 Potential partner organisations approached in each focal city

City	Potential Partner Organisation
Birmingham (Moseley)	Moseley Community Development Trust & Birmingham City Council
Birmingham (Nechells)	Birmingham City Council
Bristol	Hartcliffe and Withywood Ventures
Leeds	Groundwork Leeds
Liverpool	Energy Projects Plus
London (Islington)	Islington Council
Manchester	Manchester Council
Newcastle Upon Tyne	Your Homes Newcastle
Nottingham	St. Anns Advice Centre
Sheffield	University of Sheffield

As with the original approach to National Energy Action, each of the identified organisations were contacted, initially via email with a brief project scope and full project information sheet attached to the email. This was followed up with telephone conversations or emails at the wish of the contact in each of these organisations. A significant amount of time was invested in recruiting local partners, both in identifying organisations operating in or close to the focal LSOA's, but also in developing a strong working relationship with the point of contact within this organisation. Despite this investment of time and effort, local partners ultimately left the project in Liverpool, Manchester and Nottingham. A discussion surrounding the issues that made a number of aspects of the data collection process challenging is provided in section 5.6.1.

In order to attempt to overcome the loss of delivery partners in these three cities, further effort was made to identify potential alternative partners to take over the role and provide the necessary local knowledge. Time limitations constrained the possibility to recruit alternatives. Recruitment processes had been running over a four month period at this point (October 2013 to January 2014) and data collection had been scheduled for the final week of January 2014. It was therefore decided that it would not be appropriate to delay data collection in the other cities and to focus data collection in these areas. Given the proximity of Nottingham to the researcher as well as the very small geographic area identified in Nottingham, a direct recruitment approach was decided upon for this region to try and circumvent the lack of a local partner in this city and to maintain the city as a potential area for participant recruitment.

5.5.5 Identifying and recruiting participants in each grouping of focal LSOAs

Having developed a network of local partners in six of the nine cities of interest, these partners were then utilised in order to recruit participants to partake in the focus group and

subsequent AHP weighting exercise. Potential participants in each city were provided with a participant information sheet tailored to include information specific to each city, including date, time and location of the focus group, a brief section outlining their need to partake in a follow up exercise at a later date, as well as information about the partner organisation and the researcher. An example of the generic research information sheet (devoid of the specific information mentioned previously) is provided in appendix 8.5. Specific methods of distributing information to potential focus group participants varied in each city and were driven by the local knowledge provided by each local partner. The specific approach to recruitment utilised within each city is detailed in full in appendix 8.7.

5.5.6 Identifying social practice factors of fuel poverty

Focus groups were both audio and video recorded, providing a verbal and visual documentary of the data collection procedure. Drawing upon the work of Halkier (2010), it was deemed pertinent to video record the focus groups in order to capture the social context within which the group was conducted, reflecting the social practice theory approach which forms the epistemological framework for this study.

Following the completion of each focus group, their respective audio and video files were uploaded into the qualitative data-analysis software package NVivo. It was decided that utilising a Qualitative Data Analysis (QDA) software package would be beneficial to the project given the expected large volume of data from the focus groups as well as the use of video recordings to provide contextual data. QDA software facilitates speed and ease of access to interrogative tools for analysis of the data set (Flick 2006). Of particular interest was the ability to utilise more complex and detailed approaches to coding (Bazeley 2011) as well as creating nests of codes (Krueger and Casey 2009) which it was felt would be beneficial when subsequently developing the hierarchy of fuel poverty social practices in the

second half of the study. Similarly, the ability to undertake tests of coding reliability was a key motivator in the decision to use a QDA software approach rather than a manual coding methodology. Finally, NVivo also enables the analysis of multiple forms of media (audio, video, photographic, social) within one platform, easily facilitating the use of video and audio media for the data analysis process. This capability and the lead researcher's prior experience with the package led to the choice of NVivo as the QDA package for transcription, coding and analysis.

Each of the focus groups were transcribed by the lead researcher who had also facilitated the groups, enabling them to increase their familiarity with the data (Bloor et al. 2001) prior to the commencement of coding and analysis. The recordings were transcribed verbatim, and in conjunction with the video footage it was possible to ensure that as accurate a representation of the focus groups proceedings was recorded as possible (Bloor et al. 2001).

In order to identify social practice theory factors of fuel poverty it was deemed important to develop a reliable coding structure. Whilst the question of reliability of data is central to quantitative studies, its role in qualitative studies is less clear (Armstrong et al. 1997). Reporting of reliability within qualitative studies is not universal (Krippendorff 2004b). Some authors suggest that utilising criteria derived from quantitative methods is inappropriate (Hruschka et al. 2004), but others are increasingly calling for explicit consideration of the reproducibility of results in qualitative research (Campbell et al. 2013). Krippendorf suggests that a failure to consider whether the classifications that one analyst creates when coding would be similarly identified by other analysts is a major "epistemological mistake" (2004a, p.789). In order to avoid this mistake and to ensure the validity of the social practice theory factors of fuel poverty identified for subsequent quantitative weighting via AHP, it was deemed important to use an analysis and coding approach that would enable an evaluation of

intercoder reliability. Campbell et al. (2013) provide a practical guide to calculating intercoder reliability in studies with constrained budgets, and this approach was adopted as a guideline for this research.

The process of analysing and coding involves deciding upon the meaning of the words and phrases recorded in the data collection process (Miles and Huberman 1984) which has led to some researchers suggesting that there is little point in assessing reliability of coding as words can have many meanings and their interpretation is contextual (Campbell et al. 2013). Yet, within the context of this study in particular, a failure to consider the reliability of the codes and subsequent factors identified within the qualitative study could lead to significant concerns surrounding the validity of the subsequent quantification of the factors within the quantitative AHP study.

5.5.6.1 Coding the focus groups

Coding allows the analyst to classify and interpret the data presented in order to understand what they understand of the reality reflected within transcripts (Bazeley 2011). The process facilitates the easy retrieval of key concepts and associated examples at a later date, enabling a more efficient analysis process (Miles and Huberman 1984). Drawing more from the approaches of Corbin and Strauss (1990) than the advice of Miles and Huberman (1984), the coding structure was developed inductively by the lead researcher with codes emerging from the content of the transcripts.

Although a grounded theory approach was not adopted by the study, we drew upon the principles of Corbin and Strauss (1990), undertaking detailed analysis of each transcript in order to identify all possible coding themes. As familiarity with the transcripts increased these categories were refined into a hierarchy of coding nodes and sub-nodes (Bazeley 2011). As the research utilised the QDA software NVivo, this research refers to coding to nodes

reflecting the terminology utilised in Nvivo. A node is defined as "a collection of references about a specific theme, place, person or other area of interest" (QSR International 2015). As the nodes were refined, more precise working definitions of each node were recorded (Campbell et al. 2013) within NVivo. These definitions were important to ensure consistency of application of the node across the focus group transcripts and would be vital for developing the second coders understanding of what text would be considered relevant for each node (or sub-node) of coding (Bazeley 2011). Developing and defining precise definitions of each code was vital to maximise the unitisation of text in order to achieve a high intercoder reliability value (Campbell et al. 2013). The full and final coding structure is provided in appendix 8.9.

An initial pass through the text drew upon the "Seeing as" (Bazeley 2011, p.74) coding technique to identify the initial coding structure. By identifying, from the perspective of the analyst a passage which was deemed interesting, we then asked why we felt the passage to be interesting before reflecting more deeply upon why we were interested in that code. In doing so, passages of interest were accurately identified with a justification and description of the coding node created and recorded as an integral part of the process. The reflective component ensured global applicability; that is relevance and usefulness across multiple focus group transcripts and minimised the chance of creating limiting codes which would only be of relevance to a small sub-set of the transcripts. These codes were developed into a hierarchy based on "code families" (Campbell et al. 2013, p.301) were each family member represented a sub-code relating to the overall family theme.

5.5.6.2 Ensuring coding structure reliability

Whilst noting that it is acceptable to assess reliability upon only a sample of texts, Campbell et al. (2013) observe that consistent guidance as to what constitutes an appropriate

size of sample is lacking. Miles and Huberman (1984) suggest that in assessing the reliability of coding, different coders should separately code five to ten pages from the first data source, where as other authors suggest that 10 percent of the overall data set is more appropriate (Campbell et al. 2013).

As the factors identified from this qualitative study were to be used within a subsequent quantitative study, an area with a more defined approach to result validity, it was decided that it would be appropriate to assess validity over the larger sample size. The lead researcher selected 10 percent portions, by length in time, of each focus group transcript that contained the densest coding of each transcript. This would provide the greatest test of coding validity as the second-coder would need to agree on a larger volume of applicable codes than otherwise necessary in other areas of the text in order to achieve an acceptable level of intercoder reliability.

These subsets were prepared in to a separate NVivo file so as to ensure that the second coder was not influenced by the larger dataset with the first coders coding hidden from the view of the second coder. Following the guidance of Campbell et al. (2013) the lead researcher discussed the coding scheme with the second coder, explaining each code, its definition and how it was derived. In order to minimise unitisation effects upon the final intercoder reliability tests, the unit of analysis was precisely defined (Miles and Huberman 1984) to the second coder. The extant literature provides no clear advice as to what constitutes an appropriate unit of analysis (i.e. a sentence, a phrase, a section the coder perceives to be discussing a concept) (Hruschka et al. 2004; Campbell et al. 2013). It was outlined that in applying a code to the transcript the primary coder had adopted the approach of selecting the entire phrase rather than precisely relevant words, in order to provide context to the example which would be of use when examples of codes were retrieved subsequently.

This period of debate also allowed the second coder the opportunity to ask any questions of the primary coder to clarify their understanding of the codes and task at hand. The second coder was also given the freedom to add additional codes to the coding structure if they did not feel the codes created by the primary coder sufficiently covered the topics being discussed. After the second coder had completed coding the subset of transcripts, they were debriefed by the primary coder as a verbal check of their approach to coding as well as to explore their feelings towards the validity of the coding structure and any additional codes that they had introduced to the scheme. Any discrepancies were discussed between the two coders before agreeing as to whether any new codes identified were to be included in the final analysis.

In order to calculate intercoder reliability, the coding of the two coders were statistically analysed utilising the coding comparison function in NVivo 10. This function calculates two common analyses of coding reliability, the percentage agreement and Cohen's Kappa (Cohen 1960). The coefficient (or percentage) of agreement is perceived as overstating intercoder reliability (Hruschka et al. 2004; Krippendorff 2004b), whereas Cohen's Kappa has been accused of being too conservative in its estimation of reliability (Krippendorff 2004b).

Miles and Huberman (1984) do not discuss the use of Cohen's Kappa, but do consider the concept of intercoder reliability. They define intercoder reliability as: (Miles and Huberman 1984, p.63).

$$reliability = \frac{number\ of\ agreements}{total\ number\ of\ agreements\ plus\ disagreements}$$

They suggest that ultimately (after recoding) this value should be around 90 percent. In comparison, the main advantage of Cohen's Kappa as opposed to the coefficient of

agreement is that it corrects for chance agreement between two coders (Hruschka et al. 2004), removing potential inflation of stated reliability. Cohen's kappa is defined as (1960, p.40):

$$\kappa = \frac{p_0 - p_c}{1 - p_c}$$

Whereby: $p_0 = the\ proportion\ of\ unites\ in\ which\ the\ judges\ agreed$

$p_c = the\ proportion\ of\ units\ for\ which\ agreement\ is\ expected\ by\ chance$

Values for the variables p_0 and p_c were exported from NVivo and the calculations checked and recalculated to verify the validity of the outcomes calculated by the programme. Assessments of the strength of agreement have been calculated by numerous authors. Landis and Koch (1977, p.165), based on the analysis of categorical data suggest the following classifications of the strength of corresponding kappa ranges:

Table 17 Kappa Statistic indicative strength of agreement according to Landis and Koch (1977, p.165)

Kappa Statistic	Strength of Agreement
<0.00	Poor
0.00 – 0.20	Slight
0.21 – 0.40	Fair
0.41 – 0.60	Moderate
0.61 – 0.80	Substantial
0.81 – 1.00	Almost Perfect

Within the clinical setting, Cicchetti (1994, p.286) suggests slightly different classifications of the strength of kappa which he argues is a simplified version of those offered by Landis and Koch:

Table 18 Kappa statistic indicative strength of agreement according to Cicchetti (1994, p.286)

Kappa Statistic	Strength of Agreement
<0.40	Poor
0.40 – 0.59	Fair
0.60 – 0.74	Good
0.75 – 1.00	Excellent

Following coding of the subset of transcripts by both coders and subsequent calculation of percentage agreement and Cohen's Kappa, the resultant values were assessed against these two measures of strength of kappa and suggested values of the strength of percentage agreement. If the resultant values were not deemed to be close to 0.80, the coders would meet again to discuss their agreements and disagreements in coding, refine the coding structure, before repeating the coding and analysis process. This would be repeated until an intercoder reliability value considered suitably close to 0.80 was achieved.

5.6 Study 2a - Focus Group Results

5.6.1 Participant recruitment challenges

As discussed in section 5.5.3, the study sought to complete focus groups in ten locations across England in nine cities. Krueger and Casey (2009) suggest that the optimal number of participants in a focus group is between five and eight. We sought to recruit around 10 participants for each location to allow for any potential participant attrition prior to the focus group. This level of over-recruitment was based on prior experience of recruiting for focus groups on the subject of housing matters and was also informed by the guidelines of Krueger and Casey (2009). Recruitment in each city was a time consuming and challenging process, despite the initial work undertaken to identify local partners to assist with access to target neighbourhoods in each city and the decision to include a financial incentive package in the form of a prize draw for a payment towards the household energy bill for three randomly selected households which took part in both the focus group and AHP component of the study.

5.6.1.1 Loss of local partners

Due to personnel changes in partner organisations in Liverpool and Manchester the previously negotiated access to support from these organisations became unavailable to the

project before recruitment of participants could take place. In order to overcome this, an attempt was made to locate alternative partner organisations within these cities. Due to the precise geographic participant recruitment requirements it was not possible to identify alternative partner organisations and so as to avoid delaying data collection in other areas it was necessary to take the decision to complete the study without including Liverpool and Manchester within the focal areas.

5.6.1.2 Poor participant response

Despite the supportive nature of the partner organisations in Birmingham, participant recruitment was particularly challenging within each of the two identified areas of the city. From the 165 letters distributed across the two target areas, only three individuals responded to the call for participants, representing a 1.8% response rate. Two participants expressed an interest in partaking in the research in the Nechells area of the city (classified as 25 on the IMD/FP classification matrix) and one from the Moseley area of Birmingham (classified as 15 on the IMD/FP classification matrix). As focus groups had already been forgone in Liverpool and Manchester, limiting the scale and scope of data collection within the study, it was decided that a focus group would still be organised within the relevant Nechells LSOA's to garner the opinions of the two participants despite the low response rate. Communication was maintained with the participants in order to seek to ensure their participation in the focus group. Given the distance being travelled by the researcher a telephone call to each participant on the evening of the focus group confirmed their intention to attend, however following a telephone call to both participants on the morning of the focus group, it was found that they had both decided that they would no longer like to participate.

In Moseley, only one participant had agreed to partake in advance of the scheduled focus group date. As the methodological approach of the research was underpinned by a social

practice theory lens it was necessary to postpone this focus group. An interview with a single resident marks a significant departure from the philosophical and methodological approach adopted by the study as a whole and any data collected would not therefore be considered comparable to that gathered within a focus group environment. The researcher was invited to a community event run by Moseley CDT on the day of the previously scheduled focus groups in Birmingham in order to recruit further participants in the area. Residents, local businesses, neighbourhood policing teams and community health teams were all in attendance. No residents expressed an interest to participate at the event, however the community newspaper offered the opportunity to publicise the research to aid recruitment for a rearranged focus group. Unfortunately, this too resulted in no expressions of interest from local residents. As such both focus groups in Birmingham could not be completed and Birmingham had to be withdrawn from the study.

5.6.1.3 No local partner and no participant response

Nottingham also proved a challenging city to recruit participants. In Nottingham the area of interest was a singular LSOA classified as 5 in the IMD/FP classification matrix. This area was in the lowest quintile of deprivation nationally, but the highest quintile of fuel poverty. As such the broad characteristics of the area implied that households would be generally wealthier than 80% of English households, but with cold and hard to heat houses. The general wealth of the area meant that despite the high incidence of fuel poverty it was not a priority for support from local government or the third sector to tackle the issue. As we have discussed previously, the commonly utilised proxy for identifying fuel poor households is that of their deprivation level and therefore it is not surprising that no groups had chosen to work within this LSOA to support the households in attending to their high heating costs. Despite the researcher delivering recruitment letters to 100 of the households within the LSOA, no households indicated a willingness to participate in the data collection process.

Given the inability to identify a local partner that could help facilitate participant access and the lack of response from direct participant recruitment by the researcher, Nottingham was also ultimately withdrawn from the study.

5.6.2 Overview of focus group participation levels

After Birmingham, Liverpool, Manchester and Nottingham were withdrawn from the study, focus groups were held in the five remaining focal cities of Bristol, Leeds, London (Islington), Newcastle and Sheffield during the first quarter of 2014. A breakdown of the timing and level of participation for each focus group is provided in Table 19.

Table 19 Location, date, participant numbers and duration of focus groups

City	Date	Number of participants	Length of focus group
Newcastle	27/01/2014	3	1hr 27mins
Bristol	29/01/2014	6	1hr 40mins
London	30/01/2014	3	1hr
Leeds	31/01/2014	2	1hr 36mins
Sheffield	10/04/2014	3	1hr 22mins

As can be seen, only the focus group in Bristol achieved the level of participation suggested as ideal by Krueger and Casey (2009). Although not experienced to the same extent as in Birmingham. Liverpool, Manchester and Nottingham, recruitment remained a challenging proposition across all focal areas. Despite maintaining consistent communication with the partner organisations in the two months prior to data collection and the partners' ongoing concerted effort to recruit participants, final attendance in four out of the five cities was significantly below the numbers preferred for an insightful focus group.

In all cities, the advice of Krueger and Casey (2009) was followed in an effort to ensure attendance levels were maintained with telephone calls and emails (where appropriate) utilised to keep participants engaged in the focus group and to ensure their attendance. In Newcastle, three individuals expressed an intention to attend the focus group in advance with one of the focus group members attesting that they would bring some friends who also lived in their street along to the group. Upon arrival in Walker this was found not to be the case due to prior commitments and so the focus group was held with only the three original participants. The focus group in Bristol received six expressions of interest, all of whom attended. In London the partner organisation had worked particularly diligently to recruit residents from the relevant LSOA's and upon arrival in Islington, the local contact believed that seven individuals would attend on the basis of reminder telephone calls placed the evening before. Unfortunately, even after allowing time in the focus group schedule for late arrivals, only three residents attended.

The project received assistance in their access to residents in Leeds by a local community organisation but undertook the recruitment directly with residents themselves. One week prior to the focus group at a community event seven residents had expressed an interest in attending the focus group, with one expressing that they may be late due to a prior commitment. Again, despite reminder communications in the run up to the focus group, and on the eve of the event, there was significant participant drop out due to changing personal circumstances and unforeseen commitments. This meant that only two of the original seven residents attended the focus group.

As with Nottingham, Sheffield was a region that was classified as five on the IMD/FP classification matrix, reflecting the least deprived households by IMD score, but with the highest level of fuel poverty. These characteristics once again meant the area was not of focal

interest to any third sector organisations or the local council and therefore direct recruitment by the researcher was undertaken. As this focus group took place three months after the other four focus groups, expectations for recruitment had been recalibrated downwards in response to the recruitment and attendance experience in the other cities, and to receive three expressions of interest from the initial one hundred participant invites was deemed to be a relative success, although still short of the ideal level.

5.6.2.1 Participant background analysis

Prior to the commencement of each focus group, participants were provided with a background monitoring questionnaire as detailed in section 5.5.2 providing demographic, residence and energy information for each participant's household. This was designed to provide an indication of the similarity of the focus group participants to the general population of England as well as indication of the homogeneity of participants between all of the focus groups given the differing IMD/FP classification areas they were drawn from.

Of the 16 focus group members across England, 14 (87.5%) identified themselves as being "White British" from a list of sixteen ethnicity codes approved by the Office of National Statistics for use as a self-identification measure of ethnicity (Office for National Statistics 2003). This figure was greater than that of the general population of England and Wales in which 80.5% of the populous identified themselves as being White British in the 2011 census (Office of National Statistics 2012). The other two respondents identified themselves as being African and White and Black Caribbean. This represented 6.3% of respondents from the Black/African/Caribbean/Black British grouping which is notably greater than the national average of 3.3% of the population identifying themselves within a constituent classification of this grouping and 6.3% of participants with a self-identified ethnicity from the Mixed/Multiple Ethnic Groups classification, slightly below the national

average of 7.5% for this group in the 2011 census (Office of National Statistics 2012). There was no representation within the focus group participant pool of any residents from the Asian/British Asian ethnicity grouping or from the final classification of "other". In total three different individual ethnicity groups were identified out of the total possible 16 classifications offered, covering three of the five recognised broader ethnicity categories utilised by the Office for National Statistics. From an ethnicity perspective it can be seen that the participant pool did not represent the broader statistical breakdown of the general population of England as reported in the results from the 2011 census.

Participants ranged in age from the youngest at 27 years old to the eldest participant at 89 years old with a mean age of 54.47 years old across the participant pool. This compares to the median age of the English population in mid-2012 (the last time this data was collected) of 39.5 years old (Office for National Statistics 2013). Intuitively, it is not surprising that the median age within the participant group was higher as participants were recruited from the adult population whereas census statistics are drawn from the entire "usually resident" population irrespective of age. Of those respondents that stated their employment status (14 out of 16 participants), 53.3% were unemployed. This is a significantly greater percentage of the population than the figures for England as a whole in January to March 2014 (when the data collection was completed) which had an unemployment rate of 6.8% (Office for National Statistics 2014b)

The mean per week income of a UK household in 2012/2013 was £535 per week before housing costs, compared to a median weekly income of £440 before housing costs (Carr et al. 2014). This equates to a mean annual income of £27,820 or a median annual income of £22,880 for a UK household. In comparison, 53.8% of focus group participants that declared their household income, stated it was less than £6,475, which is notably less than the English

median annual household income. A similarly marked departure from the English average was found with the mode of energy bill payment, with 53.3 % of respondents paying their energy bill via a pre-payment meter. In England in 2013, 3,589,729 domestic electricity accounts and 2,757,173 domestic gas accounts were paid for by pre-payment meter (Voronkova 2014) which accounts to 15.2% of electricity accounts in England paid for by pre-payment meters and 14.66% of gas accounts paid for by pre-payment meters.

A further indication of the extent to which the focus group participants were representative of the wider English population was indicated through household ownership data. 80% of respondents rented their home (with no option for differentiation between private rental of social housing rental offered) with 13.3% (two households) owning their property out-right and one household preferring not to state their housing ownership status. This demonstrated that a much greater percentage of focus group users rented their home than the general population of England of which 19% rent privately and 17% rent from social landlords, with a smaller percentage of participants owning their home outright than the national average of (33%) (DCLG 2015b). A breakdown of these statistics by city is provided in Table 20.

Table 20 Background monitoring statistics by focus group

City	IMD/FP Classification	Ethnicity	Age (mean)	Employment status	Income	Bill payment	Home occupation
Bristol	23	100% White British	37.75	80% unemployed 20% prefer not to say	40% less than £6,475 20% £6,476 - £6.999 20% £8,000 - £9.999 20% £10,000 - £11.999	80% Pre-payment meter 20% Quarterly fixed direct-debit	80% rent 20% Prefer not to say
Islington	21	33.3% White British 33.3% African 33.3% White & Black Caribbean	57.33	33.3% part time employed 33.3% unemployed 33.3% missing	33.3% less than £6,475 66.7% missing	33.3% Pre-payment meter 33.3% Cash/cheque 33.3% missing	100% rent
Leeds	21	100% White British	73.5	100% retired	50% £8,000 - £9,999 50% £15,000 - £19,999	100% Monthly fixed direct-debit	100% rent
Newcastle	15 (14)	100% White British	47.67	100% unemployed	100% less than £6,475	100% Pre-payment meter	100% rent
Sheffield	5	100% White British	68	33.3% self-employed 66.7% retired	33.3% less than £6,475 33.3% prefer not to say 33.3% missing	100% Monthly fixed direct-debit	66.7% own outright 33.3% rent

The combination of the above monitoring statistics demonstrate that the participants in the focus groups were not representative of the statistical make-up of the English population more broadly and as such the resultant variables of fuel poverty identified by this study

should be subjected to further investigation to ascertain their validity to the wider populous. Given the robust sampling procedure utilised to identify localities of interest, this result is, of itself, not of concern. The study deliberately sought to investigate communities identified as outliers to the traditional relationship between deprivation and fuel poverty in order to develop an understanding of the drivers of fuel poverty that are not captured by the current technically focussed measure and financially motivated proxy measures of fuel poverty utilised for policy and intervention targeting. As such, it was expected that participants would differ from the mean results for England. With three of the five focus groups (Bristol, Islington and Leeds) held in area's in the highest quintile of deprivation and only the Sheffield focus group in the lowest quintile of deprivation, the high levels of unemployment, bill payment by pre-payment meters as well as low levels of household income and ownership, intuitively match the expected socio-demographics for the areas examined.

5.6.3 Focus group analysis

The focus groups sought to identify and understand the social practices that bear influence upon the existence of fuel poverty in England. The focus groups provided explorative insights that would then be subsequently examined (Flick 2006) utilising AHP in study 2b. As an explorative study an inductive coding approach (outlined in section 5.5.6) was utilised, drawing particularly upon the guidance of Campbell et al. (2013) and Bazeley (2011), an initial pass through all of the transcripts was completed identifying all passages of interest.

Drawing upon the question framework utilised in the focus groups as a starting point for coding node creation, but allowing for any emergent codes within the transcripts to be identified in addition to the initial topics of interest, a very broad set of codes was developed in the primary coding pass to ensure all potential codes and topics were captured. This led to

a large and potentially un-wieldy 106 different coding nodes being identified. It was decided that such a large number of nodes would make analysis unfocussed with great potential for overly subtle overlap between codes and the unnecessary identification of codes which bore little relevance to the overall dataset. The advantage of utilising QDA software was the speed with which it became possible to identify which nodes were most generally applicable to the entire body of transcripts and those that were purely case specific. For example, the node "Rights and expectations – references to whether the resident feels they should have to exist in this way or not" was only utilised in two of the focus groups, whilst the node "Personal state of mind – Feeling down, depressed or similar" was only used in one of the focus groups, suggesting that these nodes were not representative of social practice factors of fuel poverty across the broader data set.

Given that the study sought to identify social practice factors of fuel poverty that bore relevance to England generally, rather than solely to specific geographic areas, it was deemed important to focus on factors that existed across the majority of focus groups rather than to try and build a model that contains any and all potential social practice factors of fuel poverty. A further factor in the decision to undertake a second coding pass through the transcripts was based upon the decision to undertake tests of intercoder agreement through second coding by a non-subject expert second coder. A large coding base with only subtle differences between codes (for example between the code "heating control – techniques utilised to control the use of heat in the home" and "Limiting heating to certain rooms") would increase the potential for disagreement between coders and would reduce the likelihood of achieving an acceptable level of intercoder agreement.

The focus group question schedule had provided a strong basis for the coding nodes created in the initial pass through the focus group transcripts with many of the topics

identified drawing influence from the sections of the schedule as described in section 5.5.2. Although this had been helpful for creating an initial framework for understanding the data collected, examination of the coding structure created demonstrated that the nodes were not effective in capturing the concepts discussed by participants. Top level nodes in the coding hierarchy such as "environmental attitudes" were coded across all focus groups, but this was as a result of the introduction of the topic by the facilitator rather than through naturally occurring discussion of the topic by participants. For example, in the focus group in Newcastle, the topic of recycling was discussed as follows:

> *"Facilitator - And why is it you choose to recycle?*
>
> *Female Respondent 1 - Your bins, they're only emptied once a fortnight now, so everything doesn't fit in your bin. Well that's my issue anyway.*
>
> *Female Respondent 2 - Ah well you've got a big family.*
>
> *Female Respondent 1 - But I still, that's why I choose to recycle anyway.*
>
> *Female Respondent 2 - I just recycle anyway, it's just force of habit I think. 'Cos I worked as a community development years ago, and we were always doing it you know. So it's just followed on. Sometimes I'm lazy and I don't, but the majority of times I do."*

Again, in Islington recycling was discussed following a brief introduction by the facilitator:

> *"Facilitator - OK so the next question is about recycling actually. So do you do recycling…?*
>
> *Male Respondent 2 - Yeah.*
>
> *Facilitator - ...Is it important to you?*
>
> *Male Respondent 2 - I do lots of that"*

In both of these focus groups it became apparent that households did recycle, but this didn't seem to be driven by a strong pro-environmental disposition. Conversely, the topic of environmental attitudes was discussed much more naturally in the Sheffield focus group, an area classified as five in the IMD/FP classification matrix with high levels of fuel poverty but low levels of deprivation. The individuals within this focus group sought to project an image

of being a concerned citizen, perhaps reflecting the success of neo-liberal policies in focussing the cause of environmental problems upon the individual and away from the state and the collective society (Paterson and Stripple 2010). Reflecting the work of Giddens, these participants used their lifestyle choices and daily actions to demonstrate to others a certain social image that they wished to embody (Stephenson et al. 2010). The extent to which this group discussed this topic may have been amplified by one participant who took great pride in discussing her household's recycling habits.

> *"I compost all of my vegetable stuff with sole exception of onions which shouldn't go in a compost heap. I segregate the plastics, the cans, the plastic bottles and the glass, not that there's a great deal of that, but it all goes in to the appropriate boxes and bins and stuff. Large items like discarded kitchen, my husband takes to the dump. But we use loads and loads of second hand things as well, so we take stuff up to the charity shop and buy stuff from the charity shop. So, there's actually not an awful lot goes in the bin. So, usually we can find somebody that wants a book that we don't want or anything else like that, rather than throwing it in the bin. And then, if all else fails, if it's combustible, it goes on the fire…*
>
> *… I even up-cycle clothing, so clothing that I don't want any more I turn in to something else. So I sew and I make craft things out of old clothing."*
>
> *(Female respondent 2 – Sheffield)*

By exploring the sections of the transcripts that had been coded in this node, it became apparent that although topic of environmental attitudes had been driven by the question schedule, rather than emerging from the focus group discussions, the concepts and content of the discussion contained emergent properties that were of relevance to the data set. As such it was deemed appropriate to undertake a second coding of each focus group transcript but with a revised set of nodes created from the examination of the initial coding pass.

Through examination of the 106 coding nodes created in the initial pass through the five focus group transcripts, codes with minimal references (that is a relatively small total number of times the code was applied across all sources) as well as coding nodes that were used in only one or two of the focus groups (and therefore did not represent widely espoused opinions), were identified for consideration for either combining into a new, broader code or

potentially to be removed from the analysis. This process reduced the total number of nodes from 106 to 27, with a reduction in the highest level of nodes from 14 in the original coding pass to 4 in the second pass. Despite a significant reduction in the total number of nodes, as a result of carefully combining nodes and considering their definition and therefore integral content, most of the concepts identified in the initial coding pass were maintained for the second coding pass. Following Bazeley's (2011) suggestion that the skill of a good coder is to know what text needs to be coded and what text should be left un touched, in the second pass, references to the warm-up question surrounding each participant's daily routine were removed from the coding process as they had not provided any content of particular relevance to the topic of focus. Most participants summarised their routine in a very concise manner, rather than providing any insight into typical household or community practices. For example one respondent summed up their daily routine as follows:

> *"Oh right. Get up, get the kids to school. Go to college, coming in, cooking tea, housework, getting clothes ready for bed, kids ready and bed. And that's all about 10 o'clock but I get up at half past six in the morning"*
>
> *(Female respondent 5 – Bristol)*

Similarly, the topics of transport, values and personal state of mind were removed due to lack of responses or the muted answers provided that added little to the understanding of practices that influence of the existence of fuel poverty in England. Many of the nodes that utilised some of the concepts contained within these categories had also been coded within other more dominant coding titles, such as aspects of transport being discussed with respect to food purchasing habits, or values (for example, the importance of presenting a tidy home) being more closely related to broader discussions surrounding motivations surrounding domestic practices. The final coding node structure is provided in appendix 8.9.

5.6.3.1 Verifying the reproducibility of the identified coding structure.

Following the methodology outlined in section 5.5.6.2, a subset of each focus group was subjected to re-coding by a second, non-subject expert in order to ascertain the reproducibility of the coding structure created from the second coding pass. Utilising the coding comparison function in NVivo, Cohen's Kappa and the percentage coding agreement were calculated first in NVivo, and then verified through recalculation in Microsoft Excel. The full coding comparison results are contained within appendix 8.10.

Table 21 Focus group coding comparison statistics values

Coding Comparison statistic	Value
Coefficient of Agreement	0.987
Cohen's Kappa	0.796

The final values, contained within Table 21, obtained after only one coding pass by the second coder suggested that a high degree of inter-coder agreement had been achieved and that there was no need to attempt a further round of coding to improve the reliability. Following the guidelines of Miles and Huberman (1984, p.63), the coefficient of agreement of 0.987 was greater than the required minimum coefficient of 0.90, implying an acceptable level of agreement. As this statistic can be seen to overstate levels of agreement as it does not correct for agreement by chance, Cohen's Kappa (Cohen 1960) was also assessed. The value of 0.796 surpasses Cicchetti's (1994, p.286) lower boundary to achieve an excellent level of agreement (0.75 – 1.0), though it was classified as substantial (values between 0.61 and 0.80) by Landis and Koch's (1977, p.165) classification guide, rather than the top category, almost perfect (0.81+).

The combination of the strong coefficient of agreement and substantial to excellent Cohen's Kappa value satisfied the pre-determined acceptance criteria as outlined in section

5.5.6.2. As such the coding structure was deemed to be reliable and reproducible, satisfying Krippendorf's (2004a) call for a greater consideration of reliability and reproducibility within qualitative work. The identified coding structure, which also represented identified potential social practice factors of fuel poverty, was therefore accepted as appropriate and taken forward as a framework for a detailed analysis of the identified factors.

5.6.3.2 Resultant social practice factors of fuel poverty identified

The potential social practice factors of fuel poverty identified from the second round of coding were grouped in to four code families (Campbell et al. 2013, p.8), containing between one and three levels of child nodes (that is, nodes which are clustered within the top level node of the coding family). The top level node name and description are provided in Table 22.

Table 22 Top level node name and definition for focus group coding

Top level node name	Node description
Domestic Practices	A broad category which contains references to domestic home practices (cleaning, presentation of the home etc.) and their impact upon the household. As a broad category it sums specific references from the sub nodes.
Energy	A broad category for all references to energy. This refers to produced energy rather than natural energy (i.e. discussions of lacking in energy due to lack of food are not relevant within this code) and may include matters such as - Opinions on energy companies - Levels of consumption - Modes of reducing consumption - Energy efficiency As the umbrella code references are aggregated from child nodes and should not be coded directly to this umbrella title.
Food	An umbrella category for references to food. This includes references to shopping habits such as cost/value preferences, where food is purchased from, meals, how or whether food is heated and similar
Social Engagement	A broad category for references relating to the importance of social interaction to the respondent. This can be with:

	- Family members - Neighbours - Local friends - Interest Groups - Community centres (e.g. libraries, job centre etc.) It is for discussions relating to the importance of social interaction, moments of social interaction and the role of others in their life.

5.6.3.2.1 Domestic Practices.

This node tended to focus around two related concepts which formed two child nodes of laundry and social image, although there was a notable overlap between concepts of social image and heating which is categorised within the Energy top level node. Focus group questions had been influenced by the work of Hards (2013) and Hitchings and Day (2011) who note that the expectation of the arrival of guests alters householders practices in order to present a certain image to their visitors. Contrary to these authors' findings, not all focus group participants tried to put away washing because of social stigma when guests were coming round. In Newcastle, the presence of guests meant that the heating was on in the house, which was seen as an opportunity to dry washing.

> *"Well, me granddaughter was there so I had washing on. The heating's on whilst she's there and I put the washing on the radiator"*
>
> *(Female Respondent 2 – Newcastle)*

In Bristol the participants didn't change their laundry habits if guests they knew were coming round. Familiarity meant they weren't embarrassed to have washing on display, and it was even perceived as an ideal time to have guests around:

> *Female Respondent 2 - Yeah! I think 'cos we all kinda know each other so it wouldn't matter...*
>
> *Female Respondent 4 - It makes no difference to me.*
>
> *Female Respondent 2 - Say if you (FR 4) came round to my house, I'd have you following me round the house work.*
>
> *Female Respondent 4 - [giggles]*
>
> *Female Respondent 5 - [nods]*

Female Respondent 2 - 'Cos that's what we're like. Or you know, you've got certain friends that you kind of go in and then you help them do housework. You know. So I don't think that would necessarily embarrass us or make us feel...

Female Respondent 4 - No

Female Respondent 2 - ... you know because we're just kind of like, you know, 'Come in, I've still got my vacuuming to do' and you just get on with it.

Female Respondent 4 - [laughs]

Female Respondent 5 - That's how I see it, because if you just put nice clean washing on there with the comfort blowing

FR 4 - Smells nice

FR 2 - Smells nice

FR 5 - That's it, stay there for another hour. An hour later you come in and it's all disappeared innit, so you've come at the best time. But that don't make no difference, like you say. Even on my Christmas photographs and all that, you still can see washing in the background.

However, despite not supporting concepts of social stigma surrounding laundry habits as suggested by Hards (2013) and Hitchings and Day (2011), heating practices were altered by respondents in all focus groups dependent on who was in or visiting the house. One participant in Islington noted the impact of having children in the house.

"Male respondent 2: Yeah, when you have young kids indoors, it's always going to cost you more than, if say I was living on my own. Because I could really you know to maximise, and take my time. As soon as the kids say I'm cold, you know, that's going to turn the heat on. 'Cos they don't understand that it's money. So, that's the way it goes really.

Facilitator: And do they bring friends round?

Male respondent 2. Yeah, they bring the friend round. Reading, and watching maybe something. If it's cold, they knock the heat on. But if it's like me and just my wife, we know, we can control things"

This impact was also felt by participants in Newcastle.

"When they come in, I know to put the heating on because it's really cold. But as soon as they go out I turn it back off...

... But we do without because of our Berns and people coming in."

(Female respondent 2- Newcastle)

Residents in Newcastle also discussed their concerns about how they were perceived due to the temperature in their home or if they were to be seen utilising other sources of warmth such as blankets.

> *"Yeah, well I used to be ashamed. People used to come in and honestly it was colder in the house than what it was outside."*
>
> *(Male Respondent – Newcastle)*
>
> *"Male Respondent - I would never have the quilt when there was people there.*
>
> *Female Respondent 2 - Oh I do.*
>
> *Male Respondent - I mean, I'm talking, they're sort of friends. I've lost all of my friends virtually, so it's just family...*
>
> *Female Respondent 2 - Even when my family come.*
>
> *Male Respondent - Ahh, well I fold it up and put it away.*
>
> *Facilitator - And why do you choose to do that?*
>
> *Male Respondent - Well, I don't think it's sort of polite is it to be sitting there underneath the quilt"*

One participant in Sheffield had gone so far as to not allow family to visit during the winter months as a result of the temperature of their home:

> *"Well my husband's family all live in the south, in Surrey and we have said to them, "Yes we'd love for you to come and stay with us but only between May and September". They can only come and visit us when we don't need to have the heating on. They would just die in the winter here, they would freeze to death. They're just not used to it. They're used to having warm houses anyway and they're used to it not being freezing cold and damp. It's rather than having the heating on for people, we have people when we don't need the heating."*
>
> *(Female Respondent 2 – Sheffield)*

These quotations demonstrate a more complex picture of the role of social stigma in moderating household practices involving energy than has previously been acknowledged in research. The previously reported idea that presenting a cold home to guests is something to be avoided, requiring householders to maintain a thermal "frontstage" (Hitchings and Day 2011, p.2461) presented to guests which does not represent their usual heating practices was supported. Less support was found for the idea that households are concerned that visitors are

aware of their laundry habits and seek to hide evidence of their laundry from guests. This may be influenced by the economic situation of those participating in the focus groups, whose household income tended to be far below that of the average UK household, and the fact that the majority of participants had their energy supplied through pre-payment meters. The combination of these factors often necessitated the combination of activities such as drying laundry when the heating was on anyway to maximise the benefits to the household of their expenditure on heating. This phenomenon lends further support to Hitchings et al.'s (2015) concept of inadvertent environmentalism, where economic necessity has resulted in participant householders acting in a more environmentally friendly manner without any conscious intention to follow environmentally friendly practices involving energy.

Despite the complicated role social image as we have termed it (encompassing a spectrum of concepts such as the more negative phrase stigma as used by Hitchings and Day (2011) and Hards (2013), and status also employed by Hards (ibid)) plays in determining practices involving energy in the home, as evidenced by the participants in our focus groups; it is clear that social image concerns do bear influence upon household practices involving energy and as such should be included within the AHP model to be investigated as a result of this study.

When considering the role of specific domestic practices, the use of washing machines to clean clothes was unanimous, with no participants discussing hand washing as a practice they utilised to do their laundry. Although the use of a washing machine was universal amongst participants, the regularity of undertaking was more varied. Participants in Newcastle, who despite being resident in LSOA's identified as either 14 or 15 in the IMD/FP classification matrix, and were therefore only statistically perceived as being mildly deprived yet extremely fuel poor, presented themselves as suffering significant economic hardship. The

circumstances which they described suggested a significant difference in their personal situation to those that would be expected from examination of LSOA level statistics. Unlike other focus group participants they sought to minimise the amount of laundry they had to complete by actively managing the amount of clothing they wear and doing infrequent, but full loads of washing. A male respondent in Newcastle described his approach to washing as follows:

> *"To be honest with you, it depends on the weather. I'm quite lucky because I've got quite a lot of clothes and that I've built up you know. So if it comes push to the shove when I'm sort of running short, which would probably take two weeks or summat, maybe pushing it three, then I would have to put it on the radiators. But I kind of wait till I've got. It's funny at the moment I've probably got the biggest pile of washing I've ever had in my life, because I cannot. But like I've got plenty of towels, underwear, shirts you know. Like I say you know, I try to keep me best. I can just wear stuff like I wouldn't wear outside because I spend most of my time in the house"*
>
> *(Male respondent 1 – Newcastle)*

Conversely, participants in Bristol would do between two and four loads of washing each day. They attributed this to their children who expected their clothes to be cleaned daily. Equally, all respondents in Bristol washed all their towels every day which added one to two extra wash loads to their laundry routine. In broader discussions it became apparent that the concepts of social image and clean children and homes were closely related for these participants. They did not want to be seen to be living in a dirty home or for their children not to be seen looking well dressed, irrespective of their income.

> *"And then we do go to the job centre, we get criticised, 'Oh you're on benefits you kids shouldn't have that. But should our kids look poor, because, you know we can't afford it?"*
>
> *(Female Respondent 2 – Bristol)*

All participants in both of these focus groups were entirely reliant on state benefits and social housing, however those living in Bristol had young families with between two and five children, compared to two out of three households in Newcastle being sole occupants. The extra income afforded to the Bristol participants from child benefits was perceived to provide

their households with a higher income than those in Newcastle which reduced the economic strain on the household. Perhaps reflecting the attitudes towards heating when children were in the home as previously discussed, the presence of children may mean that the householders in Bristol perceived the level of washing they undertook as an unavoidable necessity whereas participants in Newcastle who only had to consider themselves may have seen laundry as an opportunity to minimise household expenditure. This concern for frequency of washing was not echoed in any of the other focus groups.

The impact of household demographics was not explored as part of these focus groups. Differences in householder practices adopted in order to achieve economic savings, particularly amongst low income households in fuel poverty with different forms of household composition (such as families with young children, households with multiple adults, single occupancy households and so on) should be investigated by future research to understand the influence of sole and multiple occupancy on household practices involving energy.

In terms of drying clothes, the use of a tumble dryer was less common amongst participants. Whilst participants with children expressed using their tumble dryer fairly regularly, "So I tend to think, right, dryer, chuck a dryer on, leave the doors open. We're all open plan downstairs" (Female Respondent 5 – Bristol), those that did not have children at home often did not even have a tumble dryer in the home. Even in those homes with a tumble dryer, the majority of householders tended to favour using washing lines outside or clothes horses. In both Leeds and Sheffield participants discussed drying their clothing but avoiding using the central heating, either from using ambient warmth in the home, or drying their washing in front of an open fire. The impact of seasonal differences was brought up in most focus groups. Summer time provided the opportunity to avoid using energy in order to dry

clothes, although not all participants took advantage of this. The focus group participants in Bristol discussed the benefits of summer at some length:

> *Female Respondent 2 - Or you might part dry it then hang it up, to save a little bit of electric. Summer time is a lot easier...*
>
> *Female Respondent 4 - Lovely*
>
> *Female Respondent 2 - 'Cos you can whack it out in the garden*
>
> *Female Respondent 5 - I still use my dryer!*
>
> *Female Respondent 4 - Why? Oh I love the smell of fresh linen*
>
> *Female Respondent 2 - If it's something I need straight away then I will still use the tumble dryer.*
>
> *Female Respondent 4 - I don't. But they dry so quick outside.*
>
> *Female Respondent 2 - But I do love putting it out on the line...*
>
> *Female Respondent 4 - And I do, it's gorgeous.*
>
> *Female Respondent 2 - ...and sitting there smelling the washing in the breeze. Especially when it flips to the neighbours, and you think (sniffs), smell my washing.*

In Islington, the impact of living in flats and seasonal weather variation changed the location of clothes drying. Participants all mentioned drying clothes indoors in winter and outdoors in the summer.

> *"When it come to winter time, I do use a clothes dryer inside. After the months when no more washing line outside on the balcony, well really during the winter time, I take the drying inside. Then it's inside, because when I leave it outside it gets too err."*
>
> *(Male Respondent 1 – London, Islington)*

During the winter this participant used a tumble dryer once a week. He changed this practice in the summer:

> *"Yeah, well no, in the summer we don't use it. We have a balcony where we have a line. In the summer we hang the clothes outside, in the summer."*

Both washing and drying of clothes were recognised by participants as a major source of energy consumption within the home. Those participants who perceived themselves to be in a particularly tight economic position actively managed their laundry practices to minimise this

expenditure. Those with families felt that washing and drying was unavoidable and were more accepting of the number of wash loads they completed each day, though some did attempt to moderate the extent to which they did laundry by spot cleaning clothes and using products such as Febreeze (a product which masks the smells contained within worn clothing) to prolong the time they could be worn for before washing. Washing of clothes was seen by most participants as a necessity, with little evidence of participants managing the frequency with which they washed clothing. Drying clothing however received more active management by householders. The impact of summer and warmer weather was seen as an opportunity to minimise energy consumption for drying clothes and participants (other than those with families) tended to use more ambient and natural sources of warmth in order to avoid using central heating or other sources of energy consumption.

As with concerns surrounding social image, the focus groups provided evidence that the practice of completing laundry (involving both the washing and drying of laundry) bears a recognisable influence on practices involving energy in the home, through management of wash loads to minimise expenditure, utilising beneficial environmental conditions to reduce the necessary consumption of energy, or the acceptance of the necessity to undertake washing and drying which therefore makes energy consumption unavoidable in completing this practice. Therefore, these factors again should form a part of the AHP analysis of social practice factors of fuel poverty.

5.6.3.2.2 Energy

The top level node energy contained four distinct child nodes relating to different aspects of energy consumption in the home, but as with the domestic practices topic there was overlap between the examples coded within these nodes due to the complex relationships

between the roles of electricity, gas and heating in the energy consumption practices within the home.

The focus groups all demonstrated that householders had strong ideas about what aspects of their home were impacting upon their energy consumption. In Bristol participants had extractor fans installed in their homes by the local housing association to tackle issues such as damp, but all had turned them off because "that rinses my electric" (Female Respondent 2 – Bristol). In Leeds the communal entrance doors and windows were seen to be causing a draught which was subsequently impacting upon the entrances and halls of each individual home. In Islington all participants felt their homes did not retain heat but weren't sure what could be done about it, whereas in Newcastle, two out of three homes still only had single glazing and had noted that they could feel the wind blowing in from around the door frames. In Sheffield, where participants were not reliant on social housing and tended to be on a higher income than participants in other focus groups, energy inefficiencies in the home were recognised but acknowledged as resulting from a decision to choose to maintain original features of cold and inefficient Victorian or Edwardian houses.

> *"In, we've got a room that faces north east, like yours, which we use as our winter sitting room because the actual sitting room downstairs is freezing cold and we just don't heat it in winter at all, it just cannot be kept warm, the one with the fire. So we move upstairs for the winter and that's our sitting room. And, my husband is going to, he keeps promising that he's going to make some replacements for the original wooden shutters that were there. Because the Victorians new how to keep the heat in. These wooden shutters are beautifully insulating and so you open up the shutters in the morning, you get your passive solar gain and you close it late afternoon before it starts to get cold. So we're going to actually try that as an experiment and recreate the shutters."*
>
> *(Female Respondent 1 – Sheffield)*

Although respondents were all aware of energy inefficiencies in the home, they tended to voice this awareness in terms of the financial implications for the home, either with respect to their electricity bills or gas bills rather than through a concern for the impact of energy inefficiency upon the environment. Respondents in Leeds had fairly recently moved from an

underfloor heating system to central heating and described the impact the previous underfloor heating system had had upon other residents in their area.

> *"Female Respondent - We were the only property where the under floor heating worked. Everybody else ended up, including the houses, with storage heaters, electric storage heaters, and everybody was going mad. And we says...*
>
> *Male Respondent - The expense really."*

Participants all wanted to have a warm home, but concerns over the cost of achieving this were common. For example, when a respondent in Islington's central heating system broke down, he was given an electric fan heater as a temporary solution.

> *"It was given to me by the council because we were having a problem with the central heating. Couldn't have central heating for two weeks. So they said, you know to fix it up, you can have the electric heater in the time being. Until they sort that out, but that cost you a lot."*
>
> *(Male Respondent 1 – London Islington)*

In order to reduce expenditure on energy, participants across all focus groups spoke of different practices they had adopted in order to minimise their consumption of energy. This was not limited solely to heating the house, but also to cooking and eating hot food, personal hygiene and the use of lighting in the home. Perhaps the most drastic practices were expressed by two of the participants in Newcastle who only prepared food once a week, cooking large batches of food to ensure that the oven or hob was completely utilised whilst it was on. They would then re-heat one hot meal a day in an attempt to reduce the overall amount of energy they used to have hot food. A similar approach was adopted by one of the participants in Sheffield, though this was not stimulated by her concern for energy expenditure but instead resulted from her expressed wish to be environmentally friendly in her use of energy in the home. She enjoyed baking and emphasised the importance of making her own bread every day, demonstrating her increased disposable income compared to other respondents. However, in the practice of baking she ensured that the oven was always fully utilised and cooked items that required lower temperatures whilst the oven was coming to

temperature to ensure that energy was not wasted. Whilst the example in Sheffield is a clear example of conscious, pro-environmental practices being employed, the actions of the two respondents in Newcastle again echo the work of Hitchings and Day (2015) in identifying inadvertent environmentally friendly activities being undertaken, in this situation as a result of practices designed to enable householders to manage their financial commitments.

Unsurprisingly when discussing heating the home, participants discussed many different practices that they undertook to moderate the amount of energy they utilised. As discussed within the domestic practices section, participants were generally more likely to heat their home if they had guests present. Outside of these circumstances a more complicated picture of practices were employed in order to manage the amount of heating utilised. In terms of technical alterations to the home these varied from fairly minor interventions to improve the thermal efficiency of the home, such as installing reflective foil behind radiators and utilising existing features of the central heating system such as timers or limiting heating to certain rooms, to significant upgrades to the home including the installation of a new boiler or double glazing. In Sheffield, where two of the participants owned their homes, much more significant interventions had been installed to reduce energy consumption generally, including Solar Photo Voltaic panels in one case. Female Respondent 1 who was particularly environmentally concerned described the extensive alterations that she had undertaken in her home in order to improve its warmth, whilst emphasising her focus on maintaining the original features of the home.

> *"But we did have under the roof insulated with solid slab insulation, so that is as good as loft insulation. We've draught stripped all the external doors, we are NOT going to replace our beautiful Victorian windows for the same reason as you, I would not contemplate losing those windows. I would rather not use the room than lose those windows. We've draught stripped the windows as much as possible with plasticise so there's no draughts coming through them, but I'm not going to take the windows out. We did a complete refit of the bathroom last year which involved taking every single thing out, grinding the plaster off the walls and dry lining it. We wouldn't use a company to do it because they don't do it to a good standard at all, so we did it ourselves, and we are in the process of doing the same in the kitchen because there*

was no insulation whatsoever in the kitchen, and the suspended floor is just a couple of inches over earth so it was damp all the time, and the floor boards have actually rotted."

Aside from technical interventions, many participants utilised practical approaches to reduce their reliance on heating. As one participant in Bristol explained, "I try to go somewhere else so I'm not using my gas at home" (Female Respondent 2 – Bristol), this view was shared by the other participants who went to college together or went to a friends' house so that they didn't have to heat their own home. In Newcastle this approach had a reduced impact with two of the respondents only leaving the home to complete their required length of job search and job applications they needed in order to remain eligible for employment benefits. The third respondent often received guests in her home, hosting Parent Teacher Association (PTA) meetings, which meant she regularly had the heating on in her home. Again, in Islington, involvement in jobs and attendance at university, the local library and local swimming pool provided an opportunity for two of the participants to be away from the home and reduce the amount of time they needed to use central heating, although one participant who was disabled was not as actively involved with her community and tended to spend most of her time at home, necessitating alternative approaches to reducing her heating consumption.

A final sub-section of the concept of heating resulted from discussion surrounding the use of supplementary sources of warmth in order to reduce the need to use central heating in the home. The disabled female participant in London had a number of practices she used in order to maintain her warmth including drinking hot drinks and wearing more clothes. She also had a more unique solution to the situation.

"Female Respondent - I like tea lights.

Facilitator - Oh, OK.

Female Respondent - As well of a night. I find that makes me feel warm"

The use of extra clothing was a commonly noted approach across all focus group participants, irrespective of income, age or geography. In Newcastle this was more pronounced with participants going to bed relatively early in the evening to benefit from the extra warmth of the duvet, whilst also minimising the amount of electricity being used for lighting or gas being used for heating. These participants voiced their frustration at living in this way.

> *"Put another layer of clothes on. It's tough. I shouldn't have to. You shouldn't have to live like that in this day and age"*
>
> *(Female Respondent 2 – Newcastle)*

The focus groups presented a large body of evidence that for many people, the best that they could hope for in tackling fuel poverty in their home was to adopt the commonly touted "solution" to put on another jumper. Yet, despite heeding this misdirected advice, many of the participants still noted their homes suffered from structural issues and a personal lack of information or knowledge that would allow them to realise an effective route to achieving a warm and comfortable home.

A recent focus of Government attention has been to encourage householders to switch energy suppliers in order for homes to gain access to the best possible energy tariffs (DECC 2012b). Reducing the cost of energy would reduce the incidence of fuel poverty in England, on the basis of the traditional tri-factor model of fuel poverty (cost of energy, household income and household energy efficiency). Against this background the focus groups discussed participants' likelihood of switching suppliers. There was a fairly even mix between those who felt there was little benefit in switching, "Well I think they're all tarred with the same brush you know" (Male Respondent – Newcastle), and those who saw it is a wise way to reduce energy bills, "I've been looking because I always check with my concern. [inaudible] I'm thinking of moving because we're trying to reduce my pay further." (Male

Respondent 1 – London Islington). In Newcastle, one respondents' recent change in suppliers had resulted in a £4 per week reduction in their meter charge. The distinct variance in interest in switching amongst participants highlight the potential importance of the practice in contributing to the likelihood of fuel poverty existing in a household. Research has shown that switching energy suppliers is not common in England and is limited to a small number of very engaged consumers (Mummery and Cooper 2011).

The identified topics within the node energy all signify potential signposts of the existence of fuel poverty in English homes. Awareness and active management of practices in the home that contribute to expenditure on gas or electricity, as well as specific actions relating to heating and managing consumption of warmth in the home all emerged from the focus group transcripts as factors that influenced the extent to which energy was used in the home, and which should therefore be considered in the AHP evaluation of new social practice factors of fuel poverty.

5.6.3.2.3 Food

The role of food emerged with four closely related sub-nodes all depicting concepts that subtly differed in their content but were linked in their relationship to food purchase decisions. In capturing a more encompassing picture of fuel poverty, understanding the role that all practices in the home contribute to the ways and reasons energy is consumed was deemed important. As discussed in the energy section, food consumption and the role of hot drinks were demonstrated by focus group participants to play an important role in the practices utilised to manage the consumption of energy in the home. The role of food purchasing habits was examined more fully in this section and drew out the important balance to be found between cost, quality, value and the implications of travel in deciding what food to purchase.

Reflecting discussions around the widely cited "heat-or-eat" purchasing trade off (Beatty et al. 2014; De Haro and Koslowski 2013) participants in Bristol and Newcastle were particularly aware of the need to find a balance between paying their energy bills and the budget that they have available for purchasing food. Two participants in Newcastle worked out that their daily budget for food was between £1 and £2 after they had paid their utility bills and purchased basic cleaning supplies for the home. The tight nature of their budget meant they were acutely aware of what food to buy as well as when and where to buy it in order to maximise the amount of food they could buy. However, this meant that if there were events such as birthday's coming up, they had to choose to miss bill payments (rather than choose to not purchase food) in order to provide for their families.

> *"Well it's like me granddaughters birthday is coming up at the beginning of February. I'm going to have to miss a couple of bills, but how can you tell a twelve year old bern like, that you cannae give her nowt. I mean it's like Christmas man, it's heart breaking man, I cry, I cried at Christmas."*
>
> *(Male Respondent – Newcastle)*

In Bristol, the focus group participants expressed how they regularly had to choose what bills not to pay, and how this had impacted upon their food purchasing practices.

> *"Female Respondent 2 - There's always something else coming up. And every day priorities need to be above and beyond what we would use for a bill. So we are, it might not be your electric bill, your gas bill, but bills in general. We would sit there and look at that and say, well that's going to have to be missed this week 'cos this needs to be done. But then we've got to try and make up that money 'cos it's not just one week we've missed. You gotta pay two weeks. So you're never ever, paying that off. And then a lot of places charge you interest for not paying, or a late payment fee. So you're not only then paying two weeks back, you're paying the fees back on top of all of it. So you're always trying to re pay off. You never kind of at a level, there's always something you're still paying off. It's a vicious circle.*
>
> *Female Respondent 5 - Cos it cuts down from the shopping and all of that. I was spending £150 on shopping. No I've got it down to ninety pound a week doing all my shopping."*

The link between food and decisions surrounding bills was not expressed in Leeds, Sheffield or Islington. Participants in these focus groups tended to have a higher household income with the majority working or receiving a pension. As with the findings of the

statistical analysis of heat-or-eat dilemma by Beatty et al. (2014), our findings support the fact that lower income households reduce food expenditure to a larger extent in order to cope with expenditure on energy.

Despite the trade-off between heating and eating not being identified as an issue for participants in all focus groups, there was an awareness of cost expressed by all participants. This varied between those who looked to ensure the lowest possible price for a product, as in Leeds where one participant expressed "They're selling tins of Princes ham, in the supermarket for £1.49 and I can go in there and get them for 69p, where do you think I'm going to shop?", and those who were emphasised the importance of value for money such as buying items on special offers, rather than just buying the cheapest brand. This included one respondent in Sheffield, who although being fairly affluent always bought reduced items in their local Co-Operative supermarket and another who actively chose to purchase reduced bruised fruit and vegetables from the local green grocer. Those participants on the lowest income focussed on minimising the cost of their shopping, utilising a number of practices to ensure they spent as little as possible including bulk buying and freezing food, purchasing from outlet stores and knowing the best times to go to supermarkets to take advantage of items in the reduced section. As one participant from Newcastle explained.

> *"I'm sometimes in the supermarket and I'll see some wife going up to the counter with £150 worth of gear. I think well I could have brought all that for £60 like. You know, paying way over the odds"*
>
> *(Male Respondent – Newcastle)*

For most participants, quality of produce was still an important factor. In Bristol, although many items were chosen on a price basis, there were certain products were perceived quality was vitally important, including gravy granules and washing powder. In London emphasis was placed upon fresh produce and in Leeds specific items were purchased

from specific shops because the quality of the produce was perceived to be particularly good. One participant in Sheffield, felt that good quality food was of the upmost importance.

> *"We would rather spend our limited budget on good quality food than on eating out or holidays or anything else like that, and it is the one thing that we really are particular about. We wouldn't compromise on that unless things were really, really dire."*
>
> *(Female Respondent 1 – Sheffield)*

Cost, value and quality of food were strongly linked to discussions surrounding where food was purchased and therefore transport decisions. In Newcastle, participants knew whether it was worth paying the bus fare to shop in a particular area in order to save money on food and in Leeds, local transport enabled one participant to traverse the city in order to buy food from her preferred suppliers. In both Bristol and Islington, participants lived in the vicinity of multiple shops and did not discuss transport to the same extent. As with Leeds, the local bus system enabled one participant to purchase food from a local supermarket, rather than being reliant upon local convenience stores and one participant, who owned their own car made specific long distance trips to purchase certain items.

> *"We go all the way out in to Derbyshire and buy our flour, muesli, various things like that in bulk. So we buy 15kg sacks of muesli which lasts us about 3 or 4 months"*
>
> *(Female Respondent 1 – Sheffield)*

Although divided into four separate nodes, the different aspects of the role of food in the participants' lives and particular in relation to household practices involving energy were heavily inter-related. Evidence was discovered to support the popularised concept of the heat-or eat phenomena, and as with Beatty et al's (2014) findings, this was a more prevalent issue amongst those participants with a lower income. Where income was less of an immediate concern participants looked for their food to meet perceived quality standards and sought value in their purchases. This meant aiming to buy products from certain shops, or at certain times of day in order to ensure they were paying the best possible price for the goods. In

many cases this therefore entailed decisions surrounding transport, utilising public transport or their own vehicles to travel to specific locations. The common theme, linking all of these concepts was that of finance. For those of a lower income, their available budget dictated what products they purchased, but for those with more income it enabled them to be able to travel and to choose to purchase goods that they perceived to be higher quality or better value for money.

Whilst household income is already considered within the current conceptualisation of fuel poverty in England, a more nuanced understanding as to how purchasing decisions, particularly with respect to a central need such as food, impact upon available income for energy expenditure will enable a more robust picture of the fuel poverty phenomenon to be developed. The focus groups contained extensive discussion of the role of food across multiple different topics of conversation, including impact on commuting decisions and transport, household budgeting generally as well as the impact which food purchases have on the ability to afford heating bills. As such, the evidence gathered from within the focus groups suggests that food purchase decisions warrant inclusion within the subsequent AHP analysis, given the centrality of the issue of food within the discussions held.

5.6.3.2.4 Social Engagement

Social engagement had been included in the focus group questioning schedule as it was seen as a potential factor that would either necessitate increased household energy consumption as a result of hosting guests, or as a potential method to reduce household energy expenditure by enabling residents to spend less time in their home. Participant focus group respondents centred their social engagement activities around five different areas, involvement with community centres, hosting or visiting family, hosting or visiting neighbours and friends, involvement in interest groups and paid employment.

The majority of focus group respondents were not involved in paid employment and as such, this was only discussed by two people in London and one in Sheffield. As highlighted in the participant background analysis, this is not representative of the employment rate across the country and so the understanding of the role that employment plays in shaping practices involving energy in the home, developed from these focus groups should only be seen as exploratory rather than representative. With an increasing emphasis on flexible working hours, self-employment and home working, this is a topic that should be investigated further in order to fully understand the implications of employment upon home practices involving energy.

The role of paid employment was not linked to practices involving energy by any participants. This may reflect the fact that the social practice perspective adopted by this study is not a commonly held approach to sense-making amongst the wider public. As a result, when employment was discussed, participants were unlikely to associate this with a cause for reducing energy usage. Similarly, amongst the unemployed no associations were made with not being at work causing them to use any more energy at the home. This may be because most participants, when discussing their use of central heating or the preparation of warm food, did not undertake these activities in the day time, and therefore daytime energy intensive practices were minimal.

Although paid employment was not widely discussed, involvement in community centres was much more pervasive amongst participants. Again, explicit association with this being a form of managing practices involving energy was not expressed, but from a social practice perspective this provided an insight in to how concepts of shared identity and common practices and values may be developed. In Bristol, all participants were attending a community college and receiving training to support them in finding employment. They

didn't speak highly of the area in which they lived, but saw each other as their own "community". In Leeds, the participants again didn't like their local area, but went to resident meetings once a month and to the local Waitrose for a free cup of coffee, whereas in London participants utilised the local library. The local library had been of some importance to residents in Newcastle, predominantly for utilising the computers for job searching, but when this was shut down they were forced to travel further to a community centre to complete the same task. This had resulted in them attending less frequently due to the distance of travel required.

There was a strong association between the role of community centres and interest groups in participants' lives, again providing an insight in to some of the external influences upon their practices. Some, though not all, of the interest groups took place in community centres, such as the local church, school Parent Teacher Association (PTA), scrabble club and the University of the Third Age. Other interest groups discussed including walking groups, swimming and going to the gym. Residents in Sheffield in particular linked their involvement in interest groups to affecting their need to heat their home:

> *"Often I'm out doing things, I have something every Monday morning which alternates between my house and another house, so the heating is sometimes on, sometimes off on a Monday morning, and various days of the week I go out to things"*
>
> *(Female Respondent 2 – Sheffield)*

By attending the gym, this was also seen as an opportunity to utilise the shower facilities there rather than at home – implying an ability to reduce their need to use energy at home. They recognised that they weren't reducing their outgoings by doing this but neatly summed their thoughts on this up.

> *"If you're going to pay for it anyway you might as well use their hot water"*
>
> *(Female Respondent 1 – Sheffield.)*

Involvement in the PTA meant that there were regularly people at the home of one of the residents in Newcastle. This was identified as a cause of increased energy use in the home as she heated the home for these gatherings. Her home was recognised as always being warm by another of the participants who was also on the Parent Teach Association (PTA).

The role of community centres and interest groups also bore notable resemblance to the importance of neighbours and friends, many of whom were involved in the same interest groups as the participants, unpicking the role of neighbours and friends from interest groups and community centres was sometimes complicated. Friends sometimes provided an opportunity to go to another hose and not have the heating on at the respondents own home, but if they were seen as the social hub of their friendship group the opposite was true. Neighbours, friends and the local community more broadly were spoken of providing a sense of belonging and togetherness across the focus groups

> *"Especially when the snow is very bad. I have a lot of people who can't afford to walk to Sainsbury or to Iceland. Lot of them I help them, because my time will come. I have to help them. I enjoy helping them, 'cos as I said you don't know when your time will come"*
>
> *(Male Respondent 2 – London Islington)*
>
> *"I think your neighbours is one of the most important things"*
>
> *(Male Respondent – Newcastle)*
>
> *"You hear a lot of bad things about Hartcliffe. But with the people within Hartcliffe, you look after your own"*
>
> *(Female Respondent 2 – Bristol)*

In Leeds, the participants also owned a canal boat. They felt little affinity to their community in Leeds, but the friends in the canal community were important to them. Neighbours were also seen as important for enjoyment of the area in Sheffield, but were not discussed in terms of their impact upon practices involving energy in the home.

> *"What I like about it is I get on well with the neighbours. 'Cos where I was before, I moved because of the neighbours because they were an absolute pain. So where I am now, I've been*

there 12 years and that's the main thing that I like living there because it's peaceful and there is nobody to get on my nerves"

(Female Respondent 3 – Sheffield)

Family impacted upon respondents lives in multiple ways. Children in the home (as previously discussed) were seen to necessitate the use of central heating that might otherwise be avoided, as well as increased use of washing machines, tumble dryers and electricity generally in the home. In considering the wider family, the impact of them visiting was again seen to necessitate increased heating, such as when grandchildren visited. Whilst visits were welcomed, some expressed concerns over the heating implications.

"I've got my grandson coming to stay with me for 5 days on Wednesday. I'm dreading putting my gas on".

(Female Respondent 1 – Newcastle)

In the most extreme case in Sheffield, it also meant asking family not to come to visit in the colder months. Only one respondent discussed visiting their family rather than having them to their home, but did not consider the potential benefits to themselves from not being at home during this time.

Social engagement can be seen to play an important role in affecting practices involving energy in the home. Again, it is a complicated relationship between requiring increased uses of energy in providing an environment which is deemed to provide the thermal "frontstage" (Hitchings and Day 2011, p.2461) that respondents wish to present to guests, and providing opportunities to avoid energy intensive practices by being away from the home. As with decisions surrounding food, domestic practices and the use of energy, the issues discussed were often related to concepts of available finance, but to rely solely upon a financial measure in conceptualising fuel poverty significantly dilutes the complex nature of the varying influence of these social practice factors on the existence of fuel poverty in English homes.

5.6.3.3 Conclusions surrounding the focus group results of study 2a

The issues discussed in the five focus groups across England highlighted a complicated network of inter-related social practices that combine to differing extents to determine the potential existence of fuel poverty. Whilst these practices were often related to their financial implications for the participant, it was evident that available income was not the only influence upon these practices. Complex trade-offs between practices including how the house is presented to others, the level of washing to be completed, how and when to heat the home, what food to purchase (of what quality and from where), and to what extent participants can and are willing to engage with others socially, amongst others, were undertaken, often unconsciously, in order to reach a balance which satisfies the householder. In prioritising different areas, participants drew upon the social norms and practices of those that surround them, for example with regards to frequency of washing clothes in Bristol, a focus on managing a very limited budget and maximising its benefits in Newcastle, or the importance of involvement in interest groups in Sheffield. By completing these trade-offs households undertook decisions in order to satisfy both their personal preferences as well as their communities needs and expectations, the results of which may combine to deliver circumstances that are more or less likely to result in them living in fuel poverty.

By drawing upon these identified social factors of fuel poverty and developing a set of weights to understand the relative importance of each one, it is possible to start to build a new model of fuel poverty which provides a picture of the phenomenon in England conceived along the principles of a measure of relative deprivation, rather than an income focussed measure of poverty, echoing the opening discussion surrounding the differences between deprivation and poverty in chapter 4. In doing so it enables decisions to be made as to what the English public perceive to be the socially acceptable minimum standards to be able to

fully partake in society in modern England, whilst also maintaining an adequate heating regime within the home.

5.7 Study 2b – Methodological approach to developing a Social Practice Theory picture of fuel poverty

Whilst study 2a utilised a traditional qualitative research approach in order to capture household practices involving energy, the application of the resultant data in to practice by weighting the identified factors through the application of AHP is experimental and has not been previously undertaken within a Social Practice Theory framework. Building on the contribution by Browne et al. (2013), one of the first published studies that sought to quantify social practices, this study utilises the social practices identified from the focus groups undertaken in study 2a to create a hierarchy of social practice factors of fuel poverty as a first stage in quantifying these practices. We then return to the original focus group participants and undertake an application of the Analytic Hierarchy Process (Saaty, 1986) in order to weight the identified social practice factors. These weightings enable the development of a socially weighted picture of the social practice factors of fuel poverty in England. In achieving this we derive a response to the problem of fuel poverty which maintains the model as one rooted in the principles of social policy in that it brings "people in to the centre of policy making" (Ortiz, 2007, page 6) whilst identifying areas for "action" (the social practices underlying the existence of fuel poverty) needed to solve the "problem" of fuel poverty

5.7.1 Defining the factors for AHP analysis.

Referring back to the study's aims, we sought to create the first model of fuel poverty that captured not only technical aspects of the problem, but also less easily quantified, social practices that contribute to the existence of fuel poverty within England. In aligning this work

with the work of Titmuss (1974), Ortiz (2007) and Dean (2012), it was identified that in order to achieve an outcome that met the needs of social policy, the resultant model would have to bring citizens in to the centre of policy decision making. Adopting an AHP approach in weighting the identified social practice factors of fuel poverty allows citizens, who are not necessarily subject matter experts to provide their subjective assessment of the contributing factors in a meaningful way, enabling a prioritisation of the underlying factors. This enables the creation of a model of fuel poverty accounting for the less obviously quantifiable social practices of fuel poverty, reflecting the lived experience of those who took part in the focus groups. In achieving this, we deliver a new model of fuel poverty that can influence and improve policy decisions by transforming "subjective value judgements into prudent decisions" (Elkarmi and Mustafa 1993, p.980).

The Analytic Hierarchy Process was defined by Saaty (1977) and has been used to solve a multitude of different decision making problems (Ishizaka and Labib 2011) as well as being a recognised decision tool of choice amongst industry and government (Elkarmi and Mustafa 1993). Utilising an AHP approach allows for the evaluation of both qualitative and quantitative aspects of the issues being studied (Nardo et al. 2008). In particular this approach allows competing priorities in a group decision making process to be accommodated within a decision making structure that facilitates complex decision making whilst accounting for both tangible and intangible points of consideration (Dyer and Forman 1992).

The AHP approach utilises the subjective judgements of respondents to derive ratio scales of priorities for the criteria being assessed (Dyer and Forman 1992). The subsequent ratio scales of priorities created within this body of work will provide user defined weights for each of the social practice factors of fuel poverty identified. Unlike many of the examples in the literature, the application of AHP in this case is solely looking to ascertain weights for

the proposed social practice factors model of fuel poverty and does not move on to utilise the priority scales to assess alternative policy instruments. This provides a potential avenue for future research, examining how the weightings identified within this study could be useful in assessing preferences for alternative approaches to tackling fuel poverty.

Given the focus of the AHP application within this work, the process can be broken down in to two broad steps; structuring the problem into a hierarchy and obtaining criteria weights (Aragonés-Beltrán et al. 2014). The completion of the coding process in study 2a defined "code families" (Campbell et al. 2013, p.301) which provided a hierarchy of social practice factors of fuel poverty (see appendix 8.11), satisfying the first stage of the AHP process (Saaty 1987).

In order to obtain criteria weights, the criterion (social practice factors of fuel poverty) in the same level of the hierarchy were subjected to pairwise comparison. Respondents were asked to assess the relative importance of each criterion with respect to the overall goal of that level (Saaty 1990). Although there is a strong debate as to what is the best scale for obtaining weights (Ishizaka and Labib 2011) this study used the fundamental scale developed by Saaty (Aragonés-Beltrán et al. 2014), presented in Table 23, which is the most commonly used scale in practice (Ishizaka and Labib 2011).

Table 23 The fundamental scale (Saaty, 1977, page 246)

Intensity of importance on an absolute scale	**Definition**	**Explanation**
1	Equal importance	Two activities contribute equally to the objective
3	Moderate importance of one over another	Experience and judgment strongly favour one activity over another
5	Essential or strong	Experience and judgment strongly

	importance	favour one activity over another
7	Very strong importance	An activity is strongly favoured and its dominance demonstrated in practice
9	Extreme importance	The evidence favouring one activity over another is of the highest possible affirmation
2,4,6,8	Intermediate values between the two adjacent judgements	When compromise is needed
Reciprocals	If activity *i* has one of the above numbers assigned to it when compared with activity *j*, then *j* has the reciprocal value when compared with *i*.	
Rationals	Ratios arising from the scale	If consistency were to be forced by obtaining *n* numerical values to span the matrix

The criteria weights were obtained from each focus group member through the use of an AHP survey, a copy of which is available in appendix 8.12. The survey split the hierarchy of pairwise comparisons in to eight separate questions with an initial example question to guide respondents through the technique of stating the preference prior to completion of the main questionnaire. Each question of the main questionnaire provided definitions of the criterion being compared so as to ensure as far as possible that all respondents had a consistent understanding of the criteria they were being asked to compare. Due to the reciprocal nature of Saaty's fundamental scale each question was presented with the two criteria being compared at opposing ends of Saaty's fully expressed reciprocal scale as depicted in Figure 36, with respondents required to select the single point on the scale that most closely represented their judgement as to the relative importance of the two factors.

	Extreme Importance		Very Strongly Important		Strong Importance		Moderate Importance		Equal Importance		Moderate Importance		Strong Importance		Very Strongly Important		Extreme Importance	
	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	
Food	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Energy**

Figure 36 Example layout of the AHP survey questions demonstrating Saaty's reciprocal scale

Whilst the AHP process and the fundamental scale is designed to aid the simplicity of completion for respondents, the factors identified from the focus groups were all defined within a social practice theory framework. Although the researcher who was well versed in the theoretical foundations of the study could interpret the factors with relative ease, it was quickly identified that the same would not necessarily be true for the focus group participants whose frameworks of sense making would not necessarily allow for a natural comparison of the factors presented. It was decided that attempting to re-write the survey in to an alternative format, or to re-label and define the factors would not be appropriate as this would strip the criteria of the meanings identified from the focus group stage of the research. Instead, the researcher decided to contact each of the AHP/focus group participants individually to help facilitate their completion of the survey.

The resultant judgements from the survey were transferred on to a positive reciprocal matrix of the form given below (Aragonés-Beltrán et al. 2014, p.224).

$$A = \begin{bmatrix} 1 & a_{12} & \cdots & a_{1n} \\ a_{21} & 1 & \cdots & a_{2n} \\ \vdots & & \ddots & \vdots \\ a_{n1} & a_{n2} & \dots & 1 \end{bmatrix}, where\ a_{ji} = {}^{1}/_{a_{ij}}\ i, j = 1, \dots, n$$

Following the transfer of preference judgments on to the matrix and calculation of priority vectors, the Consistency Ratio (CR) of each matrix was checked. The AHP method emphasises the importance of measuring consistency (Saaty 1977) and assessing the consistency of the matrix allows for an assessment of the reliability of the judgements made (Ramanathan 2001). In the process of calculating the CR, Saaty (1977) required a Consistency Index (CI) for each matrix to be calculated:

$$CI = \frac{\lambda_{max} - n}{n - 1}$$

where n is the dimension of the matrix and λ_{max} is the maximal eigenvalue of the matrix A (Ishizaka and Labib 2011). The consistency ratio was then calculated to assess the acceptability of judgement inconsistencies (Aragonés-Beltrán et al. 2014) by dividing the CI value by the relevant value from Saaty's Random Index (RI) which was calculated from the average CI values of 500 randomly filled matrices (Ishizaka and Labib 2011). If the resultant value was less than 0.10 the judgements could be considered reliable, if not the judgments must be revisited (Saaty 1987).

The priority vector for each factor was calculated, utilising the Geometric Mean Method (GMM). The geometric mean is the nth root of the product of n numbers and is defined mathematically as:

$$geometric\ mean = \left(\prod_{n=1}^{k} x_n\right)^{\frac{1}{k}}$$

Although in calculating priority vectors, the GMM approach is supported by mathematical evidence, Saaty states a preference for the use of the eigenvalue method (Ishizaka and Labib 2011) whilst others argue that the GMM is the only appropriate method

of deriving priorities (Barzilai 1997). Research has however shown there to be no notable difference in utilising the eigenvalue method or geometric mean method (Ishizaka and Labib 2011), particularly when working on small and acceptably inconsistent matrices. Given that the consistency of each matrix had been ensured prior to calculation of priority vectors, it was deemed appropriate to follow the GMM method. The geometric mean of each row was calculated, and then normalised to derive priority vectors for each factor within the preference matrix.

In calculating the weights up until this point, only the judgements of individuals were obtained. These separate rankings do not necessarily reflect the combined opinions of all respondents. It was therefore necessary to aggregate the individual judgements in order to obtain a singular set of weightings that reflect the consensus of the respondents' judgements. There are two recognised approaches to achieve this. One option requires all respondents to meet and agree on their judgement for each value in each comparison matrix. Alternatively, the geometric mean of the judgments obtained can be calculated (Saaty and Shang 2007). A particular advantage of the geometric mean is the lack of need to bring together all respondents in a single location (Ishizaka and Labib 2011), given the geographic distance between respondents within this study. The geometric mean for each element of each the combined matrix was calculated according to the formula:

$$a_{ij} = \left[\prod_{k=1}^{N} a_{ij}^{K}\right]^{1/N}$$

where a_{ij}^{k} is the judgment of the *k*th voter when comparing item *i* with item *j* (Saaty and Shang 2007, p.26). It is possible to combine the judgments of each participant in this manner as the geometric mean method preserves the reciprocal nature of the matrices (Dyer and Forman 1992).

Utilising this approach it was therefore possible to calculate the groups aggregated weightings, following the same procedure for calculation of priority vectors and ensuring consistency as applied to the individual preference matrices. This enabled the calculation of the group's combined priority vectors for each identified social practice factor of fuel poverty and therefore the arrival at the final model of fuel poverty derived from social practice factors of fuel poverty identified by citizens and assigned relative weights by the same citizenry.

5.8 Study 2b - AHP results

The completion of the AHP process facilitated the development of a new, social practice theory model of fuel poverty in England. This responds to one of the key intentions of this research project as set out in objective 5, to deliver a model of fuel poverty that captured not only technical aspects of the problem, but also less easily quantified, social practices that contribute to the existence of fuel poverty within England. Section 5.7.1 outlined that the format of the AHP hierarchy would be defined by the analysis of the focus group transcripts as discussed in section 5.6.3. The resultant hierarchy of code families (Campbell et al. 2013, p.301) outlined in appendix 8.9 was utilised to format the hierarchy of the AHP analysis, requiring pairwise comparison of the constituent factors at each level of the hierarchy by the original focus group participants.

5.8.1 Participant drop out

Although participants had been briefed in the initial participant recruitment letter and reminded verbally in each focus group that they would be required to partake in a second data gathering exercise at a later date, a number of participants did not provide responses to the AHP survey.

The focus group stage of the research had taken place between January and April 2014 (see section 5.6.2), with the follow up AHP survey being completed in April and May 2015.

Although a copy of the survey was sent to each participant at their home address, with all participants contacted via telephone and email if available to elicit availability to partake and to ensure participants had received a paper copy of the survey, only eight of the original sixteen participants partook in the AHP survey. A breakdown of response levels by focus group location is provided in Table 24.

Table 24 Focus group participant numbers and AHP survey response numbers by city

City	Number of focus group participants	Number of AHP survey respondents
Bristol	6	0
Leeds	2	2
London (Islington)	3	2
Newcastle	3	1
Sheffield	3	3

A number of the respondents were uncontactable utilising the information they had provided at the original focus group with many of the mobile telephone numbers being no longer in use. Therefore, despite having an address to send the survey too, it was not possible to confirm its receipt or to capture the participant's responses. Other participants had subsequently gained employment and were unavailable to respond during the day and stated they would prefer not to take part as they did not have free time after work due to family commitments.

Despite the levels of participant drop out experienced, the judgments collated can be considered to be valid when considering Saaty's (2014) guidance with regards to how many judges are required for group decision making. The AHP procedure undertaken in this research sought to identify the relative importance of differing social practice factors of fuel poverty. To do so required consistent judgments which are valid in practice, utilising judges who are geographically dispersed. Given these criteria, Saaty (2014) identified that the optimal number of judges is between six and eight judges, demonstrating that the eight

judgments utilised within this AHP ensure the appropriateness of the final AHP priority vectors presented.

5.8.2 Challenges in achieving consistent judgments

As predicted during the design of the AHP survey, participants had difficulty in fully understanding the process of completing the pairwise comparisons for each tier of the AHP hierarchy. Issues included being able to distinguish the level of importance they would place on two closely related concepts, such as cost of food and value of food, or most commonly, providing consistent judgments. Consistency is a fundamental requirement in the application of the AHP process as it ensures the reliability of the judgments being made (Ramanathan 2001). So as to ensure that consistent judgments were collected, participants' judgments were inputted in to judgment matrices whilst the telephone data collection process was taking place. This allowed unacceptable inconsistencies (Aragonés-Beltrán et al. 2014) to be identified immediately and a discussion completed with the respondent to identify alterations in their stated preferences which satisfied consistency criteria, and were also acceptable to the participant. This guided AHP process ensured minimal disruption to the participant as follow-up contact was not required to alter inconsistent judgments at a later point. It also provided the participant with the opportunity to ask for clarification of any points of confusion whilst completing the survey and allowed the researcher to be sure that participants were comparing the concepts as defined from the analysis of the focus group transcripts as opposed to significantly altered personal perceptions of the phenomena being discussed. Each of the eight participants completed preference matrices for each tier of the hierarchy are contained within appendix 8.13.

5.8.3 A group AHP defined and weighted model of social practice factors of fuel poverty.

The individual preference matrices were combined, utilising the Geometric Mean Method (GMM) as outlined in section 5.7.1 to derive the final weightings for each of the social practice factors of fuel poverty identified from the focus group analysis and reported in section 5.6.3.2. The full GMM values for the top tier of the AHP hierarchy are reported in Table 25, with all of the constituent group decision preference matrices presented in appendix 8.13. Through applying the priority vectors calculated at each level of the AHP hierarchy a visual representation of the relative importance of each social practice factor of fuel poverty can be obtained. This is presented in two ways, Figure 37 presents the priority vectors at each level of the AHP hierarchy using discrete weightings for each level. Figure 38 presents the priority vectors at each level utilising local weights. These values are calculated by multiplying the priority vector for level 2 factors by the value of their respective level 1 factors priority vector, such that the sum of level 2 factors equals the value of their level 1 parent factor.

Table 25 GMM AHP scores for tier 1 social practice factors of fuel poverty

	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	0.987253664	1.073539858	1.108245866	0.905499642		
λ Max*	4.07453903					
CI**	0.024846343					
CR***	0.042838523					

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

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

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

The above are calculated to enable an assessment of the reliability of the judgements to be completed prior to calculation of priority vectors.

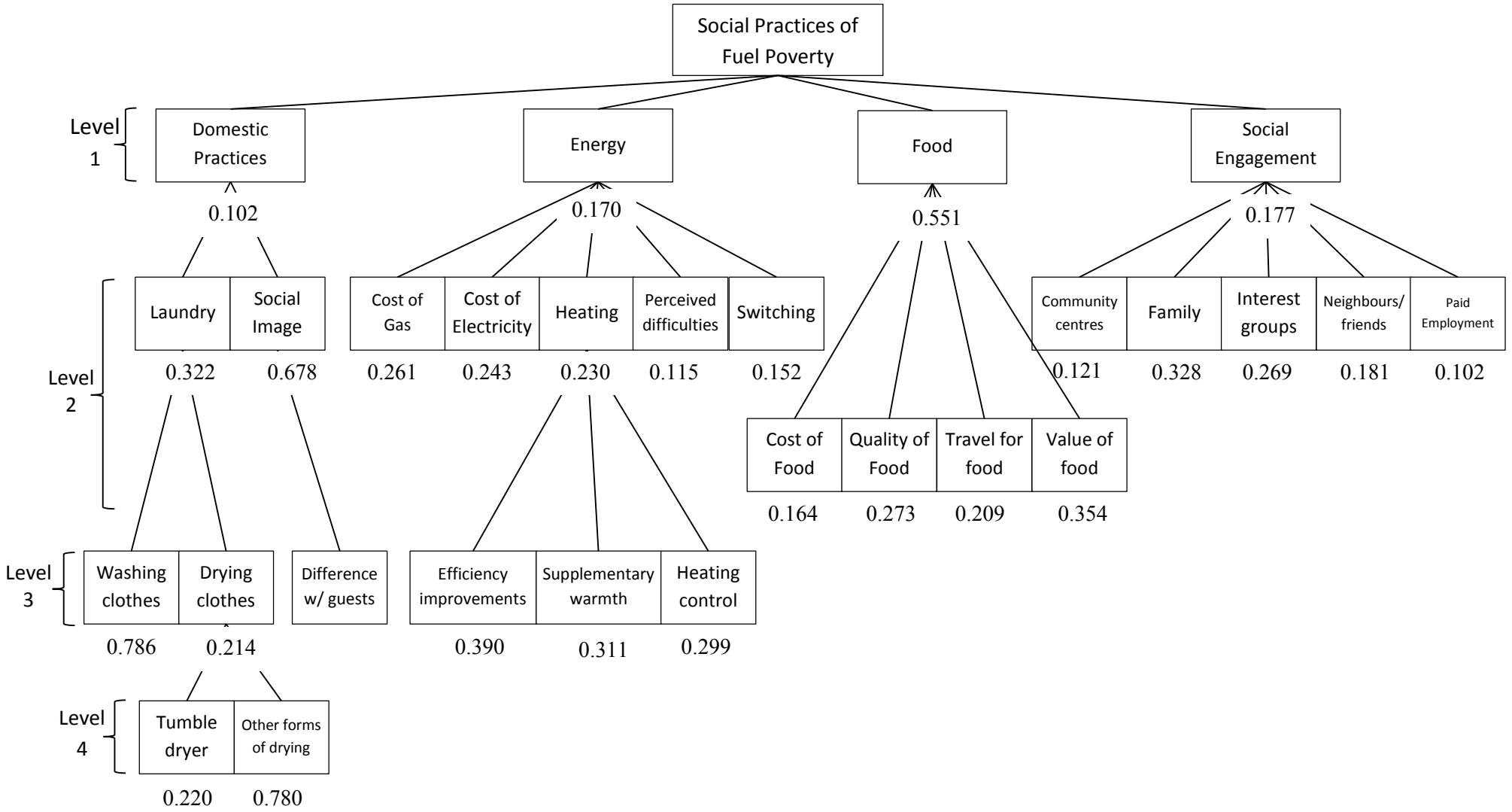


Figure 37 AHP weighted model of social practice factors of fuel poverty in England

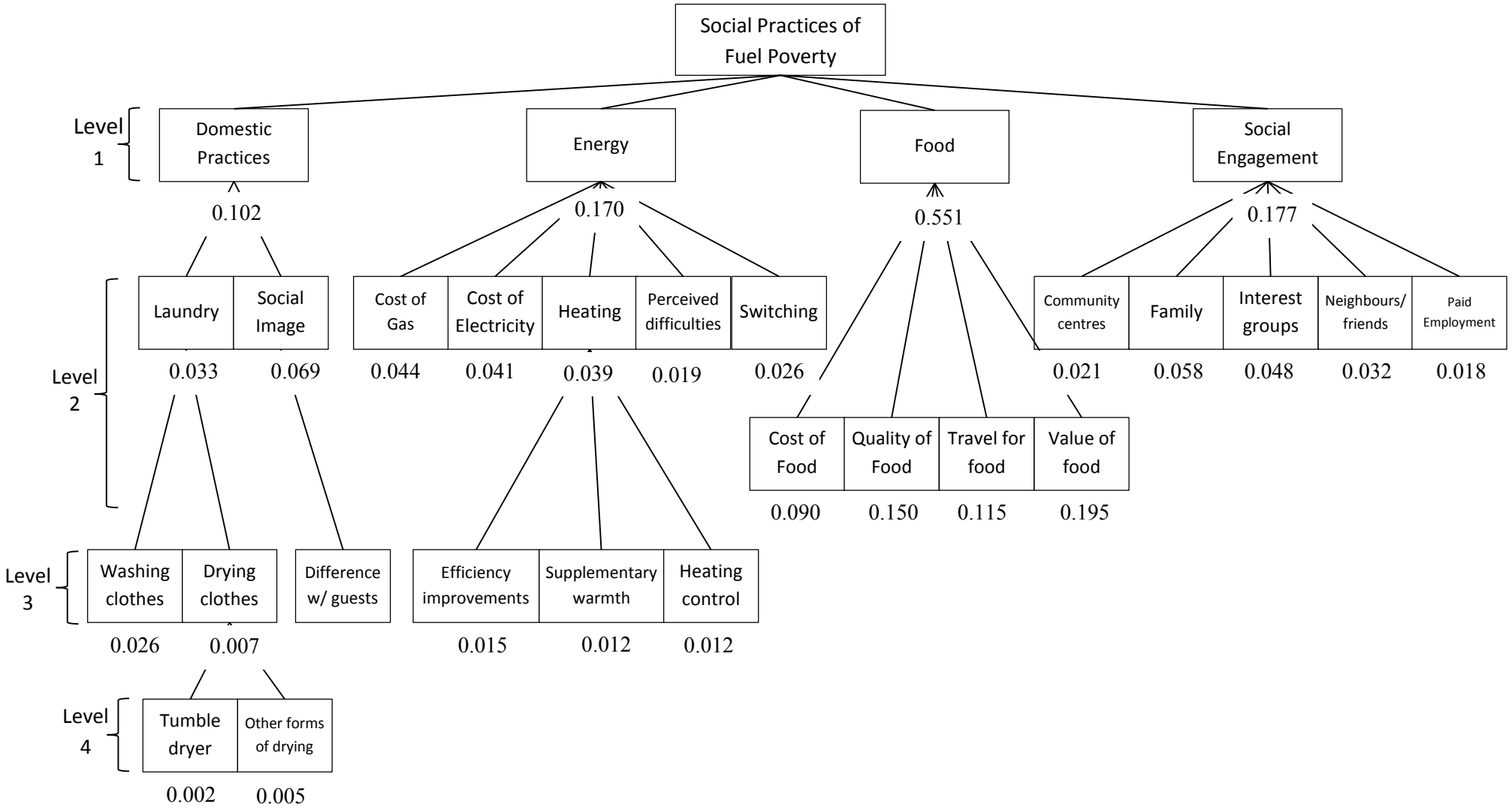


Figure 38 AHP weighted model of social practice factors of fuel poverty in England utilising localised weights for levels 2 - 4

When considering the level 1 priority vectors a particular result of note is the strong weight placed by respondents upon the role of food in determining their practices involving energy in the home. Participants were asked "When thinking about what has the biggest impact on your ability to keep your home warm, what is more important to you?" and completed pairwise comparisons of the four level one factors, Food, Energy, Social Engagement and Domestic Practices. Food was given three times the weight of either social engagement or energy and nearly five times the importance of domestic practices in determining a householder's perceived ability to keep their home warm. This suggests that the heat or eat dilemma (Beatty et al. 2014) discussed in the main stream media forms a significant influence upon household practices involving energy. This will be discussed further in section 5.9.

The second level of the hierarchy as shown in Figure 37 provided support for the importance of social image in determining practices involving energy. Considerations impacting upon social image (such as presenting a desirable thermal "frontstage" (Hitchings and Day 2011) were considered twice as important as completion of laundry related tasks within the domestic practices grouping.

Within the energy domain, there was a close balance of importance between the three constituent factors specifically relating to energy (cost of gas, cost of electricity and heating) of between 0.230 and 0.261. These were all twice as important as decisions to switch energy supplier or respondent perceived difficulties in relation to energy bills. This suggests that concerns surrounding the ability to pay energy bills or decisions to change supplier have little influence upon household practices involving energy, with a greater focus on the cost of consuming electricity and gas generally, or heating the home.

Finally at this level, food decisions reflected their relative importance in household budgeting showing the most important factor for householders was value for money. Quality and travelling to make food purchases were not considered to be as important (roughly ten to fifteen percent less important) but interestingly took priority of the pure cost of products, suggesting that whilst food is prioritised over energy consumption, in calculating this trade-off householders still seek to purchase what they perceive to be good quality food, rather than trying to minimise the financial outlay.

5.8.3.1 Examining AHP weightings without Sheffield respondents' priorities.

As highlighted in Table 20, participants from Sheffield were from an area classified as high fuel poverty but low deprivation (five on the IMD/FP classification matrix). Whilst little income data was provided, two thirds of respondents owned their own home and all paid their energy bills by monthly direct debit; characteristics which support the belief that these respondents differ from those in other focus groups. Given the classification statistics and the supporting evidence provided by respondents' pre-focus group questionnaires, the factor priority vectors reported in 5.8.3 were recalculated with the responses from Sheffield excluded. The intention of this approach was to explore whether including the responses of those living within communities classified as being in low levels of deprivation compared to the other respondents had resulted in a noticeable skew in the reported factor weightings. The group priority vectors including and excluding responses from Sheffield, for factors in level one and level two of the AHP hierarchy are presented in Table 26. The table quotes the locally weighted values for level 2 of the hierarchy. A visual comparison of the level one and level 2 priority vectors (again utilising locally weighted values) are presented in Figure 39 in order to facilitate a more immediate representation of the variation in priority vectors when Sheffield is excluded from the sample.

Table 26 Comparison of group preference priority vectors including and excluding preference weights from Sheffield respondents

AHP hierarchy level	Factor	Priority Vector (including Sheffield preferences)	Priority Vector (excluding Sheffield preferences)
1	**Domestic Practices**	**0.102**	**0.140**
2	Laundry	0.033	0.032
2	Social Image	0.069	0.108
1	**Energy**	**0.170**	**0.200**
2	Cost of Gas	0.044	0.056
2	Cost of Electricity	0.041	0.039
2	Heating	0.039	0.034
2	Perceived Difficulties	0.020	0.027
2	Switching	0.026	0.044
1	**Food**	**0.551**	**0.503**
2	Cost of Food	0.090	0.061
2	Quality of Food	0.150	0.138
2	Travel for Food	0.115	0.141
2	Value of Food	0.195	0.162
1	**Social Engagement**	**0.177**	**0.158**
2	Community Centres	0.021	0.015
2	Family	0.058	0.068
2	Interest Groups	0.048	0.032
2	Neighbours/Friends	0.032	0.030
2	Paid Employment	0.018	0.014

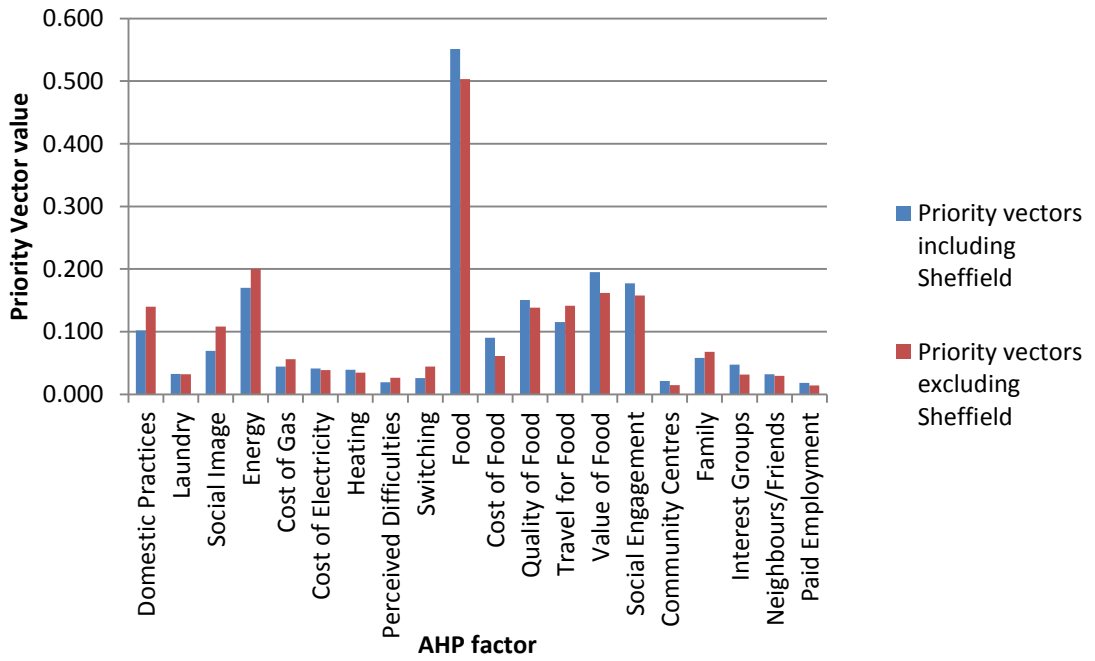


Figure 39 Bar chart comparison of the priority vectors for the SPT model of fuel poverty including and excluding the values from respondents in Sheffield

Interestingly, at level one of the hierarchy, the emphasis of the importance of food is slightly reduced (by around five percent) when Sheffield is excluded from the AHP but there is a slight increase in the importance of energy of around three percent. Similarly the importance of social engagement is reduced by a small margin with a slightly larger increase in the emphasis placed upon domestic practices. These variations will be examined in more detail in the discussion section, but both sets of priority vectors bring to the fore a picture of a complex set of unconscious trade-offs in household priorities and practices, that seem to be influenced by the norms, expectations and social priorities of the surrounding community.

5.9 Discussion

In examining the data resulting from the focus groups and AHP survey, this discussion focusses on three areas. Firstly it assesses whether the evidence gathered from these two related but separate data collection procedures, presents a consistent understanding of the varying social practices that impact upon a householder's ability to keep warm. It then evaluates whether the social practice factors of fuel poverty identified and the approach used to realise this conception of the issue meets the understanding of what entails social policy and social policy design as discussed in sections 5.3 and 5.4. Finally it examines the extent to which the methodological approach developed by this study presents a conceivable approach to utilising the Social Practice Theory lens in the design of social policy.

A thorough assessment of the factor weightings with relation to fuel poverty and energy literature is presented in the overall discussion and conclusion (chapter 6) rather than within this chapter. This allows a broader assessment of the data presented with respect to the full spectrum of literature considered within the thesis overall, rather than within the confines of critiques of social policy design. In doing so it will be possible to examine more thoroughly the complexity of the relationship between the different factors alluded to in sections 5.6.3.2

and 5.8.3, presenting a more comprehensive understanding of the novel, social practice model of fuel poverty created as a culmination of all the work presented.

This study sought to achieve two aims. Building upon the work presented in study 1 which had identified the limitations of the current technically focussed conception of fuel poverty in England the primary intention was to identify and understand the social practices which combine to facilitate the existence of fuel poverty in England. The second objective was to develop a methodological approach that would enable the Social Practice Theory perspective to be utilised in the policy design domain.

In meeting these objectives, two distinct stages of data collection were utilised in order to develop an approach to understanding the factors which contribute to the existence of fuel poverty in England that can be rightfully seen to match with the social nature of social policy. The evidence collated marks the first attempt to address the 'evidence-action' gap identified in section 5.4.2 by drawing upon qualitative data collected from focus groups and quantitative, group –decision data drawn from AHP survey work. Whilst these two components have thus far been discussed in a discrete manner, conjoint analysis of the focus group and AHP results enables a more thorough understanding of the social practices identified to be presented and assessed.

Independently, the qualitative data collected from the focus groups provided continued evidence of phenomenon already discussed in the extant practices involving energy literature, for example in considering concepts such as the importance of social image (Day and Hitchings 2011; Hitchings 2012; Hards 2013) or how household practices had created "inadvertent environmentalists" (Hitchings et al. 2015). Further evidence of day to day shopping habits were uncovered as well as considerations surrounding the importance of laundry to householders (Shove 2003). The focus groups also explored the locations of social

influence within participant's daily lives, in the form of social engagement. However, as discussed in section 5.4, the real societal interest and need does not lie in developing further qualitative evidence as to how practices are embodied, but in exploring whether this information can be incorporated in to policy design. In order to address this question it is vital to explore how the weighting of factors identified from the focus groups explains and can be explained, by the practices uncovered in this study.

5.9.1 Consistency of factor importance between focus group responses and AHP results

Consideration of the AHP priority vectors alone presents a very linear image of the relationship between the social practice factors identified. It suggests an obvious vertical integration of concepts within distinct silos of factors of fuel poverty. If this understanding of the AHP model of fuel poverty is accepted, the complexity of the relationships between the factors as discussed in section 5.6.3.2 would be lost.

By combining the qualitative evidence from the focus group analysis with the quantitative weightings provided through the AHP process it is possible to assess the consistency of the data from both sources whilst also developing an understanding of the relationships between the factors across different tiers and groupings. In order to develop this conjoint analysis we will examine factors within their distinct "silos", i.e. each of the four nodes within the top level of the AHP/Coding hierarchy, but will discuss linkages across each of the silos and hierarchy levels.

5.9.1.1 Domestic Practices

The AHP process demonstrated that a strong importance was placed upon social image by householders when considering how and why they keep their home clean. Completing the laundry was perceived to be only half as important to householders as presenting the home in

a desirable manner to visitors. However, the distinct preference for social image was not as fervently supported within the focus groups as the AHP figures alone would suggest. For some participants, notably those in Newcastle and Bristol, the presence of guests facilitated the completion of laundry tasks as heating was on and was also perceived as an ideal moment for guests to be present. Yet when considered in conjunction with issues of heating (from the Energy domain of the AHP) and the presence of family or guests in the home (from the Social Engagement domain), social image was deemed to be very important. Presenting a cold home to others was met with expressions of shame and even deliberate attempts to avoid guests in the home. Furthermore, links were demonstrated between social image and the topic of supplementary warmth, a third level sub-factor of heating. Some participants did not wish to be seen to be utilising blankets when guests were present, whilst for others there was little concern with being seen under a blanket.

The focus group evidence presents a more nuanced picture of social image than the AHP results, though both support the conclusion that social image does play a stronger influence in how and why homes complete domestic practices than laundry, and therefore also a stronger role in the existence of fuel poverty in England when conceived from a social practice lens. In quantifying the extent of this effect, this work not only adds support to discussions surrounding status and stigma as discussed by Hitching and Day (2011) and Hards (2013) but provides evidence of the extent to which status and stigma affects household practices involving energy, whilst also linking this to issues surrounding social engagement (with friends and family) and the role of supplementary sources of warmth within the home.

In considering the level 3 and level 4 factors from the AHP contributing to the importance of laundry in household practices involving energy, there was a clearer link between the evidence from focus groups and the AHP weights. Although drying clothes was

identified as a high energy use practice, all households placed more emphasis upon washing clothes than drying them. When considered in conjunction with the level 4 preference for other forms of drying, over the use of a tumble dryer, it is apparent that washing clothes would constitute a higher proportion of energy consumption for most respondents as many either did not own a tumble dryer or attempted to avoid utilising it where possible. Thus, whether the importance of washing in its contribution to energy consumption in the home was as a result of the large numbers of people in the home (as was the case in Bristol), the perceived need to avoid to complete washing due to its high energy cost (as was the case in Newcastle) or a relative emphasis on energy used in washing compared to drying as householders did not have or avoided using a tumble dryer (as in Leeds, London and Sheffield), the focus group evidence and AHP results support each other.

5.9.1.2 Energy

The similar level of importance placed upon the cost of gas, electricity and the role of heating uncovered within the AHP survey links with the findings of the focus group where respondents identified high consumption items such as extractor fans, or limited their consumption of electricity and gas by minimising the times when they utilised lighting or heating, presenting equal emphasis of the role of gas and electricity expenditure in their practices involving energy. Separating heating from the cost of gas was confusing for some participants who had gas central heating, but for others who had electric fires or fans to warm the rooms the concept was more easily separated. However, considering that all sources of heat rely on the use of gas or electricity, it is not surprising to see these given fairly equal weighting in the AHP.

It is perhaps surprising that heating was not given more emphasis given the central role it plays in maintaining adequate warmth in the home. The equal importance it is afforded

suggests that as discussed in section 5.6.3.2, householders must undertake complex trade-offs when prioritising their household needs. Heating is only a singular consideration against other perceived necessities such as providing hot food, hot water for personal cleaning, lighting when necessary and power for electrical devices. Reflecting discussions held in chapter 4 emphasising that fuel poverty within England is a measure of relative deprivation, rather than an absolute measure of poverty, this new model allows for consideration of what society perceives to be necessary for an individual or household to be able to fully participate in society.

A point of disagreement between the AHP results and the focus group evidence can be seen in the increased importance placed upon efficiency improvements over supplementary sources of warmth or heating control in terms of managing the amount of heat used in the home. Within the focus groups householders were able to identify inefficient aspects of their home and listed predominantly minor interventions they had made, but often suggested that these had not overcome these inefficiencies. More of their time was spent discussing the role of supplementary sources of warmth, such as wearing extra layers of clothing, using supplementary heaters or going to bed early to avoid using the central heating. Similarly, concepts of heating control were widely considered, often making links with the role of social engagement. Householders went to friends' houses to avoid heating their own home, or recognised that attending interest groups or going to the gym meant that they did not have to warm their own home. Overall, these three issues were weighted similarly within the AHP, however the role of efficiency improvements was discussed less than that of supplementary warmth or heating control. This may have been down to misinterpretation of the question. Participants were asked which of the three factors was more important to them when thinking about managing the amount of heat they use in the home. They may therefore have placed greater importance on efficiency improvements as they saw these as the best opportunity to

manage the amount of heat they use (Bolton 2014; Marchand et al. 2015), rather than our intention which was that they should reflect upon how energy efficiency improvements that they had managed to make had impacted upon managing the amount of energy they use.

5.9.1.3 Food

The terms utilised in the AHP relating to food purchase decisions (cost, quality, and value) had required significant explanation to participants to clarify the perception of differences between the terms. Thus, although the AHP suggests that value of food is more important than cost or quality the discussions rarely mentioned explicitly the concept of value for food. Instead value was often embodied within considerations of cost, demonstrating the difficulty in separating these two ideas. Quality of food was explicitly discussed by many participants, including suggestions that certain products would not be compromised upon, the importance of buying fresh food and buying food from certain sources. This also often resulted in participants discussing the need to travel to source their preferred products. The interrelated nature of the terminology chosen in the AHP may have influenced the fairly balanced levels of importance placed upon the four components but also reflected the discussions held in which value, quality, cost and travel were intertwined in participants contributions.

5.9.1.4 Social Engagement

Social Engagement has been shown to relate to issues of social image, laundry, heating, heating control and supplementary warmth, embodying the complex relationships and trade-offs have discussed previously. Broadly speaking the AHP values matched with focus group discussions with little importance placed upon paid employment, which is not surprising given that only three participants were employed. Again, the inter-related nature of the concepts discussed may have confused the results to an extent. Community centres were

discussed by many participants, including attending college, church, completing job searches, going to the library or taking part in scrabble group. But these concepts also related to interest groups, for example church and scrabble group. Respondents expressed that it was hard to differentiate the two in the AHP comparisons and this may reflect why interest groups were given a greater emphasis than community centres in the AHP.

Initially, the most surprising result was the emphasis placed upon the importance of family compared to neighbours or friends. In the focus groups participants in three out of the five focus groups suggested that community was very important to them, though this was less so for the other two focus groups. In comparison, family was not discussed to such a great extent in terms of them visiting or being visited as had been the initial intention behind the AHP question. Yet family were discussed in relation to issues of social image and their implications for heating and laundry by many participants. Therefore it is not so surprising that family were given such importance in the AHP, as although their importance was based predominantly on those present in the home rather than those visiting, the presence of family in any form had been acknowledged by participants as necessitating them to alter their practices involving energy.

5.9.1.5 Conclusions in relation to the consistency of factor importance between focus group responses and AHP results

Although there were some minor variations in the importance of different factors between the qualitative evidence gathered from focus groups and the quantitative evidence from the AHP survey, upon closer examination these variations echo the complex network of inter-related social practices captured by both of these sources.

In combining the responses from these two sources, bringing together two forms of data it is possible to examine how appropriate the conception of fuel poverty provided by either

source is. Had the AHP weightings not resembled the ideas discussed in the focus groups, it would be questionable as to whether the interpretation of the focus group data was valid and therefore whether the factors identified and the weightings calculated should be used in policy design. However, there two data sources reflect each other and suggest that our interpretation of the factors identified is correct. Therefore it is reasonable to adopt the weightings identified from the AHP process and propose that the model of fuel poverty represents the views of the public involved and captures the first Social Practice Theory derived model of fuel poverty in England.

5.9.2 Evaluating whether the objectives of this chapter were met

This chapter outlined in section 5.1 that the two constituent studies undertaken would seek to understand the social practices that bear influence upon the existence of fuel poverty within identified communities throughout England (study 2a) and quantify these factors in a manner that will enable policy makers and strategic planners to utilise the SPT perspective in policy design (study 2b). This section examines the extent to which the outcomes of these two studies result in a model of fuel poverty that meets the needs of social policy as discussed in 5.3.1, which facilitates consideration of the potential of the methodological approach applied and the resultant SPT model of fuel poverty developed within this chapter to meet the needs of policy designers and strategic planners.

5.9.2.1 Examining the potential for the SPT model of fuel poverty in England to meet the needs of social policy theory

Whilst current conceptions of fuel poverty point to the importance of the cost of energy, the energy efficiency of the home and household income in determining whether a home is in fuel poverty; results from the AHP, utilising factors derived from focus groups held with participants from across England demonstrate that by exploring the practices which combine

to enable the emergence of fuel poverty from a social practice theory perspective a much deeper understanding of the issue can be developed.

Ortiz (2007) notes that social policy is "about bringing people into the centre of policy-making" (p.6), which in section 5.3 we contend is not achieved by the predominant market based interventions favoured by government in social policy design. The methodology applied in this study necessitates the inclusion of the general citizenry in understanding the issue and prioritising the resultant factors. Our approach enables an understanding of the problem which facilitates an identification of routes to action, meeting the needs of social policy as outlined by Titmuss (1974). From the results presented in this study, it is apparent that by adopting a citizen-centred approach to social policy design, which captures both the "the social relations necessary for human wellbeing and the systems by which wellbeing may be promoted" (Dean 2012, p.1) a very different understanding of fuel poverty in England is created.

5.9.2.2 Examining the potential for the methodological approach utilised and the resultant SPT model of fuel poverty in England to meet the needs of policy designers and strategic planners

It has been argued that current approaches to social policy fail to consider context (Catney et al. 2013) through their narrow conception of the issue being considered (Shove 2010b) and that this can be addressed through the application of Social Practice Theory (SPT). Yet, Shove argues that given the dominance of the ABC approach to policy design, any approach that lies outside this realm are "doomed to be forever marginal" (2010a, p.1283), questioning the potential to utilise a SPT approach in applied policy design.

However, Browne (2013), in presenting the first quantitative exploration of social practices suggests that the inability of the Social Practice Theory approach thus far to provide

evidence in a format that policy practitioners understand is a major stumbling block in developing its applicability to practice.

To overcome this hurdle, we have developed a novel methodological approach that captures evidence of social practices and facilitates their expression within a quantitative language. In achieving this a degree of methodological pragmatism was adopted, rejecting the assertions from Hargreaves (2011) that verbal inquisition fails to capture the nuance of practice and instead drawing upon Hitching's (2012) assertion that people can talk about their practices. By inductively coding focus groups we identified social practice factors of fuel poverty and then quantified their relative importance utilising the AHP (Saaty 1977) approach.

Whilst some authors may not accept that the resultant model of fuel poverty represents a social practice picture of fuel poverty in England due to the methodological approach undertaken, by reflecting upon the quantitative model and its relationship with the focus group evidence, we have ensured that we have respected the ontological and epistemological foundations of SPT. In doing so we have responded to Hitchings (2012) call for further interview work that may confound expectations in the field of SPT. Furthermore we have built upon the work of Browne (2013) and presented a further example of a SPT methodology which can provide a detailed understanding of social practices whilst also delivering quantitative evidence of practice required by policy practitioners in policy design.

5.10 Conclusion

This study sought to meet the aims of objectives 3, 4 and 5 in identifying and understanding the social practices which combine to facilitate the existence of fuel poverty in England. It also aimed to develop a methodological approach that would enable the Social Practice Theory perspective to be utilised in the policy design domain.

In responding to these objectives an alternative picture of fuel poverty in England has been captured that presents a broad understanding of the phenomenon. It adds to the corpus of knowledge within the fuel poverty literature in relation to the lived experience of fuel poverty (c.f. Brunner et al. 2012; Gilbertson et al. 2006; Hong et al. 2009), supporting and developing the existing literature. By adopting a SPT lens a rich understanding of the complex network of inter-related practices (Shove et al. 2012) that enable the existence of fuel poverty has been realised, developing the work of SPT based energy research (c.f. Hitchings et al. 2015; Hitchings and Day 2011; Day and Hitchings 2011; Strengers 2012) and introducing this perspective to fuel poverty analysis. In addition, the methodological approach developed has built upon the work of Browne et al (2013) surrounding the capability of Social Practice Theory to provide the necessary evidence to facilitate the inclusion of the perspective it offers by policy practitioners.

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. In doing so we have met the aims of the study and discovered that contrary to current thinking, when social policy is designed with citizens and a social practice theory lens is adopted, the use of energy in the home is not perceived as the largest contributor to fuel poverty, instead the impact of providing food for the household is. We continue to explore why this might be by drawing upon the evidence presented throughout this thesis in the concluding chapter.

6 Conclusions, limitations and future research directions

Whilst the phrase fuel poverty has been used for over 40 years, it is only in the last 15 years that the social issue has started to be explored, challenged and fully understood. The original legislative instrument, designed to tackle fuel poverty in England, the Warm Homes and Energy Conservation Act (2000, sec.2) stated that steps should be taken to ensure that no one should be living in fuel poverty "as far as reasonably practicable" by 2016. Despite setting a clear target, the latest figures show that 3.05 million homes in England were fuel poor in 2012 (DECC 2014) someway short of realising the eradication of this social issue.

Against this background the thesis has sought to challenge the current approach to fuel poverty measurement in England by drawing upon the principles of social practice theory (SPT) to help understand the broader social influences and societal impacts of fuel poverty. A three stage process (reported here within two cumulative studies) has facilitated a 'grass-roots' examination of fuel poverty by firstly assessing whether fuel poverty differs from poverty generally. This statistical analysis enabled the development of a novel fuel poverty targeting methodology that allowed us to identify geographic areas in which the relationship between fuel poverty and deprivation lies outside the generally positive linear correlation. Householders in these areas took part in focus groups which developed a rich picture of the social practices that combine to facilitate the existence of fuel poverty in England. Finally, in line with social policy principles, residents weighted the identified social practice factors of fuel poverty, delivering the first ever socially defined, citizen weighted model of fuel poverty in England.

This chapter moves forward to examine in detail the model of fuel poverty developed as a culmination of the two studies presented in chapters 4 and 5. In doing so, we advance the analyses provided within these chapters and relate our Social Practice Theory model of fuel

poverty back to the historical development of the concept, the extant literature on the "drivers" of fuel poverty and past and present fuel poverty policy. This will then be utilised to highlight the contributions to knowledge and practice provided by this thesis before exploring the implications of our work for both policy and practice. Finally, we conclude with an examination of the limitations of the studies presented before making some suggestions as to potential avenues of future research resulting from this body of work

6.1 Assessing the SPT model of fuel poverty against SPT literature

In chapter 5 the SPT model of fuel poverty was validated with reference to literature on social policy design and through examination of the factor weightings with respect to the qualitative data collected from the focus groups undertaken. As this model marks the first attempt to provide a quantitative appreciation of the social practices that combine to deliver fuel poverty in England it is appropriate to assess the model with respect to extant social practice theory literature also.

The model of fuel poverty created as a culmination of the three stages of research (studies 1, 2a and 2b) outlined in chapter 3 presents a markedly different understanding of fuel poverty to either the ten percent model of fuel poverty initially proposed by Boardman (1991) and adopted by the first UK fuel poverty strategy (DEFRA & DTI 2001) or the new Low Income High Cost measure adopted by government in July 2013 (DECC 2013). By conceiving fuel poverty as combination of practices, rather than a technical issue, the SPT model of fuel poverty enables academics, policy makers and the general public to understand what changes in practice are needed to a deliver "a better life for citizens" (Saunders 2011, p.93) through the eradication of fuel poverty.

Fuel poverty has been traditionally conceived within a tri-factor model of underlying drivers of fuel poverty, namely household income, the energy efficiency of the home and the

cost of energy (Boardman 1991). However, as Boardman (Boardman 1991) contends, households consume warmth, which is a condition, rather than fuel, which is a resource. Drawing upon the work of Saunders who suggests that "increased economic resources are ultimately reducible to different practices" (2011, p.93), we contend that it is therefore appropriate to conceive of fuel poverty's existence as a result of the combination of different practices that impact upon a household's ability to consume warmth, rather than a set of structural barriers which prevent the ability to consume adequate resources.

The SPT model of fuel poverty identified 27 factors, nested within four levels, the combination of which can be perceived to result in the existence of fuel poverty. At the highest level of the model were four factors, Domestic Practices, Energy, Food, and Social Engagement. These factors of fuel poverty contain social practices which may be impacted by considerations relating to the energy efficiency of the home, the household income or the cost of energy (i.e. the traditionally conceived drivers of fuel poverty). However, our research supported the work of Saunders (2011) in demonstrating that it was not the ability to afford a resource which resulted in a household living in fuel poverty, but a complex network of inter-related practices which combined to cause a household to experience fuel poverty. Understanding the relationships between the different practices is vital (Higginson et al. 2013) to understanding how the relative strength of one practice over another may "restrict, enable or condition" (Shove et al. 2012, p.83) the existence of fuel poverty in England.

By understanding fuel poverty from a social practice theory perspective and adopting a degree of methodological pragmatism (Browne et al. 2013) in our approach to doing so, we have challenged current thinking in both the conception of what causes fuel poverty in England and also how practices can be examined, understood and quantitatively modelled. Therefore it is appropriate to reflect upon the resultant model to assess the validity of the

factors and weights it delivers, not only with respect to the methodology used and cross validation undertaken within chapter 5, but also in relation to the extant theory.

6.1.1 Food

Through examining the priority vectors at the top level of the AHP model of fuel poverty, it is apparent that food has the greatest impact upon a householder's ability to keep their home warm from the perspective of participants. Participants placed more than three times the importance upon food than energy, a factor which from the focus group discussions included issues relating to the cost of energy, heating practices and bill issues, all of which could conceivably be seen to relate much more directly to traditional conceptions of factors of fuel poverty.

When using a traditional behaviour based model to understand drivers of fuel poverty which focuses on the individual, such as the ABC approach to social policy design, critiqued by Shove (2010a), the strong emphasis that the SPT model of fuel poverty places upon food makes little sense. Food can be related to fuel poverty only in its impact on the energy used for cooking. This reflects Richardson's definition of fuel poverty as "people are unable to afford the fuel they need for heating, lighting and cooking" (Richardson (1980) cited in Osbaldeston 1984, p.368). However as Delormier et al (2009) note interpreting actions around eating and food from a behaviour perspective rather than a social practice perspective "underestimates the extent to which eating is embedded in the flow of day-to-day life (Delormier et al. 2009, p.217). Food plays a central role in our lives with practices of food purchase, preparation and consumption heavily influenced by social context (Wills et al. 2011). Practices related to food can be seen to impact upon social image (Wills et al. 2011), shopping, social engagement and cooking (Maller 2015), all of which are reflected within the SPT model of fuel poverty.

The strength of importance placed upon the role of food in impacting upon a householder's ability to keep their home warm lends support to the work of Beatty et al. (2014) who show that the poorest elderly households trade-off between food and fuel expenditure during cold weather shocks. The quantitative results from our AHP and qualitative focus group data suggest that, whilst food and fuel form a decreasing proportion of household budgets across the UK, meaning that balancing food costs against fuel costs is rarely necessary (Beatty et al. 2014); amongst the poorest households generally, rather than solely poor elderly households as suggested by Beatty et al. (ibid), there is a trade-off made between household heating practices and food related practices, reflecting the findings of De Haro and Koslowski (2013). This is likely a result of the low incomes on which the majority of our respondents existed, which would negate their ability to absorb both the high energy costs required to maintain a warm home and provide sustenance for their household. Faced with this decision, it is apparent that the provision of food is more important in sustaining the household, than providing the desired level of warmth.

6.1.2 Energy

Energy received the second lowest priority vector value within the SPT model of fuel poverty which seems surprising upon initial consideration. Within the traditional models of fuel poverty, energy in the form of its cost to the household is positioned as one of the three drivers of the existence of fuel poverty (Boardman 1991). Yet, when considered from a practice perspective, there is evidence to suggest that people do not know how much energy they use and that energy is only "made visible through the practices it enables" (Hards 2013, p.442). In this sense, energy may be embodied throughout many, if not all of the factors presented in the model. Examples of practice based consumption of energy were evident in discussions surrounding how household tasks such as laundry were completed, or how food

was prepared demonstrating the inter-related nature of practices involving energy and the other household practices identified in this study.

Within the topic of energy, participants were (other than the role of heating) predominantly asked to reflect upon energy consumption in a manner not attributed to specific practices, for example the perceived contribution of gas or electricity use to their overall energy expenditure. This may serve to suggest the low priority vector associated with this factor correctly reflects individual's inability to understand their energy use, with the importance of energy instead being captured within examples of practice embodied within the three other top level factors of fuel poverty. Similarly, the low importance placed upon the role of energy may echo low-income household's perceptions that there is little more they can do in order to save energy (Brunner et al. 2012), reflecting the already identified challenge of improving the energy efficiency of the housing stock in the private rented sector (Marchand et al. 2015).

Boardman (1991) and Campbell (1993) both note that fuel poverty as a concept is distinct from that of poverty more generally, in that it is possible to eradicate fuel poverty through capital investment in the building fabric. However, particularly amongst low income groups, the ability to afford the necessary levels of capital investment is limited. Lower income households are more likely to live in non-decent homes (Gilbertson et al. 2006) which need significant investment in order to overcome their inefficiencies. Participants were able to identify multiple inefficiencies within their home, such as ill-fitting windows and doors, or inefficient heating systems (Bradshaw and Harris 1983) which had been installed to serve the economic benefit of the installer and serve to exacerbate the fuel poverty problem for the resident rather than reduce it (Buzar 2007b).

The structural confines which prevent inhabitants from realising their recognised opportunities for efficiency improvement may indicate why such emphasis was placed upon this factor in the AHP model. Whilst residents were able to adopt practices such as putting on extra layers of clothing, going to bed early or limiting heating to certain rooms only (echoing the results of Brunner et al (2012)) in order to manage the impact of heating; the inability to achieve any more than basic efficiency improvements supports Brunner et al's (2012) assertion that low income household feel there is little they can do in order to improve the energy efficiency of their home.

6.1.3 Domestic Practices

Although domestic practices received the lowest weighting in the SPT model of fuel poverty, perhaps reflecting the discussion held above regarding people's inability to understand their energy use, the weightings attributed to the level 2 nodes of laundry and social image provide an interesting insight in to how individuals domestic practices, thermal expectations and social interactions all relate. At this level of analysis discussion in the focus group demonstrated that whilst the AHP might suggest that domestic practices have little impact upon the ability to keep the home warm, considerations, particularly surrounding the completion of laundry had a notable impact upon energy related practices in the home.

Drawing upon the work of Hards (2013) and Higginson et al. (2013), focus groups had explored the laundry practices of individuals and how these alter with guests. Contrary to the example provided by Hards, participants often sought to align the arrival of guests with the completion of laundry as this meant that the guests could benefit from the pleasant fragrance emanating from the washing (as was the case in Bristol) or it meant that heating was on anyway (as was the case in Newcastle). This demonstrates how laundry relates to social

image and social engagement and may provide insight into where to target interventions to reduce fuel poverty (Higginson et al. 2013).

The importance of social image, though not expressly negatively affected by the presence of laundry in the home, was emphasised in discussions surrounding warmth. Reflecting findings from Hards (2013) as well as the work of Hitchings and Day (Hitchings and Day 2011; Day and Hitchings 2011) the importance of presenting a warm home when guests or family were in the home was demonstrated in both the focus groups and represented in the AHP weightings. This work further supports the principle of a thermal image or "frontstage" (Hitchings and Day 2011, p.2461) that residents wish to project towards guests. The support for this concept supports the emphasis placed upon social image within the AHP weightings and provides further evidence of the network of inter-related practices that combine to facilitate the existence of fuel poverty.

6.1.4 Social Engagement

Social practices shape and are shaped by the social norms and values of the community, culture and society in which they are enacted (Higginson et al. 2013) which can be referred to as communities of practice (Saunders 2011). Social engagement provides a platform for practices involving energy to be learned and developed, supporting the emphasis placed upon this factor in the model. Within the SPT model of fuel poverty, social engagement was the second most important factor in determining the ability to keep the home warm.

Social engagement as a topic had initially been included as a result of previous data collection work surrounding energy retrofit of homes, in which participants had mentioned attending public spaces such as libraries or shopping centres in order to avoid heating their home, reflecting Hitching's (2009) commentary around thermal expectations in different locations. Our work did not show evidence of this potential practice taking place, with social

engagement more often being cited as necessitating altering heating practices to be more energy intensive due to the presence of guests in the home, rather than undertaking practices to avoid the use of energy in the home. Within this grouping of practices, family was identified as the most important component of social engagement. This may reflect the traditional emphasis placed upon the importance of family, with participants wishing to project this value in their responses. But with reference to the focus group responses, it is evident that the presence of family in particular was seen to necessitate ensuring the warmth of the home. Echoing the importance of a thermal frontstage as discussed above, the presence of guests, family and children in particular can be seen to alter normal household heating practices in order to meet perceived expectations and social norms (Hitchings and Day 2011).

6.2 Key findings

The final model, assessed with respect to social practice theory literature above was the culmination of a three stage methodology contained within two studies building on an extensive assessment of the extant literature on fuel poverty.

6.2.1 What is fuel poverty?

We started by examining the historical development of the fuel poverty concept in order to examine not only what fuel poverty is conceived to be and why it exists in England, but also in order to understand why England has been unsuccessful in targeting and eradicating fuel poverty to date (Liddell et al. 2012). This work, outlined in chapter 2, demonstrated that in line with the opinion of Shove (2010a) the current understanding of fuel poverty in England is based upon a narrow and limited understanding of its impact upon society. Evidence of the wider societal benefits of energy efficient retrofit are limited (c.f. Scott et al. 2014) although there is more evidence surrounding the health impacts of fuel poverty (Marmot Review Team 2011; Gilbertson et al. 2006), illustrating a failure to understand the

wider societal impacts and causes of fuel poverty also. Work by Boardman (2010) demonstrated a mismatch between eligibility criteria for supplier obligation programmes designed, in part, to tackle fuel poverty. The mismatch between definition and policy can be attributed to a practical decision to utilise proxy-indicators as a methodologically simple approach to identify fuel poor households, such as household income, as well as a lack of understanding of the broader social influences that impact upon fuel poverty's existence.

Through analysing this extant literature it was apparent that a failure to be able to accurately identify households affected by fuel poverty resulted in poorly targeted policy and interventions. A strong need for a new measure of fuel poverty which can be utilised to both design policy and identify fuel poor households was apparent. In order to improve fuel poverty measurement research within the academic realm had sought to utilise small area data sets to understand the spatial distribution of fuel poverty (Fahmy et al. 2011), examine how the picture of fuel poverty changes when utilising subjective measurement (Waddams Price et al. 2012) and adopted GIS informed area based targeting approaches utilising a fuel poverty risk indicator (Walker et al. 2012). Research utilising subjective measurement of fuel poverty consistently discovered a lack of overlap between those identified as fuel poor subjectively (i.e. through self-report measures) and objectively (through statistical modelling) (Healy and Clinch 2004; Fahmy et al. 2011; Waddams Price et al. 2012) which suggests that the narrow understanding of fuel poverty currently utilised in both policy and academic research fails to truly capture the fuel poverty phenomenon.

6.2.2 Measuring fuel poverty

In order to move towards a more accurate understanding of fuel poverty in England we returned to assess the political position of the successive Conservative governments from 1979 - 1997 that fuel poverty was no different to any other form of poverty. Poverty in

England is a unidimensional relative measure based solely upon income (Council of the Europen Union 2004) whereas fuel poverty contains many of the qualities of a composite indicator, being made up presently of household income, household energy efficiency and the cost of energy (Boardman 1991). At this level, fuel poverty clearly differs conceptually from poverty in England through consideration of what is included in measuring each concept. However, by moving away from considering the relationship between a unidimensional measure (poverty) with a multidimensional measure (fuel poverty), to considering the relationship between the multi-dimensional measures of deprivation and fuel poverty, the differences between the two concepts are not as immediately obvious.

Much of the extant literature contends the independence of the two concepts (Bradshaw and Harris 1983; c.f. Boardman 1991; Campbell 1993), with particular emphasis on the ability for capital investment in housing stock to eradicate fuel poverty, which would not have the same impact upon poverty. Boardman (1991) does note the overlap between fuel poverty and the income poor with this overlap also acknowledged by more recent studies (De Haro and Koslowski 2013; Hills 2011). This relationship has been seen to be weakening, which suggests that tackling poverty will have a reduced benefit for fuel poverty reduction (Palmer et al. 2008). Hills concluded that income is a predictor of fuel poverty, and reconfirmed fuel poverty as a separate issue, though one which is difficult to separate from income poverty.

The close relationship between poverty and fuel poverty has resulted in the adoption of proxy indicators to identify the fuel poor, such as income. The suitability of this approach is questionable (Fahmy et al. 2011) as we have discussed. The literature examined in chapter 2 shows how fuel poverty relates to multiple social issues, yet recognising the complex intricacies of the underlying drivers of fuel poverty has been ignored in favour of procedural

simplicity. We therefore undertook a new examination of the independence of the fuel poverty concept through bivariate analysis of sub-regional fuel poverty statistics and deprivation as identified from the Index of Multiple Deprivation. This facilitated two achievements, firstly bringing our statistical understanding of the relationship between fuel poverty and deprivation up to date to reflect the impact of the supplier funded programmes the Energy Efficiency Commitment wave 2, CERT and CESP (Rosenow 2012; Rosenow et al. 2013) upon the relationship since the study by Palmer et al. (2008). Secondly it allowed us to explore how the relationship differs when a more socially encompassing measure, namely that of multiple deprivation is used as a point of comparison.

This analysis showed that nationally there is a moderate, positive correlation between percentage of LSOA considered fuel poor and deprivation score of 41%. Reflecting previous studies (Palmer et al. 2008; Hills 2011; Boardman 1991) fuel poverty was shown to be closely related to deprivation, though utilising income as a proxy will still fail to accurately identify the majority of fuel poor homes.

The statistical analysis of fuel poverty and deprivation also enabled the creation of a novel methodology for identifying and targeting poverty and fuel poverty interventions at a small area throughout England. Through examination of the relationship between fuel poverty and deprivation at different geographic levels, distinct geographies of fuel poverty and deprivation relationships could be identified, suggesting that centrally formulated policy responses are unlikely to be effective and efficient in tackling fuel poverty. This provides a potential insight as to why three quarters of money spent on fuel poverty reduction related interventions fail to reach those that are fuel poor (Boardman 2010).

Furthermore this analysis allowed each of the Lower Super Output Areas in England to be classified according to the relationship between fuel poverty and deprivation. By

categorising each area according to the quintile of deprivation and quintile of fuel poverty a simple yet powerful classification of areas for intervention targeting was created. By understanding the balance between deprivation and fuel poverty in each LSOA, decisions can be made as to which type of intervention will be most beneficial for which area. As Palmer et al (2008) suggest, as the relationship between fuel poverty and poverty weakens, tackling poverty has a reduced capability to also deliver reductions in fuel poverty. This classification framework therefore assists policy makers in deciding whether a specific LSOA, or grouping of LSOA's would see greater social benefit from instigating poverty related interventions (in areas with both high fuel poverty and high poverty) or fuel poverty related interventions (in areas with high fuel poverty and low poverty).

6.2.3 Reconceiving fuel poverty from a Social Practice perspective

The fuel poverty/index of multiple deprivation (FP/IMD) classification framework developed in chapter 4 as a result of analysing the independence of the fuel poverty concept highlighted the presence of significant geographic variations in the relationship between fuel poverty and deprivation. As we demonstrate in chapter 2, fuel poverty is affected by multiple social, economic technical and environmental factors. By adopting a social practice theory perspective we were able to examine the practices which embody these factors to understand how they differ amongst communities with different fuel poverty/deprivation relationships across England. Focus groups were completed in five locations across England to identify practices related to energy amongst communities at extremes of the fuel poverty / multiple deprivation relationship. The communities chosen existed outside of the generally positive linear correlation between poverty and deprivation previously discussed. It was intended that by examining their practices it would be possible to identify the factors which impact upon the existence of fuel poverty beyond the traditionally utilised proxy variable of household income.

In doing so, we were able to develop a new model of fuel poverty that meets the definition of social policy provided by the UN (Ortiz 2007) by engaging directly with those affected by fuel poverty to both identify social practice factors of fuel poverty and weight their relative importance in the model. This marks the first model of fuel poverty which has adopted an approach to developing a composite measure of the factors of fuel poverty that seeks to reduce the influence of the indicator designer through adoption of the Analytical Hierarchical Process (Nardo et al. 2008).

The resultant model identified four broad groupings of social practices; domestic practices, energy, food and social engagement. The model is very different to that of fuel poverty as identified by the traditional tri-factor model of fuel poverty, yet encompasses all of the factors of this model. Cost of energy, household income and the energy efficiency of the home were represented in a number of the social practices discussed by participants, showing that the conception of fuel poverty we present does not discount the drivers of fuel poverty identified in the extant literature. However, the social practice theory model of fuel poverty is able to reflect a much more complex picture of the multifarious influences which combine to deliver the existence of fuel poverty in England. It allows academics and practitioners to understand the relationship between practices (Higginson et al. 2013) which is vital to understanding how these practices might be altered in order to move to eradicate fuel poverty in the future (Shove et al. 2012).

6.3 Contributions to knowledge

This thesis makes two distinct contributions to knowledge. Firstly the thesis has argued that if we wish to understand the multiple influences upon the existence of fuel poverty in England it is necessary to adopt a Social Practice Theory perspective. Whilst the analysis of fuel poverty presented in chapter 2 demonstrates many factors affecting the existence of fuel

poverty in England such as our building heritage, mild climate and evolving thermal expectations (Rudge 2012) it also highlighted a lack of evidence of the social impacts of fuel poverty (Heyman et al. 2011). Drawing upon the work of Shove (2010a) this is likely due to the narrow accounts utilised to develop our understanding of social issues within policy formulation approaches.

The current approach to measuring fuel poverty is highly technically and economically focussed and fails to reflect the social influences upon fuel poverty. In developing this approach, Hills rejected the use of subjective measures of fuel poverty due to difficulties in utilising subjective opinions in policy formulation (Hills 2011). This failure to consider context (Catney et al. 2013), we argue, has resulted in an inaccurate measure of fuel poverty that is not suitable for targeting interventions. Boardman (2010) noted that by 2006 less than 25% of fuel poverty expenditure was successfully being spent on fuel poor homes.

In chapter five we outlined how the individualistic focus of current policy formulations fails to capture the complex socio-technical networks which combine to drive the existence of fuel poverty in England. Powells (2009) suggests this approach to policy design marginalises groups, limits access to resources and delivers unexpected outcomes. Individualistic approaches to policy design can also be seen to be socially regressive and environmentally inadequate (Paterson and Stripple 2010). By adopting a social practice theory lens to understanding fuel poverty it is possible to overcome the individualistic focus of behavioural models (Hargreaves 2011), shifting focus instead towards practices rather than the choices of the individual. This change in focus enables the capturing of social, cultural and environmental influences within our conception of fuel poverty, developing a broader and more robust understanding of the social issue.

Through adoption of a social practice theory lens to explore fuel poverty we developed a an understanding of this social issue which encapsulates the technical and economic considerations captured within the currently adopted Low Income High Costs measure of fuel poverty (DECC 2013) and the previous 10% measure of fuel poverty (DEFRA & DTI 2001) within a broader depiction of the inter-related social practices the combine to cause fuel poverty in England. This work builds upon a strong body of social practice based examinations of practices involving energy that may impact upon fuel poverty, encompassing issues such as temporal shifting of energy consumption (Higginson et al. 2013), how the elderly manage warmth in winter (Hitchings and Day 2011), the status enhancing or stigmatising role of energy practices (Hards 2013) and the role of community networks in understanding practices involving energy (Catney et al. 2013). However, this represents the first body of work which explores the social practices which contribute to the existence of fuel poverty in England, contributing not only to the academic understanding of the field, but also offering insights to practice that will be discussed later.

A second contribution of this thesis has been the methodological approach utilised in capturing social practices. Shove has suggested that "approaches which lie beyond the pale of the ABC are doomed to be forever marginal" (2010a, p.1283). We argue in chapter five that this may be heavily influenced, not only by the predisposition towards individualistic frameworks of understanding and self-perpetuating cycle of commissioning of policy analysis within this approach by policy practitioners (Shove 2010a), but also the lack of quantitative evidence that can be provided by social practice theory practitioners to date (Browne et al. 2013). We contend that if social practice theory is to overcome the prominence of the ABC approach in policy design, it is important to be able to provide evidence in a format that meets the needs of the end users. As with Hills' rejection of subjective measures of fuel poverty (Hills 2011), the almost exclusively qualitative basis of social practice theory

investigations to date structurally precludes its potential to contribute to policy design and implementation.

In responding to this issue we adopted a degree of methodological pragmatism (Browne et al. 2013) in rejecting the assertions of some SPT authors that people cannot talk about practices and drew upon the reflexive work of Hitchings (2012) to understand the potential of discursive approaches to be adopted within a SPT framework. In doing so we also reflected Halkier's (2010) assertion that focus group data can be utilised to explore social practices. Through the completion of five focus groups and the subsequent inductive coding and analysis of their content, we developed Hitching's (2012) one-on-one interview approach to understanding social practices, in to a more discursive and reflexive group environment facilitating broader public participation. This environment also enabled greater comparative discussions to take place between participants, rather than solely in the analytical stage, allowing a richer, and more detailed understanding of how and why household practices involving energy develop, are sustained or die out, further developing the work of Hitching (ibid).

Drawing upon the analytical outcomes of the SPT focus groups enabled the development of a hierarchy of factors of fuel poverty, representing the social practices identified from the focus groups. Within the existing fuel poverty literature some criticism has been levied at the relative weighting of the sub-indicators utilised to model current approaches to measuring fuel poverty (Fahmy et al. 2011). In order to overcome such criticism and in order to deliver a model of fuel poverty that reflects the principles of social policy, the factors were weighted through the application of the Analytic Hierarchy Process (Saaty 1977). This approach is recognised as reducing the influence of the policy designer (Nardo et al. 2008) and facilitates group decision making in relation to complex issues (Dyer and Forman 1992).

The resultant model of fuel poverty, building upon the work by Browne et al. (2013), contributes to a limited literature on the quantification of social practices. It represents the first body of work to adopt a mixed methods approach to exploring social practices, taking qualitatively expressed data and subsequently quantifying identified practices utilising the AHP methodology. In doing so this thesis hopes to develop not only the methodological approaches to exploring social practices, encouraging further empirical studies to be completed, but also to demonstrate the potential of the social practice approach to deliver data and insights that can be utilised in the formulation of more appropriate and accurate policy and interventions.

6.4 Contributions to practice

The Lower Super Output Area (LSOA) Fuel Poverty/Index of Multiple Deprivation (FP/IMD) classification matrix developed within chapter 4 marks an important contribution to both academic understanding and practice. Whilst subsequent studies (Boardman 1991; Palmer et al. 2008; Hills 2012) and theoretical analyses (Bradshaw and Hutton 1983; Campbell 1993) have previously demonstrated that fuel poverty is different to poverty, the analysis presented in chapter 4 confirms that the relationship between the two concepts remains close despite the various fuel poverty eradication schemes run to date. Hills (2011) notes the significant difficulty in separating fuel poverty from poverty, which has resulted in the questionable adoption of proxy indicators such as income as a means of identifying the fuel poor for policy targeting (Fahmy et al. 2011). Boardman (2010) shows that this approach has resulted in less than 25% of expenditure on fuel poverty related policies actually reaching fuel poor homes.

Improving targeting is therefore vital in delivering fuel poverty policies (Walker et al. 2012) that reach their intended recipients. The FP/IMD classification matrix provides a

simple, yet powerful practical classification tool for policy makers at community, local and national government level to identify both areas for targeting and also what form of intervention will be most beneficial for the identified area. By categorising small areas according to the relationship between the extent of fuel poverty and depth of deprivation in quintiles it becomes apparent that given the difficulties in separating the relationship between deprivation and fuel poverty, understanding the relative importance of one compared to the other is vital for policy delivery.

In LSOAs where fuel poverty is high, but deprivation is low (such as those classified as "5" in the FP/IMD classification matrix) the benefit of poverty reduction approaches in tackling fuel poverty is minimal (Palmer et al. 2008), however the potential impact of energy efficiency interventions in reducing the level of fuel poverty is much greater. Conversely, in areas that are extremely deprived but not very fuel poor (such as those classified as 16 in the FP/IMD classification matrix), undertaking fuel poverty reduction initiatives in the form of energy efficiency interventions is likely to have little benefit. Areas such as this are often characterised by high incidences of social housing which have benefitted from the Decent Homes Standard (DETR 2000) and are relatively energy efficient. Policies to tackle the root causes of poverty in the area, such as unemployment and health, are likely to be of a much greater benefit to the area.

By mapping the FP/IMD classification matrix the tool provides a simple visual understanding of the homogeneity or heterogeneity of different localities FP/IMD relationship. This will further support Local Authorities in the design of the most beneficial schemes whereby they can easily identify homogenous areas which can be easily targeted within a large area based scheme utilising the most beneficial form of intervention for that area.

The SPT model of fuel poverty developed as a result of this thesis provides a further contribution to practice. The model encompasses a much broader and more detailed understanding of the factors which combine to facilitate the existence of fuel poverty in England. It captures not only the technical and economic factors upon which the current model of fuel poverty is based, but also social, cultural and environmental factors that were not previously considered within the model.

As outlined in chapter 4, fuel poverty is a relative measure of the deprivation of access to a resource, namely warmth, rather than an absolute measure of poverty. By considering fuel poverty as an issue of deprivation it is reasonable to draw upon Townsend's (1979) definition of deprivation and reflect that fuel poverty relates to a lack of access to multiple factors which are deemed necessary to participate within society. It is therefore clear that it is important to conceive fuel poverty from a social practice perspective rather than the traditional ABC approaches in order to reflect the access to social resources which a measure of deprivation entails by definition.

Through understanding fuel poverty from the perspective of social practices, rather than the predominant ABC individualistic models of policy (Shove 2010a), practitioners are empowered to tackle fuel poverty through sites of intervention that would not have been considered relevant previously. A particular emphasis on the importance of food within this model shows that for those on limited budgets, the provision of food for the household is prioritised over the provision of warmth. Therefore, practitioners should, for example, consider examining household eating practices in more detail to explore ways in which these can be altered to facilitate greater emphasis on the provision of warmth in the home.

The SPT model of fuel poverty has created a model of fuel poverty defined and weighted in conjunction with the general public, meeting the UN's definition of social policy (Ortiz

2007). By engaging directly with citizenry, it enables practitioners to understand the broader social factors which are considered important to participating in society, reflecting the definition of deprivation, but which also impact upon the practices involving energy and therefore fuel poverty status of a home. As a result of identifying these practices, the model provides practitioners with new sites of intervention and tools for change, enabling policy makers to draw upon communities of practice (Saunders 2011) to seek ways to encourage the alteration of practices which have a detrimental effect on fuel poverty and the emergence of new practices (Shove et al. 2012) to reduce the existence of fuel poverty in England.

6.5 Contributions to policy

There has previously been a mismatch between the definition of a fuel poor household and those receiving fuel poverty interventions. The National Audit Office estimated in 2009 that less than 25% of expenditure on fuel poverty schemes was reaching fuel poor homes (National Audit Office 2009) and Hills concludes that the inefficiency of such schemes can be attributed to the "flawed" definition of fuel poverty that had been used (Hills 2012, p.8). The challenge of identifying the fuel poor has resulted in policy makers utilising proxy indicators to target schemes of intervention which has exacerbated the inefficiency of such schemes (Boardman 2010). The work presented in this thesis provides two broad contributions to policy that will support policy makers in the creation of more suitable schemes to tackle fuel poverty. Firstly, a new picture of fuel poverty in England has been created which capture the broad practices involving energy which are related with the social issue, suggesting new locations to consider for targeting of policy. Secondly, the FP/IMD classification framework developed in this thesis demonstrates the need for, and facilitates the localisation of decision making when targeting fuel poverty.

Previous research has shown that there is a relationship between poverty and fuel poverty (De Haro and Koslowski 2013; Hills 2011) but that this relationship is weakening (Palmer et al. 2008), providing further support to the argument that utilising poverty or income as a proxy measure for fuel poverty is unsuitable (Fahmy et al. 2011). The examination of the relationship between fuel poverty and deprivation presented in this thesis again supports this position. Through examination of the relationship at different geographic levels the analysis also demonstrates the importance of a more localised understanding of fuel poverty for the creation of effective policy responses.

There is an increasing academic literature that calls for more localised targeting of fuel poverty working at progressively smaller scales of geography (Fahmy et al. 2011; Walker et al. 2012; Walker et al. 2014). The statistical analysis presented in chapter 4 emphasises the importance of developing this ability in order to deliver successful policy targeting. Although a moderate correlation between fuel poverty and deprivation was observed at the national level of analysis, as the level of geographic analysis was reduced, significant heterogeneity in the strength of the correlation between these factors was apparent. The geographic variation in the relationship between fuel poverty and deprivation means that policy designed in a "one size fits all" format and defined by central government is highly unlikely to succeed as it fails to account for this underlying variation in the local situation. The implication of this is that fuel poverty policy should be devolved. Given the role of local councils in public health, a matter which fuel poverty is strongly related to (Marmot Review Team 2011), it seems that local councils will be best positioned to understand their localities needs and will be able to focus on a suitably tightly defined geographic area to deliver real policy impact to the benefit of the specific needs of the area.

The statistical analysis also suggests that in order to effectively tackle fuel poverty, policy makers need to stop utilising proxy measures such as income or poverty flags for targeting policy. The fuel poor will always only represent a sub-set of any of these groups (Boardman 2010). Hills (2011; 2012) acknowledges the challenges in separating fuel poverty and poverty which gives some indication as to why policy makers may have previously chosen to utilise such proxy measures. In order to move policy design forward, it is important then to understand the relative importance of poverty or fuel poverty in different localities. The FP/IMD classification matrix facilitates this understanding as previously discussed. It enables policy makers to comprehend at an individual LSOA level whether policy responses should focus on poverty alleviation or policy related to factors of fuel poverty such as improving the energy efficiency of the home in order to deliver the greatest impact in tackling fuel poverty in that area.

Whilst understanding the relative importance of fuel poverty and poverty in different localities marks an improvement upon current policy design, the SPT picture of fuel poverty developed in this thesis marks a contribution to policy that may enable better identification of fuel poor homes. By utilising a SPT approach it captures objective measures of fuel poverty utilised in the tri-factor measure of the issue, and combines them with subjective experiences of fuel poverty in an attempt to overcome the weaknesses of previous approaches which have failed to demonstrate an overlap between objective and subjective measures of the issue (Healy and Clinch 2004; Waddams Price et al. 2012). The SPT perspective captures the role of energy as a material contributor to practice, but no longer necessarily places it as a driver of practice (Shove and Walker 2014). The implication of this is that through the combination of subjective and objective contributors to fuel poverty and the removal of energy as the focus, new locations for policy makers to tackle fuel poverty can be identified.

The SPT picture of fuel poverty presented in this thesis demonstrates the significant importance placed upon food by householders, supporting the much reported heat or eat dilemma (Beatty et al. 2014). Policy makers should now consider how the importance of food could be utilised to alter practices involving energy in the home. Potential solutions may include providing food vouchers when energy bills are paid so that food is not prioritised over heating the home. The model also demonstrates the importance of social engagement and suggests another location for intervention whereby policy makers could intervene in local resources such as libraries, community centres and community groups to seek to support the evolution of social practices that are likely to result in a reduction and eventual eradication of fuel poverty in England. The SPT picture of fuel poverty starts to provide policy makers with an indication of where to prioritise interventions rooted in a broader conceptualisation of fuel poverty. As outlined by Browne (2013), SPT studies have rarely presented findings in a format of relevance to policy makers. By attempting to quantify the social practices identified from the focus groups completed in study 2a, this thesis makes the first steps towards a numerical representation of SPT factors of fuel poverty that meets the data needs of policy design. This work suggests as outlined above that food is the greatest determinant contributing to fuel poverty related practise in the home, with 55% of the importance placed upon this domain, with only 17% of the importance placed upon the energy domain, supporting Shove and Walker's (2014) observation that energy is not necessarily a driver of practice. By providing a numerical quantification of the relative importance of different factors of fuel poverty, policy responses can be prioritised utilising the newly identified loci of intervention (such as those discussed here). This could allow fuel poverty policy makers to engage with policy makers working in areas which impact upon fuel poverty (such as the Food Hygiene Agency, Department of Health of DEFRA) by demonstrating the interrelated complexities of the identified practices which contribute to fuel poverty. This could

encourage a more holistic approach to policy design which considers the relationship of different specific policies to wider policy impacts (such as fuel poverty) in addition to the primary area of concern for a given policy.

6.6 Limitations

It is important to acknowledge the limitations within which these observations and contributions have been developed. Study 1 sought to examine the independence of fuel poverty from that of deprivation more broadly through analysis of existing official government statistics. Analysis was provided at national, regional, local government and also LSOA levels. As noted within chapter 4, DECC warned that the modelled sub-regional fuel poverty data at the LSOA level should be treated with caution as the figures were not robust at very low levels of geography with figures at census output area (COA) level being removed from the statistical sets altogether due to the small sample size of households surveyed in developing the dataset (DECC 2014). The modelled nature of the sub regional fuel poverty dataset used and the small sample size utilised by DECC in creating these statistics may potentially lead to some inaccuracies in the categorisations of LSOA's created within the FP/IMD classification matrix. Resultantly, it is important for potential users of this classification approach to understand the limitations of the underlying modelling approaches applied by DECC. In order to improve the accuracy of the analysis of the relationship between fuel poverty and deprivation as well as the subsequent classification of English LSOA's, further research is required to develop upon small area estimation techniques such as those proposed by Fahmy et al. (2011) or Walker et al. (2014) to facilitate a greater degree of understanding of the fuel poverty phenomenon at a localised level. Drawing upon census data, as in the work of Fahmy et al (ibid) is likely to provide the largest possible dataset, but offers only limited opportunity for data of relevance to fuel poverty to be obtained. Future developments in the availability of data on energy consumption from the installation of

smart-meters across England may provide a further avenue for data exploration and the development of more accurate small area estimates of the extent of fuel poverty.

A further limitation of this analysis relates to the historical nature of the data. The English Indices of Deprivation, referred to commonly as the IMD, have not been updated since 2010 and are based on 2008 data sources. In order to maintain comparability of LSOA boundaries the study also utilised fuel poverty data collected in 2010 (published in 2013) rather than the most recent data set. As such, the results of this analysis may not fully represent the current relationship between deprivation and fuel poverty in England. The analysis provided presents the most up to date examination of the relationship possible with available comparable data. To improve the accuracy and relevance of the analysis, it will be relatively simple in future work to apply the approach undertaken to new datasets as they become available. At present the UK government is scheduled to publish an updated version of the English Indices of Deprivation in late 2015 which would be comparable with the most recent fuel poverty statistics enabling a more current understanding of the statistical relationship to be realised.

In study 2a (chapter 5) the thesis built upon the statistical analysis provided in study 1 in examining the lived experiences and social practices of communities living in different LSOA's across England, characterised by different levels of deprivation and depth of fuel poverty. The study sought to identify common social practice factors of fuel poverty through undertaking and analysing focus groups with residents from communities identified as a result of the statistical analysis in study 1.

The results of this study were limited by the levels of participation achieved in each focus group as well as the number of focus groups that were held. Significant challenges were faced in recruiting partner organisations in each city of interest as well as participants in each

area of interest and were discussed in detail in chapter 5. Practical limitations such as the time and budget available to the researcher to recruit and incentivise participation, combined with a lack of personal familiarity with the various potential partner organisations and modes of operation across England meant that this study failed to achieve the desired levels of participation. This has resulted in a study that provides a more explorative examination of the social practices of fuel poverty that has enabled the development of a new methodological approach to examining social practices, rather than achieving a new definition of fuel poverty that can be robustly defended as representing the reality of this social issue in England. Future research should look to adopt the methodological approach utilised within study 2a on a broader scale in order to capture a more representative picture of the social practices that combine to facilitate the existence of fuel poverty across England.

The AHP study (study 2b) was designed to weight the social practice factors of fuel poverty identified in the first half of the study in order to deliver a socially defined and socially weighted measure of fuel poverty in England. AHP survey responses were received by only eight of the focus group participants, the reasons for this low response rate are outlined in chapter 5. Whilst the AHP weightings received are adequate for delivering an understanding of the relative importance of different social practices in contributing to the existence of fuel poverty in England; the extent to which this represents the views of those across England is less immediately obvious. These results should therefore be seen as representative of the views of the individuals and also the communities within which they live, rather than necessarily presenting the weightings that would be realised from a broader survey throughout England.

This study has provided the first examination and quantification of the social practice factors that combine to deliver fuel poverty in England. It has been limited by the accuracy of

official statistics available and the level of participation achieved in the primary data collection activities. Whilst care has been taken to minimise the impact of these issues, through careful and reasoned targeting of participant recruitment, this work should be seen primarily as exploratory in nature, providing a strong platform of methodological development. Further work should seek to advance the approaches utilised and insights gained in order to assess the validity of the outcomes observed across a broader population base.

6.7 Future research directions

The work presented in this thesis offers a strong methodological approach as well as an initial set of explorative results upon which future research should develop. A number of interesting future research directions can be identified that draw upon the limitations of the work as outlined above.

Initially it would be appropriate to update the statistical evaluation of the relationship between fuel poverty and deprivation utilising the latest available datasets. The publication of the new English Indices of Deprivation in late 2015 will include some methodological alterations and variations in indicators included when compared to the 2010 dataset (DCLG 2015c) and therefore will not be directly comparable with the analysis undertaken in this thesis. Through utilising this dataset it will be possible to use the most current fuel poverty dataset for comparison also, as both will utilise the same, post-2011 LSOA boundaries. Although there will be some slight variation in the indicators included as we have argued, fuel poverty is a relative measure, as with deprivation; it is therefore right that the included indicators of deprivation are updated to represent the factors considered most relevant to social policy delivery and the variation in the constituent indicators should be seen as representing the current priorities for policy, rather than a major methodological hurdle.

Updating of the analysis will also facilitate the updating of the FP/IMD classification matrix, providing a more accurate and policy relevant picture of the relative importance of fuel poverty or general deprivation in each LSOA across England for current policy delivery. This will enable the methodological approach developed within this thesis to continue to be relevant to policy makers and others and help to contribute to the debate and design of fuel poverty interventions and policy as discussed in section 6.5.

The analysis of the relationship between fuel poverty and deprivation presented in study 1 did not seek to explain why there is a local and regional variation in this relationship. Further work should draw upon the literature review presented in chapter 2 suggested factors in chapter 4, to explore how factors such as geographic variation in temperature, household income, property ownership, rurality and demographic factors alter the relationship. The examination of official datasets such as census data, English housing survey data and met office weather data potentially offers a good opportunity to robustly analyse these factors from a quantitative view point.

This thesis has developed an exploratory social practice model of fuel poverty, contributing to a limited literature on quantitative and mixed methodological approaches within the social practice theory field. In doing so it has challenged the assertions of Shove (2010a) that the SPT approach is set to be forever marginal in policy design, built upon the reflective discussions and methodological suggestions of Hitchings (2012) and developed novel methodological approaches responding to calls for more work in the area by Browne (2013).

In order for this contribution to deliver maximum benefit to both academic enquiry and policy practice it is vital that future research seeks to examine and test both the methodological approach utilised and the validity of the model and subsequent weightings created. Again, as we have positioned fuel poverty in England as a relative measure of

poverty, rather than an absolute measure, and in line with the evolving, dynamic nature of social practices (Shove et al. 2012) we propose that the social practices identified and weightings obtained will vary and change over time, so some difference between the results presented and future research outcomes would be expected. Future research should seek to draw upon a much broader participant base than that achieved in this research in order to capture the opinions of a wider population. Doing so would improve the reliability of the social practices identified and the robustness of the weightings collected, representing more accurately the views of the English population more generally. Furthermore, future research should examine the opportunity that the AHP methodological approach offers for assessing preferences for alternative fuel poverty policy configurations. Whilst this research utilised AHP to capture quantitatively the perceived importance of different social practice factors of fuel poverty, the methodology can also be utilised to support effective group decision making (Saaty and Shang 2007). In line with the focus of this research to assist in creating social policy which reflects the expressed definitions of social policy offered by Titmuss (1974), Dean (2012), and Ortiz (2007), AHP enables policy makers to engage directly with citizens to identify preferred policy configurations. By developing upon the application of AHP utilised within this thesis, future research should examine how the priority weights identified within study 2b could be useful in assessing preferences for alternative approaches to tackling fuel poverty in England.

Drawing upon the challenges faced in collecting data in this study a number of learning points can be drawn out that may help in future research. Future studies should seek to develop strong working relationships with partner organisations as well as local communities across England a long time in advance of any proposed data collection. The limited time frame available in this research made the process of identifying potential partners, developing relationships and recruiting participants particularly challenging and contributed to the poor

participation rates achieved. Similarly, consideration should be given to incentivising participation. Due to the small research budget available, this study was predominantly reliant upon the interest and goodwill of participants which limited the participant pool. The lack of any guaranteed tangible benefit for participation may have influenced who took part and caused over representation from those who are unemployed, or caused those who have a strong personal interest in energy efficiency issues to participate. Through incentivising participation in future research it may be possible to encourage higher levels of participation, particularly amongst those in higher income brackets who were generally under-represented within the data collection process in this study.

As well as validating the methodological approach and subsequent AHP weightings on a larger research population, future research should seek to examine variation in practice priorities according to multiple demographic variations. The participants drawn upon in this research were predominantly from lower income areas with a high degree of fuel poverty. This matches with Hills' (2012) refocussing of the fuel poverty measure on low income households with higher than average energy costs. However, understanding the social practice variation in the determinants of fuel poverty by factors such as household composition, household type, ethnicity, age, gender and income will provide a finer level of detail that will enable greater precision in the delivery of well targeted, appropriately designed interventions to tackle fuel poverty in England.

6.8 Conclusion

This thesis has contributed to our understanding of the role of social practices in determining the depth of fuel poverty in England. In doing so it has developed a novel methodological approach for classifying, identifying and targeting LSOAs in England with the most relevant intervention for reducing fuel poverty in that area, either through tackling root causes of

poverty or addressing home energy inefficiency. It has also developed a methodologically pragmatic approach to quantifying social practices that contributes to an emerging field of research that seeks to demonstrate the potential for social practice based approaches to contribute to the design, delivery and assessment of social policy.

By drawing upon these contributions to practice and knowledge it is possible for future research to develop a detailed understanding of the multiple social practices and myriad of social influences that combine to impact upon not only fuel poverty but other social phenomenon. The methodology and philosophy has been applied by this thesis in to the specific realm of fuel poverty policy in England, due to the well specified nature of the field, current policy relevance and notable social need. However, the approach developed has the potential to be applied in to other cultural settings and different areas of policy interest, engaging citizens in the specification, design and delivery of policy that impacts upon their daily lives and practices.

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8 Appendices

8.1 Full nonparametric Spearman's Rho correlations between fuel poverty and all components of the IMD at the aggregated national level

Correlations

			Number households in LSOA	Number households FP	% LSOA considered FP	IMD income score	IMD employment score	IMD Health, Deprivation and Disability score	IMD Education, Skills and Training score	IMD Barriers to Housing and Services score	IMD Crime and Disorder score	IMD Living Environment score
Spearman's rho	IMD aggregate score	Correlation	.071**	.380**	.410**	.949**	.925**	.872**	.800**	.095**	.695**	.601**
		Sig. (2-tailed)	**.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**.000**	**0.000**	**0.000**
		N	**32482**	**32482**	**32482**	**32482**	**32482**	**32482**	**32482**	**32482**	**32482**	**32482**
	% LSOA considered FP	Correlation	.076**	.895**	**1.000**	.342**	.451**	.457**	.393**	-.214**	.136**	.277**
		Sig. (2-tailed)	**.000**	**0.000**		**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**.000**	**0.000**
		N	**32482**	**32482**	**32482**	**32482**	**32482**	**32482**	**32482**	**32482**	**32482**	**32482**
	Number households FP	Correlation	.468**	**1.000**	.895**	.315**	.426**	.419**	.341**	-.203**	.140**	.281**
		Sig. (2-tailed)	**0.000**		**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**.000**	**.000**	**0.000**
		N	**32482**	**32482**	**32482**	**32482**	**32482**	**32482**	**32482**	**32482**	**32482**	**32482**

**. Correlation is significant at the 0.01 level (2-tailed).

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8.2 Full nonparametric correlations between fuel poverty and IMD for each of the GOR's of East Midlands, London, North East, North West, South West and Yorkshire & the Humber

The full set of nonparametric correlations between fuel poverty and IMD at Local Authority level for each of the focal Government Operating Regions outlined in chapter 4 are presented in the attached appendices CD

8.3 Study 2a Focus Group question schedule

Number of participants: Target of 10
Running time: 90 minutes

Introduction – 2 minutes

Thank you all for giving up your time to come along today and take part in this focus group. This is one of a number of focus groups that I am running across the whole of England with the aim of understanding how, when and why people heat their home.

By the time that the focus groups are finished I will have spoken to around 100 people from a range of cities and backgrounds across England. This will help me build a picture of the similarities and differences in peoples' reasons, priorities and motivations when it comes to heating their home.

At the end of March I will then come back and meet with you all again, but I will explain more about that when we finish today.

Today's focus group will last no more than 90 minutes, so at times today I may have to step in and cut a discussion short so that I make sure that we get through all the topics that we need to talk about. This leads me on to talking about our ground rules for today:

Ground rules – 3 minutes

In our discussion today there are no right or wrong answers. I am interested in your opinions, feelings, experiences and thoughts. You might agree with what someone else around the table says, or you might think what they says is wrong. This is fine, but please respect each other's opinions. They are your opinions and are neither right nor wrong.

Today's focus group is being recorded on these two Dictaphones and on this video camera. This is so that I can transcribe the focus group later today. The video is just in case I miss any information on the audio recordings and so I can add context to my write up – the video won't make its way on to YouTube or be shown to anyone else!

So that everyone can hear everyone else's thoughts and opinions, and so that I don't have too much trouble trying to transcribe the focus groups later today, please try your best not to talk over the top of anyone else. Everyone's thoughts are very important to me and the research, so I don't want to lose them because I can't hear them!

Finally, in order to ensure that everyone's opinions are captured I may start the discussion by asking one of you your opinion first. I may also move conversation on to someone else, or ask you to wrap up on that idea so that someone else can make their point. I'm not meaning to be rude, but want everyone to be involved in the conversation and also want to ensure that we cover everything in the 90 minutes we have.

Is everyone OK with these ground rules?
Are there any other rules we think we should include?

Excellent, so let's start the focus group!

Section 1. Setting the scene – 10 minutes

Let's get to know each other a little bit!

Tell me briefly what your typical day involves. (30 secs – 1 minute per participant).

Get a picture of routines
Explore involvement with community

And your home is it an important place for you / does it play a big part in your day?

What the home means to them?
Identify with it – home for life?
Just a roof over their head?
Does it reflect how they live?
Do they avoid it because it's cold?
Too big? Too small?
Locked in due to housing availability?

Section 2. About others – 15 minutes

Are you involved in any local groups/clubs/activities?

What do they mean to you?
Where do they meet?

Do you share similar concerns to your neighbours/friends/relatives?

More or less concerned over bills/environment/belongingness
Sense of community identity
Shared values / points of disparity
Comparison with neighbours

Self-image

Keeping up appearances
Personal position in the community

Section 3. How they use the home / attitudes and actions in the house – 15 minutes

Tell me about how you normally do your laundry/washing

Why?
Frugality (full loads)
Cold house – do it when heating's on
Damp house – have to use tumble drier

What are your eating habits?

Three hot meals or only one?
Save on energy bills?

Has this changed?
Meals on wheels? Eat at community group? Go out for food? Rely on family?

How do you deal with your rubbish?

Recycling preferences – being a “responsible” citizen?
Consider themselves environmentally friendly?

Consider topics such as:

What do you use curtains/blinds for / do you use them??
Why? Why not?
Generational differences?
Upbringing – parental influence
Neighbour influence
Do you typically close doors?
As above

Section 4 – Opinions on warmth – 15 minutes

Do you do anything to try and control your energy bills?

Not heat whole house
Use blankets
Use hot water bottles
Put on more layers
Use timers
Heat all day on a lower temp
No – you just have to accept the bills
Don’t use central heating
Supplement with a fan heater (or similar) in room.

Do you do anything differently if you have guests?

Turn up / put on heating
Don’t use blankets
Changed from when / because kids were at home
Why?
Want to be seen as good host
Don’t want to be seen as “cheap”
Want to be “presentable”

Section 5 – Balancing the books (may be underlying in other sections) – 15 minutes

Coping strategies

Installed energy saving measures?
“Top-tips” to keep costs down
Go to community spaces – like the library etc.

Done to save money or save the planet?
Don't want to waste money
Just being "savvy"

Section 6 – The Green Consumer – 10 minutes

Who are your energy suppliers?
Why
Chose a green supplier
Who was provided?
Cheapest deal
Because a friend recommended them
What do you look for when shopping?
Value
Quantity
Quality
Label
Eco-label?

Closing statement and setting the scene for March – 5 minutes

Thank you for taking part today and speaking so openly in our discussions. It has been incredibly helpful. As I mentioned at the start, I will be back at the end of March to do the second of the focus groups. By then I will have typed up all of the focus groups and will have analysed the scripts to look for any common themes and ideas that have been brought up across the country.

The idea of the second group is to present these common ideas to you and to ask you to tell me which of these mean the most to you and which are least important.

Today I have been speaking to you about lots of topics that all relate to how, when and why you heat the home. My research at The University of Sheffield is trying to improve the way charities, social housing providers, councils and the Government work to reduce fuel poverty in England.

Through the two focus groups you have agreed to take part in, you are helping to create the first measure of fuel poverty designed by actual householders rather than "experts". More than this it is the first measure of fuel poverty that isn't just based on household income and energy costs, but instead reflects the ways that real people actually live in their home.

From here, I will be writing this work over the next 4 months to finally submit for examination for my PhD. As well as this I will be preparing a report for each city I work in to help them in their fuel poverty work and will be sending my final findings and recommendations to the Government. There is no guarantee that they will take on my findings, but hopefully it will make them aware of some of the broader issues associated with keeping a warm home.

Any questions?!

8.4 List of LSOA codes and corresponding postcodes for focus group recruitment

The full list of LSOA codes and corresponding codes for each of the 10 target locations as discussed in chapter 5 are presented within the attached appendices CD.

8.5 Potential partner project information sheet

Householder Options for Managing Energy Savings & Heating

What is the HOMES & Heating Project?

The Householder Options for Managing Energy Savings (HOMES) & Heating Project is a research project being undertaken by Robert Marchand, a doctoral researcher at Sheffield University Management School.

The project is aiming to develop a more accurate picture of fuel poverty in England. By talking to a broad range of people from different communities across the country, this work will start to understand what fuel poverty means to different groups of people across England.

The findings will be used to identify how fuel poverty is experienced by householders from different social and economic backgrounds. This information will then be used to create a new way of measuring fuel poverty that will, for the first time, attempt to include subjective variables that represent householders experiences of fuel poverty, energy management and home heating decisions as well as the traditional, technical, and, objective variables of fuel poverty in a quantitative model that can be used for policy decision making and intervention targeting.

It is hoped that this will result in a more focussed measure of fuel poverty that can be used by local authorities for better targeting of fuel poverty alleviation programmes, policy makers for forecasting policy impacts and performance, third sector organisations for holding local and national government to account and individual households for understanding whether their home may be at risk of fuel poverty.

How have different communities been chosen for the HOMES & Heating Project?

The project has used official government statistics to identify different communities across England for the project to undertake more detailed data collection.

The communities have been chosen as they represent different relationships between fuel poverty levels and economic and social profiles. They allow the research team to explore how experiences of fuel poverty vary across the country and by different social and economic backgrounds. This will help to ensure that the new measure of fuel poverty created by the research is relevant to the whole of England.

What will the data collection involve?

There are two stages to the data collection process. The first involves focus groups in each of the communities identified in Birmingham, Bristol, Leeds, Liverpool, Manchester, Newcastle, Sheffield, Stoke-on-Trent and London. Between 6 and 10 householders will be recruited from within the identified communities to discuss their home heating practices as well as experiences and thoughts surrounding fuel poverty. These will be subsequently analysed by the research team.

The analysis will draw out new variables of fuel poverty that will then be used by the research team to develop a new model of fuel poverty. Once this has been created, the project will return to each of the cities and the householders that took part in the original focus groups and, using a specific statistical technique, ask the householders to rank the importance of each variable in the new fuel poverty model. This will enable a new model of fuel poverty, rooted in the different experiences and understanding of fuel poverty across England to be created. The first model of fuel poverty built with and by communities living in, around, and with fuel poverty.

How can you help?

You have been approached in your role as an energy, fuel poverty, or related area specialist, as you have the local knowledge and contacts that will help to turn this new representative measure of fuel poverty in to a reality.

The research team have created a specific list of postcodes in each of the core cities that they would like to draw their focus group members from. They need your knowledge and contacts to help get in touch with these communities and to identify a suitable venue for the focus groups to be held in February 2013. Robert Marchand will be contacting each of the regional representatives to discuss the precise location s and communities required for this process and any support, advice and further information you can provide would be gratefully received.

What will be the benefit for NEA and other groups?

The project forms part of a PhD thesis for Robert Marchand that will be publically available once the entire project has been completed. As well as this, it is the intention of the project to develop a report for partners at a national and regional level that will discuss the HOMES and Heating Project's learning points, final model of fuel poverty and comparison with current and alternative measures of fuel poverty.

Robert would also be happy to meet with the local partner once the final report is completed to present the findings and discuss the implications of the work for moving the area of fuel poverty forward.

It is hoped that this will help stoke local and national debate on the issue, enable more accurate local targeting of resources, inform policy design and ultimately help reduce fuel poverty.

About the research team

Robert Marchand is a PhD student at Sheffield University Management School and is supervised by Professor S.C.L. Koh. The research is funded by the Engineering and Physical Sciences Research Council (EPSRC). You can contact the research team by any of the means below:

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8.6 Participant research information sheet

Insert date

Dear Resident,

We are writing to you to ask if you would like to take part in a focus group looking in to how and why you heat your home.

The University of Sheffield is working with *insert local partners name* to understand people's opinions and attitudes towards warming their home. We hope to help develop better ways for local organisations such as *insert local partners name*, councils, and the government, to help ensure all homes are warm enough, all year round.

The project is being run in 9 cities across England, including here in *insert city*. We are looking for 10 local residents in each city to attend two focus groups. The first focus group will be in **January 2014**, and the second will be held in **March 2014**. The focus groups will be held in a local venue and each one should last around 1 hour 30 minutes, refreshments will be included.

In return for taking part in the two focus groups, everyone who attends will be entered in to a prize draw for a chance to win one of three prizes:

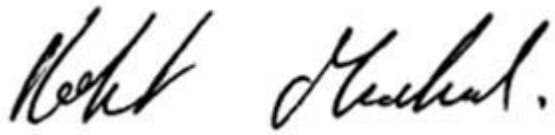
First place - **£100** towards your household's next energy bill
Second place - **£50** towards your household's next energy bill
Third place - **£25** towards your household's next energy bill
If you are interested in taking part in the focus groups we will be holding in *insert city*, then please get in touch with us in any of the following ways:

Send an email to rmarchand1@sheffield.ac.uk
Telephone us on **0114 222 3496**
Speak to your local representative from *insert local partner's name*. (They will pass your details on to the University of Sheffield)
When contacting us, please include your full name, your address, your email address (if you have one) and a contact telephone number. We will then contact you to give you more details and to confirm the date, time and venue for the focus group.

Thank you very much for considering taking part in our focus groups. If in the mean time you have any questions, you can contact the main researcher **Rob Marchand** in any of the ways listed on the next page.

We hope that you have a pleasant festive period and look forward to hearing from you soon. If you could aim to contact us by **24th December 2013** that would really help us in planning for the focus groups starting next January.

Kind regards,



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8.7 City specific participant recruitment details for study 2a, identifying social practice factors of fuel poverty in England

Recruitment of participants in Birmingham

Initial contact in Birmingham was made with Moseley Community Development Trust (CDT) due to their active involvement in fuel poverty projects and the proximity of Moseley to LSOA's identified as 15 on the IMD/FP classification. Through conversations with the organisation, Moseley CDT subsequently took details of the project to the warm zones team at Birmingham City Council. The team were interested in the research and agreed to distribute the participant recruitment letter to 165 households. These households had all received a home energy visit and as such their details were available to the partner. The council altered the letters wording in to more accessible language and provided a statement to allow residents to confirm the validity of the project with the council should they wish to do so. The amended letter used in recruitment in Birmingham is provided in appendix 8.8.

Recruitment of participants in Bristol

In Bristol it was not possible to identify any specific fuel poverty projects operating within the area of interest. As such the partner identified was a community centre which provided vocational training to local residents. Hartcliffe & Withywood Ventures provided information on their community information display and copies of the participant recruitment letter on their reception desk at the centre.

Recruitment of participants in Leeds

The local partners in Leeds were not able to distribute recruitment letters to potential participants due to their data protection policies and did not have a public office where they could promote the event from. The research team was invited to attend a public event being

held by Groundwork Leeds within the focal LSOA. At this event it was possible to discuss the research with potential participants as well as distribute the participant recruitment letter to those who attended.

Recruitment of participants in Liverpool

The contact at Energy Plus projects in Liverpool unfortunately left their position during the period of arranging the data collection process. Attempts were made to locate an alternative organisation to assist with recruitment but this was not possible within the available time frame.

Recruitment of participants in London Islington

The London borough of Islington has a well-established team set up to tackle cold and damp homes as well as provide seasonally driven health interventions to vulnerable residents. The Seasonal Health Interventions Network (SHINE) run in partnership with the NHS in Islington utilised their database of residents to contact potential participants within the target LSOA postcodes. Households were contacted via telephone by a representative of the SHINE project who provided them with the information on the participant recruitment letter before asking the householders whether they would be willing to attend. A positive response was followed up with a second telephone call prior to the focus group to minimise potential participant drop out.

Recruitment of participants in Newcastle-upon-Tyne

Potential focal LSOA's in Newcastle were dispersed across the city as can be seen in Figure 33. Following conversations with NEA it was decided that it was practically necessary to slightly relax the classification focus for Newcastle in order to identify a geographic area large enough to allow for potentially successful participant recruitment. In allowing both

LSOAs categorised as 15 and those categorised as 14 in the IMD/FP classification it was possible to target LSOAs in the Walker area of Newcastle. Housing in this area was predominantly provided by an Arm's Length Management Organisation (ALMO) Your Homes Newcastle. The organisation promoted the research to their tenants by providing the participant recruitment letter at the local housing office and in a second community facility in the area.

Recruitment of participants in Nottingham

The LSOA of interest in Nottingham was a very compact geographic area which enabled the research team to undertake a direct approach to recruitment in the area. One hundred participant recruitment letters were hand delivered to households in the LSOA.

Recruitment of participants in Sheffield

As with Nottingham, a direct recruitment approach by the research team was undertaken in Sheffield. One hundred households in the target LSOA's were approached with hand delivered copies of the participant recruitment letter. Households were targeted according to their proximity to the pre-identified venue for the focus group.

8.8 Birmingham participant recruitment letter

Insert date

Dear Resident

We are contacting you to ask if you wish to attend a focus group that will look at how you heat your home.

The University of Sheffield is working with Birmingham City Council so that we can better understand resident's opinions and attitudes about heating homes.

The information gained will be shared with: local organisations helping people with energy matters; Councils and the Government, to help improve ways of making homes warm all year round.

The project is taking place in 9 cities across England, including here in Birmingham, and we need 10 residents in each city to attend focus groups.

The Birmingham focus groups will be held in late **January 2014** and in **March 2014**.

Each group will meet at a community venue and the meeting will last around 1 hour 30 minutes, with refreshments provided.

In return for taking part, everyone who attends will be entered in to a prize draw and have the chance to receive one of three prizes:

First draw - **£100** towards your next domestic energy bill
Second draw - **£50** towards your next domestic energy bill
Third draw - **£25** towards your next domestic energy bill
If you wish to take part please get in touch as soon as possible and **no later than Friday 24 January** by either:

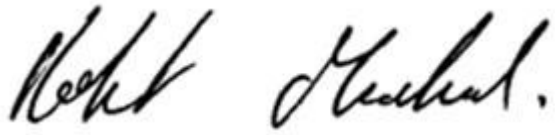
Sending an email to rmarchand1@sheffield.ac.uk or telephoning us on **0114 222 3496**
We need your full name, address and telephone contact number, plus an email address if you have one. Then we can contact you to provide more detail and to confirm the date, time and venue for the local focus group.

Thank you for considering helping us with this important piece of research work, which will help residents with future home energy matters.

In the meantime if you have any questions please contact the main researcher **Rob Marchand** by any of the ways listed on the next page.

We look forward to meeting you soon.

Kind regards,



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Email: rmarchand1@sheffield.ac.uk

Please be assured that research work will not involve the selling of any product or service.
If you, or someone who supports you, wants to verify this project you can contact the Council's Policy & Commissioning Team on telephone 0121 303 4559

8.9 Focus group coding structure

Name	Node level	Description	Sources	References
Food	1	An umbrella category for references to food. This includes references to shopping habits such as cost/value preferences, where food is purchased from, meals, how or whether food is heated and similar	5	84
Cost of food	2	References to cost being the primary driver in food purchase decisions	5	42
Value of food	2	References to value for money being the primary motivator in food purchase decisions. In this case the price might not be the lowest, but value for money is important	1	1
Quality of food	2	References to the importance of food quality to the respondent in their food purchase practices and/or personal lifestyle.	4	22
Travel for food purchases	2	References to journeys taken to specifically source food. This does not relate to quality or value specifically, so could be to a market as its cheap, a specific shop because of its quality etc. Any discussions involving specific journeys for food purchase are relevant	3	11
Energy	1	A broad category for all references to energy. This refers to produced energy rather than natural energy (i.e. discussions of lacking in energy due to lack of food are not relevant within this code) and may include matters such as - Opinions on energy companies - Levels of consumption - Modes of reducing consumption - Energy efficiency As the umbrella code references are aggregated from child nodes and should not be coded directly to this umbrella title.	5	318
Switching	2	References to respondent's opinions, intention or actions in relation to changing energy supplier (either gas, electricity, both or not specified). These references may be to historical actions, future intentions, perceptions of energy switching, issues with regards to supplier lock in or similar.	5	14
Cost of Electricity	2	References specifically mentioning the cost of electricity, the level of the current electricity bill, the comparative cost of electricity to other items. If this item alone has few specific references and similar is found for the cost of gas node, these items will be combined in to the cost of energy (generic) node.	5	56
Cost of Gas	2	References specifically mentioning the cost of gas, the level of the current gas bill, the comparative cost of gas to other items. If this item alone has few specific references and similar is found for the cost of electricity node, these items will be combined in to the cost of energy (generic) node.	4	28
Heating	2	A broad umbrella code under energy that encompasses any and all references to the role of heating for the respondent. Specific references to the role of - Heating controls or approaches to control the heating - Supplementary sources of warmth - Efficiency improvements to the home to increase warmth are coded in specific sub nodes. General references to heating that don't fit in these categories are coded under this node	5	220
Heating control	3	References to techniques used for heating control. These will predominantly reference the use of timers, thermostats and other technical forms of heating control or manual approaches such as limiting heating to certain rooms, manually turning heating on or off as required, going out of the home to avoid using own heating or similar.	5	74

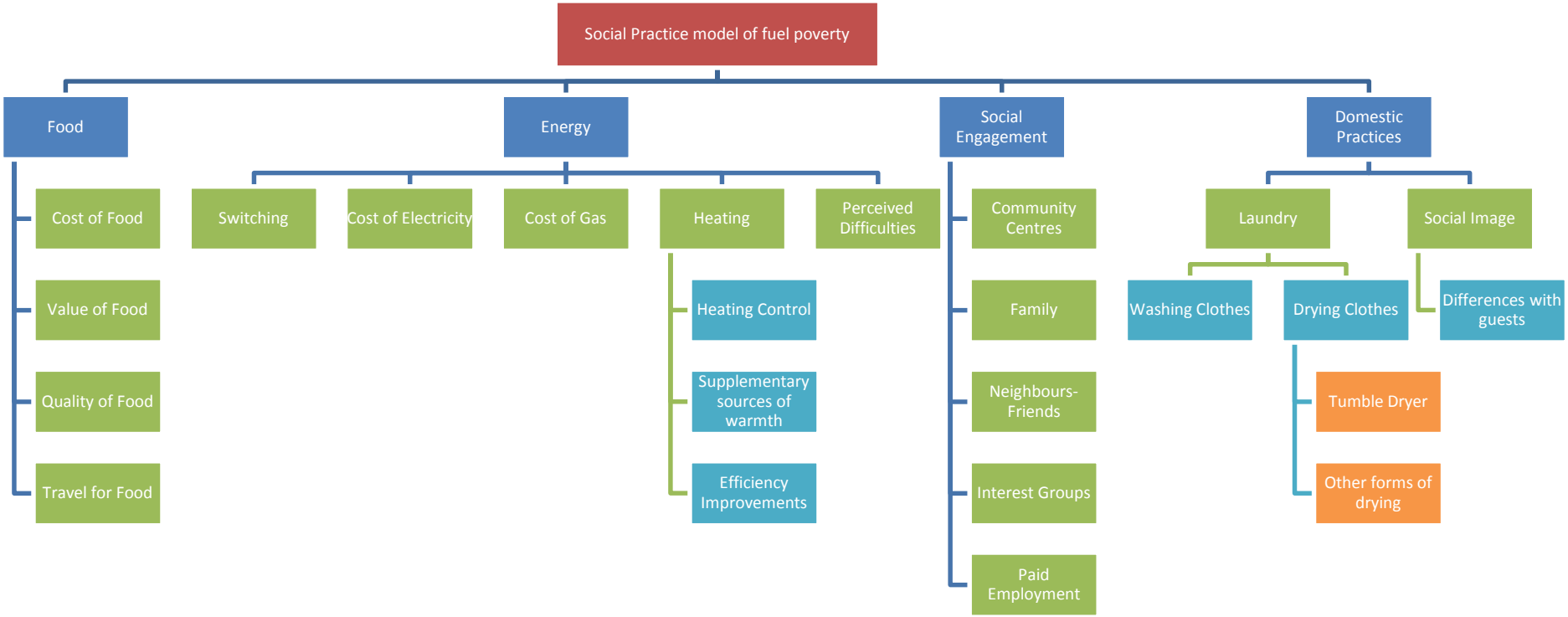
Supplementary sources of warmth	3	References to the use of alternative sources of warmth to supplement central heating or make the respondents warmer as an alternative to the use of central heating. This could include: - blankets - extra clothing - hot water bottles - electric heaters/fans - mobile oil radiators	5	71
Efficiency improvements	3	References to improvements made to the home in attempts to increase the energy efficiency of the home. This could be motivated by either financial or self-declared energy efficiency improvement concerns. Improvements could be minor things implemented either by themselves or third parties such as councils (e.g. reflective paper behind the radiator, draught-strips around doors/windows) or larger scale interventions (such as the installation of solar panels, insulation etc.)	5	47
Social Engagement	1	A broad category for references relating to the importance of social interaction to the respondent. This can be with: - family members - neighbours - local friends - Interest Groups - Community centres (e.g. libraries, job centre etc.) It is for discussions relating to the importance of social interaction, moments of social interaction and the role of others in their life.	5	183
Community Centres	2	References to engagement with community centres and their role in the respondent's life. Community centres are defined in a very broad sense and could include references to: - Job Centres - Libraries - Churches	5	24
Family	2	References to family members and their role in the respondent's life. This could be the importance of children, the role of other family members in the life including cousins, aunts, uncles, etc.	4	72
Neighbours-Friends	2	References to the role of neighbours/friends in the respondent's life. Neighbours could include either those in the direct vicinity of the respondent's home or those that the respondent considers to be their neighbour's i.e. local people important to them. References will discuss how their neighbours affect them and interact with them. Therefore references that discuss lack of interaction with neighbours or the fact that neighbours are not important to them are not to be coded.	5	47
Interest groups	2	References to the role of interest groups in the respondent's life and home. This could be references to engagement with interest groups such as walking groups, Parent Teacher Associations, University of the Third Age, Work/employment, volunteering etc., or references to how aspects of being involved in this group affect how they undertake acts in their home.	5	32
Paid employment	2	References to paid employment and their role in the respondents daily life	1	8
Domestic Practices	1	A broad category which contains references to domestic home practices (cleaning, presentation of the home etc.) and their impact upon the household. As a broad category it sums specific references from the sub nodes.	5	153
Laundry	2	References to completing laundry within/by the householder. This could include but is not limited to number of loads, impact of use of washing machine/dryer etc.	5	101
Washing Clothes	3	References to washing clothes.	5	41
Drying clothes	3	References to drying clothes in the home. This could be whether the clothes were dried indoors or outdoors, on a washing line, on a clothes dryer, or in a tumble dryer or similar.	5	56
Tumble dryer	4	References to the use of a tumble dryer to dry clothing	3	14

Other forms of drying	4	References to clothes drying using sources of warmth other than a tumble dryer. For example: - drying inside on clothes horses - drying outside on a washing line	5	34
Social Image	2	References to the importance of how the respondent is perceived by others in the broadest of senses. This may be references to how they wish to be perceived, unfair labelling of them by others or similar. Specific references to the home are contained in a sub-node.	5	40
Differences with guests	3	References to how behaviours in the home are changed if guests are expected or are at the home. For example putting washing away, putting the heating on	5	25

8.10 Verified coding comparison output from NVivo

The verified coding comparison output from NVivo, detailing the Cohen's Kappa value and weighted average value for the focus group coding comparison completed in chapter 5 are presented within the attached appendices CD.

8.11 AHP factor hierarchy



Colour	AHP Hierarchy level
	Level 1
	Level 2
	Level 3
	Level 4

8.12 AHP Survey

Keeping your home warm: What matters to you?

About the survey

In 2014, researchers from the University of Sheffield undertook focus groups around England to understand how and why people choose to keep their homes warm.

This survey builds upon the responses from those focus groups and will help create a new way of measuring the ability of English householders to afford to keep their home adequately warm.

By completing this survey you will be helping the research team to understand the different things that are important to you when keeping your home warm, as well as contributing to the first statistical measure of these issues created *with* English households.

The results of the HOMES & heating project will be made available to local councils, charities and representatives from government, with the aim of making decision makers and support providers aware of the social effects and English householders' priorities when it comes to keeping your home warm.

If you have any questions relating to this survey, please contact **Robert Marchand** at the University of Sheffield (Tel: 0114 222 3496 or email rmarchand1@sheffield.ac.uk)

Keeping your responses anonymous

We are very grateful for you taking your time to complete this survey. There are no right or wrong answers to the questions; we are only interested in **your opinion**. Your responses will remain **confidential** and will not influence any of the services or benefits that you receive.

All responses provided will remain anonymous as feedback will be given at group level, with no individuals identified. You reserve the right to withdraw at any time and can do this by contacting Robert Marchand (Tel: 0114 222 3496 or email rmarchand1@sheffield.ac.uk).

Completing the survey

It will take around 15-20 minutes to complete this survey. Instructions on how to complete each question are written below. Please choose your response by ticking (☑) the answer that most closely matches your opinion.

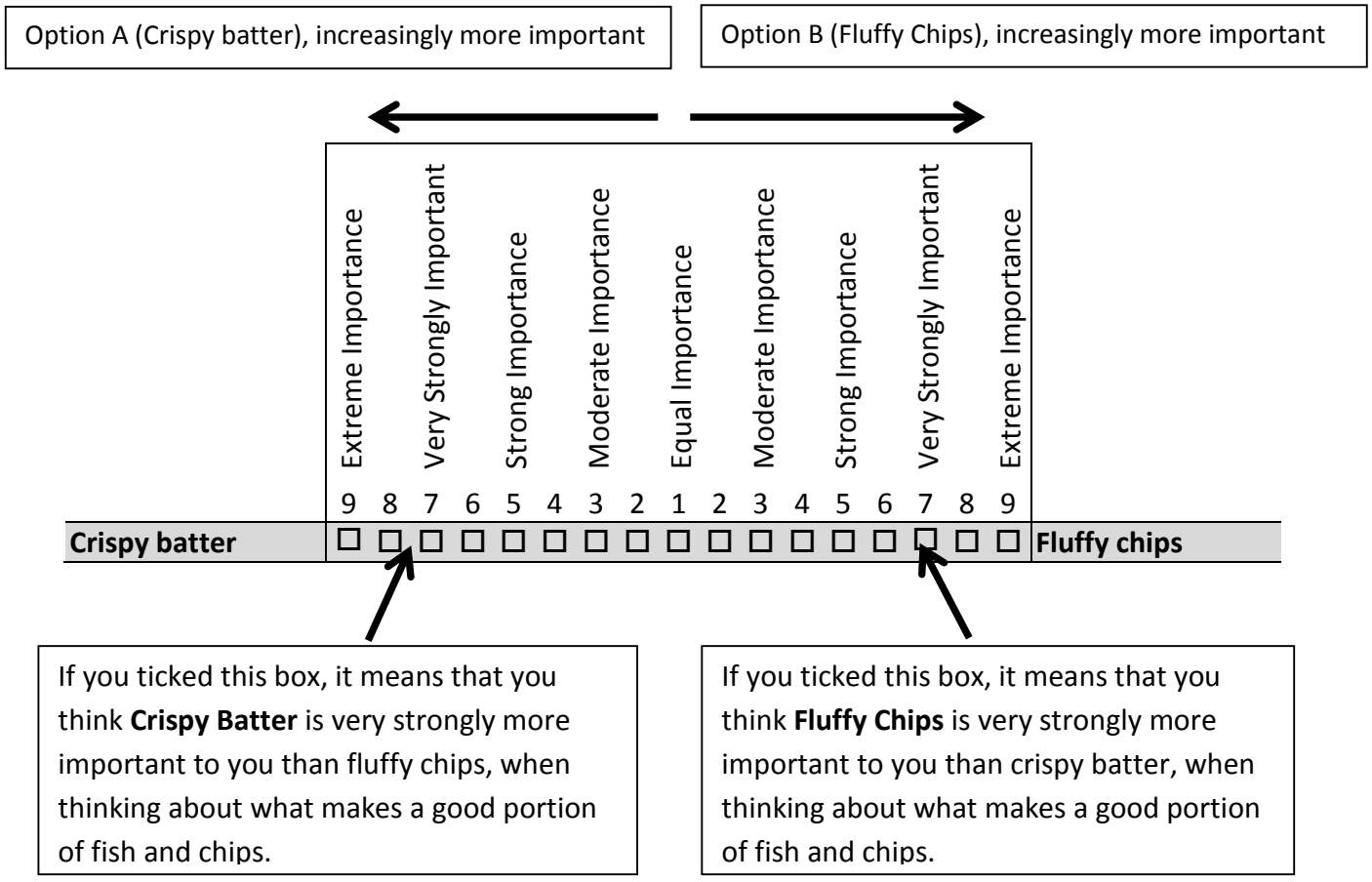
Example Question

This example will show you the format of all the questions in this survey and how to respond.

In each section of the survey you will be presented with a list of different pairs of things to compare and tell us how much *more important* one is than the other. Each line is a different comparison, so try and think about each line on its own.

Using a scale of 1 to 9 you will be able to state how much more important your chosen option is compared to the other option. For example:

When thinking about what makes a good portion of fish and chips, which is <u>more</u> important to you?



Main Questionnaire

Keeping your home warm

In this section you will be asked to compare:

Food	The impact of providing food for you & your household e.g. how much you spend, what and when you buy it, or where you buy your food.
Energy	The impact of using energy in your home. I.e. anything related to how you use gas or electricity at home, such as its cost, cooking, heating, washing etc.
Social Engagement	The impact of having guests in your home, attending community events, being involved in interest groups, or working.
Domestic Practices	The impact of washing and drying clothes, presenting your home for when guests come over, general housework, etc.

Question:

When thinking about what has the biggest impact on your ability to keep your home warm, what is more important to you?

	Extreme Importance 9	8	Very Strongly Important 7	6	Strong Importance 5	4	Moderate Importance 3	2	Equal Importance 1	2	Moderate Importance 3	4	Strong Importance 5	6	Very Strongly Important 7	8	Extreme Importance 9	
Food	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Energy**
Food	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Social Engagement**
Food	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Domestic Practices**
Energy	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Social Engagement**
Energy	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Domestic Practices**
Social Engagement	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Domestic Practices**

Food habits

In this section you will be asked to compare:

Cost of Food	How much you spend on your food purchases
Value of Food	Your perceived value for money of your food purchases
Quality of Food	How you perceive the quality of the food you purchase
Travel for Food	Travelling somewhere to buy specific food products

Question:

When thinking about the food you purchase, what is more important to you?

	Extreme Importance 9	8	Very Strongly Important 7	6	Strong Importance 5	4	Moderate Importance 3	2	Equal Importance 1	2	Moderate Importance 3	4	Strong Importance 5	6	Very Strongly Important 7	8	Extreme Importance 9	
Cost of Food	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Value of Food**
Cost of Food	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Quality of Food**
Cost of Food	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Travel for Food**
Value of Food	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Quality of Food**
Value of Food	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Travel for Food**
Quality of Food	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Travel for Food**

Using energy in the home

In this section you will be asked to compare:

Switching	Changing energy supplier to get the best rates
Cost of Electricity	How much you spend on using electricity at home
Cost of Gas	How much you spend on using gas at home
Heating	The impact of heating your home
Perceived Difficulties	Issues related to paying your energy bills

Question:

When thinking about what contributes the most to your energy bills, what is most important to you?

	Extreme Importance 9	8	Very Strongly Important 7	6	Strong Importance 5	4	Moderate Importance 3	2	Equal Importance 1	2	Moderate Importance 3	4	Strong Importance 5	6	Very Strongly Important 7	8	Extreme Importance 9	
Switching	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Cost of Electricity**
Switching	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Cost of Gas**
Switching	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Heating**
Switching	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Perceived Difficulties**
Cost of Electricity	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Cost of Gas**
Cost of Electricity	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Heating**
Cost of Electricity	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Perceived Difficulties**
Cost of Gas	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Heating**
Cost of Gas	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Perceived Difficulties**
Heating	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Perceived Difficulties**

Social Engagement

In this section you will be asked to compare

Community Centres	Attending at job centres, libraries, church groups or similar
Family	Having family members visit you, or visiting family members
Neighbours-Friends	Spending time socially with your friends and neighbours
Interest Groups	Your involvement in groups such as Parent Teach Association's, voluntary organisations, university of the third age or similar.
Paid Employment	Your involvement in a paid job, full or part time.

Question:

When thinking about your social engagement (meeting and interacting with other people), what is most important to you?

	Extreme Importance 9	8	Very Strongly Important 7	6	Strong Importance 5	4	Moderate Importance 3	2	Equal Importance 1	2	Moderate Importance 3	4	Strong Importance 5	6	Very Strongly Important 7	8	Extreme Importance 9	
Community Centres	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Family**
Community Centres	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Neighbours-Friends**
Community Centres	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Interest Groups**
Community Centres	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Paid Employment**
Family	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Neighbours-Friends**
Family	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Interest Groups**
Family	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Paid Employment**
Neighbours-Friends	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Interest Groups**
Neighbours-Friends	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Paid Employment**
Interest Groups	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Paid Employment**

Domestic Practices

In this section you will be asked to compare

Laundry	How you choose to complete you laundry, such as the number of wash loads, when you do your laundry and the impact doing laundry has on you and your home.
Social image	The importance to you of ensuring your home is well presented if you have visitors. E.g. tidying up especially, ensuring washing is out of site, etc.

Question:

What is more important to you when thinking about how and why you keep your home clean?

	Extreme Importance		Very Strongly Important		Strong Importance		Moderate Importance		Equal Importance		Moderate Importance		Strong Importance		Very Strongly Important		Extreme Importance	
	9	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	
Laundry	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Social image**

Heating

In this section you will be asked to compare:

Heating control	Using techniques to control the amount of heating you need (e.g. using thermostats or timers or limiting heat to certain rooms only)
Supplementary sources of warmth	Using other sources of warmth (e.g. using hot water bottles, blankets, extra clothing or a portable heater)
Efficiency Improvements	Making improvements to the Energy Efficiency of your home (e.g. installing insulation, using energy saving light-bulbs, draught-proofing doors, installing solar-panels or similar

Question:

When thinking about managing the amount of heat you use in your home, what is more important to you?

	Extreme Importance 9	8	Very Strongly Important 7	6	Strong Importance 5	4	Moderate Importance 3	2	Equal Importance 1	2	Moderate Importance 3	4	Strong Importance 5	6	Very Strongly Important 7	8	Extreme Importance 9	
Heating Control	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Supplementary Sources of Warmth**
Heating Control	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Efficiency Improvements**
Supplementary Sources of Warmth	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Efficiency Improvements**

Laundry

In this section you will be asked to compare

Washing Clothes	Cleaning clothes, either with a washing machine or by hand.
Drying Clothes	Drying clothes, either with a tumble dryer or air drying

Question:

When thinking about the amount of energy used doing laundry, what is more important to you?

	Extreme Importance 9	8	Very Strongly Important 7	6	Strong Importance 5	4	Moderate Importance 3	2	Equal Importance 1	2	Moderate Importance 3	4	Strong Importance 5	6	Very Strongly Important 7	8	Extreme Importance 9	
Washing Clothes	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Drying Clothes**

Drying Clothes

In this section you will be asked to compare

Tumble Dryer	Drying clothes using a tumble dryer.
Other forms of drying	Using other forms of drying (e.g. washing line, clothes horse etc.)

Question:

When thinking about how you dry clothes, what is more important to you?

	Extreme Importance 9	8	Very Strongly Important 7	6	Strong Importance 5	4	Moderate Importance 3	2	Equal Importance 1	2	Moderate Importance 3	4	Strong Importance 5	6	Very Strongly Important 7	8	Extreme Importance 9	
Tumble Dryer	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	**Other forms of drying**

End of survey

Thank you for taking your time to complete this survey.

Your responses, combined with those from other participants around the country are vital in helping us to understand what is important for English householders when thinking about keeping their home warm. They will also help us to create a new statistical measure of these issues that can be presented to decision makers locally and nationally to help improve the way different agencies respond to supporting cold homes in England.

Before you return this survey, please take a moment to check that you have answered all parts of each question to ensure that we have the fullest set of responses possible.

Once again, thank you for taking part and helping to improve the way we support English households to keep adequately warm all year round.

8.13 Individual AHP matrices for each AHP participant

The full set of individual AHP matrices for each AHP participant as well as the full combined AHP matrices outlined in chapter 5 are presented in the attached appendices CD