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**‘New Social Risks’ at Key
Stages of the Life Course:
*Exploring the Social Vulnerability of
Neighbourhoods in England and Wales***

Amber E. Wilson

Department of Geography

Faculty of Social Sciences

The University of Sheffield

A thesis submitted in partial fulfilment of the requirements for the
degree of Doctor of Philosophy

May 2018

In memory of my dad – Brian Mawson Wilson

The candidate confirms that the work submitted is of their own and that appropriate credit has been given where reference has been made to the work of others.



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Acknowledgements

This research was funded by a White Rose Doctoral Training Partnership (WRDTP) between the University of Sheffield and the University of York, via an Economic and Social Research Council (ERSC) Network Grant: ES/J500215 and would not have been possible without it.

First and foremost, my heartfelt thanks go to my primary PhD Supervisor and mentor, Dr Daniel Vickers for his continued support throughout my academic career. I am truly thankful for all the advice, encouragement, and unwavering patience that he has given to me – especially since leaving the University of Sheffield.

I would also like to extend my gratitude to my PhD Supervisor, Dr Daniel Hammett for finding extra time in his busy schedule, in order to provide me with valuable guidance and comments on my work. Thanks for ensuring that I made it across the finish line Dan!

Besides my PhD Supervisors, I would like to thank all the staff, colleagues, and friends that have supported my learning and development during my studies. Special thanks go to Professor Dimitris Ballas, Dr Tom Broomhead, Eleanor Carter, Professor Danny Dorling, Dr Rebecca Holloway, Dr Phil Jones, Professor Charles Pattie, Dr Luke Temple, Dr Bethan Thomas, and Farouk Umar for your continued kindness and hospitality over the years. I will miss working with you all.

Special mentions also go to the Mercer family, including Sarah Mercer, who the first chapter ‘*People and Places*’ of this thesis is named after (due to an unforgettable geography class that we took together at school). Furthermore, I extend my thanks to my friends David Abrams, Robert Begley, Dr Guy Lansley and Charlotte Paul who continue to inspire me to travel, and to learn more about how to enjoy the environment that we live in. More recently, I have had the pleasure of getting to know the Jones, Orgill, Perring, Rose, and Spence families – thanks to each and every one of you for all the coffees, conversations, and adventures that you have shared with me. Long may they continue. Many thanks also go to Don McAllister, Barbara McAllister, and Nicola McAllister for your ongoing generosity, and for making me feel part of the family. Last, but not least, I cannot thank Dr Martin McAllister enough for his unwavering belief in me, even when I didn’t believe in myself. Here’s to the next fun-filled chapter in our lives together, my love!

To my family, thank you for encouraging me in all my pursuits, inspiring me to work hard, and to be ambitious with everything that I could ever want to achieve.

Finally, I take great pride in thanking my greatest source of strength and inspiration - my mum and dad. The hopes and dreams of my father Brian Mawson Wilson, and the continued support and unconditional love of my mother Rekha Wilson, are what made this PhD journey possible. I love you both.

Abstract

This thesis begins by providing a background to the conceptualisation and measurement of deprivation outcomes (*Chapter 2*) that result from the relatively unexplored concept of ‘New Social Risks’ (NSRs). In summary, NSRs can be theorised as ‘events’ or ‘transitions’ that occur at critical junctures across the life course and that may interfere with individuals/households fully participating in contemporary society. Specifically, it has been theorised that the occurrence of deprivation outcomes resulting from NSRs has led to an increasing prevalence and diversity of social problems, which may affect the life chances of individuals/households. Yet, an understanding of how geographical variations of these effects may potentially modify and influence NSR outcomes is lacking within the existing literature. Therefore, in addition to existing individual- and national-level approaches to examining NSR outcomes, this research enquiry aims to add a more nuanced understanding of the differential NSR outcomes attributed to specific NSR profiles at the small-area level for England and Wales. By responding to this aim, a geographical perspective will be added to the exploration of social deprivation outcomes resulting from distinct NSR profiles, which is a key strength and contribution of this research.

This research establishes an innovative approach to examining and measuring the deprivation outcomes that distinctive NSR profiles may experience at the neighbourhood level. For the purpose of this research, each NSR profile is conceptualised as a ‘Household-Unit-Type’ (HUT) (*Chapter 3*), which represents a critical juncture of the life course when specific NSRs are commonly triggered. For example, becoming a lone-parent ‘HUT’ who may be potentially exposed to the NSR of being ‘unable to reconcile paid work with caring for dependent children’. The establishment of a conceptual framework (*Chapter 4*), enables both the compositional and contextual attributes of the NSR outcomes that distinct ‘HUTs’ may potentially face at the neighbourhood level, to be examined via the construction of two, social vulnerability indices (SVIs).

Data to represent NSR outcomes via appropriate social measures are obtained from a range of sources at the Middle Super Output Area (MSOA) level, to represent neighbourhoods in England and Wales (*Chapter 5*). Of note, are the specially commissioned datasets from the 2011 Census which, are obtained from the Office for

National Statistics (ONS) to partially meet the data requirements of this research enquiry. Access to these cross-tabulated datasets allows for associations between previously unexplored combinations of variables to be explored and identified. Multiple linear regression (MLR) models identify both strong and moderate interactions between the chosen compositional and contextual predictors of specific NSR outcomes at the neighbourhood level. These MLR models inform and justify the final selection of variables which, are included in each of the resulting SVIs for the ‘lone-pensioner HUTs’ (*Chapter 6*) and ‘lone-parent HUTs’ (*Chapter 7*). Overall, this thesis highlights the continued importance of determining issues of social deprivation resulting from NSRs, via the construction of small-area level deprivation measures for specific compositional groups in contemporary British society.

Key words: *2011 Census, Deprivation, Life Course, New Social Risks, Neighbourhoods, Small-Area Level Measures, Social Indicators, Social Vulnerability.*

List of Acronyms

| | |
|-----------------|---|
| CDR | Child Dependency Ratio |
| DCLG | Department for Communities and Local Government |
| GIS | Geographical Information Systems |
| GP | General Practitioner |
| HESA | Higher Education Statistics Agency |
| HMLR | Hierarchical Multiple Linear Regression |
| HPIR | House Price to Income Ratio |
| HUT | Household-Unit-Type |
| IDAOP | Income Deprivation Affecting Older People Index |
| IDACI | Income Deprivation Affecting Children Index |
| IMD | Index of Multiple Deprivation |
| JRF | Joseph Rowntree Foundation |
| LA | Local Authority (District) |
| LFS | Labour Force Survey |
| LSOA | Lower Super Output Area |
| MAUP | Modifiable Areal Unit Problem |
| MSOA | Middle Super Output Area |
| MLR | Multiple Linear Regression |
| NHS | National Health Service |
| NSR | New Social Risk |
| NI | National Insurance |
| OA | Output Area |
| OAC | Output Area Classification |
| OADR | Old Age Dependency Ratio |
| OECD | The Organisation for Economic Cooperation and Development |
| ONS | Office for National Statistics |
| P-P Plot | Predictive-Probability Plot |
| SD | Standard Deviation |
| SDC | Statistical Disclosure Control |
| SRM | Social Risk Management |
| SVI | Social Vulnerability Index |
| VIF | Variance Inflation Factor |

Table of Contents

| | |
|--|-----------|
| Acknowledgements | 7 |
| Abstract | 11 |
| List of Acronyms | 13 |
| Table of Contents | 15 |
| List of Figures | 21 |
| List of Tables | 23 |
| Chapter 1 – Introduction | 27 |
| 1.1. People and Places | 27 |
| 1.1.1. Conceptualising New Social Risks (NSRs) | 29 |
| Determining NSR Profiles: The Construction of ‘Household-Unit Types’ (HUTs) at Key Stages Across the Life Course..... | 34 |
| 1.2. Social Vulnerability Framework | 36 |
| 1.3. Establishing Measures of New Social Risks (NSRs) across the Life Course at a Neighbourhood Level | 38 |
| 1.3.1. The Purpose of Social Vulnerability Indices (SVIs)..... | 38 |
| 1.3.2. The Construction of Social Vulnerability Indices (SVIs) | 39 |
| 1.4. Thesis Intention | 42 |
| 1.4.1. Aims | 43 |
| 1.4.2. Objectives..... | 43 |
| Chapter 2 – Examining New Social Risks (NSRs) | 47 |
| 2.1. Introduction | 47 |
| 2.1.1. The Emergence of the British Welfare State: the Identification of ‘Social Risks’ in Industrial Society | 47 |
| 2.2. The Transition to a Post-Industrial Society and the Emergence of New Social Risks (NSRs) | 50 |
| 2.2.1. The Post-Industrial Labour Market..... | 50 |
| 2.2.2. Changes to the ‘Family Household’ Structure | 53 |
| 2.2.3. The ‘Crisis’ of the British Welfare State..... | 55 |
| 2.3. The Conceptualisation of New Social Risks (NSRs) in Research | 56 |
| 2.3.1. Theorising the Uncertainty and Diversity of New Social Risk (NSR) Outcomes | 60 |
| 2.4. Social Stratification of New Social Risks (NSRs) | 61 |
| 2.4.1. The Life Course Perspective | 62 |
| 2.5. The Measurement of New Social Risks (NSRs) | 64 |
| 2.6. Discussion | 67 |

| | |
|--|------------|
| Chapter 3 – Exploring New Social Risks (NSRs) Attributed to the ‘Household’ Domain | 69 |
| 3.1. Introduction | 69 |
| 3.2. The ‘Household’ | 69 |
| 3.2.1. Definition of the ‘Household’ | 73 |
| 3.3. Identifying ‘Household Transitions’ Across the Life Course | 75 |
| 3.3.1. Categorising New Social Risk Profiles – Household-Unit-Types (HUTs)..... | 78 |
| 3.4. The New Social Risk (NSR) of ‘Physical Dependency in Old Age’ | 82 |
| 3.4.1. Determining the Most Susceptible HUT Attributed to the NSR of ‘Physical Dependency in Old Age’ | 83 |
| 3.5. The New Social Risk (NSR) of the ‘Inability to Reconcile Paid Work with Caring for Dependent Children’ | 85 |
| 3.5.1. Determining the Most Susceptible HUT Attributed to the New Social Risk (NSR) of the ‘Inability to Reconcile Paid Work with Caring for Dependent Children’ | 86 |
| 3.6. Social Indicators: The Measurement of Deprivation Outcomes at the Neighbourhood Level..... | 88 |
| 3.6.1. The Neighbourhood Context..... | 89 |
| 3.6.2. Small-Area Level Deprivation Measures | 91 |
| 3.7. Discussion..... | 92 |
| Chapter 4 – Implementing a Social Vulnerability Framework | 95 |
| 4.1. Introduction | 95 |
| 4.2. Social Vulnerability..... | 96 |
| 4.3. Implementing a Social Vulnerability Framework | 101 |
| Section 4.3.1. Dimensions of Social Vulnerability | 104 |
| Neighbourhood Capacity | 104 |
| Exposure..... | 105 |
| Susceptibility..... | 105 |
| 4.4. Selection of Indicators to Determine the Social Vulnerability of ‘Lone Pensioner HUTs’ | 106 |
| 4.5. Selection of Indicators to Determine the Social Vulnerability of ‘Lone Parent HUTs’ | 115 |
| 4.6. Discussion..... | 122 |
| Chapter 5 – Data and Methods | 125 |
| 5.1. Introduction | 125 |
| 5.2. Spatial Data..... | 125 |
| 5.2.1. 2011 Census Data..... | 127 |
| Census Geographies | 128 |

| | |
|---|------------|
| Specially Commissioned Census Datasets..... | 133 |
| 5.2.2. Non-Census Datasets: Available at Small-Area Level Geographies..... | 135 |
| 5.3. Variables to Assess the Social Vulnerability of ‘Lone-Pensioner HUTs’..... | 135 |
| 5.3.1. Outcome Variable: ‘Physical Dependency’ in Old Age..... | 137 |
| 5.3.2. Neighbourhood Capacity..... | 139 |
| Neighbourhood Resources..... | 140 |
| Neighbourhood Opportunities..... | 141 |
| Provision of Informal Social Support (Population-Level)..... | 142 |
| 5.3.3. Exposure..... | 143 |
| Inadequate Pension Coverage..... | 144 |
| Financial Resources..... | 145 |
| Provision of Informal Social Support (at the Individual-Level)..... | 146 |
| 5.3.4. Susceptibility..... | 147 |
| Age of ‘Lone-Pensioner HUT’..... | 149 |
| Gender of ‘Lone-Pensioner HUT’..... | 149 |
| 5.4. Variables to Assess the Social Vulnerability of ‘Lone-Parent HUTs’..... | 150 |
| 5.4.1. Outcome Variable: The ‘Inability of Lone-Parent HUTs to Reconcile Paid Work with Caring for Dependent Children’..... | 151 |
| 5.4.2. Neighbourhood Capacity..... | 152 |
| Neighbourhood Opportunities..... | 153 |
| 5.4.3. Exposure..... | 155 |
| Labour Market Exclusion..... | 156 |
| 5.4.4. Susceptibility..... | 156 |
| Age of Youngest Dependent Child..... | 157 |
| Access to a Car and/or Van..... | 158 |
| 5.5. Analytical Structure for the Construction of the Social Vulnerability Indices (SVIs)..... | 159 |
| 5.5.1. Multiple Linear Regression (MLR)..... | 161 |
| 5.5.2. Construction of the Social Vulnerability Indices (SVIs)..... | 162 |
| 5.6. Concluding Statement..... | 165 |
| Chapter 6 – The Social Vulnerability of ‘Lone-Pensioner HUTs’..... | 167 |
| 6.1. Introduction..... | 167 |
| 6.2. Multiple Linear Regression (MLR)..... | 167 |
| 6.2.1. Merged Cases: Issues of Statistical Disclosure Control..... | 168 |
| 6.2.2. Descriptive Statistics..... | 169 |
| Correlation Analysis..... | 170 |

| | |
|--|------------|
| 6.3. Examining Compositional and Contextual Predictors of the ‘Physical Dependency’ of ‘Lone-Pensioner HUTs’ | 174 |
| 6.3.1. Examining the Association of the Dimensions of ‘Neighbourhood Capacity’ and ‘Exposure’ in Determining the ‘Physical Dependency’ of ‘Lone-Pensioner HUTs’ | 174 |
| Model 1: ‘Neighbourhood Capacity’ | 174 |
| Model 2: ‘Neighbourhood Capacity’ and ‘Exposure to NSRs’ | 176 |
| 6.3.2. Assumptions of MLR..... | 179 |
| Checking the Assumption of Multicollinearity | 179 |
| An Assessment of the Residuals for Potential Outliers | 183 |
| 6.4. The Prediction of Potentially ‘Susceptible’ ‘Lone-Pensioner HUTs’ | 189 |
| 6.4.1. Gender Differences | 189 |
| 6.4.2. Age Differences | 192 |
| 6.4.3. Age and Gender Differences | 194 |
| 6.5. Final Selection of Variables | 197 |
| 6.5.1. Standardisation of Variables | 199 |
| 6.6. Weighting and Aggregation | 200 |
| 6.7. Discussion | 202 |
| Chapter 7 – The Social Vulnerability of ‘Lone-Parent HUTs’ | 205 |
| 7.1. Introduction | 205 |
| 7.2. Multiple Linear Regression (MLR) | 206 |
| 7.2.1. Descriptive Statistics | 206 |
| Correlation Analysis..... | 207 |
| 7.3. Examining Compositional and Contextual Predictors of the Inability of ‘Lone-Parent HUTs’ to ‘Reconcile Paid Work with Caring Responsibilities’ | 210 |
| 7.3.1. Examining the Association of the Dimensions of ‘Neighbourhood Capacity’ and ‘Exposure’ in Determining the Inability of ‘Lone-Parent HUTs’ to ‘Reconcile Paid Work with Caring for Dependents’ | 211 |
| Model 11: ‘Neighbourhood Capacity’ | 211 |
| Model 12: ‘Neighbourhood Capacity’ and ‘Exposure to NSRs’ | 212 |
| 7.3.2. Assumptions of Multiple Linear Regression (MLR) | 215 |
| Checking the Assumptions of Multicollinearity | 215 |
| An Assessment of the Residuals for Potential Outliers | 219 |
| 7.4. Examining the Fit of the Multiple Linear Regression (MLR) Equation | 223 |
| 7.4.1. Age of Youngest Dependent Child | 224 |
| 7.4.2. Personal Mobility | 227 |
| 7.5. Final Selection of Variables | 230 |
| 7.5.1. Standardisation of Variables | 232 |

| | |
|--|------------|
| 7.6. Aggregation..... | 232 |
| 7.7. Discussion..... | 233 |
| Chapter 8 – Overview of the Social Vulnerability Indices for ‘Lone-Pensioner HUTs’ and ‘Lone-Parent HUTs’ | 235 |
| 8.1. Introduction | 235 |
| 8.2. An Overview of the SVI of the Physical Dependency of ‘Lone-Pensioner HUTs’ | 236 |
| 8.3. A Comparison of the Social Vulnerability Index (SVI) for ‘Lone-Pensioner HUTs’ Against an Existing Gold Standard Deprivation Measure | 239 |
| 8.3.1. Overview of the ‘Income Deprivation Affecting Older People Index’ (IDAOPI) | 239 |
| 8.4. An Overview of the SVI of the Inability of Lone-Parent Households to Reconcile Paid Work with Care Responsibilities..... | 255 |
| 8.5. A Comparison of the Social Vulnerability Index (SVI) for ‘Lone-Parent HUTs’ Against an Existing Gold Standard Deprivation Measure..... | 257 |
| 8.5.1. Overview of the ‘Income Deprivation Affecting Children Index’ (IDACI)... | 257 |
| 8.6. Discussion..... | 273 |
| Chapter 9 – Discussion..... | 275 |
| 9.1. Introduction | 275 |
| 9.2. Summary and Context of Key Findings..... | 275 |
| 9.3. Limitations | 279 |
| 9.4. Directions for Future Research..... | 282 |
| References | 285 |
| Appendix | 323 |

List of Figures

| | |
|--|------------|
| Figure 1.1. The importance of the ‘household’ domain for understanding NSR outcomes | 33 |
| Figure 1.2. The contribution of ‘context’ and ‘susceptibility’ to social risk management (SRM) strategies | 39 |
| Figure 1.3. A checklist for the construction of composite social measures | 41 |
| Figure 2.1. Differences between traditional and integrated life course perspectives | 63 |
| Figure 3.1. Theoretical model of determinants of household composition and structure | 72 |
| Figure 4.1. An ‘outcome vulnerability’ approach to identifying the outcomes attributed to being exposed to a risk | 98 |
| Figure 4.2. A ‘contextual vulnerability’ approach to identifying the outcomes attributed to being exposed to a risk | 99 |
| Figure 5.1. Spatial scales for the 2001 and 2011 Censuses | 129 |
| Figure 5.2. The ‘scale’ and ‘zoning effect’ of the modifiable areal unit problem (MAUP) | 132 |
| Figure 5.3. Summary of the analytical structure for the construction of the social vulnerability indices (SVIs) | 160 |
| Figure 6.1. Histogram of the frequency of the residuals from the outcome variable of ‘physical dependency of ‘Lone-Pensioner HUTs’ | 182 |
| Figure 6.2. Normal P-P plot of regression standardised residuals for the dependent variable: physical dependency of ‘Lone-Pensioner HUTs’ | 182 |
| Figure 6.3. Plot of *ZRESID against *ZPRED – ‘physical dependency’ of ‘Lone-Pensioner HUTs’ | 184 |
| Figure 6.4. Potential outlier of Sheffield 073 (higher than expected value) - <i>Model 2</i> | 186 |
| Figure 6.5. Potential outlier of Sutton 002 (lower than expected value) - <i>Model 2</i> <i>Contains OS Data © Crown Copyright and Database Copyright 2017</i> | 188 |
| Figure 7.1. Histogram of the frequency of the residuals from the outcome variable for the ‘unemployment’ of ‘Lone-Parent HUTs’ – economically active (aged 18-34 years old) | 218 |
| Figure 7.2. Normal P-P plot of regression standardised residuals for the dependent variable: ‘unemployment’ of ‘Lone-Parent HUTs’ – economically active (aged 18-34 years old | 218 |
| Figure 7.3. Plot of *ZRESID against *ZPRED – ‘unemployment’ for ‘Lone-Parent HUTs’ | 219 |
| Figure 7.4. Potential outlier of Westminster 019 (lower than expected value) – <i>Model 12</i> | 221 |

| | |
|---|------------|
| Figure 8.1. Histogram of the distribution of values for the SVI for ‘Lone-Pensioner HUTs’ | 236 |
| Figure 8.2. The SVI of ‘Lone-Pensioner HUTs’ for MSOAs in England (equal decile ranks)..... | 238 |
| Figure 8.3. Scatterplot of the SVI for ‘Lone-Pensioner HUTs’ (2011) against the IDAOPI (2015)..... | 240 |
| Figure 8.4. The presence of ‘extremely’ vulnerable ‘Lone-Pensioner HUTs’ in the city of Portsmouth | 245 |
| Figure 8.5. The ‘extremely vulnerable’ MSOA of Portsmouth 024 | 247 |
| Figure 8.6. The ‘extremely vulnerable’ MSOA of Portsmouth 017 | 249 |
| Figure 8.7. The ‘extremely vulnerable’ MSOA of Portsmouth 024 | 251 |
| Figure 8.8. The ‘extremely vulnerable’ MSOAs of Portsmouth 008 and 011 | 253 |
| Figure 8.9. Histogram of the distribution of values for the SVI for ‘Lone-Parent HUTs’ | 255 |
| Figure 8.10. The SVI of ‘Lone-Parent HUTs’ for MSOAs in England (equal decile ranks)..... | 256 |
| Figure 8.11. Scatterplot of the SVI for ‘Lone-Parent HUTs’ (2011) against the IDACI (2015) | 258 |
| Figure 8.12. The presence of ‘extremely vulnerable’ MSOAs in West Berkshire 263 | |
| Figure 8.13. The ‘extremely vulnerable’ MSOA of Reading 014 | 265 |
| Figure 8.14. The ‘extremely vulnerable’ MSOA of Woking 005 | 267 |
| Figure 8.15. The ‘extremely vulnerable’ MSOA of West Berkshire 012 | 269 |
| Figure 8.16. The ‘extremely vulnerable’ MSOA of West Berkshire 022 | 271 |

List of Tables

| | |
|---|-----|
| Table 1.1. New Social Risks (NSRs) and associated domains | 32 |
| Table 1.2. The distinct New Social Risks (NSRs) examined in this research and their associated ‘Household-Unit Types’ | 35 |
| Table 3.1. Family and non-family households – by composition and type | 77 |
| Table 3.2. Household composition – by households (2011 Census table: KS105EW) from which, HUTs are derived | 81 |
| Table 4.1. Overview of key indicators for the assessment of the social vulnerability of ‘Lone-Pensioner HUTs’ | 108 |
| Table 4.2. Summary of indicators for the social vulnerability of ‘Lone-Pensioner HUTs’ | 115 |
| Table 4.3. Overview of key indicators for the assessment of the Social Vulnerability of ‘Lone-Pensioner HUTs’ | 116 |
| Table 4.4. Summary of Indicators for the Social Vulnerability of ‘Lone-Parent HUTs’ | 122 |
| Table 5.1. An example of the issues of Ecological Fallacy when using different spatial aggregations of data to infer results – for the electoral ward of Burngreave | 127 |
| Table 5.2. Summary of independent variables to assess the social vulnerability of ‘Lone-Pensioner HUTs’ | 136 |
| Table 5.3. Variables to represent the physical dependency of ‘Lone-Pensioner HUTs’ | 138 |
| Table 5.4. Variables relating to the ‘neighbourhood capacity’ of ‘Lone-Pensioner HUTs’ | 141 |
| Table 5.5. Variables relating to the ‘exposure’ of ‘Lone-Pensioner HUTs’ | 144 |
| Table 5.6. Variables relating to the ‘susceptibility’ of ‘Lone-Pensioner HUTs’ ... | 148 |
| Table 5.7. Summary of independent variables to assess the social vulnerability of ‘Lone-Parent HUTs’ | 150 |
| Table 5.8. Variable to represent the inability of ‘Lone-Parent HUTs’ to reconcile paid work with caring for dependent children..... | 151 |
| Table 5.9. Variables relating to the ‘neighbourhood capacity’ of ‘Lone-Parent HUTs’ | 153 |
| Table 5.10. Variables relating to the ‘exposure’ of ‘Lone-Parent HUTs’ | 155 |
| Table 5.11. Variables relating to the ‘susceptibility’ of ‘Lone-Parent HUTs’ | 158 |
| Table 5.12. Summary of potential standardisation procedures for the social vulnerability indices (SVIs) | 164 |
| Table 6.1. An example from table: <i>CT0532</i> – how the merged Middle Super Output Areas (MSOAs) were split into individual cases | 169 |

| | |
|--|------------|
| Table 6.2. Descriptive statistics of all ‘Lone-Pensioner HUTs’ | 170 |
| Table 6.3. Correlation matrix of contextual and compositional predictors of the physical dependency of ‘Lone-Pensioner HUTs’ in England and Wales (at MSOA Level) | 173 |
| Table 6.4. MLR exploring the association of the ‘neighbourhood capacity’ dimension with the NSR outcome of ‘physical dependency’ of ‘Lone-Pensioner HUTs’ – <i>Model 1</i> | 175 |
| Table 6.5. MLR exploring the association of the ‘neighbourhood capacity’ dimension and the ‘exposure to NSRs’ with the NSR outcome of ‘physical dependency’ of ‘Lone-Pensioner HUTs’ – <i>Model 2</i> | 177 |
| Table 6.6. Collinearity statistics: VIF and tolerance values for MLR: <i>Model 2</i> - ‘neighbourhood capacity’ and ‘exposure to NSRs’ | 181 |
| Table 6.7. Examination of the standardised residual for Sheffield 073 – <i>Model 2</i> (higher than expected value) | 184 |
| Table 6.8. Examination of the standardised residual (lower than expected value) for Sutton 002 – <i>Model 2</i> | 187 |
| Table 6.9. MLR exploring the association of the ‘neighbourhood capacity’ dimension with the NSR outcome of ‘physical dependency’ of male and female ‘Lone-Pensioner HUTs’ – <i>Models 3 & 4</i> | 190 |
| Table 6.10. MLR exploring the association of the ‘neighbourhood capacity’ dimension with the NSR outcome of ‘physical dependency’ of ‘Lone-Pensioner HUTs’ aged 65-74 years old and 75 years old and over – <i>Models 5 & 6</i> | 193 |
| Table 6.11. MLR exploring the association of the ‘neighbourhood capacity’ dimension with the NSR outcome of ‘physical dependency’ of ‘Lone-Pensioner HUTs’ by age and sex – <i>Models 7-10</i> | 195 |
| Table 6.12. Final selection of variables for the SVI of ‘Lone-Pensioner HUTs’ to becoming ‘physical dependent’ | 199 |
| Table 7.1. Descriptive statistics of all ‘Lone-Parent HUTs’ (aged 18-34 years old) | 206 |
| Table 7.2. Correlation matrix of contextual and compositional predictors of the ‘unemployment’ of ‘Lone-Parent HUTs’ (aged 18-34 years old) in England and Wales (MSOA Level) | 209 |
| Table 7.3. MLR exploring the association of the ‘neighbourhood capacity’ dimension with the ‘unemployment’ of ‘Lone-Parent HUTs’ – <i>Model 11</i> | 211 |
| Table 7.4. MLR exploring the association of the ‘neighbourhood capacity’ dimension and the ‘exposure to NSRs’ with the outcome of ‘unemployment’ of ‘Lone-Parent HUTs’ – <i>Model 12</i> | 213 |
| Table 7.5. Collinearity statistics – VIF and tolerance values for MLR – <i>Model 12</i> | 216 |
| Table 7.6. Examination of the standardised residuals (lower than expected values) for Westminster 019 and Leeds 011 | 220 |

| | |
|---|------------|
| Table 7.7. Examination of the standardised residual (higher than expected value) for Northumberland 018..... | 222 |
| Table 7.8. MLR exploring the association of the ‘neighbourhood capacity’ dimension with the NSR outcome of ‘unemployment’ of ‘Lone-Parent HUTs’: by the age of the youngest dependent child (0-4 years old) and (5 years old and over) – Models 13 & 14 | 225 |
| Table 7.9. MLR exploring the association of the ‘neighbourhood capacity’ dimension with the NSR outcome of ‘unemployment’ of ‘Lone-Parent HUTs’: in terms of access to a car/van – Models 15 & 16..... | 228 |
| Table 7.10. Final selection of variables for the SVI of ‘Lone-Parent HUTs’ who are unable to ‘reconcile paid work with caring for dependent children’ | 231 |
| Table 8.1. The ‘extremely’ vulnerable MSOAs in the South East of England which, are identified by the SVI for Lone-Pensioner HUTs with a score in the 9th and 10th deciles, (i.e. ‘most vulnerable’) but has a score in the 5th decile or below for the IDAOPI (i.e. ‘not vulnerable’). | 242 |
| Table 8.2. The ‘extremely’ vulnerable MSOAs in the South East of England which, are identified by the SVI for Lone-Parent HUTs with a score in the 9th and 10th deciles, (i.e. ‘most vulnerable’) but has a score in the 5th decile or below for the IDACI (i.e. ‘not vulnerable’). | 260 |

Chapter 1 – Introduction

1.1. People and Places

The conceptualisation and measurement of the differential outcomes that individuals may face due to experiencing issues of social and spatial inequalities in society, continues to be a key research interest within the discipline of human geography (Lupton, 1999; Sampson *et al.*, 2002; Stillwell & Clarke, 2011). Specifically, in recent decades there has been a re-emergence of the theoretical debate surrounding the existence of ‘place effects’ (see: MacIntyre *et al.*, 2002; Cummins *et al.*, 2007; Galster, 2012), which were originally theorised as part of the 1960s “quantitative revolution in geography” (Whitehand, 1970: p.28). For example, Heywood *et al.* (2011) state that these specific geographical enquiries from the 1960s can be more succinctly referred to as a form of ‘spatial science’ from which the key principles of socio-spatial enquiries, and more recently GIS-based investigations, are derived. And so, the continued development of both theoretical and analytical enquiries within quantitative geography (e.g. Yeates, 1965; Openshaw, 1977; Fotheringham, 1983), continue to inform how ‘place effects’ are understood and evaluated within society today (Van Ham *et al.*, 2012).

Although defining the concept of ‘place’ seems simple enough at first glance, there are several perspectives concerning what the concept of ‘place’ exactly entails within different geographical contexts (e.g. Cummins *et al.*, 2007; Norman *et al.*, 2013). For instance, Staeheli (2003: p.159) categorises four distinct but interrelated elements that identify the concept of ‘place’ within the discipline of geography, including place as a context, physical site, cultural and/or social location, and an ongoing socially-constructed process. This concise summary of existing ‘place-based’ perspectives are reflected by numerous investigations into how contextual effects can modify and influence social and societal processes (see *Section 2.2.*), when compositional effects are controlled for (e.g. Diez-Roux, 2001; Macintyre *et al.*, 2002; Dibben *et al.*, 2006). Therefore, the continued interest in the quantitative measurement of ‘place-effects’ is imperative to understanding how the compositional and contextual attributes of areas can be associated with the everyday interactions between people and places.

The continued interest in ‘place-based’ enquiries has also led to specific investigations into how the context and composition of residential areas can potentially influence the unequal distribution of socio-economic outcomes experienced by different individuals and households residing in different areas (Lupton, 2003). Correspondingly, the ‘neighbourhood’ is often utilised as the spatial unit of interest for exploring such interactions, as it incorporates the everyday physical and social characteristics of an area (Keller, 1968; Flowerdew *et al.*, 2008). Galster (2001) reinforces the notion that neighbourhoods can be determined by their physical attributes, by stating that the environmental and location-based elements of an area should be considered and evaluated in research undertaken at the neighbourhood level. Whereas, Cummins *et al.* (2007) further suggests that the collective nature of both social and population characteristics determined at the neighbourhood level should also contribute to issues relating to determining the presence of neighbourhood effects.

Thus, the integration of both perspectives can enable a fuller understanding of the physical and social characteristics, and their subsequent effects on the local population that are experienced at a neighbourhood-level (Diez-Roux, 2001: p.1787); complementing the wider argument that ‘*where you live, can influence your life chances*’ (Slater, 2013: p.368). A more detailed consideration of how the ‘neighbourhood’ is defined for the purpose of this research enquiry is outlined in *Section 3.6.1*.

Specifically, the impacts of social inequality which are considered at the neighbourhood level are often derived from issues relating to a *lack* of provision (*resources*) or participation (*missed opportunities*) in society (Holzmann & Jorgensen, 2001), with both most commonly attributed to the concepts of ‘poverty’ and ‘deprivation’ in the literature (Townsend, 1970; Lupton, 1999). Although the terms ‘poverty’ and ‘deprivation’ are somewhat used interchangeably (Cantillon & Vandenbroucke, 2014) it has been argued by Whelan *et al.*, (2011) that a clear distinction should be made between the two concepts, because they are not synonymous with one another. The standalone concept of ‘poverty’ is most often used in reference to a specific section of the population in society who experience an acute lack of material resources, based on a given threshold (e.g. Gordon *et al.*, 2000; Bradshaw & Richardson, 2009). Correspondingly, one of most frequently used poverty measures in Britain (and internationally) is calculated from the proportion

of household incomes which are less than 50% or 60% of the median income; a value often equivalised by the size of the household and/or housing costs (JRF, 2009). The utilisation of such explicit indicators to measure poverty outcomes allows for a clearer distinction to be made between those individuals who are not at risk and those who are at acute risk of experiencing negative outcomes, due to a potential lack of material resources.

In contrast, the concept of deprivation provides a more nuanced understanding of a “lack of something which is deemed a social necessity in society”, for a given population of interest (Callan *et al.*, 1993; p.143), beyond what can be ascertained from income-derived perspectives (Whelan *et al.*, 2003). In Townsend’s (1987: p.125) seminal research into constructing small-area level measures of deprivation, the term ‘deprivation’ is explicitly defined as “a state of observable and demonstrable disadvantage relative to the local community, or the wider society, or nation to which an individual, family, or group belongs”. Consequently, the concept of multiple deprivation extends to a wider range of necessities beyond those which are solely based upon material resources, e.g. income (McKay, 2004). Due to the multidimensional nature of the concept of ‘deprivation’, there is an added layer of complexity to the process of conceptualising and measuring issues of deprivation at the neighbourhood level, in comparison to existing poverty measures (Ranci, 2010); a consideration further discussed in *Section 3.6.1*. The concept of deprivation can provide a valuable insight into the social constraints that individuals experience in their everyday lives, and which may ultimately have a negative impact upon their quality of life and future life chances (Drukker *et al.*, 2003).

1.1.1. Conceptualising New Social Risks (NSRs)

Globally, the human population is continually exposed to a variety of risks, due to the occurrence of natural hazards, alongside socially-constructed risks derived from the manifestation of certain human activities (Tansel, 1995). Correspondingly, Aven (2016) outlines the concept of ‘risk’ as the exposure of a person or place to a source of loss or danger that may lead to consequences and contingencies as an outcome. The concept of ‘risk’ can be more readily determined as providing an *estimate* of the likely impact of a danger or “hazard event” (Ericson & Doyle, 2003: p.50) over space and time (Wisner *et al.*, 2004). The ability to explore and measure the incidence of these different types of

risks is fundamental to understanding issues of social inequality that contribute to the quality of our lives and future life chances (Beck, 1992). Accordingly, different forms of socially-constructed risks can be seen to influence a range of practices, experiences and social activities undertaken by individuals in their daily lives (Pintelon *et al.*, 2013). From the outset, this research's focus will specifically be upon the conceptualisation and measurement of social deprivation outcomes, associated with the concept of New Social Risks (NSRs).

NSRs are a socially-constructed form of risk that can be directly associated with social and societal changes, originating from the transition from industrial society to a post-industrial society in Europe in the early 1970s. Yet, the direct use of the term 'new social risks' and the preceding term of 'social risks' (SRs) in everyday lexicon is somewhat uncommon (Huber & Stephens, 2006). In lay terms, the consequences that may potentially result from being exposed to NSRs are more commonly misunderstood as the occurrence of unacceptable 'welfare losses' (Bonoli, 2007: p.498). Contrastingly, the concept of NSRs has continued to evolve within the context of academic research, since its initial conceptualisation in the early 1990s (see: *Section 2.3*). This theoretical perspective has resulted in the concept of NSRs to be more explicitly understood as: events or transitions across the life course, which may potentially prevent individuals from fully participating in the everyday life of contemporary society (Whelan *et al.*, 2011; Ranci *et al.*, 2014).

A key example of an NSR that is commonly discussed in the literature (see: Ranci, 2010) is that of: 'being unable to enter the post-industrial labour market, due to the lack of/inadequate skills or training' (Bonoli, 2005). This NSR has presented itself as a key social issue for young-adults in Britain; a group who are often conceptualised in this instance as 'not in education, employment or training', or 'NEETs' for short (Thomas, 2010). Whereby, being 'NEET' can seriously affect the life chances of young-adults, due to the issues of social deprivation associated with the outcomes of long-term unemployment and social exclusion, which are in turn derived from being exposed to this NSR. And so, it is unsurprising that the conceptualisation and measurement of the social deprivation outcomes resulting from the exposure of individuals to specific NSRs

continues to be argued as a key research priority within the NSRs literature and beyond (e.g. Eping-Andersen, 1999; Ranci & Pavolini, 2013).

In addition, a key focus of NSRs research is to understand why the welfare needs of individuals most at risk of experiencing specific issues of social deprivation, are being inadequately met by the institutions who are supposedly responsible for managing them (Powell & Hewitt, 2002; Powell, 2008; Whelan & Maître, 2008). To further complicate matters, existing analyses continue to evaluate these NSR outcomes incorrectly by solely focusing on the context of the ‘labour market’ domain - a perspective that is only truly applicable to that of the ‘social risks’ of industrial society (for examples, see: Bonoli, 2007). Moreover, as the term ‘social risk’ continues to be used interchangeably with the term ‘new social risk’, there is a need to acknowledge both theoretically and empirically the clear distinction between these two interrelated, but not interchangeable ‘risk’ phenomena. Consequently, NSRs are demonstrated by this research to extend beyond the ‘labour market’ domain to other key social domains of ‘participation’ and ‘provision’ in contemporary society; most notably the ‘household’ domain within this empirical work.

In summary, the four NSRs outlined in *Table 1.1*. can be understood as including (but are not limited to) issues of: ‘being unable to fully participate’ in the *labour market* domain, together with issues relating to: ‘physical dependency in old age’ and ‘being unable to reconcile paid work with caring for dependent children’ in the *household domain*. These four NSRs were chosen after detailed consideration of the wider literature, especially those which are frequently cited within research attributed to exploring NSRs in Britain and Europe (see: Taylor-Gooby, 2004; Bonoli, 2005; Ranci & Pavolini, 2013). Correspondingly, from this point onwards when reference is made to NSRs in general, this statement corresponds to the four NSRs outlined in *Table 1.1*. Moreover, from a practical standpoint and to reduce the repetition of key terms in this thesis: the theory, concepts, and analyses of this work are all made in reference to the context of England and Wales - unless otherwise stated.

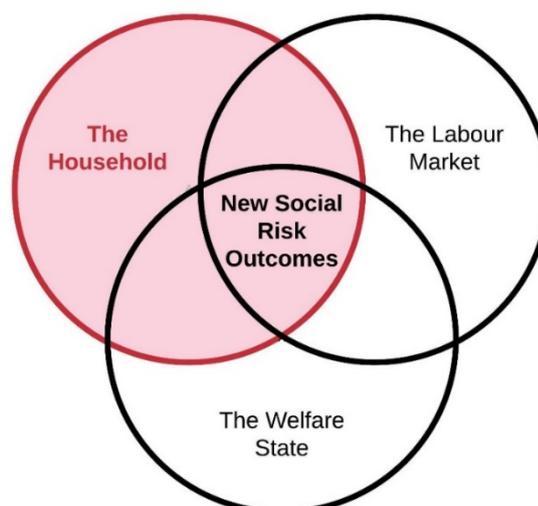
Table 1.1. New Social Risks (NSRs) and associated domains

| New Social Risk (NSR) | Domain | Description of NSR |
|------------------------------|---|---|
| NSR 1 | <i>Changes to Family & Gender Roles</i> | Becoming dependent in old age <i>e.g. due to long term health problem</i> |
| NSR 2 | | Being unable to reconcile paid work with caring for dependent children |
| NSR 3 | <i>Changes to the Labour Market</i> | Being unable to enter the labour market <i>e.g. due to a lack of skills/education</i> |
| NSR 4 | | Being unable to remain within the labour market <i>e.g. due to obsolete skills/training</i> |

[Source: Taylor-Gooby, 2004; Bonoli, 2005; Ranci, 2010]

This research aims to clarify the roles and responsibilities of the key domains, which ‘consume’ and ‘produce’ NSRs (and related deprivation outcomes) in contemporary society (Taylor-Gooby, 2004). And so, a key focus of the literature review in *Chapter 2* is to determine the wider socio-demographic changes that have occurred alongside the transition to a post-industrial society beginning in the 1970s. From a comprehensive review of the literature it can be demonstrated that NSRs (and the resulting deprivation outcomes) occur where: ‘the labour market’, ‘the (family) household’, and ‘the welfare state’ intersect (for a detailed discussion see: Ranci, 2010: pp.18-21). These three domains are ultimately classified as the key, social domains of ‘participation’ and ‘provision’ for the purpose this research enquiry. The resulting interactions that occur within and between these three domains can be attributed to the: insecurity of labour market structures, decreasing care-capacity of households, and the institutional inertia of the welfare system (Ranci, 2010). The result of which, has led to the increasing uncertainty and diversity of social deprivation outcomes that can be attributed to being exposed to NSRs in one or more of these three domains (see: *Figure 1.1.*).

Figure 1.1. The importance of the ‘household’ domain for understanding NSR outcomes



As illustrated by *Figure 1.1.*, NSR outcomes do not occur solely within each individual domain, as they can also occur at the point at which they overlap with one another. The identification of these three domains provides a unique opportunity to further explore the prevalence and nature of the differential NSR outcomes, which in turn will contribute to reducing the uncertainty of deprivation outcomes in contemporary society. As illustrated in *Figure 1.1.*, the establishment of the social domains relating to ‘participation’ and ‘provision’ in society not only clarifies the notion of the individual domains that NSRs operate within, but it also demonstrates the value of how the empirical analyses outlined in this thesis overlap with the wider context.

Correspondingly, by exploring the NSRs derived from ‘the household domain’, which are identified in *Table 1.1.* as: ‘dependency in old age’ (NSR1), and ‘being unable to reconcile paid work with caring for dependents’ (NSR2). By specifically directing the attention of this research upon the ‘household’ domain, it will allow for the empirical analyses included within this thesis to add to existing NSRs research that predominately focuses upon empirical analyses attributed to the ‘labour market’ and ‘welfare state’ domains (e.g. Ferrera, 2005). And so, now that it has been established via the key social domains of ‘participation’ and ‘provision’ *where* such events and transitions associated with NSRs are most likely to occur, a more detailed consideration needs to also be undertaken as to *when* they are most likely to occur.

Determining NSR Profiles: The Construction of ‘Household-Unit Types’ (HUTs) at Key Stages Across the Life Course

It is widely accepted that the occurrence of specific NSRs are socially stratified across different sub-populations, more simply referred to as ‘NSR profiles’ (Pintelon *et al.*, 2013). From the standpoint of attempting to determine the social stratification of NSR profiles, two key perspectives emerge: a ‘social class perspective’ (Pintelon *et al.*, 2013), and that of the ‘life course perspective’ (de Vroom, 2008). After detailed consideration (in *Section 2.4.1.*) the life course perspective was chosen, as it provides a theoretical structure which aligns with the social changes and processes of post-industrial society (Vandecasteele, 2011); reflecting a suitable context for the operationalisation of NSRs. Additionally, the life course perspective has also been widely utilised as a social stratification perspective in deprivation research (and beyond...) to demonstrate key points across an individual’s life where key events/transitions are most likely to occur (Taylor-Gooby, 2004). The literature review undertaken in *Chapter 2* informs the process as to how the NSR profiles are established as ‘Household-Unit Types’ (HUTs), representing the key stages of the life course at which NSRs are most likely to occur (in *Chapter 3*).

In summary, HUTs are constructed as an appropriate unit of analysis for determining the critical junctures across the life course at which NSRs are most likely to be experienced, within the context of the ‘household’ domain. However, a comprehensive overview of all the potential configurations of the NSR profiles and their associated pathways lies beyond the scope of this thesis and so is not provided. Instead, for the purpose of this research, only one HUT (i.e. NSR profile) is analysed at a time when determining the potential deprivation outcomes that may result from being exposed to a given NSR. Specifically, this research aims to examine two different ‘HUTs’ that represent distinct stages in a person’s life course at which NSRs are most likely to occur – particularly in relation to ‘family and household changes’ (see: *Table 1.2.*). Specifically, ‘lone-pensioner HUTs’ and ‘lone-parent HUTs’ are identified in *Chapter 3* as representing two contrasting stages of the life course at which the wider NSR of ‘caring for dependents’ can be explored. Moreover, a specific advantage of utilising HUTs containing only one adult, is that it is straightforward to determine whom the compositional characteristics of

the HUT are attributed to (e.g. age and gender). Consequently, the two chosen NSRs and their corresponding HUTs are outlined in *Table 1.2*.

Table 1.2. The distinct New Social Risks (NSRs) examined in this research and their associated ‘Household-Unit Types’

| New Social Risk (NSR) | Domain | Description of NSR | |
|-----------------------|----------------------------------|--|------------------------|
| NSR 1 | Changes to Family & Gender Roles | Becoming dependent in old age <i>e.g. due to long term health problem</i> | Lone-pensioner (HUT 1) |
| NSR 2 | | Being unable to reconcile paid work with caring for dependent children | Lone-parent (HUT 2) |
| NSR 3 | Changes to the Labour Market | Being unable to enter the labour market <i>e.g. due to a lack of skills/education</i> | |
| NSR 4 | | Being unable to remain within the labour market <i>e.g. due to obsolete skills/training</i> | |

As demonstrated by *Table 1.2*, the two HUTs at the focus of this research are ‘lone-pensioners’ and ‘lone-parents’ (see: *Sections 3.4.* and *3.5.* for further justification of these ‘HUTs’). Of note, is how both HUTs are associated with overlapping NSRs - with the ‘lone-pensioner HUT’ focusing on ‘being a dependent’ in society whilst, the ‘lone-parent HUT’ focuses upon ‘caring for dependents’ in society. The result of which leads to different issues and patterns of social deprivation being determined for differential population groups at the neighbourhood level. Overall, it is anticipated that examining the NSRs associated with these two contrasting ‘HUTs’ will provide a unique opportunity to further understand the distinct NSR outcomes that can occur at small-area level geographies, for England and Wales.

The remainder of this chapter provides an overview of the research process used to meet the key aims and objectives of this thesis. Firstly, the importance of implementing a social vulnerability framework will be established (*Section 1.2.*), as this allows for the addition of contextual variables via the ‘neighbourhood capacity’ dimension, alongside

the contribution of compositional variables via the ‘exposure’ dimension to be made. Moreover, how the conceptual framework allows the widely considered dimension of ‘exposure’ to NSRs to be extended to also include the ‘susceptibility’ to NSRs, will also be outlined. Once a reflection of the conceptual framework and its corresponding dimensions are determined, exactly how this theoretical process informs the construction of separate, social vulnerability indices (SVIs) for both of the chosen ‘HUTs’ will also be determined (*Section 1.3.*). Finally, this chapter concludes by outlining the overall intention of this research enquiry - including an overview of the three key aims and the corresponding objectives of this thesis (*Section 1.4.*).

1.2. Social Vulnerability Framework

The proposed social vulnerability framework provides an appropriate structure in which to explore the differential NSR outcomes that are potentially experienced by distinct NSR profiles (‘HUTs’), at a neighbourhood level. Social vulnerability can be seen to be the outcome of a complex set of social interactions, namely the exposure to either a threat (i.e. risk) or the occurrence of a threat materialising and lacking the defences and/or resources to deal with the resulting consequences (Spini *et al.*, 2013; Oris *et al.*, 2016). As Vasta (2004) demonstrates, the social vulnerability to a negative outcome in a population is not in relation to its cause (the risk factor) but is understood to be due to the greater or lesser exposure of the population whom may suffer the consequences resulting from the initial cause (Cutter, 1996). Therefore, the concept of social vulnerability has been commonly utilised within the wider literature, to understand the differential outcomes of socially constructed ‘risks’ within society (e.g. Ranci, 2010). Overall, the concept of social vulnerability helps to reconcile the emergence of the increasing prevalence and diversity of deprivation outcomes, which result from the social risks experienced in society as further discussed in *Chapter 4*.

The theoretical importance of establishing this social-vulnerability approach to measuring social deprivation outcomes is two-fold. Firstly, the contribution of the ‘neighbourhood capacity’ dimension allows additional contextual attributes to be considered, in relation to determining the deprivation outcomes that may result from the exposure to specific NSRs (*Aim 1*). Secondly, the contribution of the dimension of ‘susceptibility’ to NSRs

is made via the investigation of previously unexplored compositional attributes associated with the different NSR profiles (*Aim 2*). Finally, it is anticipated that the innovative contributions of both previous aims will also contribute to the quantitative measurement of the resulting deprivation outcomes from the NSRs, via the construction of the SVIs for both ‘HUTs’ (*Aim 3*). Correspondingly, this research argues from a wider research perspective that there continues to be the need for empirical analyses to engage with understanding the drivers and outcomes of specific forms of deprivation, explicitly at small-area level geographies. As, not only can the immediate neighbourhood be influential in shaping the lives of individuals and households, but the neighbourhood’s relationships with surrounding areas (and their corresponding attributes) can also be fundamental in the reproduction of issues of social inequality.

Furthermore, this research enquiry extends beyond existing perspectives of ‘outcome vulnerability’, which merely outline a simple linear process of a person being exposed to risks in society (Chambers, 1989). Instead, a ‘contextual vulnerability’ approach is employed from *Section 4.3.1.* onwards, as it is also important to identify and understand how the underlying contextual effects can impact on the life chances of individuals and/or households (e.g. Buckner *et al.*, 2013). In addition, there is also an emerging body of evidence to suggest that living in a deprived neighbourhood can have negative effects over and above what have previously been explained for, by compositional characteristics alone (Van Ham *et al.*, 2012). Yet, in reality, compositional and contextual effects are highly intertwined as the concept of ‘the neighbourhood’ incorporates both the place itself and the people who reside within it, making it difficult (but not impossible) to untangle the direction of causality of outcomes. The implementation of a contextual model also pertains to the idea that individuals do not conform to a linear process of experiencing NSRs, and their associated deprivation outcomes throughout their lives (Whelan & Maitre, 2008). Especially as, the exposure to NSRs can vary in prevalence and nature, across different points in space and time for each individual/household.

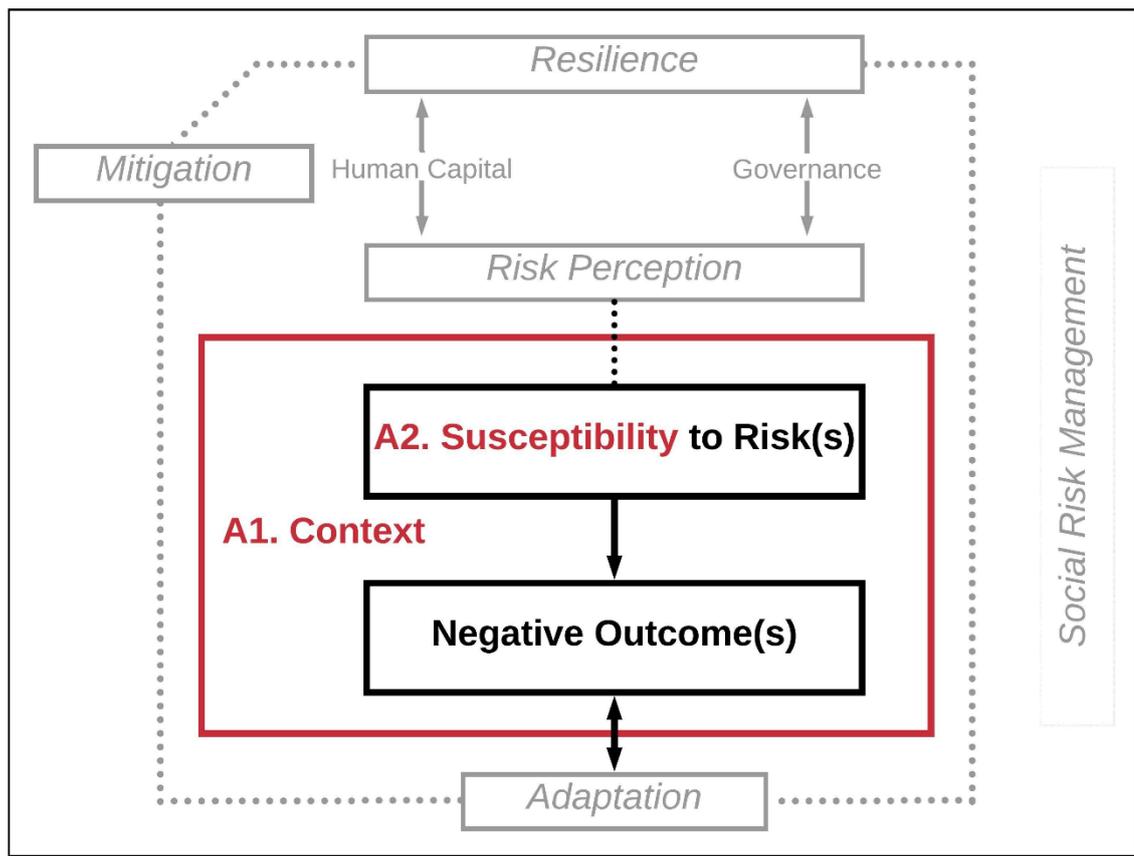
1.3. Establishing Measures of New Social Risks (NSRs) across the Life Course at a Neighbourhood Level

Despite the continued interest in conceptualising area-level deprivation outcomes in the European context, little attention has been paid to measuring NSR outcomes at small-area level geographies (Ranci & Pavolini, 2013). Therefore this research enquiry provides an innovative approach to understanding how NSRs are changing in both nature and prevalence at the neighbourhood level in England and Wales, via the construction of two social deprivation measures (i.e. SVIs).

1.3.1. The Purpose of Social Vulnerability Indices (SVIs)

Justifying the SVIs constructed in this research enquiry lies in demonstrating the fitness for purpose of the measures, both theoretically and empirically prior to their conception (de Vaus, 2004; Nardo *et al.*, 2005). The purpose of constructing the proposed small-area level deprivation measures was to establish if the ‘neighbourhood context’ can be associated with differential NSR outcomes at the neighbourhood level, for England and Wales. Additionally, the construction of the SVIs can be used to inform how specific compositional attributes might partially determine the ‘susceptibility’ of the different HUTs to being exposed to NSR outcomes. *Figure 1.2.* outlines how these theoretical and empirical contributions of how “contextual” and “compositional” attributes fit within wider social-risk management (SRM) strategies in contemporary society.

Figure 1.2. The contribution of ‘context’ and ‘susceptibility’ to social risk management (SRM) strategies



[Adapted from: Kemp & Rotmans, 2005]

As illustrated by the red box within *Figure 1.2*, there are two theoretical contributions of this research, in terms of understanding both the contextual and compositional attributes of NSR profiles - via the addition of the ‘neighbourhood capacity’ and ‘susceptibility’ (to NSRs) dimensions. As also acknowledged by *Figure 1.2*, these two dimensions are embedded in the wider processes of SRM (Kemp & Rotmans, 2005), including processes of: resilience, risk perception, mitigation and adaptation (see: *Section 9.4*). Therefore, the establishment of the domains of ‘neighbourhood capacity’ and ‘susceptibility’ are in response to establishing how similar sub-groups or ‘HUTs’ in society who are exposed to NSRs, may potentially experience differential deprivation outcomes.

1.3.2. The Construction of Social Vulnerability Indices (SVIs)

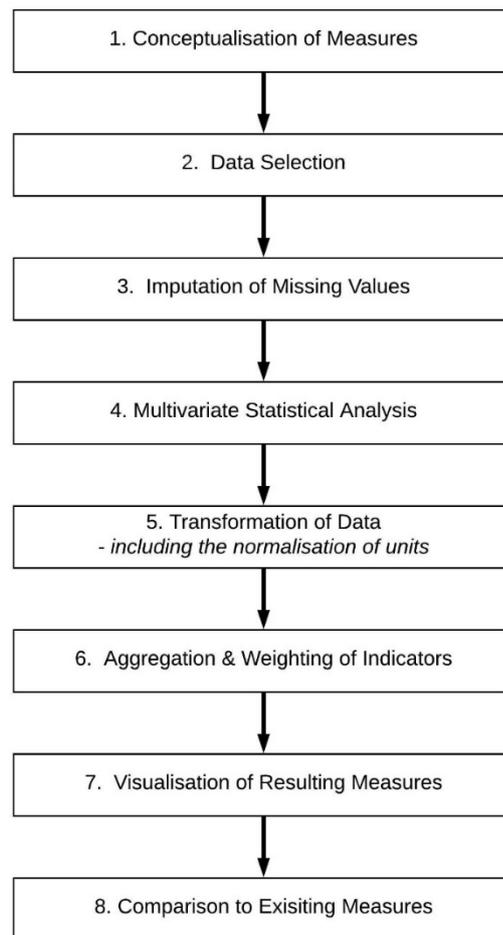
The construction of the small-area level measures requires the incorporation of several analytical stages, all of which are informed by the social vulnerability framework. These

stages consider how to determine the most suitable geographical scale, the utilisation of the most appropriate dataset(s), and the most appropriate quantitative methods that can be employed to combine the chosen indicators into a single-figure measure (Norman, 2010). The construction of any composite indicator is not a straightforward process, and involves theoretical and statistical assumptions that must be assessed carefully. Therefore, a practitioner-led ‘checklist’ by Nardo *et al.*, (2005) for the Organisation for Economic Cooperation and Development (OECD) has been modified to inform and guide the construction of the social vulnerability framework, as summarised by *Figure 1.3*.

As demonstrated by the checklist in *Figure 1.3*, it is important that the conceptualisation of any social deprivation measure should be theoretically informed, prior to construction of the relevant analytical outputs. A key purpose of the literature review in *Chapter 2* is to provide the background and context in which to inform the first step of this procedure, together with the process of establishing the conceptual framework from *Chapter 4* onwards. However, prior to establishing the social vulnerability framework, *Chapter 3* establishes the NSR profiles that are to be explored within the context of the ‘household’ domain for the purpose of this research enquiry.

Subsequently, a consideration of the availability of small-area level data will also be made in the second step, as demonstrated by *Chapter 5*. Finally, leading on from these initial steps (*Figure 1.3*), the focus of constructing both of the SVIs will centre on quantitatively assessing the associations between the hypothesised dependent and independent variables, in *Chapters 6* and *7* respectively. The direction and nature of these statistical relationships are grounded in a broad range of social deprivation literature, due to the lack of contextual research in relation to evaluating NSRs at small-area level geographies. The hypothesised relationships of interest include: interactions that occur between neighbourhood contexts, and the composition of NSR profiles at a neighbourhood level who are most likely to be exposed to NSRs. Therefore, by assessing the associations between the proportion of HUTs within neighbourhoods (who are exposed to a given NSR), together with the relevant contextual attributes that may contribute to the occurrence of negative outcomes (*Aim 1*), the statistical relationships of interest for the purpose of this research enquiry will be determined.

Figure 1.3. A checklist for the construction of composite social measures



[Source: Nardo et al., 2005]

The statistical assessment of the relationships is undertaken via multiple linear regression (MLRs) modelling, a process which includes checking that the assumptions of undertaking regression analyses are being adhered to. Once the nature and strength of these relationships have been determined, the process will then be repeated to examine if the ‘susceptibility’ of HUTs (based upon underlying socio-demographic attributes) can further influence NSR outcomes (*Aim 2*). Following on from these statistical analyses, the findings derived from the MLR models will be used to inform the construction of the SVIs, which are based upon the significance, strength and direction of the corresponding statistical models. On completion, the SVIs and their relative rankings will be interpreted, including the benchmarking of results against two corresponding deprivation indicators: the Income Deprivation Affecting Older People Index (IDAOPI), and the Income Deprivation Affecting Children Index (IDACI) in *Chapter 8*. By benchmarking the SVIs against these notable measures, it will be possible to establish the exact contributions the

proposed measures have made, in terms of further understanding non-income deprivation outcomes at a small-area level for the chosen ‘HUTs’ (*Aim 3*).

In the concluding chapter (*Chapter 9*), a summary of the research findings is presented, highlighting how the thesis has effectively tackled each of the aims and objectives set out in *Sections 1.4.1.* and *1.4.2.* This empirical approach is followed by a reflection of both the theoretical and practical limitations encountered during the research process, which are deemed necessary to critically determine the findings of this research. Finally, potential areas of future work will be discussed, in reference to adding to the key theoretical and empirical contributions discussed and established in this research.

1.4. Thesis Intention

This thesis focuses upon the conceptualisation and measurement of NSRs that occur at key stages across the life course, for different NSR profiles, resulting in the construction of SVIs at the neighbourhood level for England and Wales. A social vulnerability approach is employed to provide a more nuanced understanding of the deprivation outcomes resulting from ‘HUTs’ experiencing NSRs via the dimensions of: ‘exposure’, ‘susceptibility’ and ‘contextual capacity’. Furthermore, the social vulnerability framework provides an appropriate structure, in which the differential NSR outcomes experienced at the small-area level can be assessed. The theoretical importance of establishing such an approach, provides an appropriate setting to explore the dimensions of the ‘neighbourhood capacity’ (*Aim 1*), and the ‘susceptibility’ to NSRs, which are relatively under-explored in NSR research (*Aim 2*).

Overall, it is hoped that the innovative contributions of these proposed aims will also contribute to wider research efforts in investigating issues of social deprivation via constructing SVIs, in relation to specific NSRs for distinct ‘HUTs’ (NSR profiles) at the neighbourhood-level (*Aim 3*). Correspondingly, this research argues the importance of empirical analyses continuing to engage in exploring the drivers and outcomes of multiple deprivation for specific sub-populations (‘HUTs’) at the neighbourhood level. Overall, a core argument of this work is that contextual attributes, alongside compositional

attributes, can be influential in shaping the nature and prevalence of NSR outcomes experienced by individuals and households at the neighbourhood level.

1.4.1. Aims

There are three overall aims to this thesis:

Aim 1: To establish the importance of contextual attributes in modifying the social deprivation outcomes that distinct NSR profiles may experience, as result of being exposed to specific NSRs at the neighbourhood level.

Aim 2: To examine which specific compositional attributes of distinct NSR profiles may influence their exposure to social deprivation outcomes, at the neighbourhood level.

Aim 3: To construct small-area level measures of deprivation (determined by the results of *Aims 1* and *2*) that can inform the identification of issues of social deprivation, which distinct NSR profiles may experience due to the exposure to specific NSRs at the neighbourhood level.

1.4.2. Objectives

There are several research objectives which complement the overall aims of the thesis:

- i. **To review the existing literature on the conceptualisation and measurement of New Social Risks (NSRs).**

Chapter 2 provides a comprehensive review of the literature surrounding the conceptualisation of NSRs and associated deprivation outcomes. This literature review includes a background to the preceding concept of ‘social risks’, attributed to industrial society and how their corresponding deprivation outcomes are different to those resulting from NSRs in contemporary society. An examination of the wider socio-demographic changes associated with the transition to a post-industrial society will also be included, as there is the suggestion these changes can determine the nature and prevalence of NSRs in society. Once the concept of NSRs has been successfully outlined, a consideration of how different NSRs are socially stratified in society across different population sub-groups (or NSR profiles) will also be considered.

ii. **To determine the NSRs and associated NSR profiles (attributed to the ‘household’ domain)**

Derived from the findings from the *first objective (i)*, an overview of all potential NSR profiles that can be associated with the specific NSRs that are attributed to the ‘household’ domain, will be determined and evaluated. The result of these findings will inform the conceptualisation and construction of the required NSR profiles (i.e. ‘HUTs’), in order to meet the specific aims of this research enquiry.

iii. **To establish a conceptual framework**

A conceptual framework will be employed to guide the construction of the small-area level derivation measures, in order to achieve the aims of this research. As part of this approach a social vulnerability framework based upon the concept of ‘contextual vulnerability’ will be developed, in order to inform the differential deprivation outcomes that may potentially occur for distinct NSR profiles (‘HUTs’), at the neighbourhood level.

iv. **To identify the availability of data at the small-area level, to represent the neighbourhood context**

Before any statistical analyses can be undertaken, appropriate datasets must be obtained at small-area level geographies, which have a detailed coverage of the compositional and contextual indicators; as outlined by the conceptual framework (previously identified by *objective iii*). A consideration as how to operationalise the theoretically-informed indicators, by obtaining the appropriate variables will also be determined as part of this analytical process.

v. **To analyse the strength of the association of the relationships occurring between the contextual and compositional attributes of the exposure of ‘HUTs’ to NSR outcomes at the neighbourhood level**

Informed by the previous *objectives (i-iv)*, this objective will allow *Aim 1* to be fully addressed. Of particular note, this objective is reflected by the ‘neighbourhood capacity’ or contextual dimension of the social vulnerability framework.

- vi. **To analyse the strength of the associations occurring between the (additional) compositional attributes of the ‘HUTs’ to differential NSR outcomes at the neighbourhood level**

Informed by the previous *objectives (i-v)*, this objective will contribute to *Aim 2* being fully addressed and is reflected by the ‘susceptibility’ dimension of the social vulnerability framework.

- vii. **To construct small-area level measures of deprivation – in relation to specific NSR outcomes**

Two distinct SVIs will be constructed based on the results of *objectives v* and *vi*, for both of the NSRs attributed to the ‘household domain’ and in relation to the corresponding NSR profiles (‘HUTs’) – partially addressing *Aim 3*. The final choice of variables prior to aggregation into the SVIs will be based upon the significance, strength and direction of the previous statistical models, as previously addressed by *objectives v* and *vi*.

- viii. **To illustrate the value of constructing the SVIs**

On completion of *objective vii*, each of the SVIs and their overall (relative) rankings will be both theoretically and spatially interpreted by comparing the SVIs of this research enquiry, against comparable measures of multiple deprivation - fully meeting the requirements of *Aim 3*.

Chapter 2 – Examining New Social Risks (NSRs)

2.1. Introduction

The concept of NSRs are associated with a series of societal and sociodemographic changes that are related to the transition to a post-industrial society (Whelan & Maître, 2008; Eppel & Leoni, 2011). These changes include: the increased participation of women in the labour market, the destabilisation of family structures, and a continued ageing population (Jenson, 2002; Armingeon & Bonoli, 2006). It is the combination of these societal and sociodemographic changes (further explored in *Section 2.2.*) which has inspired the emergence of NSRs to be understood as the ‘unintended consequences’ of post-industrialisation in Britain (Taylor-Gooby, 2004). Prior to a detailed examination of the concept of NSRs in further detail, the preceding concept regarding the social risks of industrial society is briefly explored in *Section 2.1.1.*

2.1.1. The Emergence of the British Welfare State: the Identification of ‘Social Risks’ in Industrial Society

The original foundations of the British welfare state have been credited to Beveridge’s review (1942) of ‘social insurance and allied services’; directed by the then Churchill government. The primary objective of Beveridge’s review was to re-establish social cohesion and economic stability within post-war Britain (MacLeavy, 2012). The key findings of this review reported that existing welfare provisions were somewhat basic, provided limited coverage, and did not adequately meet the needs of citizens (e.g. The Poor Law Act, 1930). Subsequently, this critical review of social security policies resulted in the Beveridge Report (1942) being established as the initial blueprint for the future implementation of a government-led welfare state in Britain (Alcock, 2014).

Beveridge (1942) outlined a series of recommended state interventions, namely to tackle the ‘five giant evils’ facing British society in the 1940s: the introduction of the National Health Service (NHS) “to combat disease”, full employment “to combat idleness”, state-provided education “to combat ignorance”, public housing “to combat squalor”, and National Insurance (NI) and assistance schemes “to combat want” (Alcock, 2014). Beveridge’s statement to remove these ‘five giant evils’ from society was an ambitious

attempt at furthering social progress, by *combating* the persistent issues of inequality within society. And so, the British welfare state was formulated as a ‘safety-net’ measure, in order to ensure that the basic economic and social care needs of the population could be adequately met from “cradle to grave” (Beveridge, 1942: p.4).

Since the initial conception of the ‘modern’ British welfare state in 1945 by the then incumbent Atlee government, the operation and development of welfare provision has been associated with the collective vision of attempting to reduce the disparity of incomes across the life-cycles of individuals (Pfau-Effinger, 2005). In post-war Britain a key driver of income inequality was the occurrence of social risks that were derived from situations of the male breadwinner of a family household, being unable to derive a wage from the industrial labour market (Crompton, 1999). These social risks of industrial society could be clearly identified as resulting from the following events: short-term unemployment, long-term sickness, chronic disability, and entering old age (Huber & Stephens, 2006). However, due to the continued economic success of heavy industry in Britain, a collective response of compensatory mechanisms was able to be provided in order to combat against these social risks; via the redistribution of a share of the economic gains of industrial society (Archer, 1995). The delivery of such welfare mechanisms included the Workmen's Compensation Act (1951), which was a form of social insurance provision that guaranteed employees a secure source of income during periods when workers were unable to fully participate in the labour market (e.g. the potential loss of a family-household income, due to disability and/or life-limiting illness). The introduction of social protection measures to compensate against experiencing the negative consequences resulting from the social risks of industrial society, demonstrates how the British welfare state began to universally meet the socioeconomic needs of its citizens.

The introduction of these income-based, social-protection measures were made possible by the dominance and stability of nuclear-family households in British society (Bengtson, 2001; Esping-Andersen, 2009). The notion of a ‘nuclear-family household’ was originally defined by Murdock (1949) as consisting of two, married (heterosexual) parents living in a household with their dependent children. Within this household model adult women were perceived to be largely dependent on marriage, and therefore their husbands for the provision of day-to-day economic necessities (Bengtson, 2001: pp.93-

118). This ongoing societal trend enabled a clear gendered division of responsibilities within most households, whereby the male-breadwinner was to secure an income for his family, whilst women were primarily responsible for the care of family members and domestic duties (Streek & Thelan, 2005). And so, the private social sphere was considered to be responsible for the care of dependents (i.e. children and the elderly), whilst the public social sphere was determined as being in control of the distribution of economic resources in society. Overall, this societal trend was ultimately legitimised by the continued high proportion of nuclear-family households (c. 70% until the mid-1960s: Summerfield, 1998), and the associated gendered division of everyday roles and responsibilities in the family-household unit.

During this time-period, the ongoing success of the welfare state was attributed to the continued guarantee of economic stability provided by the industrial labour market, as demonstrated by low, long-term unemployment rates across a number of industrial sectors (Esping-Andersen, 1999). Furthermore, the male-breadwinner of a household was clearly identifiable as the ‘modal-welfare client’, due to obtaining public recognition as both a key contributor and beneficiary of the welfare system (Huber & Stephens, 2006: p.143). Consequently, these key societal features enabled the continued support for a collective welfare response by the public social sphere, which in turn provided compensatory measures against the negative consequences that resulted from the social risks of industrial society.

However, the comprehensive welfare measures that were imperative to improving the living standards for those belonging to the working classes (Pfau-Effinger, 2005), together with the ongoing stability and social cohesion of communities provided by these measures, became somewhat challenged by the transition to a post-industrial society in the mid-1970s. Thus, resulting in the emergence of the concept of NSRs being noted as the ‘unintended consequences’ of post-industrial society (Armingeon & Bonoli, 2006). This theoretical development of social risks in industrial society suggests why the definition of ‘social risks’ should not be used to directly inform the conceptualisation and examination of NSRs, which are instead derived and should be understood from a post-industrial context (Taylor-Gooby, 2004: pp.5-7). *Section 2.3.* provides further justification as to why NSRs should be identified as a distinct social phenomenon, which

should be considered as a separate term to the concept of the social risks of industrial society.

Prior to outlining what the concept of NSRs exactly entails, *Section 2.2.* provides an overview of the sociodemographic and structural changes associated with the transition to a post-industrial society. *Section 2.3.* outlines how NSRs have been defined and conceptualised within the literature, whilst *Section 2.4.* discusses the social stratification of NSR outcomes that can be attributed to a wider range of NSR profiles, beyond that of a male-breadwinner household. Finally, *Section 2.5.* explores how deprivation outcomes resulting from NSRs have been measured within social research, including a consideration of how other forms of deprivation outcomes are examined.

2.2. The Transition to a Post-Industrial Society and the Emergence of New Social Risks (NSRs)

As previously discussed in *Section 1.3.*, NSRs can be derived from several changes associated with the transition to a post-industrial society. This section focuses specifically upon three key domains of ‘participation’ and ‘provision’ in society, which these changes can be attributed to: ‘the labour market’ (*Section 2.2.1.*), ‘the household’ (*Section 2.2.2.*), and ‘the welfare state’ (*Section 2.2.3.*).

2.2.1. The Post-Industrial Labour Market

The causes and consequences of deindustrialisation in Britain have been subject to much debate (see: Crafts, 1996; Booth *et al.*, 2002). However, a key determinant of British deindustrialisation can be attributed to changing macroeconomic conditions, resulting from an increase in global competition between key industrial sectors; in part due to the combination of lower wages and taxes bases of other countries (Schmid, 2007). This resulted in the transfer of core manufacturing activities overseas, and subsequently the decline in heavy-manufacturing in Britain from the 1960s onwards. In particular, from peak manufacturing employment in 1966 (Chandler, 1992i), which is often associated with an increased perception of wage insecurity and growing rates of long-term unemployment (Bazen & Thirwall, 1989).

Accompanying the decline in the manufacturing sector in post-industrial Britain was the establishment of the newly innovative service sector (Leoni, 2015), which offered new opportunities and constraints for those actively participating in the labour market. The emergence of this technologically-driven sector provided both low-value and high-value-added forms of employment in service-based industries (Aggarwal, 2011: p.57). Low-skilled individuals; including those who were once employed in the manufacturing sector (i.e. male breadwinners), typically found themselves partaking in low-value-added forms of service employment. Such precarious forms of employment included entry-level roles in retail, cleaning, and catering, and often provided low wages and a limited scope in terms of career progression (Pierson, 1998).

Furthermore, the ‘contractualisation’ of such forms of service-based employment (Eppel, 2012), led to an increasing number of workers undertaking ‘temporary’ or ‘fixed-term’ contracts; estimated at 15-20% of the entire workforce by 2011 (Van Wanrooy *et al.*, 2013). The perceived lack of economic security which stemmed from such insecure forms of employment became further constrained, as contract-based workers were often not entitled to the same employment rights as employees, such as the right to receive company-based severance pay (Booth *et al.*, 2002). The result of such precarious forms of employment led to the emergence of an increasing proportion of workers who were undertaking ‘non-standard’ jobs, and who ultimately faced the constraints and (potentially) negative consequences of not being able to fully-participate within the post-industrial labour market.

In contrast, high-value-added forms of service employment also emerged via the introduction of a knowledge-based economy, which centred around: the production, distribution, and use of knowledge and information systems (OECD, 2005). This transition to a knowledge-based economy ultimately resulted in the specialisation of tasks which required employees to have specific skills and competencies (see: Leoni, 2015). The importance of obtaining specific skills and formal qualifications can be demonstrated by the increasing median returns of employment wages, in relation to an individual’s investment in higher education (Greenaway & Haynes, 2003). Thus, establishing the importance of educational attainment together with the ongoing provision of life-long

learning, as key determinants of being able to secure an adequate form of employment (Taylor-Gooby, 2004: p.4.). Consequently, over time there has been an increasing proportion of individuals that have been unable to enter or remain within the post-industrial labour market in Britain, either due to a lack of (premium) qualifications and/or skills (Armingeon & Bonoli, 2006). In addition to these contextual changes there were also important compositional changes within the labour market, which have also acted as both causes and consequences of the transition to a post-industrial society.

A notable modification to the employment patterns of individuals in modern society has been a theoretical transition from the male-breadwinner model to the adult-worker model (Lewis, 2006). Specifically, during the 1970s two pieces of employment legislation were fundamental to the continued increase in the proportion of women in paid employment (Becker, 1994). Notably, the 1970 Equal Pay Act which prohibited any less favourable treatment between men and women, in terms of both pay and conditions of employment (Equal Pay Act, 1970). Subsequently, the 1975 The Employment Protection Act was also commenced, making it illegal for an employer to dismiss a woman from paid employment due to pregnancy; alongside introducing the notion of statutory pay during a woman's maternity leave (Employment Protection Act, 1975).

Therefore, this ongoing trend of implementing forms of legislation to promote greater gender equality in the workforce, is reflected by 66% of women (aged 16 to 64 years old) partaking in paid employment by 2011, which was a substantial increase from only 53% of women partaking in equivalent forms of employment in 1971. In comparison, the proportion of men in paid employment declined from 92% to 77% across the same period (LFS, 2012). Furthermore, during this time-period an increasing number and type of employment options also began to emerge, such as: an increasing number of opportunities to go part-time, the ability to work flexibly (e.g. from home), and the ability to delay entry into the labour market as a result of being able to opt into full-time education instead (Schmid, 2007). However, the increasing diversity and prevalence of employment options alongside the mass employment of women, constrained the ability for all workers to fully participate in the labour market. The result of which was an increasing proportion of the (potential) overall workforce who became unable to secure stable employment-opportunities, or long-term unemployed.

2.2.2. Changes to the ‘Family Household’ Structure

There are numerous changes associated with the transition to a post-industrial society that have enhanced the everyday lives of individuals and/or households. The widespread sociodemographic changes associated with the transition to a post-industrial society, included a cultural shift in terms of the social norms surrounding the formation of partnerships; including the emancipation of women, who were once predominately located within the ‘private’ social sphere. This modification of relationships was partially facilitated by the introduction of the 1967 Divorce Reform Act, which meant that potential grounds for divorce could now result from a lack of relationship quality or due to couples spending an extended period apart (Farber, 1973).

In contrast, prior to the 1967 Divorce Reform Act being introduced, legal grounds for divorce could only be granted if one spouse could demonstrate that the other had broken the marriage contract through: adultery, desertion, or unreasonable behaviour (Cliquet, 1991). Consequently, the introduction of the 1967 Divorce Reform Act allowed for both men and women, to no longer be as constrained by the legal institution of marriage as they once had been (Mulder & Lauster, 2010); resulting in a declining proportion of married couple households in modern society (with or without dependent children). Furthermore, young adults were provided with the (potential) opportunity to experience the autonomy and freedom of adulthood (Cross-Barnet *et al.*, 2011), without having to immediately assume the position of marriage and childbearing within traditional family structures.

Correspondingly, since the 1970s onwards there has been an increase in the diversity and prevalence of both family and non-family household types (as further discussed in *Chapter 3*), yet, family households that consist of a couple with dependent children still remains a key type of (delayed) household formation today (Lund, 2011). Instead, new forms of relationships are reflected in a greater range of options and potential choices in terms of living arrangements (Lesthaeghe, 1995), including: co-habitation, child-bearing outside of marriage, and legally-recognised civil partnerships (Kiernan, 2004). However, this ongoing transformation in types of living arrangements has led to a key shift in the historical notions of the ‘household’ and ‘family’, no longer being terms that are

synonymous with one another (Mc Rae, 1999). Therefore, from the late-1970s onwards the roles and responsibilities surrounding the care of dependent children which were once assumed to be predominantly undertaken by women within a nuclear-family household, could no longer be guaranteed to be provided for by the 'private' social sphere.

The constrained caring capacity of family households due to the shift in the employment patterns of household members, became further compromised by the increasing number and proportion of dependent older people that had emerged simultaneously with the transition into a post-industrial society. Whereby, for conceptual reasons, older people are often referred to as those who are aged 65 years old and over (Caley & Sidhu, 2011). Yet, this definition of 'older' people does not directly reflect the current state pensionable age, as recent pension reforms have begun to increase this (arbitrary) threshold for successive age-cohorts (see: Carrino *et al.*, 2018). Therefore, in terms of determining 'older people' should no longer be defined solely as a homogenous group who are aged 65 years old and over. Instead, a clearer divide should be acknowledged between those older people who are 'actively ageing' and continue to contribute productively to society (Schroder-Butterfull & Marianti, 2004), and those who are the 'oldest-old' who have ongoing health and social-support needs (Schwanen *et al.*, 2012).

However, the concept of 'population ageing' is often framed in relation to the challenges that older people may potentially face, in terms of the planning of adequate social care provision (Christensen *et al.*, 2009). Specifically, an ageing population refers to one that has an increasing number and proportion of *very* old people (Townsend, 1981). And so, population ageing can be determined as a reflection of both an increase in the average (median) age of the population, alongside an increase in the number and proportion of older people in society (Schwanen *et al.*, 2012).

In populations that already have high proportions of older people - such as in Britain, it is the reduction in both fertility and mortality rates that are the key determinants of *continued* population ageing (Stockdale, 2011). And so, the continued ageing of the population in Britain has led to an increasing number and proportion of older people who may require ongoing support, via both formal and informal types of health and social-

care provision (Smart, 2009). Consequently, a greater understanding of the opportunities and constraints which older people may face in comparison to those of previous generations, is vital to maintaining and improving the everyday life-chances of the 'oldest' old in society. Yet, due to this increasing proportion of the population who may potentially require specific welfare-support measures (e.g. accommodation for 'assisted living'), the transition to a post-industrial society has also be associated with the 'crisis' of the welfare state in Britain.

2.2.3. The 'Crisis' of the British Welfare State

It has been suggested by Whelan *et al.*, (2003) that an ongoing paradox has emerged between an increasing number of social problems in post-industrial society, in conjunction with a reduced fiscal base in which to support the wants and needs of citizens (Pierson, 2001). This societal problem has led to an ongoing trade-off between the equity and efficiency of redistribution mechanisms across an individual's lifetime (Bovenberg, 2007), which have become increasingly constrained due to the shift from social protection mechanisms to social investment mechanisms (Holzmann & Jorgensen, 1999). Thus, reinforcing the perspective that the social-welfare needs of different population sub-groups are not able to be appropriately met by the welfare state, which in turn reinforces specific socioeconomic disparities within society.

In addition, constraints to the provision of welfare can also be partially attributed to the fact that the assumptions on which, the welfare state was established are increasingly compromised. In *Section 2.2.1* it was demonstrated that the abundance of secure industrial employment opportunities could no longer be guaranteed (Schmid, 2007), resulting in a relative increase in the number of welfare clients who require assistance and an ongoing reduction in the number of net contributors to the welfare system. Furthermore, as established in *Section 2.2.2*. the 'family household' can no longer be assumed to be the primary provider of care for dependents in society, which has placed increasing pressure on the welfare state to provide additional support beyond its initial remit. And so, due to the occurrence of these structural changes within both the 'labour market' and 'family household' domains, the 'caring capacity' of the 'welfare state' has increasingly become constrained in terms of being able to provide adequate assistance to the increasing number and diversity of welfare clients. Overall, the aforementioned

societal changes resulted in the term ‘social risk’ no longer being applicable to explaining the unintended consequences experienced by individuals/households in post-industrial society.

Consequently, the emergence of a greater range and diversity of household types required the concept of NSRs to be generated in academic discourse (e.g. Taylor-Gooby, 2004), in order to reflect the evolving compositional and contextual changes associated with contemporary British society. This theoretical perspective of including the ‘household domain’, is in contrast to previous empirical analyses of NSRs that have solely focused upon the ‘labour market’ and ‘welfare state’ domains. And so, the specific social and societal changes that are associated with the transition to a post-industrial society, and have subsequently resulted in the conceptualisation of NSRs in research are discussed in *Section 2.3*.

2.3. The Conceptualisation of New Social Risks (NSRs) in Research

From the outset, this research has defined NSRs in reference to the point in which the inertia of the welfare state, job insecurity, and the increasing fragility of family support intersect (Busetta & Milito, 2009). Thus, NSRs can be conceptualised within the context of individuals who are unable to fully participate in the social domains of ‘participation’ and ‘provision’ in society, namely: the ‘labour market’, ‘welfare state’ and ‘household’ domains. Whereby, these three domains are most commonly cited in the literature as being responsible for the distribution of key resources and opportunities in the everyday lives of individuals (Taylor-Gooby, 2004; Bonoli, 2005; Pintelon *et al.*, 2013; Ranci & Pavolini, 2013).

Despite the increasing utilisation of the term NSRs within the literature and beyond (Taylor-Gooby, 2004; Bonoli, 2005; Huber & Stephens, 2006), there is continued confusion surrounding as to what the concept of NSRs exactly entails. For example, NSRs are often incorrectly conceptualised as simply a ‘modified’ form of social risk, with NSRs defined solely in relation to situations in which individuals may experience a loss of income (see: Jenson & Saint-Martin, 2006; Häusermann, 2012). Furthermore, the

ongoing conceptual confusion surrounding NSRs may also be compounded by the fact that they should not be treated as a ‘new’ social phenomenon as per se, but rather one that is ‘newly recognised’ (Pierson, 2001: p.456). However, due to the complexity of the discourse surrounding how NSRs are conceptualised and theorised within the literature it is unsurprising that a lack of consensus surrounding a clear definition of NSRs has yet to be reached. For example, Vandecasteele (2011) makes repeated references to “life course risks”, a term which they use interchangeably with the term NSRs. Therefore, it is unsurprising that further investigation into defining the opportunities and constraints of NSRs, and the population sub-groups which they are applicable to (i.e. NSR profiles), is required.

And so, for the purpose of this research enquiry, NSRs are defined as ‘events’ or ‘transitions’ that occur at critical junctures across the life course which, may prevent individuals or households from fully participating in the key social domains of contemporary society (Taylor-Gooby, 2004; Bonoli, 2005; Pintelon *et al.*, 2013). A succinct summary of the exact NSRs associated with the transition to a post-industrial society, within the three key domains of participation and provision which, include but are not limited to (*adapted from*: Taylor-Gooby, 2004):

Labour Market

- Lacking the skills required to either enter, and/or remain within the labour market.
- Obtaining adequate skills and training, which, subsequently become obsolete.

Household

- Being unable to reconcile paid work with care responsibilities, especially the care of (pre-school aged) dependent children.
- Becoming physically dependent in old age, whilst lacking the support of friends and family.

Welfare State

- Experiencing insecure or inadequate forms of welfare provision.

There are two overlapping NSRs attributed to the post-industrial labour market that are reflected by the skill sets of workers; often preventing individuals from undertaking secure forms of full-time employment. For younger adults, there is the issue of being unable to enter and securely remain within the post-industrial labour market, due to a lack of adequate training and skills (Armingeon & Bonoli, 2006). Whereas, for middle-aged and older workers there is the inability to remain within secure forms of employment, due to obsolete skills and/or a lack of on-the-job training (Cantillon & Vandembroucke, 2014). Both of these NSRs are not necessarily derived from a lack of employment opportunities, but are instead attributed to the increasing insecurity of employment options available to low-skilled workers. Although there are structural changes within the labour market that are compromising the ability of workers to obtain and remain within secure forms of employment, the responsibility has fallen to individual workers - at a variety of life-stages, to adapt to the requirement of life-long learning. Furthermore, both these NSRs are also applicable to a greater range of compositional groups in society than previously thought of, due to the increasing participation of women in the labour market, alongside the increasing longevity of the economically-active population (Esping-Andersen, 2002).

Changing gender and family roles associated with the 'household' domain are also associated with two, distinct NSRs. The first NSR regards 'the inability to reconcile paid work with caring for dependents', which is an issue that is particularly applicable for parents who have younger dependent children (Jenson, 2004). This NSR is also commonly associated with lone-parent households, whereby lone-parents themselves are frequently defined within the literature as an NSR (Jenson, 2006; Eppel, 2012). The second NSR attributable to the 'household' domain is that of 'dependency in old age' due to the increasing number and proportion of older people within the British population who have a diverse set of social-support needs (Victor *et al.*, 2000). Although this particular demographic group has long been recognised as a social risk in the literature rather than as a NSR, the emerging complexity of the resulting deprivations outcomes which occur for the increasingly diverse older population can be identified as "newly recognised" within contemporary studies (Pierson, 2001: p.456). Therefore, examining the NSR of 'physical dependency' in old age should be distinguished separately to existing investigations that contextualise 'old age' as a social risk of industrial society.

Finally, the welfare state which was once conceptualised as providing a form of social insurance against the social risks of industrial society, has now been determined as a producer (as well as a consumer) of NSRs in post-industrial society. As a result, NSRs put pressure on the welfare state due to “the rising demand, restricted resources and constraints on the capacity of the government to reconcile the two” (Taylor-Gooby, 2004: p.6.). And so, although the concept of NSRs is often utilised within the NSR literature in relation to responding to and mitigating against NSR deprivation outcomes (see: Esping-Andersen, 1999), NSRs are less frequently assessed in terms of how they can be attributed to the insufficient coverage of welfare provision. The result of which, is the NSR of ‘welfare-client groups who experience insecure or inadequate forms of social investment measures’ (as summarised above), being less commonly acknowledged within the NSR literature than that of evaluating the role of the welfare state as an NSR.

This concise overview has demonstrated that NSRs should be understood in relation to the uncertainty and diversity of a wide range of welfare outcomes, rather than simply being understood as a ‘modified version’ of the preceding social risks of industrial society. Also, the labour market is no longer the principal mechanism of social integration in society, due to the previously mentioned social and societal changes associated with the transition to a post-industrial society. Correspondingly, NSRs should therefore not be assumed to be derived exclusively from the ‘labour market’ domain (see: Cantillon & Van den Bosch, 2002).

Instead, as demonstrated by *Section 2.2.2.* (and highlighted by *Section 1.2.*), the ‘household’ can also be determined as a key domain of social participation and provision in society. Furthermore, it has also been suggested that the key changes to family and gender roles within the household context (Ranci, 2010), has resulted in the increasing prevalence of NSRs attributed to the inability to meet the care needs of dependent members of the household. The result of such a theoretical notion requires further empirical investigation into how the ‘household’ domain, can potentially modify and influence the NSR outcomes which are attributed to it. And so, prior to investigating the context of the ‘household’ domain further, there is a prior need to understand how the uncertainty and diversity of NSR outcomes have been theorised within the literature.

2.3.1. Theorising the Uncertainty and Diversity of New Social Risk (NSR)

Outcomes

There continues to be a dominance of theoretical perspectives based upon the wider perspective of social risk management strategies and evaluating the management and responses to the diversity of NSR outcomes in society (e.g. Holzmann & Jorgensen, 2001). For example, the perspective of ‘governmentality’ focuses upon how risks in society should be collectively managed, by the appropriate institutional structures in society (Miller & Rose, 2008). Whereby, it has been suggested that it is the impacts that stem from experiencing the opportunities and constraints of risks that should be the focus of governance structures, rather than the actual risks themselves. In contrast, the systems theory approach suggests that it is *how* risks are communicated within social systems, as to how the subsequent outcomes are responded to in society (Lupton, 2003). Although, both theoretical perspectives provide an indication of NSR outcomes being potentially modified as a result of how they are managed and communicated within society, they do not provide an indication of how the uncertainty and diversity of NSRs are initially determined within society. The result of this lack of understanding of how NSRs are socially stratified in society, has also led to the wider discussion as to who is actually responsible for mitigating (and potentially preventing) NSR outcomes in the first place.

In response, the risk society perspective has been established as a fundamental theory within the NSRs literature, specifically by informing how NSRs are socially constructed within contemporary society (Zinn, 2013). Whereby, Beck (1992) originally discussed the emergence of a ‘risk society’ which, suggested that there was increasing diffusion and intensity of *risks* within postmodern societies. Subsequently, this perspective was developed by Giddens (1994) as the ‘*uncertainties*’ that had been socially manufactured amongst the general population. And so, it is the ambiguity of the uncertainty and diversity of NSR outcomes (as outlined in *Section 2.2.*) that is attributed to Beck’s (1992) and Giddens’ (1994) concept of the ‘risk society’.

The uncertainty and diversity of outcomes that result from NSRs, are further reinforced by the continued fragmentation and disorganisation of the ‘risk society’ (Whelan & Maître, 2008). Of particular note is how the ‘risk society’ perspective has called

traditional, hierarchical-forms of social stratification, such as the social-class system into question. The unpredictability of the NSR outcomes that the same population group may experience in contemporary society, has resulted in a number of challenges for NSR structures. For example, older people who live alone and would not be classified as being in poverty or income-deprived, but who may experience differential access to social networks in order to support with their social-care needs (Armingeon & Bonoli, 2006). Therefore, the notion of NSRs has facilitated a social discourse that has identified that there are differential consequences and contingencies that different NSR profiles may experience, due to individuals being unintentionally exposed to NSRs in their everyday lives. And so, there is a need to explore other forms of social stratification mechanisms, in order to provide further understanding of how NSR outcomes can be potentially modified for different NSR profiles, as discussed in *Section 2.4*.

2.4. Social Stratification of New Social Risks (NSRs)

Given that contemporary societies have become more heterogeneous and biographies more individualised, the hierarchical role of the social-class perspective in shaping the distribution of different forms of social disadvantage in society have become a challenge (Leoni, 2015). Existing forms of social stratification have been demonstrated to be losing their relevance to the exploration of NSRs, due to the restrictive nature of categorising who 'is', and 'is not' determined to be potentially 'at risk' (Pintelon *et al.*, 2013). Thus, resulting in the argument that the social-class perspective may only be relevant to the analysis of SRs only, due to their specific population bases aligning with one another, and the distinct notion of what social risks exactly entail (Pintelon *et al.*, 2013). Further consideration needs to therefore be given as to how NSRs are socially stratified within contemporary society, especially in terms of being able to assess the key instances in which NSR 'events' or 'transitions' (Taylor-Gooby, 2004: p.48) are most likely to occur.

Correspondingly, there continues to be a pervasive lack of conceptual clarity surrounding how NSRs are understood and conceptualised in the literature. However, as is noted in *Section 2.4.1*, the social stratification of NSR outcomes via the 'life course' perspective has become an important theory for understanding of how NSR outcomes may contribute to wider issues of social inequality (e.g. Mayer, 2009).

2.4.1. The Life Course Perspective

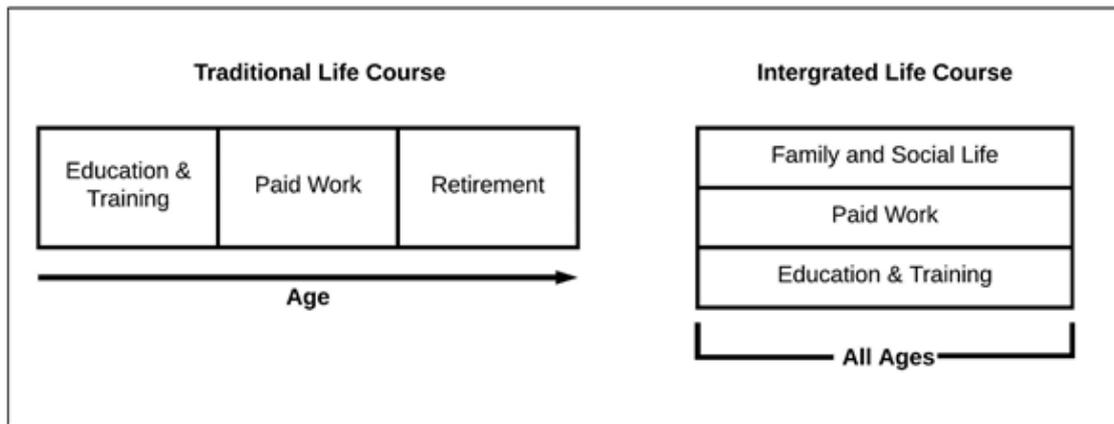
The life course perspective is often adopted as a key theoretical approach with which to explore the diversity and uncertainty of NSR outcomes, as it provides a way to outline how specific NSRs correspond to certain population sub-groups (NSR profiles). Initially, Taylor-Gooby (2004) first referred to how NSRs occurred in relation to “transitory life-stages” (p.48), reflecting the difficulties of being unable to successfully identify NSRs and their corresponding deprivation outcomes. Subsequently, the life course perspective was introduced soon after by Armingeon & Bonoli (2006), who acknowledged the notion of NSRs as being socially stratified across the life course (p.58). Nevertheless, up until now there has been a limited consideration of how the life course is operationalised within research (Arnett, 2007).

Primarily, the life course has been utilised as a social stratification perspective in order to understand the risks of contemporary society, as it demonstrates key points across an individual’s life where key/events transitions are most likely to occur. The life course perspective is often conceptualised as being comprised of three distinct phases: education, work, and retirement (Leisering & Leibfried, 1999). As stated by Irwin (2013), empirical analyses often fail to engage sufficiently with sociodemographic changes that have occurred in contemporary society; as already outlined in *Section 2.2*. This has led to repeated calls for the life course to be understood in relation to how different events and transitions have become de-standardised (e.g. Heinz & Krüger, 2001), away from the tripartite of ‘life-stages’ as previously stated by Leisering & Leibfried, (1999).

Congruently, traditional notions of age stratification have begun to be challenged by the shift from a linear perspective (e.g. Alwin, 2012), to one which is more diversified. Consequently, this research argues that existing notions of a *linear*, life course perspective should be re-conceptualised into one that provides a more *integrated* approach, based on the work of Reday-Mulvey in *Figure 2.1*. (2005). The integrated, life course perspective demonstrates that NSRs are more inherently embedded within the wider social structures of contemporary society (Cantillon, 2011). Unlike the social class perspective, which, focuses upon defining specific groups and their associated outcomes, the result of which, is more relevant to the analysis of SRs of industrial society (Pintelon *et al.*, 2013).

Subsequently, allowing for the precariousness and unpredictability of events that can emerge for a wide range of biographies across the life course to be captured, and for their impacts to be effectively measured (Vandecasteele, 2011).

Figure 2.1. Differences between traditional and integrated life course perspectives



[Adapted from: Reday-Mulvey, 2005]

Figure 2.1. illustrates that there has been a movement towards an updated approach to investigating the life course, which considers the life course from an integrated rather than a linear perspective (see: Reday-Mulvey, 2005). The discontinuity of outcomes experienced by different NSR profiles and the subsequent shift in trajectory of how individuals can participate in everyday life, should be considered as alternative pathways for empirical investigations to explore (Ranci & Pavolini, 2013). As Dewilde (2003) highlights, there is now great debate as to the importance of the life course and individualisation perspectives, for informing how we conceptualise and evaluate NSR outcomes. This is in relation to how experiences which, enable individuals to participate in society have become individualised (Atkinson, 2007). The process of individualisation has given adults the ability to seek out a variety of opportunities, instead of being controlled by the pre-existing social norms of British society (Giddens, 1991). Moreover, the individualisation thesis also suggests that traditional structures have lost their grip on individuals' lives (Beck, 1992; Beck & Beck-Gernsheim, 1996; Beck & Beck-Gernsheim, 2002).

The individualisation thesis therefore challenges the influence of traditional social structures upon the lives of individuals due to the heterogeneity of society, and the diversity of outcomes individuals may face. Thus, reinforcing the notion of the decline in social-class structures and the intergenerational transmission of life chances, instead the introduction of the individualisation perspective should be viewed as being complementary to that of the life course perspective. Consequently, the life course perspective has been viewed as a way of exploring how the lives of individuals have become embedded within specific social structures, often providing a focus to the roles and positions that different NSR profiles within social structures occupy. As Schmid states: “the life course is socially constructed and should be shaped by (institutional) forces alone” (2007: p.8). Due to the once linear notion of the life course perspective corresponding to the three key life stages of ‘childhood’, ‘adulthood’ and ‘old age’ becoming challenged, the newly-emerging concept of phases of life’ can now be explored (Pintelon *et al.*, 2013).

To summarise, for the purpose of this research, NSRs are defined as ‘events’ or ‘transitions’ across the life course, which, may prevent individuals or households from fully participating in the everyday domains of society (Taylor-Gooby, 2004; Bonoli, 2005; Pintelon *et al.*, 2013). Furthermore, it has previously been acknowledged that simply being exposed to an NSR does not result in the equal prevalence nor intensity of deprivation outcomes for everyone who is ‘at risk’ (Ranci, 2010). For example, reaching state pensionable age, and potentially retiring from the labour market, does not necessarily equate to the occurrence of a negative outcome through reaching ‘old age’. As discussed by Schroder-Butterfill & Marianti (2006), future studies should also consider the ‘susceptibility’ of NSR profiles experiencing deprivation outcomes at key points of the life course, via the assessment of individual’s sociodemographic attributes (e.g. age, or gender).

2.5. The Measurement of New Social Risks (NSRs)

As identified in *Sections 2.1.-2.4.*, there is a vast amount of literature surrounding the conceptualisation and qualitative assessment of NSRs, yet the quantitative measurement of NSRs is particularly lacking - especially within the context of Britain. Also, as

previously acknowledged in *Section 2.3*. empirical analyses of NSRs tend to solely focus upon the ‘labour market’ as the principal context in which to investigate the occurrence of specific NSRs, especially for distinct NSR profiles. Examples of existing studies that seek to determine and evaluate specific NSRs and resulting outcomes are discussed below.

Hendrickson & Sabatinelli (2014) examined the changing context of labour markets in relation to local employment policies across ten European cities, in order to evaluate the NSR of ‘being unable to fully participate within the labour market’. Specifically, Hendrickson & Sabatinelli (2014) found that different NSR outcomes corresponded to both the composition of the economically active population, and the dominance of specific employment structures within each city. Of note, were the differences in NSR outcomes depending upon the nature and prevalence of temporary-employment structures within each city of interest, thus informing the construction of the typology of ‘local labour markets’ to be undertaken. For example, notable differences, in terms of NSR outcomes were demonstrated in relation to the insecurity of employment opportunities between cities classified as ‘formal industrial centres’ e.g. Birmingham (UK), and in comparison, to ‘male-centred’ cities, e.g. Milan (Italy). Furthermore, from this analysis Hendrickson & Sabatinelli (2014) were able to suggest specific local intervention measures for each of the cities of interest, in order to meet the needs of the economically-active population via the construction of a typology of ‘local labour markets’. Overall, this study demonstrates the importance of the context and composition of the economically active population, in assessing the diversity of NSR outcomes resulting from the NSR of ‘being unable to remain within the labour market’.

Furthermore, as part of the NSR literature the ‘welfare state’ domain is frequently examined in order to assess the *responses* that mitigate against the impacts of NSR outcomes, rather than as a domain in which, to examine and evaluate the constraints and opportunities of being exposed to an NSR (see: Bonoli, 2007; Ranci *et al.*, 2014). This research’s positionality led to several NSR analyses exploring how NSR outcomes are responded to by different forms of social welfare provision. Accordingly, the concept of NSRs has been instrumental within social policy research for evaluating the capacity of welfare state mechanisms, via: classifying different welfare typologies (Esping-

Andersen, 1990), evaluating existing welfare policies (Ranci, 2010), and establishing different forms of comparative policy research (Armingeon & Bonoli, 2006). Of note, Armingeon & Bonoli's classification (2006) determines that certain typologies of European countries (e.g. Nordic countries) have reoriented their welfare states to provide more adequate protection to NSRs, whereas English-speaking countries maintain an outdated policy approach that fails to respond to the increasing prevalence of NSRs within contemporary society.

In summary, how NSRs are understood and measured within the literature has demonstrated the importance of examining the determinants of NSRs, in relation to the corresponding social structures that shape the everyday lives of individuals. Research has often focused on how institutional perspectives (i.e. the labour market and welfare state) determine the outcomes and responses to issues of social inequality in society, including those resulting from NSR outcomes (e.g. Adams *et al.*, 2008). These social institutions and structures (e.g. the Organisation for Economic Cooperation and Development [OECD]) often reflect and incorporate key social and societal values (e.g. the importance of equal opportunities, meritocracy, and social justice... etc.), and can therefore further influence the way in which people respond to being unable to participate fully within the everyday social domains of society (Ranci, 2010). Thus, Markus & Fiske (2012) argue that these social institutions, which, are structured to benefit the dominant (easily-recognised) social groupings within society, may then neglect responding to the social needs of other sub-populations of interest (Adams *et al.*, 2008).

As demonstrated by the variety of research outputs the examination of NSRs has been integral to understanding how different NSR outcomes are responded to at both the national, and cross-national levels (Van Ham *et al.*, 2012). Yet, these analyses are largely aspatial, as they consider effects across the whole extent of the nation, with (at most) some discussion of regional variations (Ranci & Pavolini, 2013). It is therefore essential that future enquiries into how NSR outcomes can be understood within specific geographies, in order to establish how specific contexts can contribute to understanding and potentially modify specific deprivation outcomes within contemporary society. Such a shift in research direction towards exploring the importance of spatial contexts would also provide a response to the dominance of comparative institutional research,

particularly about cross-national social policy evaluations within the NSR literature (Armingeon & Bonoli, 2006). This suggestion of NSR literature exploring the differential NSR outcomes experienced by a diversity of NSR profiles, would also inform more equitable solutions and mitigation strategies for combating deprivation outcomes in the future.

2.6. Discussion

The conceptualisation of NSRs has been shown to be attributed to a series of societal and sociodemographic changes associated with the transition to a post-industrial society from the 1970s onwards. Furthermore, NSRs have been identified to emerge from a wide range of circumstances, extending beyond that of being the male-breadwinner of a household, or being unable to derive a wage from the labour market; a context which should be specifically associated with the concept of social risks. Thus, the key changes attributed to NSRs should be understood within the domain of the ‘household’, alongside the domains of the post-industrial ‘labour market’ and ‘welfare state’. Although the changes within these three domains can be associated with transformations and/or modifications to existing social structures, the concept of NSRs itself should not be confused as being a ‘modified’ form of social risk, but as a separate social phenomenon instead. And so, the conceptual clarity provided by establishing NSRs within a wider range of contexts to that of SRs, provides the opportunity to further examine the uncertainty and diversity of NSR outcomes commonly theorised within the literature.

Therefore, a primary consideration of this thesis is to examine NSRs in relation to the uncertainty and diversity of *social deprivation* outcomes, which may result for distinct NSR profiles at different points across the life course. Social deprivation outcomes were chosen as the NSR outcome of interest in this research enquiry, because it would be impossible to account for all constraints and opportunities resulting from being exposed to any given NSR. As previously acknowledged in *Chapter 1*, the social deprivation outcomes resulting from NSRs do not necessarily concern situations in which, individuals face extreme hardship or poverty (Armingeon & Bonoli, 2006). Instead, these outcomes refer to the inability of individuals and/or households to access opportunities and resources in society that are deemed a necessity, in order to maintain an adequate quality of life, the lack of which may influence the future life chances of the individual and/or

household. Therefore, investigations into the social deprivation outcomes resulting from NSRs, should also take into consideration the social stratification of outcomes for different NSR profiles across a variety of contexts. Thus, shifting away from the existing dominance of institutional perspectives, in relation to examining income and welfare-based approaches to evaluating NSR outcomes.

It is specifically the deprivation outcomes that particular compositional groups may experience, as a result from being exposed to NSRs within the relatively under-explored domain of ‘the household’, which, will be considered further. As illustrated by *Figure 1.1.*, exploring the NSRs derived from ‘the household’ domain allows empirical analyses to extend beyond existing research. For example, Ferrera (2005) who focuses upon the drivers and outcomes of the labour market, alongside the responses produced by the welfare state. Instead, the approach undertaken by this research enquiry provides basis in which, to establish a more nuanced understanding of the social deprivation outcomes that are associated with NSRs attributed to the ‘household’ domain. The ability of such an approach will add to our current understanding of the prevalence and diversity of social deprivation outcomes, which may potentially occur for distinct NSR profiles who are exposed specific NSRs. Furthermore, this chapter has also addressed lack of analysis at small-area level geographies, in which, to understand and measure NSR outcomes (Ranci, 2010). Correspondingly, this chapter provides the impetus for this research, to respond to the need for quantitative measures of NSR outcomes which, are attributed to the ‘household domain’ which, are further investigated from *Chapter 3* onwards.

Chapter 3 – Exploring New Social Risks (NSRs) Attributed to the ‘Household’ Domain

3.1. Introduction

As previously established in *Chapter 2* the ‘household domain’ remains a relatively unexplored context in which to examine the differential deprivation outcomes associated with specific NSRs. Therefore, this chapter aims to conceptualise how the NSRs attributed to the ‘household domain’ correspond with specific NSR profiles, in relation to key points across the life course (Dewilde, 2003; Vandecasteele, 2011). Prior to establishing the NSR profiles that are to be explored within the context of the ‘household’ domain, *Section 3.2.* provides a clear definition of what the concept of the ‘household’ exactly entails for this research enquiry. *Section 3.3.* then establishes the NSR profiles that can be utilised to explore the differential outcomes of NSRs; conceptualised as ‘Household-Unit Types’ (‘HUTs’) for the purpose of this research.

Once the HUTs (NSR profiles) have been established, *Sections 3.4.* and *3.5.* will then consider the two NSRs most commonly theorised within the ‘household’ domain: the ‘physical dependency’ of older people, and the inability of individuals to ‘reconcile paid work with caring for dependents’. Correspondingly, the selection of the HUTs most suitable to examine the required NSRs are then determined. Finally, *Section 3.6.* provides an overview of how previous studies of multiple deprivation have been quantified at the neighbourhood level, via the construction of composite social measures. Additional justification is included as to why the neighbourhood provides an appropriate context to explore the social deprivation outcomes of the chosen NSRs and attributed HUTs. Overall, this chapter aims to provide the background to the construction of small-area level measures of deprivation for the distinct HUTs (detailed from *Chapter 5* onwards).

3.2. The ‘Household’

As previously identified in *Section 2.2.2.* the ‘household’ has been theorised in NSRs literature as a key social domain of ‘participation’ and ‘provision’, and has become modified due to the changing family and gender roles associated with the transition to a

post-industrial society. For example, the emergence of the NSR of being ‘unable to reconcile paid work with caring for dependent children’ (Taylor-Gooby, 2004), can be attributed to the ‘household’ domain. This particular NSR has been suggested to correspond to how the ‘family household’ can no longer be assumed solely responsible for the general provision of care of dependents (Jenson, 2004). It has also been suggested by Bonoli (2005) that exposure to this NSR may result in an increasing diversity of social deprivation outcomes for parents/legal-guardians and their children, within a given ‘household’. Furthermore, the NSRs literature has also explored how the ‘household’ can also be situated as a key site for the redistribution of everyday resources and social protection mechanisms in society (Lewis, 2006). Thus, both studies highlight the theoretical importance of the ‘household’ domain as a context for exploring social deprivation outcomes, alongside the ‘labour market’ and ‘welfare state’ domains that are more commonly considered in empirical analyses of NSRs (e.g. Ranci, 2010). Therefore, the ‘household’ can provide a useful unit of enquiry in which to explore the disparity of resources and opportunities in contemporary society.

This research aims to reinforce the importance of the ‘household’ domain to the assessment of NSR outcomes, especially in response to how “social scientists continue to overlook the study of the household...within empirical analyses” (Ellickson, 2008: p.5). Therefore, by exploring the specific deprivation outcomes that are associated with the NSRs attributed to the ‘household’ domain (as outlined in *Table 1.1.*), this research enquiry aims to add a more nuanced understanding of the social deprivation outcomes associated with distinct NSR profiles. Prior to identifying the specific compositional attributes of different household types that may experience differential NSR outcomes, how the ‘household’ is understood as a concept in sociodemographic research needs to be established.

Frequently, the concept of the ‘household’ from a social research perspective can either be understood as an object of enquiry (Lund, 2011), or as a context in which to understand issues of social inequality in contemporary society (Pickett & Pearl, 2001). In the first instance, the ‘household’ as a standalone physical structure can be used to inform the availability of accommodation, in order to meet the needs and requirements of different populations. For example, exploring the accessibility of different accommodation types

that are suitable for older people with mobility issues, who also wish to continue to reside independently in their own residence (see: Walker, 2002; Fendrich & Hoffmann, 2007).

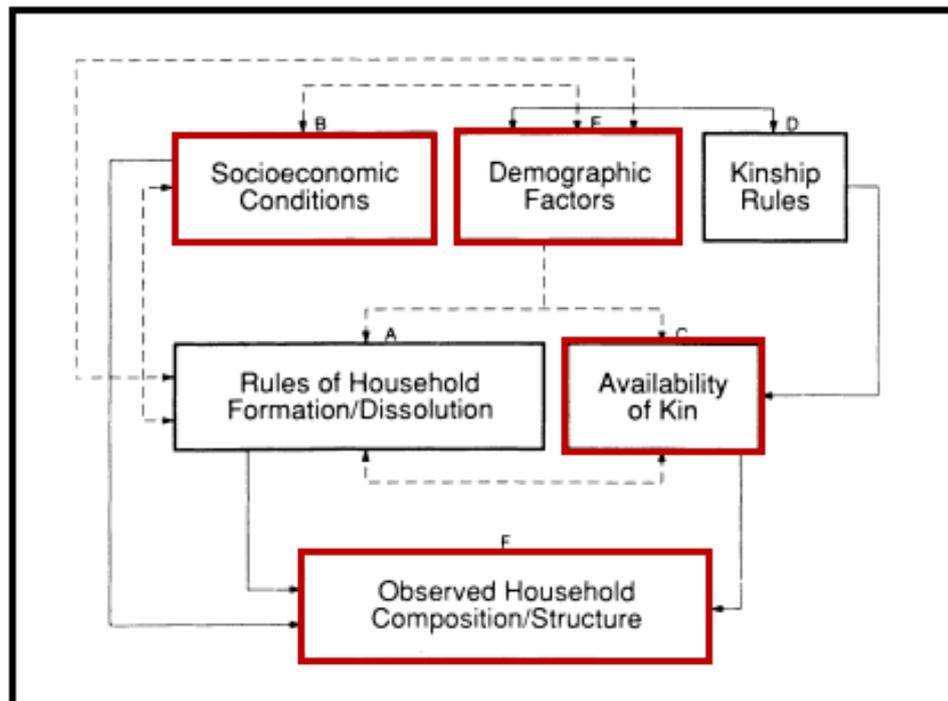
In contrast, when the ‘household’ is utilised as a unit of analysis when exploring issues of social inequity within society, it is often positioned from a socioeconomic perspective (Lund, 2011). For instance, the ‘household’ is situated as a site of production and reproduction in society in Smith & Stenning’s (2006) study, which also includes an assessment of deprivation outcomes at the household level. The result of which has led the concept of the ‘household’ being used as a dominant social context in research, “at the detriment of other forms of spaces... such as the wider communities” (Smith & Stenning, 2006: p.191). And so, both perspectives can inform how the ‘household’ can more generally be used as an object of enquiry in which, to investigate issues of social participation and provision in society; most notably in relation to NSR outcomes. However, in response to Smith & Stenning’s (2006) criticism of the dominance of the ‘household’ in social research, greater consideration of how the households operate at different spatial scales, would allow for the “differential relations of...socioeconomic practices” (p.191) to be further understood in contemporary society.

Correspondingly, the purpose of this research is to build upon a variety of perspectives of how the ‘household’ domain provides a valuable setting, in which to explore and account for the diversity of NSR outcomes. Due to the diversity of elements that can form the ‘household’, a comprehensive definition of the ‘household’ in a sociodemographic context is somewhat problematic to employ. Instead, the seminal research of De Vos & Palloni’s (1989) ‘Theoretical Model of Determinants of Household Composition and Structure’, provides a detailed consideration of the key dimensions that contribute to the variation in compositional attributes of different household types. As illustrated by *Figure 3.1.*, De Vos & Palloni’s (1989) model provides a succinct overview of the six dimensions that continue to reflect key determinants of household composition in contemporary society today (see: Ruggles, 2012).

The six dimensions outlined by De Vos & Palloni’s model (*Figure 3.1.*) are organised in a hierarchical structure - from the dimensions influenced by external societal influences

at the top of the model, to the factors attributed to compositional factors in the middle, and the resulting outcome of the ‘observed household composition/structure’ at the bottom. Furthermore, *Figure 3.1.* outlines two pathways that illustrate the sociodemographic connections between dimensions, with the solid arrows representing the direct social relationships between household dimensions, and the dashed lines indicating more uncertain relationships between household members (more difficult to quantify explicitly). And so, De Vos & Palloni’s model provides a succinct summary of the social dimensions that inform the outcome of the ‘observed household composition/structure’ in this research enquiry.

Figure 3.1. Theoretical model of determinants of household composition and structure



[Source: De Vos & Palloni, 1989]

The decision-making process regarding how the social dimensions from *Figure 3.1.* should be involved in the construction the NSR profiles, was informed by both theoretical and practical considerations. Firstly, the decision was made to include the dimensions of ‘socioeconomic conditions’ and ‘availability of kin’, as they can both be identified in

Figure 3.1. as directly contributing to the observed housing composition/structure, and can be used to inform the identification of elements that should comprise the NSR profiles at the household level. Secondly, the decision was made to also include ‘demographic factors’, as their inclusion is imperative to being able to differentiate the relationships between each of the household members, which is necessary for determining the presence of dependents in a household. Finally, the decision was made *not* to include the two dimensions related to ‘rules of the household’, as these dimensions were not deemed theoretically imperative to understanding NSR outcomes, which is a key objective of this research. Moreover, from a practical standpoint, the social relationships attributed to these dimensions are somewhat difficult to observe and would therefore be difficult to quantify in empirical analyses.

To summarise, the ‘household’, from a social research perspective can be conceptualised in relation to two distinct elements: a spatial element which, defines ‘households’ within a physical context (e.g. Ranci, 2010), and a social element describing the relationships between ‘household’ members (Pickett & Pearl, 2001). De Vos & Palloni’s model has established that when utilising the ‘household’ as a unit of enquiry within sociodemographic research, attention should be paid to the social context, as well as the observed ‘household’ composition/structure. The three dimensions that have been selected as being the most relevant to informing the conceptualisation of the ‘household’ domain in this research: socioeconomic conditions, availability of kin, and demographic factors, are highlighted in red in *Figure 3.1.* And so, these elements and their associated dimensions will be used to inform the construction of the NSR profiles that are attributed to the ‘household’ domain (*Section 3.3.*).

3.2.1. Definition of the ‘Household’

Previously, the concept of the ‘household’ has been theoretically explored as a key component in sociodemographic analyses, yet it can be somewhat problematic to attempt to define the concept in relation to what (in reality) can be objectively measured. Hence, the operationalisation of definitions concerning the ‘household’ are often restricted to the outcomes of pre-determined, statistical exercises such as censuses, national surveys, and other governmental data sources (de Vaus, 2013). Therefore, explicitly defining the concept of the ‘household’ for this research requires an advanced consideration of

potential datasets, which may be appropriate for obtaining the required compositional attributes of households and their residents. Additionally, to meet the specific needs of this research enquiry, the ability to obtain the required household-level attributes at small-area level geographies was also deemed imperative when undertaking the initial overview of potentially suitable datasets. Suggesting that existing definitions regarding the ‘household’ have been formulated in social research because of empirical convenience, as well as being theoretically informed.

Correspondingly, the theoretically informed definition of the ‘household’ used for the empirical enquiries in this research is based upon the harmonised survey definition by Office for National Statistics (ONS):

“A household is defined as one person living alone, or a group of people who are not necessarily related, who live at the same address who share cooking facilities, and share a living area” (ONS, 2011a).

This definition describes the structure of ‘households’ and their occupant(s) in terms of their statuses and roles within society, as well as the relationship of ‘household’ members to each another. The underlying assumption of this definition is that the ‘household’ refers to where people are usually resident, so can include any type of site as long as it is their permanent address of residence (e.g. anyone usually resident in a caravan). Additionally, this definition of the ‘household’ also includes sheltered accommodation units, in which 50% or more of residents have private access to their kitchens, irrespective of whether there are other communal facilities (ONS, 2011a). This exact definition assumes:

“...that the spatial element is a single dwelling that relates to a private household-unit; the social element corresponds to the relationship between residents which, have a shared living space within the household-unit; and the temporal element is an individual’s residence at the time of investigation (i.e. The day of the 2011 Census – 27th March 2011)” (ONS, 2011b).

Overall, this definition of the ‘household’ was chosen by undertaking a preliminary data search, from which the 2011 Census was identified to be the most suitable dataset to facilitate the empirical analyses in this research. The decision to obtain the required data from the 2011 Census was made because no other source of data provides such a wide-range of sociodemographic characteristics for both individuals and households, across a variety of spatial scales, and for England and Wales (Thomas *et al.*, 2009). The decision to utilise the 2011 Census for England and Wales as a key source of data from which to obtain the household-related variables are further discussed further in *Chapter 5*.

3.3. Identifying ‘Household Transitions’ Across the Life Course

The aim of this section is to establish the NSR profiles that are relevant to the specific NSRs attributed to the ‘household’ domain: the ‘physical dependency’ of older people (*Section 3.4.*), and the inability of individuals to ‘reconcile paid work with caring for dependent children’ (*Section 3.5.*). It is anticipated that categorising the NSR profiles in relation to critical junctures across the life course, as represented by the relationships between household members, will provide a unique opportunity to explore the specific social deprivation outcomes that may occur for these individual NSR profiles. However, this idea of sorting things into categories based on similar characteristics is not new to geodemographic research. The ability to simplify information via forms of categorisation has previously been shown to help us better understand the complex interactions of the world around us (e.g. Vickers & Rees, 2007). Categorising sociodemographic data by different population sub-groups, or in this instance ‘NSR profiles’, will allow for the identification of additional patterns in the data that may otherwise be hidden by aggregate measures of deprivation produced for the entire population (e.g. the Index of Multiple Deprivation [IMD], 2015).

The initial considerations for identifying the NSR profiles, were primarily based upon the following previously outlined theoretical assumptions:

1. NSRs which, are specifically related to the ‘household’ domain, which, are centred around the idea of the presence of both children (aged 0-17 years old) and older people (aged 65 years old and over) who are classified as ‘dependent’ in a household (Bonoli, 2005) – *Section 2.2.2*.
2. The identification of critical junctures across the life course (Reday-Mulvey, 2005), at which, NSRs relating to the ‘household’ domain are most likely to occur at (Taylor-Gooby, 2004; Bonoli, 2005) – *Section 2.4.1*.
3. The ability to identify a selection of the key determinants of household composition/structure for each NSR profile, including the availability of kin, socioeconomic conditions and demographic factors (De Vos & Palloni, 1989) – *Section 3.2*.

Correspondingly, prior to being able to identify outcomes that relate the first and second NSR-related assumptions outlined above, the third consideration of identifying and categorising the key compositional attributes of common household types needs to be addressed. Establishing a comprehensive overview of all the potential household configurations will provide a basis with which, to explore the other two theoretical assumptions relating to specific NSRs across the life course. Accordingly, a summary of different household configurations by family structure, composition, and type, is outlined in *Table 3.1*.

Table 3.1. Family and non-family households – by composition and type

| FAMILY STRUCTURE | <i>Composition</i> | <i>Type</i> | | |
|-------------------------|--------------------|--|----------------------------|----------|
| FAMILY | Extended | - <i>Multi-generational</i> - <i>Cross-generational</i> | (NON-) DEPENDENT CHILDREN? | OVER 65s |
| | Couples | - <i>Co-habiting</i> - <i>Married</i> - <i>Legal-Partnership</i> | | |
| | Lone-Parent | - <i>Divorced/Legally-Separated</i> - <i>Never Married</i> | | |
| NON-FAMILY | Lone-Person | - <i>Widowed</i> | | |
| | Multi-Person | - <i>Students</i> - <i>Housemates</i> | | |
| | | - <i>Landlord(s) & Tenant(s)</i> | | |

[Adapted from: Mc Rae, 1999]

Initially, the ‘households’ in *Table 3.1.* are categorised by ‘family household-types’. A ‘family household’ consists of a primary social unit in which, all members of the ‘household’ are formally related to one another (Mc Rae, 1999), such as a parent and (dependent or non-dependent) child, or two partners cohabiting with one another (Jenson, 2006). Additionally, even though the ‘family household’ has previously been situated as the primary context in which, to explore NSRs, especially in terms of the care of dependents (Esping-Andersen, 1999), ‘non-family households’ should also be acknowledged as being exposed to NSRs (Ranci & Pavolini, 2013). Examples of these ‘non-family households’ in *Table 3.1.* include individuals who reside by themselves as ‘lone-person households’, or different configurations of ‘unrelated household members’ in ‘multi-person households’, such as university students living in purpose-built accommodation.

In addition, *Table 3.1.* provides an indication of the availability of kin in a ‘household’. For instance, categorising married or cohabiting adults who have dependent children, in comparison to a ‘lone-parent household’, provides an indication of the difference in the availability of kin between the two ‘household’ types. The availability of kin is of particular importance to ‘households’ containing ‘dependents’, as the presence of adults

who may potentially be able to care for dependents in a ‘household’, is a key element in the assessment of NSR outcomes associated with the ‘household domain’ (Bonoli, 2005).

Table 3.1. has provided an overview of the most common configurations of ‘households’, in partial response to the third theoretical assumption, as suggested by De Vos & Palloni’s (1989) model. However, the consideration of socioeconomic conditions and underlying demographic characteristics of ‘household’ types (outlined in *Figure 3.1.*) can only be partially determined at this initial stage of the research process. For example, it is apparent that those individuals who are aged 65 and over may be found in all ‘household’ composition types, demonstrating that the older population is currently a heterogeneous group in terms of ‘household’ living arrangements. A key constraint is that the social categorisation of ‘households’ may be somewhat problematic to quantify, as it is impossible to identify *all* potential relationships which, may occur between household members. For instance, couples who live apart during the week (in ‘non-family households’) but live together on the weekend as a ‘family household’ – who are often categorised as *living apart together* (Duncan & Phillips, 2010). To summarise, *Table 3.1.* provides a starting point for all potential ‘household’ configurations which, may be of theoretical interest when examining NSRs at critical junctures across the life course.

3.3.1. Categorising New Social Risk Profiles – Household-Unit-Types (HUTs)

As previously determined in *Section 3.2.1.* the 2011 Census was provisionally chosen as the data source from which to obtain household-level variables, as informed by the categorisation of ‘household’ types in *Table 3.1.* From an initial consideration of the 2011 Census, two tables (*QS113EW* and *KS105EW*) were identified as being suitable for informing the construction of the NSR profiles attributed to the ‘household’ domain. Primarily, these tables were chosen because they outline characteristics regarding ‘household composition’ at the household-level, two distinct elements which provide an indication of the relationships between household members. The ability of the variables within these tables to determine the availability of kin (De Vos & Palloni, 1989), alongside the ability to identify ‘dependent’ members of the household (Bonoli, 2005), are key theoretical assumptions of the NSR profiles constructed for the purpose of this research (as previously stated). Conversely, all the remaining variables which could be obtained from tables in relation to characteristics of ‘household composition’ from the

2011 Census, are all derived at the individual-level rather than the household-level (i.e. the 2011 Census table: *QS112EW*), and were deemed unsuitable for informing the construction of the NSR profiles.

In summary, for the 2011 Census table *QS113EW* there were 23 possible options for categorising 'household composition' (at the household-level), whereas, the 2011 Census table *KS105EW* has 15 possible options. It can be demonstrated that both these tables consist of similar elements and variables, especially in terms of their categorisation of different 'households'. For example, both census tables identify the most common 'household' configurations containing those who are 'aged 65 years old and over', and those which contain 'dependent' and 'non-dependent' children. Contrastingly, the additional information provided by the more detailed variable *QS113EW*, in comparison to *KS105EW*, includes the further categorisation of different forms of legally recognised partnership; such as differentiating those couples who were 'married', from those who were in a 'civil-partnership'.

Moreover, variable *QS113EW* allows the differentiation between the number of dependent children in a household; for example, those containing one dependent child, and those containing two or more dependent children. However, from determining the descriptive statistics of the more detailed variable *QS113EW* at small-area level geographies, the cell counts for this variable were deemed relatively small (i.e. cases with a cell count of < 25 at the MSOA level). Thus, indicating that further cross-tabulations with this variable would likely be unobtainable, due to potential issues of statistical disclosure control. The consequence of which, would be the inability to fully meet the key theoretical assumption of being able to obtain accurate information about the socioeconomic conditions and demographic factors of the household (De Vos & Palloni, 1989).

Hence, from a detailed consideration of both census tables, *KS105EW* was ultimately chosen as the most appropriate table with which, to construct the NSR profiles from (see *Table 3.2.*). The resulting NSR profiles represent the specific points at which, processes of 'household' formation and dissolution are theorised as being likely to occur.

Correspondingly, the decision was made to designate these innovative forms of NSR profiles as HUTs for the purpose of this research enquiry. Subsequently, eight theoretically-informed HUTs were each identified as being an appropriate unit of analysis with which, to explore NSRs attributed to the ‘household’ domain (*Table 3.2.*).

The chosen classification of the eight HUTs in *Table 3.2.* reflects the three theoretical assumptions outlined at the start of *Section 3.3.* Varying social structures and demographic characteristics of different population sub-groups can contribute to distinctive patterns of ‘household’ structures (Clark & Drinkwater, 2002). Therefore, although the proposed HUTs matches up succinctly to the life course perspective, modifications were needed to ensure that critical junctures at which NSRs are triggered could also be considered.

Highlighted in grey in *Table 3.2.* are the ‘households’ potentially containing dependent household members (as defined by the NSRs literature, e.g. Bonoli, 2005), while the other (non-highlighted) HUTs are also included to aid future research, beyond the scope of this study (e.g. the identification of ‘non-dependent children’ for enquiries relating to ‘emerging adulthood’). *Table 3.2.* also illustrates that, as the eight HUTs have been derived from fifteen, pre-existing variables of the census, HUTs can be split into smaller ‘sub-HUTs’ for more in-depth analysis, if required. For example, the ability to identify the socioeconomic relationships (e.g. availability of kin) and demographic characteristics (e.g. age).

Table 3.2. Household composition – by households (2011 Census table: KS105EW) from which, HUTs are derived

| | Household-Unit-Type (HUT) | HUT Sub-Group (derived from 2011 Census table: KS105EW – at the household level) |
|--|---|---|
| Family Households | 1. “Pensioner-couple” | 1a. One family only; all aged 65 and over |
| | | 1b. Other household types; all aged 65 and over |
| | 2. “Couple” – with no children | 2a. One family only; married or same-sex civil partnership couple; no children |
| | | 2b. One family only; cohabiting couple; no children |
| | 3. “One-family” – with dependent children | 3a. One family only; married or same-sex civil partnership couple; dependent children |
| | | 3b. One family only; cohabiting couple; dependent children |
| | | 3c. Other household types; with dependent children |
| | 4. “Lone-parent” – with dependent children | 4a. One family only; lone parent; dependent children |
| | 5. “One-family” – non-dependent children | 5a. One family only; lone parent; all children non-dependent |
| | | 5b. One family only; married or same-sex civil partnership couple; all children non-dependent |
| 5c. One family only; cohabiting couple; all children non-dependent | | |
| Non-Family Households | 6. “Lone-person” – economically active | 6a. One-person household; aged 18-64 years old |
| | 7. “Lone-pensioner” | 7a. One-person household; aged 65 years old and over |
| | 8. “Non-related” | 8a. Other household types; all full-time students |
| | | 8b. Other household types; other |

3.4. The New Social Risk (NSR) of ‘Physical Dependency in Old Age’

The first NSR to be considered in relation to the ‘household’ domain, is that of ‘physical dependency in old age’ (see *Table 1.1.*). As previously mentioned in *Section 2.2.2.*, the continued ageing of the population in Britain is a phenomenon that has resulted in a greater number and proportion of older people, which presents both challenges and opportunities to contemporary society (Allen, 2008). In Britain, older people are often categorised as those who are aged 65 years old and over (Tinker, 2014). However, this specific categorisation of older people does not directly reflect the current state pension age, due to the current pension reform implemented by the British Government, which has increased the age of state pension variably across age cohorts to between 60 and 66 years old, for both men and women (ONS, 2012a).

Although older people are commonly defined as having a chronological age of 65 years or older within the social research context, there is no clear medical or biological evidence to support this definition. Recently, this definition of older people has come to the critical attention of researchers and policymakers alike, as defining older people as aged 65 years and older, does not match the current situation of the ageing population in Britain (Tinker, 2014). Instead, it has been suggested by the British Geriatrics Society that an increasing proportion of older people lead healthy and active lives, especially those aged 75 years old and under (Turner & Clegg, 2004). And so, for the context of this research enquiry ‘older people’ are categorised by the somewhat arbitrary groups of: the ‘youngest-old’ (aged 65-74 years old), and the ‘oldest-old’ (aged 75 years old and over).

Furthermore, what makes the beginning of the twenty-first century a particularly vulnerable time for older people, especially the ‘oldest-old’, is the remarkable longevity that has been achieved by the general population, a consequence of: medical advances, eradication of certain diseases, and healthier lifestyles (Bloom *et al.*, 2010). The effects of such longevity have resulted in an increase in the proportion of older people who eventually become physically dependent on society, which has coincided with a decrease in the proportion of people who can domestically care for them (Tinker, 2002). And so, older people can no longer be assumed to be a homogenous group in society, as there is a greater uncertainty and diversity of social opportunities (both positive and negative) available to them than there was previously (Schroder-Butterfill & Marianti, 2006).

Correspondingly, it has been suggested by Harper (2006) that contemporary perspectives of social ageing should reflect the changing roles, responsibilities, and relationships of older people within contemporary society; a key objective of exploring the deprivation outcomes associated with the NSR of ‘physical dependency in old age’.

Current gerontological perspectives relating to measuring issues of deprivation often focus upon how the everyday lives of older people can be determined by a diversity of social and health issues, which may ultimately lead to issues of dependency later in life (Beer & Faulkner, 2011; Schwanen *et al.*, 2012). The focus of these social- and health-related enquiries are summarised by Estes *et al.*, (2003), who define four categories integral to understanding the health and wellbeing of older people. These include issues of medical dependency, economic vulnerability, the continued social stigma surrounding older people, and an insufficient understanding of the social stratification of deprivation outcomes which, older people may face (Estes *et al.*, 2003). The latter issue of understanding the social stratification of deprivation outcomes is of central importance to understanding the NSR of ‘physical dependency in old age’, however the other issues relating to the health and wellbeing of older people are also integral to this research enquiry.

3.4.1. Determining the Most Susceptible HUT Attributed to the NSR of ‘Physical Dependency in Old Age’

As stated by Grundy (2006: p.129) there is a need for a greater body of research examining the increasing proportions of older people in society, who are perceived to be at risk of being/becoming physically dependent in later life. Therefore, this research aims to respond to this claim, by determining the relevant HUTs which can be attributed to the NSR of ‘physical dependency in old age’.

Leading on from this, although researchers commonly use living arrangements as a lens to clarify the circumstances of older residents and their access to resources and opportunities in society (e.g. Grundy, 2006), there is no explicit approach as to how this should be undertaken. Consequently, all of the HUTs that were previously categorised in *Table 3.2.* were systematically examined, in order to identify the HUTs which, were

most likely to act as a critical juncture for the ‘physical dependency of older people’. Ultimately, ‘Lone-Pensioner HUTs’ were chosen for the purpose of this research, as they are theorised to be more susceptible to experiencing NSR outcomes, compared to ‘Pensioner-Couple HUTs’. In particular, ‘Lone-Pensioner HUTs’ are theorised to face greater constraints than other HUTs, in instances requiring the provision of additional social care measures. For example, in the instance of poor health (e.g. Lund, 2011), or lack of personal mobility (Victor *et al.*, 2000). The consequences of which, can lead to issues of social deprivation alongside the constraint of ‘Lone-Pensioner HUTs’ being unable to *actively age* within their own communities (Walker, 2002), an increasing issue for ageing population in contemporary society.

One of the most striking changes in the living arrangements of older people that reside in their own ‘households’, has been the rise in the proportion of those older people who live alone (Tinker, 2014). The proportion of older people who live in one-person ‘households’ varies by age and gender and is dependent on a variety by several socioeconomic factors. In 2011, approximately 50% of men and 65% of women aged 85 and over, who were usually resident in a household (in comparison to those residing in communal establishments), lived alone in England and Wales (ONS, 2012a). More generally, individuals who reside in one-person ‘households’ can be split into two categories: those who elect (or ‘choose’) to live alone, and those who are constrained (or ‘forced’) into this type of living arrangement due to socio-economic circumstances (Schroder-Butterfill & Marianti, 2006). Therefore, the outcomes for these two drivers to living alone will ultimately have implications for the quality of life and future life chances of this group, especially those who have not chosen this type of living arrangement (e.g. due to becoming widowed).

In addition, an increasing number of the cohort born in the 1950s, and consequently beginning to reach state pensionable age, are more increasingly likely to have been married, or to have become divorced and not remarried, than previously experienced (Grundy, 2006). Hence, it is not just life expectancy differences between men and women that are driving the numbers of ‘lone-pensioner households’. Furthermore, future population projections predict that approximately half of the 1960s cohort will be living alone by 75+ (ONS, 2012b). However, it should be acknowledged that living alone does

not necessarily mean that they are alone, as many older people rely upon family, friends and neighbours for social support (Tinker, 2014). Although, there is the suggestion that older people who live alone are more likely to face issues of loneliness and isolation (Harper, 2000), especially men who tend to have a reduced social capital in comparison to women at older ages (Harper, 2000). And so, there is an increasing diversity of routes which can lead to the rising prevalence of ‘Lone-Pensioner HUTs’ in society, and who are increasingly at risk of facing a greater uncertainty of outcomes, in relation to their health and social care needs.

3.5. The New Social Risk (NSR) of the ‘Inability to Reconcile Paid Work with Caring for Dependent Children’

The second NSR to be considered in relation to the ‘household’ domain, is that of the ‘inability to reconcile paid work with caring for dependent children (see *Table 1.1.*). As previously mentioned in *Section 2.2.*, the increasing participation of women in the labour market in Britain has led to several challenges, in terms of meeting the care needs of dependent children. Especially, as women in the (family) ‘household’ have traditionally been determined to be the primary care-givers of dependent children in society (Jenson, 2009; Bradshaw, 2016). Consequently, this assumption remains true in contemporary society, largely due to lack of viable alternative childcare arrangements (JRF, 2009). Prior to exploring this NSR regarding the ‘inability to reconcile paid work with caring for dependent children’ in further detail, the definition of ‘dependent children’, as understood by this research, is as follows:

“Dependent children are those living with their parent(s) or guardian(s) and are either (a) aged-under 16, or (b) are aged 16-18 in full-time education, excluding children who have a spouse, partner or a child living in the house” (ONS, 2004b).

In 2011, there were 25.6 million dependent children living in 47% of all ‘households’ in England and Wales. This was a slight decrease in percentage share compared to 2001, when 48% of households contained 24.3 million dependent children (ONS, 2012b). However, this increase in the overall number of dependent children was not consistent

for all age groups. The number of dependent children aged five years and under living in all family-types increased between 2001 and 2011 in England and Wales. This is in contrast to dependent children aged 5-15 years old, whose numbers decreased over the same time period (ONS, 2012a). Although dependent children are often categorised as one homogenous group (aged 0-17 years old) for administrative purposes, it has been suggested that greater consideration should be given to the differing care requirements of children at different life-stages (Jenson, 2004). The result of which, is key to further understanding the deprivation outcomes associated with the NSR of the ‘inability to reconcile paid work with caring for dependent children’.

3.5.1. Determining the Most Susceptible HUT Attributed to the New Social Risk (NSR) of the ‘Inability to Reconcile Paid Work with Caring for Dependent Children’

Researchers commonly use household-level analyses of families with dependent children as a lens with which, to examine the deprivation outcomes of dependent children, often to reflect those of their parents (Mulder & Lauster, 2010). Therefore, this research aims to respond to this approach by determining the relevant HUTs that can be attributed to the NSR of the inability of parents to ‘reconcile paid work with caring for dependent children’ (Taylor-Gooby, 2004). Once again, all of the HUTs (*Table 3.2.*) were systematically examined in order to identify the HUTs most likely to act as a critical juncture for the NSR of ‘the inability to reconcile paid work with caring for dependent children’. As shown by *Table 3.2.*, there are three main sub-groups that can be derived from family ‘households’ that may potentially contain dependent children: couples, lone-parents and extended families. And so, ‘Lone-Parent HUTs’ were ultimately chosen for the purpose this research as they are theorised to be more susceptible to experiencing the NSR outcomes, a direct result of a lack of other household members to share care-responsibilities with. Thus, ‘Lone-Parent HUTs’ relate back to the wider societal changes of changing family and gender roles at the household level (e.g. Bonoli, 2005), which have resulted in a greater uncertainty as to who is responsible for the day-to-day care of dependent children in contemporary society (*Section 2.2.2.*).

Interest in understanding the NSR outcomes of ‘Lone-Parent HUTs’ can be made in relation to their general association with non-traditional family behaviours (Lewis, 2006).

The continued delay of marriage has meant that parents at younger ages (i.e. those aged 18-34 years old) are less likely than their previous counterparts to be living with their spouses, and more likely to be living alone (Andrew & Meen, 2003); approximately 25% of dependent children now live in a lone-parent family (ONS, 2013). As marriage rates have fallen the proportion of lone parents who have never been married has increased, from below 40% at the 1991 Census, to over 50% by the 2011 Census (ONS, 2013). However, this reveals only a limited amount about the different routes into lone parenthood, given the rise of non-legally recognised partnerships who have dependent children (Blekesaune *et al.*, 2008). However, what has been more readily by Furstenberg (2010), is that the very nature and determinants of lone-parenting has begun to change, especially for those ‘Lone-Parent HUTs’ at younger ages.

Lone-parents are regularly viewed as a disadvantaged group, especially in terms of employment opportunities and their perceived welfare dependency (Gregg *et al.*, 2009). Subsequently, a consideration needs to be made of the challenge of ‘Lone-Parent HUTs’ facing the NSR of ‘attempting to reconcile paid employment alongside meeting childcare needs’ (Jenson, 2004), especially for those with low marketable skills and limited earning power who wish to (re)enter the labour market (Jenson, 2006). Lone-parents, who face the most acute problems relating to this NSR, are those individuals who are only young-adults themselves (Furstenburg, 2010). The median age at which a single, lone-parent (i.e. the mother) has their first child is 20 years old, almost ten years younger than mothers who undertake childbearing in long-term relationships, or when legally married (Bradshaw, 2016: p.50).

Additionally, these ‘lone-parent households’ who are also young adults, demonstrate the poorest levels of educational attainment. Only 6% of lone-parents who had their first child when aged 16-19 years old have higher or degree-level qualifications, whilst 24% have no qualifications at all (ONS, 2014). In comparison, 24% of lone-parents who had their first child between the ages of 24-29 years old, have higher education or degree level qualifications, increasing to 31% for lone-mothers who had their first child in their early 30s. Another consideration is the continued emphasis by the government and society alike for parents to undertake paid employment (e.g. Anderson *et al.*, 2002). Yet, for those with limited earning power due to inadequate skills and qualifications, accessing

market-provided childcare is prohibitively expensive in terms of cost, and reduces the chance of lone-parents to be able to carry out paid employment in order to meet a basic standard of living (Taylor, 2008). This range of social determinants provides a concise summary of ‘Lone-Parent HUTs’, who are constrained in their ability to reconcile paid work with their existing family structure.

3.6. Social Indicators: The Measurement of Deprivation Outcomes at the Neighbourhood Level

The construction of composite measures allows for the aggregation of several (abstract) theoretical components that represent a complex multidimensional concept, to be transformed into a single summary score. Because composite measures allow for a potentially vast amount of information to be assimilated into a concise format, such measures are a valuable tool for conveying the assessment of an intangible social phenomena, for a variety of end-users (Diener & Suh, 1997). However, prior to the construction of any social indicator, the purpose and nature of the research enquiry must be established (Nardo *et al.*, 2005; Saisana *et al.*, 2005).

There are several reasons for constructing a composite social measure, including: informative, predictive, problem-orientated, programme evaluative, and target delineation purposes (de Vaus, 2004). In this instance, the construction of the subsequent small-area level deprivation measures are produced for both predictive and informative purposes, in order to generate a more nuanced understanding about the social deprivation outcomes associated with NSRs. Composite measures are comprised of a matrix of component indicators where the constituent parts are identifiable (Patterson & Jollands, 2004), allowing for the overall composite measure to be verified and replicated by other researchers. Furthermore, it is imperative that the individual indicators that make up the composite measure, are informed by both theoretical and empirical justification (Saisana *et al.*, 2005). Ideally, a conceptual framework should inform this process in order to provide a clear frame of reference for the inclusion of each of the indicators for the researcher (see: *Chapter 4*). The key purpose of implementing a conceptual framework is to avoid overall understanding of the composite measure being “hidden” behind a single number, owing to the subjective decision-making of the modeller, rather than being based

around the underlying theoretical characteristics of the social phenomenon in question (Nuttall, 2017).

Ultimately, the construction of any form of social indicator involves an unmeasurable concept and a quantitative surrogate for that concept (Eakin & Luers, 2006). The construction of composite measures allow for the understanding of the ‘bigger picture’ of a complex social issue to be achieved, via the ability to classify areas based upon these results. However, there will inevitably be a number of empirical challenges in relation to issues of: data quality, variable selection, and aggregation (Eakin & Luers, 2006), that will need to be considered throughout the modelling process. Thus, theoretical and practical considerations therefore need adhering to, in order to ensure that the final outputs are correctly employed and interpreted (Nardo *et al.*, 2005); a consideration for the remainder of this work (and a reflection of this in: *Chapter 9*). The transparency of methods throughout the construction of any social indicator is key to ensuring the justification of the internal and external validity of the proposed measures.

3.6.1. The Neighbourhood Context

A lack of geography has been identified in the NSRs literature (see *Section 2.5.*), due to the dominance of research studies focussing on the evaluation of NSRs and the resulting socioeconomic outcomes, at either the national or cross-national level (e.g. Huber & Stephens, 2006; Zinn, 2009). This gap in the literature has led to the call for a greater consideration of geography in determining NSR outcomes within the European context (Ranci, 2010: p.256). Therefore, the lack of geography in NSR analyses is something that this thesis aims to respond to, via the investigation of NSR outcomes at the neighbourhood level. When considering the range of contexts associated with so-called *neighbourhood effects*, Riva *et al.*, (2007) highlights that the labels of: ‘neighbourhoods’, ‘small areas’, ‘local areas’, and ‘places’ are often used interchangeably. To ensure conceptual clarity and consistency of terminology throughout the remainder of this work, focus will be placed upon *neighbourhood-based* research as the spatial context of interest. Wider references will also be made to how the composite measures derived from this research are theoretically informed, and can further contribute to the wider-research effort into investigations of small-area level measures of deprivation.

Building upon *Section 1.1.*, Galster's (2001: p.2112) definition of a neighbourhood as a "...bundle of spatially based attributes associated with clusters of residences, sometimes in conjunction with other land uses", is deemed an appropriate definition for this research, due to the scope and nature of the definition in recognising both the social and spatial elements of the neighbourhood context. Neighbourhood effects research can also allow for a clear distinction to be made between compositional and contextual attributes, which may be derived from the neighbourhood context (Macintyre *et al.*, 2002). However, this dichotomy of perspectives is not as clear-cut as it seems, as the contextual attributes of the neighbourhood should not be deemed solely in relation to the physical environmental and/or infrastructure. Instead, there will always be an overlap between area-level characteristics, and the collective social characteristics of the neighbourhood (e.g. Cummins *et al.*, 2007). For instance, old age dependency ratios (OADRs) are comprised as a contextual measure, but are determined from the aggregation of compositional attributes of the area in question (Spijker & MacInnes, 2013).

Subsequently, a consideration of both physical and collective functioning of the neighbourhood context should be considered as part of ascertaining the 'contextual attributes' of a neighbourhood. Furthermore, as neighbourhood areas can be theorised as "fluid entities" (Whitehead, 2003: pp.285-287), it should be contemplated how the social characteristics of neighbourhoods can also interact with surrounding areas (Lloyd, 2010). This perspective corresponds to the well-known observation that 'birds of a feather, flock together' (Sohn, 2004), further reinforcing the justification of examining issues of social inequality at pre-determined administrative units that equate to small-neighbourhood areas (e.g. census geographies). Accordingly, further consideration of how neighbourhoods should not be examined in isolation, including the need to investigate both the collective and individual-level features of neighbourhoods for this research enquiry are outlined in *Section 4.2.*

For the purpose of this research enquiry into NSRs outcomes, reference can be made specifically to the everyday social and economic interactions that occur at the neighbourhood level (Galster, 2001: p.2112). And so, the continued interest of these neighbourhood effects can allow for a more nuanced understanding of the social relationships that are experienced between people and places (Sampson *et al.*, 2002).

However, as Sampson *et al.*, (2012) argues, how neighbourhoods affect our day-to-day lives often go unrecognised in social research. Consequently, this research ascertains to the perspective that the neighbourhood is important for understanding the social stratification of outcomes in British contemporary society (Noble *et al.*, 2006). Essentially, relating back to the argument previously outlined (in *Section 1.1.*), that where someone lives can affect the future life chances of that person (Slater, 2013). However, it is important to avoid assuming the homogeneity of the collective characteristics of residents within a defined area, as the diversity of the compositional characteristics of an area must also be considered (further consideration of which, is made for the empirical analyses outlined in *Section 8.2.*).

3.6.2. *Small-Area Level Deprivation Measures*

The ability to identify issues of deprivation at the small-area level can be demonstrated by a wide variety of indices and classifications, often devised to establish findings regarding the geographical distribution of different issues of social and spatial inequalities. Empirical approaches have included the development of several publicly available area-level classifications (e.g. Vickers & Rees, 2007), and deprivation indices (DCLG, 2011) at small-area level geographies for England and Wales. These spatial outputs are rooted in the methods established by the pioneering work of Webber *et al.*, (1975), which identify issues of poverty and deprivation in Liverpool in the 1970s. This work was followed by the seminal research produced by Townsend *et al.*, (1988) that is of central importance to research regarding the measurement of deprivation outcomes at the small-area level, with the Townsend Material Deprivation Score is still frequently utilised today; nearly three decades after its initial conception (e.g. Stafford & Marmot, 2003). The result of this continued research approach allows for the accommodation of varying combinations of: deprivation, disadvantage, and difference - across small-area levels, to be prescribed into meaningful and purposeful classifications of social and societal trends.

Lupton (2003) also argues that neighbourhood research needs to find a balance between using composite indicators, in order to be able to identify patterns, generalise about neighbourhood types and trajectories, and to illuminate the nuances of change within these overall patterns. A typical approach is to compare the outcomes of people living in

neighbourhoods with different characteristics that are measured at a particular point in time, and controlled for other individual and household characteristics (van Ham *et al.*, 2012). For instance, the Income Deprivation Affecting Older People Index (IDAOPI, 2015), is an official overall summary measure of (relative) multiple deprivation at the small area level, drawing upon the individual- and collective-level features of the neighbourhood. In addition, the measurement of deprivation outcomes can also extend to specific attributes regarding the physical environment. For example, Dalton *et al.*, (2013) include as part of their relative measure of deprivation, separate indicators regarding the median distance travelled to get to work (in km) and the availability of bus stops (count), within a neighbourhood area. Correspondingly, drawing upon wider evidence (e.g. Cummins *et al.*, 2007; Stillwell & Clarke, 2011; Norman, 2016), it can be theorised that the neighbourhood context can influence the differential social deprivation outcomes which, individuals who are exposed to specific NSRs may potentially face.

3.7. Discussion

This chapter has explored the theoretical considerations of constructing NSR profiles, or HUTs for the purpose of this research enquiry, as the basis from which, to explore NSRs attributed to the ‘household’ domain. By establishing the key HUTs at critical junctures across the life course, relating to key points of ‘household’ formation/dissolution, this analytical approach has provided the ability to establish an appropriate unit of analysis with which to explore the social deprivation outcomes associated with NSRs. Correspondingly, the HUT (or NSR profile) found most susceptible to the NSR of ‘physical dependency in old age’ was identified as the ‘Lone-Pensioner HUT’ (e.g. Taylor-Gooby, 2004). The ‘Lone-Parent HUT’, deemed most susceptible to the NSR of the ‘inability to reconcile paid work with caring for dependent children’, was also identified (e.g. Armingeon & Bonoli, 2006). These two HUTs were chosen due to their ability to reflect the key social and societal changes associated with the transition to a post-industrial society (e.g. Armingeon & Bonoli, 2006; Ranci, 2010), with both HUTs being theorised as ‘susceptible’ to experiencing the two NSRs attributed to the ‘household’ domain (*Table 1.1*). The result of identifying these two HUTs at critical junctures across the life course, is that the social deprivation outcomes associated to these HUTs can be clearly identified.

Once the selection of the HUTs had been made, exactly how to go about specifically measuring the social deprivation outcomes for each of these distinct NSR profiles at the neighbourhood level was considered. The overall objective is to inform the construction of the composite social measures in the subsequent empirical chapters in (*Chapters 6-8*). In anticipation of constructing these composite measures a general overview of social indicator research was carried out, providing a background/context to the key theoretical and empirical considerations that should be adhered to. Building upon this, a more detailed consideration of small-area level deprivation measures was made, including further reinforcement of how neighbourhood effects can provide further understanding of social deprivation outcomes (e.g. Sampson *et al*, 2002). However, prior to utilising this approach to inform the construction of the composite measures for both the ‘Lone-Pensioner HUT’ (*Chapter 6*) and ‘Lone-Parent HUT’ (*Chapter 7*), the diversity of compositional and contextual attributes associated with the deprivation outcomes for these HUTs needs to be determined via establishing a conceptual framework in *Chapter 4*.

Chapter 4 – Implementing a Social Vulnerability Framework

4.1. Introduction

The need for implementing a conceptual framework prior to undertaking the construction of any social composite measure has been highlighted by Nardo *et al.*, (2005), who compiled the methodology for the Human Development Index (HDI) for 2005. It is suggested by Nardo *et al.*, that there is a demonstrable need to be able to clearly identify the relevant components and dimensions when compiling a composite measure. Furthermore, it has been suggested that the application of a conceptual framework also allows for the ongoing theoretical process of developing conceptual concepts, assumptions, expectations, beliefs, and models that can inform and support the final statistical outputs (Robitaille & Maxwell, 1996). Therefore, the implementation of the proposed conceptual framework allows for the identification of the interrelated compositional and contextual attributes of social deprivation outcomes, which the previously outlined HUTs (*Section 3.3.*) may encounter when exposed to NSRs at the neighbourhood level.

This chapter aims to demonstrate why a social vulnerability framework is deemed a suitable approach for meeting the aims and the objectives of this research enquiry (see: *Section 1.4.1.*). To inform this process, a three-step approach will be undertaken. Firstly, a range of definitions and approaches concerning the concept of social vulnerability will be obtained, within the context of assessing NSR outcomes within the existing NSR literature. Subsequently, an overview to the chosen social vulnerability approach, which is based upon a contextual vulnerability perspective will be established. *Section 4.2.* will also outline of the contribution of the dimensions of ‘exposure’ and ‘susceptibility’ to NSRs, alongside the ‘neighbourhood capacity’ dimension, to this research enquiry. In addition, *Section 4.3.* demonstrates how the different dimensions of social vulnerability will be implemented via the construction of a suitable theoretical framework. Finally, the results obtained from the previous steps will be used to inform the selection of the compositional and contextual indicators that are subsequently used to construct the resulting social vulnerability indices (SVIs), for both chosen HUTs – i.e. the: ‘physical dependency’ of ‘Lone-Pensioner HUTs’ (*Section 4.4.*) and the inability of ‘Lone-Parent HUTs’ to ‘reconcile paid work with caring for dependent children’ (*Section 4.5.*).

4.2. Social Vulnerability

The general concept of vulnerability was introduced in ‘risk-related’ literature, in order to explain how the same risk factor can have different impacts for equally exposed individuals, households, communities or locations (Ranci, 2010). Initially, the term ‘vulnerability’ can be broadly defined as the potential for loss (Cutter, 1996), or more specifically as the “capacity to suffer harm and react adversely” (Hohenemser, 1985: p.17) in relation to an external risk or hazard event. Yet, due to the widespread application of the term *vulnerability*, no precise definition can be given as to what the dimensions and components attributed to the concept are without providing further context to the usage of the term. Therefore, to meet the explicit aims and objectives of this research enquiry, the concept of social vulnerability will be implemented as a lens in which to explore the differential NSR outcomes that distinct HUTs experience at the neighbourhood level.

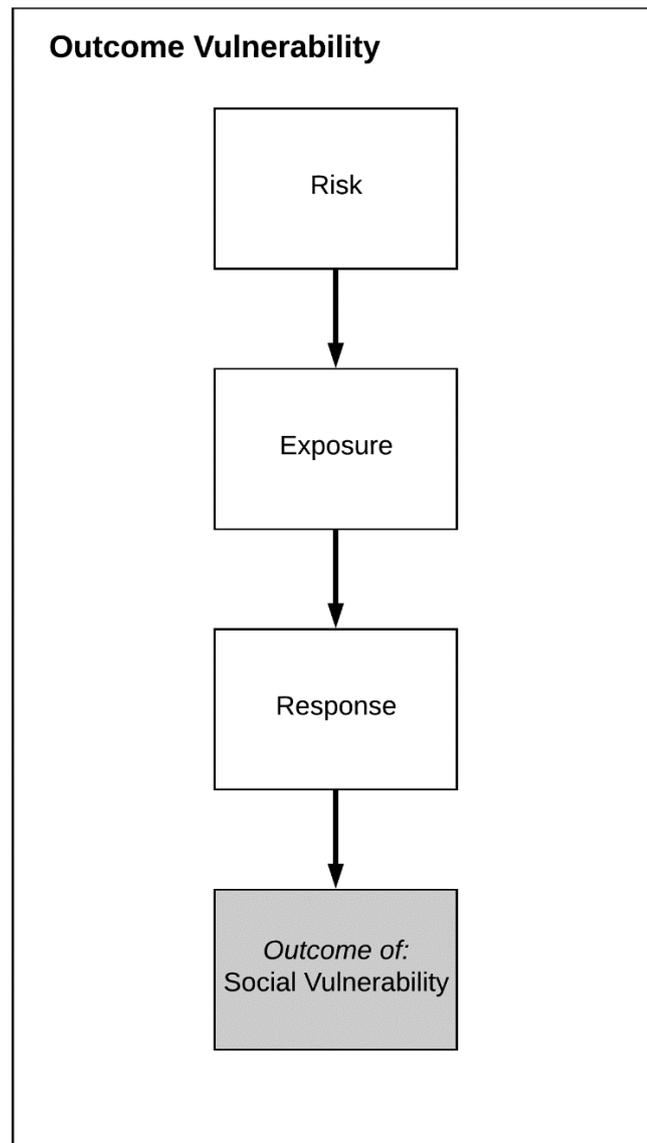
Social vulnerability can be seen to be characterised by the instability of outcomes that an individual/household may face due to an underlining social context of constraints and opportunities (Ranci & Pavolini, 2013). To situate the term of social vulnerability specifically within the NSRs literature, the concept can be associated with a weak societal position of an individual/household, due to a lack of capacity to deal with unintended consequences and contingencies resulting from NSRs. Therefore, experiencing NSR outcomes can potentially leave individuals/households in a rather insecure position in society, who are then increasingly likely to be further disadvantaged by a subsequent risk event (Ranci *et al.*, 2014).

However, what the concept of social vulnerability currently fails to recognise in relation to socially constructed risks, is that the distribution of the risk factors that contribute to the outcome of social vulnerability is highly uneven (Schroder-Butterfill & Marianti, 2006). Hence, it is proposed by this research that social vulnerability is not just a property of social groups or of individuals, but it is also deeply imbedded in complex social relations and processes. Consequently, to understand the complex nature of social vulnerability beyond that experienced by individuals, a consideration of the disparate views on social vulnerability.

The interpretation of social vulnerability outcomes often focuses upon predicting the occurrence and impact of a negative outcome, in the context of adaptive responses as demonstrated in *Figure 4.1*. Of particular note, is the approach outlined in *Figure 4.1*. that demonstrates that the outcome of social vulnerability is only determined once the responses to the risk event have been considered. *Figure 4.1*, demonstrates a sequence of analyses which, focus on the identification of “triggers” of deprivation outcomes and the identification of appropriate adaptation options (O’Brien *et al.*, 2007). This theoretical approach is useful for future mitigation and compensation strategies as well as advancing the provision of resources and opportunities in society.

However, the key limitation of the outcome vulnerability approach (*Figure 4.1*.) is the linear nature of how NSR outcomes are evaluated, neglecting the diversity and uncertainty of the social deprivation outcomes that may be experienced from an individual being exposed to NSRs (Bonoli. 2005). In contrast to the previous approach, a contextual vulnerability framework is utilised instead in order to provide an overview of the multidimensional process of encountering being exposed to NSRs. The result of which provides an overview of the interactions occurring in society that may influence the negative consequences or contingencies of experiencing a risk event, as illustrated in *Figure 4.2*.

Figure 4.1. An ‘outcome vulnerability’ approach to identifying the outcomes attributed to being exposed to a risk

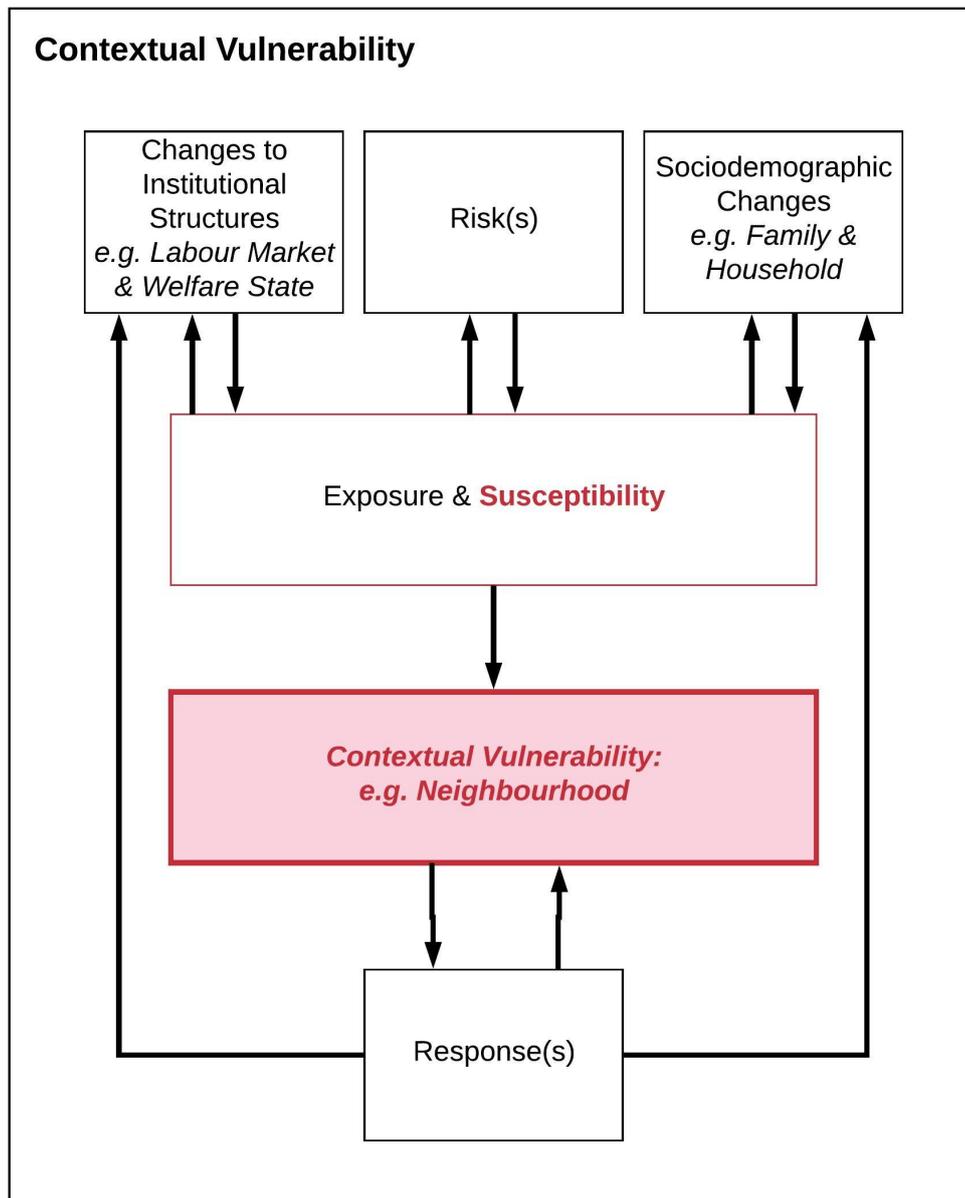


[Adapted from: O'Brien et al., 2007]

The contextual vulnerability approach outlined in *Figure 4.2.* allows for a greater understanding of how the neighbourhood context can influence the exposure and susceptibility of an individual, to a potential risk event. Therefore, there are two overarching processes of “outcome” and “contextual” interpretations of social vulnerability (O'Brien *et al.*, 2007) that must be considered for the purpose of any research enquiry. Utilising a contextual vulnerability approach assumes the consequences of risk events should be considered in relation to context in which the NSRs

are experienced, including a series of interactions between people and places that can draw upon a number of: individual, physical and societal and institutional conditions.

Figure 4.2. A ‘contextual vulnerability’ approach to identifying the outcomes attributed to being exposed to a risk



[Adapted from: O'Brien et al., 2007]

Initially, the contextual vulnerability approach as outlined in *Figure 4.2.* considers how the effects of the underlying sociodemographic characteristics of individuals, alongside changes to wider societal structures, can determine the exposure and susceptibility of

individuals to experiencing the outcomes of a risk 'event'. Whereby the 'exposure' dimension refers to the circumstances of an individual/household that may result in a lack of protection against experiencing a given risk, which in turn may affect the probability of encountering the associated consequences and contingencies (Schroder-Butterfill & Marianti, 2006: pp.16-17).

Correspondingly, the 'susceptibility' dimension may also be considered alongside the 'exposure', as the concept allows for the likelihood of an individual/household being influenced by the negative outcomes from experiencing a risk 'event' to be determined (Alwang *et al.*, 2001). Therefore, the 'susceptibility' to an NSR refers to specific characteristic(s) of the individual/household in question, which may have influence on the severity of the social deprivation outcome(s) resulting from experiencing the NSR (Leoni, 2015). Accordingly, the differential 'exposure' and 'susceptibility' of an individual/household to an NSR, allows for the severity of the consequences to be determined via the 'susceptibility' dimension, in conjunction with determining the likelihood of experiencing the consequences and contingencies in the first place.

Furthermore, there is the 'coping capacity' dimension (e.g. Adger *et al.*, 2004), which considers the ability of an individual/household to resist or modify the impact(s) of a risk 'event' once it has occurred. Often, coping capacities are simply referred to as a set of assets, resources, and relationships, that allow people to protect themselves or respond to a crisis (Schroder-Butterfill & Marianti, 2006: p.19). Although, the 'coping capacity' dimension and associated compositional factors are often considered by the literature (e.g. Spiers, 2003: p.79), the 'capacity' to resist and modify risk outcomes from a contextual perspective is often neglected (e.g. Cattell, 2001). Therefore, the 'coping capacity' dimension is integral to developing our understanding of the resulting affects of NSR outcomes at the neighbourhood level.

As previously established in *Section 1.1*. 'the neighbourhood' has been deemed to be the most appropriate context in which to explore NSR outcomes at, as it provides a context in which, most of an individual's daily interactions occur (Neutens *et al.*, 2011). Accordingly, a social vulnerability approach that also considers the addition of a

‘neighbourhood capacity’ dimension will be implemented by this research. However, as illustrated by Nelson *et al.* (2010), the established definitions and dimensions of social vulnerability should not be used interchangeably with the term ‘conceptual framework’. Instead, it should be noted that definitions of social vulnerability should be considered as a starting point in which, to describe the components of the given social vulnerability approach. Alternatively, the actual implementation of a social vulnerability framework should be considered as an ‘analytical tool’ (Miller *et al.*, 2010: pp.10-11), in which to explore and develop our understanding of the *relationships* between each of the relevant risk-related dimensions: ‘exposure’, ‘susceptibility’, and ‘neighbourhood capacity’. Therefore, a contextual vulnerability approach has been selected for the purpose of this research and will be considered in further detail in *Section 4.3*.

Ultimately, the resulting conceptual framework should always be considered as an ongoing social process rather than a static phenomenon in society, therefore it is consistently under further development in order to accommodate additional factors and effects as required over time (Ravitch & Riggan, 2012). Yet, the benefit of implementing a social vulnerability framework that considers the exploration of NSRs across the life course at the neighbourhood-level, allows for a consistent frame of reference to be established for what is complex multidimensional process (Taylor-Gooby, 2004: p.8). Correspondingly, this replicable approach as further developed in *Section 4.3*. should allow for greater transparency and clarity, when determining the uncertainty and diversity of the deprivation outcomes that result from individuals/households experiencing NSRs at different points across the life course.

4.3. Implementing a Social Vulnerability Framework

This section aims to build upon previous empirical investigations into the dimensions and factors resulting from differential NSR outcomes (see: Ranci, 2010), by conceptualising this process via a social vulnerability approach. The implementation of a social vulnerability framework allows for both compositional and contextual factors to be considered, to determine the deprivation outcomes of an individual/household experiencing NSRs across the life course. In reference to NSR outcomes the addition of

the ‘neighbourhood capacity’ dimension is an innovative approach, as it allows for geography to be added to understanding issues of deprivation that are often considered at the individual or societal level only (e.g. Bonoli, 2007; Ranci, 2010). Whereby, these existing approaches to exploring NSR outcomes often employ an ‘outcome vulnerability’ approach (*Figure 4.1.*), focus solely upon examining the direct impact(s) of an NSR ‘event’, so that the relevant responses to mitigate against the resulting consequences can be established (e.g. Armingeon & Bonoli, 2006).

The social vulnerability approach outlined in this chapter aims to provide an alternative approach to examining deprivation outcomes that could potentially result from the HUTs (as identified in *Sections 3.3.-3.5.*) experiencing specific NSRs. By extending our understanding beyond the direct impacts and responses, to the consequences and contingencies resulting from NSR events, a more nuanced consideration can be made as to how the wider societal and sociodemographic context may influence the uncertainty and diversity of deprivation outcomes. Thus, adding to our existing income- and welfare-based measures of NSR outcomes, to also consider the social deprivation outcomes (*Section 1.1.*) that may result from the occurrence of different HUTs experiencing NSRs. Hence, a key theoretical aim of implementing a conceptual framework is to ensure that all the relevant multidimensional relationships that occur between key components, can be determined and explored in a purposeful and meaningful way (Ravitch & Riggan, 2012).

Prior to establishing the conceptual framework in further detail the definition of social vulnerability that is to be utilised by this research is discussed, building upon the definition provided in *Section 1.2.* Whereby, the concept of social vulnerability is made up of the characteristics of a person or group, and their corresponding situation which, may influence their capacity to cope, resist and recover from the impact of a risk ‘event’ (Wisner *et al.*, 2004: p.11; Schroder-Butterfill & Marianti, 2006: p.2; Morrone *et al.*, 2011: p.6). Due to this concept of social vulnerability being utilised within a diversity of disciplines, the exact meaning of the term varies in relation to the outcome(s) of a risk-related event that provide an analytical focus for the concept. For example, in economics the conceptual focus of social vulnerability is often centred on a decline in income and consumption (e.g. Whelan *et al.*, 2011), whilst sociodemographic research tends to

consider the loss and/or or inability to access of physical resources or opportunities (e.g. Vasta 2004). The result of these ‘outcome vulnerability’ approaches dominating the NSRs literature, has led to a variety of linear approaches that focus upon conceptualising and measuring the social vulnerability outcomes for different societal groups.

Consequently, there is an extensive conceptual and terminological diversity of an exact definition of social vulnerability, making it an ambiguous term that requires a systematic approach when operationalised as part of the wider research process (Spini *et al.*, 2013). However, developing upon more generalised perspectives of social vulnerability (e.g. Morrone *et al.*, 2011), this research argues that the multidisciplinary concept can be divided into two key elements: one which, considers the likelihood that a specific form of damage or consequence is going to occur, and another which, determines the extent to which, an individual/group is able to deal with the consequences. The seminal research by Chambers (2006: pp.32-34) outlines how the term “vulnerability” refers to exposure to contingencies and stress, and difficulty in coping with them. As stated by Chambers: “vulnerability has two sides: an external side of risks, shocks, and stress to which, an individual or household is subject and an internal side which, is defencelessness, meaning a lack of means to cope without damaging loss” (2006: p.33). This dichotomy has influenced the choice of the compositional (internal) dimensions of the ‘exposure’ and ‘susceptibility’ to NSR outcomes, and the contextual (external) dimensions for determining the ability of the neighbourhood to cope with NSR outcomes.

An empirical benefit of using a social vulnerability framework to categorise the elements which correspond to the: context, risks, exposure, susceptibility and outcomes, is that it allows for the transparent selection of indicators and variables to be made at latter stages of the research process (Nardo *et al.*, 2005). It is anticipated that the social vulnerability framework will guide the research process in order to meet the overall aims and corresponding objectives of this thesis (as outlined in *Section 1.4.*). However, there is much debate as to which components the social vulnerability dimensions should be comprised of, in order to adequately inform the uncertainty and diversity of social deprivation outcomes that may occur from NSR events (Lupton, 2003; Whelan *et al.*, 2011; Ranci, 2010).

Section 4.3.1. Dimensions of Social Vulnerability

The concept of social vulnerability will be considered via the three dimensions of ‘exposure’, and ‘susceptibility’ to NSRs, alongside the ‘neighbourhood capacity’ dimension. The purpose of considering these three dimensions in relation to NSR outcomes is to add further understanding to the diffusion and intensity of social deprivation outcomes, which different NSR profiles may face at key points of the life course (Bonoli, 2007: pp.5-8). The neighbourhood capacity dimension will be always be outlined first from this point onwards, as it allows for the addition of contextual factors to be accounted for prior to the compositional factors.

Neighbourhood Capacity

The ‘neighbourhood capacity’ dimension encapsulates the ability of the neighbourhood to cope and resist, the most likely impacts and consequences of NSR ‘events’ or transitions across the life course. As noted by Galster (2001: p.2111) although “the ‘neighbourhood’ is a term that is hard to define precisely, everyone knows it when they see it”. Although, there is debate as to what “it” is, there appears to be a greater consensus on the observable components that the neighbourhood is comprised of (see: *Section 3.6.1.*). Diez-Roux observes “neighbourhood definitions have typically not been formed by thoughtful theoretical considerations” (2002: p541), as data constraints often shape the choice of data (as discussed in *Chapter 5*).

i In contrast, when operationalising ‘the neighbourhood’, it has been suggested that the boundaries used to represent the ‘neighbourhood areas’ must be relevant to the mechanism being tested (Burgess *et al.*, 2001). Therefore, a continued understanding of neighbourhood characteristics which may modify and resist against NSR outcomes is required, in terms of appropriately: identifying, measuring, and managing both the aggregate-level/contextual-level processes. Also, the dichotomy of perspectives regarding how to measure deprivation outcomes at the neighbourhood-level (Sampson *et al.*, 2002), must also be considered - those relating to the individuals who live their everyday lives in their corresponding neighbourhoods, and those relating to the understanding the underlying geographical processes of an area (Diez-Roux, 2005).

Exposure

A pre-requisite of social vulnerability is that it should not be assumed that everyone who is exposed to an NSR outcome, will experience an unacceptable socioeconomic outcome (Adger, 2006). Instead, Schoon & Bynner (2003) demonstrate the exposure to NSRs can be attributed to a number of socioeconomic elements, which in turn may affect the future life chances of individuals/households. In relation to De Vos & Palloni's (1989) as previously outlined in *Section 3.3.*, there are a number of constraints which, particular 'HUT' may face in terms of the presence of certain demographic characteristics or socioeconomic conditions. For instance, in relation to NSRs across the life course, the lack of a (legally recognised) partnership is often associated with the increased vulnerability to issues of loneliness and social isolation at older ages (e.g. Victor *et al.*, 2005). In other words, one individual or 'HUT' is better positioned than another, because they have a greater share of and opportunities due to the inherent socioeconomic inequalities in society. Therefore, the exposure dimension should be considered as circumstances in which an individual/household faces a lack of protection to NSR outcomes. Accordingly, it could be argued that the identification of 'HUTs' in *Section 3.4.* and *3.5.*, establishes a starting point with which, to identify the *trigger points* across the life course at which, individuals/households are most likely to be exposed to NSRs.

Susceptibility

In addition to the exposure of individuals to NSRs, there are differences in the susceptibility different 'HUTs' to NSR outcomes (i.e. providing an indication of the differences within, as well as between groups in society). The result of which is that certain sub-groups of 'HUTs' are more likely to be influenced to NSR outcomes due to specific underlying sociodemographic characteristics, and will consequently face differential severities of social deprivation impacts (Busetta & Milito, 2009). Therefore, it is unsurprising that susceptibility factors are tailored to the exact NSRs experienced by specific individuals and groups in society, and should accordingly be determined on a case-by-case basis (Schroder-Butterfill & Marianti, 2006). For instance, the age of the dependent who is the subject of an NSR analysis, may have an additional effect upon the consequences and contingencies experienced, as age has been established as a marker of care-requirements in the NSRs literature (see: Jenson & Saint-Martin, 2006). As, it has been established by that the 'youngest-young' (Phillips & Adams, 2001) and 'oldest-old' (Baert *et al.*, 2011), will on average have the greatest level of care requirements as it is

these demographic groups are most likely to require health and social support in comparison to other age groups.

Social processes generate unequal exposure and susceptibility to NSRs by making individuals or 'HUTs' more likely to experience social deprivation outcomes and to varying extents, as well such outcomes being further influenced and modified by the context(s) in which, they occur. The result and consequences of such social and spatial inequalities are largely a function of the power relations operating in society (Hillhorst & Bankoff, 2004). Therefore, a greater consideration of how NSRs are conceptualised and measured is required as the measurement of the multiple dimensions of NSRs across the life course, are indispensable to further understanding the key components and dimensions, benchmarking current progress and to inform future responses (Ranci *et al.*, 2014). However, due to the exploratory nature of this research, the aim is not to establish a comprehensive model of all potential characteristics which, may lead 'HUTs' being exposed or susceptible to the consequences and contingencies of NSRs, but to instead summarise and establish the key pathways which, lead to a lack of protection to social deprivation outcomes.

As demonstrated by this section, there are three key dimensions that are imperative to understanding the social vulnerability of NSR outcomes at the neighbourhood level: neighbourhood capacity, exposure, and susceptibility. Yet, what is less explicit are the key components, which, make up each of these dimensions, and how these may vary for different HUTs across diverse contexts. Therefore, the aim of the *Sections 4.4* and *4.5*. is to provide a clear overview of the sub-dimensions and indicators which, are relevant to the specific NSRs attributed to the chosen 'Lone-Pensioner HUTs' and 'Lone-Parent HUTs'.

4.4. Selection of Indicators to Determine the Social Vulnerability of 'Lone Pensioner HUTs'

The aim of this section is to determine the indicators that are theoretically relevant to determining the social vulnerability of 'Lone-Pensioner HUTs', to the NSR of 'becoming

physically dependent at older ages' (as previously stated in *Section 3.4.*). Where possible the proposed indicators and their analytical interpretation(s) have been derived from the NSRs literature and where this was not possible (due to a lack of empirical research), a wider-scope of deprivation-related research is made. However, the indicators outlined in this section are also relevant to assessing the social vulnerability of 'Lone-Pensioner HUTs' to other NSRs (e.g. lacking a secure and adequate pension coverage [Taylor-Gooby, 2004: p.5.]). Moreover, *Tables 4.1. & 4.2.* provide a clear and modifiable structure, to allow for other 'HUTs' to also be included in additional analyses of the NSR of 'becoming physically dependent at older ages' (e.g. 'Couple-Pensioner HUTs') – if required in the future.

Table 4.1. Overview of key indicators for the assessment of the social vulnerability of ‘Lone-Pensioner HUTs’

| Dimension | Proposed Indicators | Analytical Interpretation |
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| <p>Neighbourhood Capacity - <i>the ability to cope and resist the impacts of NSR outcomes due to contextual attributes</i></p> | <p>1. Neighbourhood Resources</p> | <p>There is currently limited research on understanding the contextual resources that may influence social and physical functioning of older people (Bowling & Stafford, 2007). Although, it has been widely established that older people's everyday social functioning can be limited due to the social and physical (external) capabilities of the area and environment in which, they live (Scharf <i>et al.</i>, 2005).</p> <p>Constraints in terms of the inaccessibility to key local services for older people are theorised to negatively affect opportunities for individuals to partake in everyday social interactions in society, which, in turn can result in a reduced quality of life (e.g. Schroder-Butterfill, 2004). For example, older residents may ultimately have issues even the most basic local services and amenities, such as food retailing and banking facilities (Hickman, 2013). Due to age-based stereotypes and attitudes persisting in society, chronological age is often used to define access to: insurance, financial services, social security, education and training, and health care. This results in barriers to accessing services and opportunities, and can have impacts on the health, independence, and the approach of practitioners, researchers and patients alike (Lynch & Baker, 2005: p.135).</p> <p>Furthermore, the provision of formal social support has also been widely documented as a key determinant for measuring the quality of life of older people (Estes <i>et al.</i>, 2003; Grundy, 2006). Formal welfare provisions at the neighbourhood-level are therefore imperative to ensuring the social wellbeing of residents, especially via reliable and consistent access to GP surgeries and pharmacies (Bernsten <i>et al.</i>, 2001).</p> |

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| | | <p>Musselwhite & Haddad (2010) suggest that the ability to measure the accessibility of these key local services is important for understanding the health and wellbeing outcomes of older people who already have reduced mobility due to illness or disability. Thus, access to basic services is important to social wellbeing later life, as it provides a key component of an individual maintaining independence in their own house, for as long as possible (Scharf <i>et al.</i>, 2005).</p> |
| | <p>2. Neighbourhood Opportunities</p> | <p>There is the existence of two broad categories of: 'potential for active ageing' and 'informal social networks' (e.g. Schroder-Butterfill, 2004), with which the indicator of neighbourhood opportunities can be comprised of.</p> <p>The notion of 'active ageing' provides an opportunity for providing age-friendly neighbourhoods that can enable environments in which to boost community resilience, and reduce the social vulnerability of older people (Zaidi, 2014). As, it has been previously shown that in Europe, a lack of family and informal community support predisposes older people towards institutionalisation (Scott and Wenger 1995: p.164).</p> <p>Primarily, the effects of living in rural locations (in comparison to urban locations) is a key determinant of 'active ageing' for older persons. For example, those aged over 65 years old tend to have lower rates of car ownership than the rest of the population (Davey 2007). The result of which reduces the personal mobility of older people, who wish to access the comparatively fewer social and community resources that are present in rural areas; hindering opportunities for social participation and networking (Bowling & Stafford, 2007).</p> <p>Furthermore, the provision of unpaid care continues to provide a vital contribution to the supply of informal care yet in society, yet potentially affects the employment and social</p> |

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| | | <p>opportunities of those providing the care (Pickard, 2012). Norman & Purdam, (2013) also provide evidence to suggest that unpaid care provided within the household has a strong association with the need for the provision of formal care locally.</p> <p>Additionally, the ageing population is an issue that is integral to the whole population because of its pervasive nature, which can affect the relative role and dominance of older people in: society, family structures, employment, pensions, social care, housing, and service demands (European Commission, 2011). Consequently, the proportion of older persons living in a neighbourhood will ultimately have an impact on the distribution of key resources and opportunities made available to the local area (Davey, 2007). Therefore, as the proportion of older persons increases in an area, the greater the constraints to the neighbourhood opportunities for mitigating against NSR outcomes.</p> |
| <p>Exposure of 'Lone-Pensioner HUTs'– a lack of protection to NSR outcomes due to compositional characteristics</p> | <p>3. Lack of Economic Resources</p> | <p>Homeownership is a key indicator of economic status for older people in England and Wales in contemporary society. Demey <i>et al.</i>, (2013) use longitudinal data which demonstrated that men who were not homeowners were most likely to be at risk of requiring extra socio-economic resources in old age in Britain. Therefore, homeownership is commonly used as a proxy indicator of income/wealth for both men and women at older ages (e.g. Askham <i>et al.</i>, 1990; Rowlingson and McKay, 2005).</p> <p>A fall in the ratio of workers to pensioners means that the source of funding for the state pension has become a predominant issue. A main concern is that the state pension system is currently funded on a 'pay as you go' basis that is through the contributions of the current workforce, rather than through an accumulated reserve of previous contributions (Harper, 2000). This method of accumulation and redistribution has left an uncertain and uneven coverage of private pensions for those who are reaching retirement age.</p> |

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| | <p>4. Lack of Individual-Level Support</p> | <p>From the outset it should be acknowledged, that being resident in a one-person household is technically an exposure to the NSR of becoming 'physically dependent' in old age. Although, living alone should no longer be assumed to be a marginal household type amongst older people (Mc Rae, 1999), as it becomes a more widely occurring phenomenon in society.</p> <p>On the other hand, Pickard (2012) outlines marital status and living arrangements are pivotal to and older persons material and economic wellbeing of older people, as generally speaking, older people with larger, more active social networks are likely to be healthier and live longer, but network sizes and the amount of contact with people in one's network both tend to decline with age. I.e. family formation as a source of social support, those who are never married in this cohort are less likely to have has children (Young <i>et al.</i>, 2004). However, as illustrated by the above examples, there are a number of factors which may influence the lack of individual support that a person may experience.</p> |
| <p>Susceptibility of 'Lone-Pensioner HUTs' - <i>a state of likely to be influenced to NSR outcomes due to compositional characteristics</i></p> | <p>5. Age of 'Lone Pensioner HUT'</p> | <p>The concept of 'age' assumed to refer to a biological reality, rather than as a social construction. However, from a geographical perspective the meaning and experience of age, and of the process of ageing, is in reference to historical and cultural processes (Wyn & White, 1997: p.10). By examining specific life course stages in relation to specific age categories, it can be demonstrated how age can be socially, rather than biologically determined.</p> <p>Subsequently, SPA is an arbitrary cut off point in determining age categories. Instead, a clear description of "functional categories of ageing is needed" (Phelan <i>et al.</i>, 2004). Alongside the consideration of the theoretical limitation regarding the social categorisation of ages, it should the NSR of 'physical dependency at older ages' does not occur at the same chronological age point for everyone, as previously noted by the integrated life course approach (Alwin, 2012).</p> |

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| | | <p>Instead, 'old age' extends multiple decades and is comprised of early and late phases that are often extremely different from one another. Old age is reflected in what has been called the <i>third</i> and <i>fourth</i> ages of life (i.e. Laslett, 1994). The <i>third</i> age can span several decades and is viewed as a time of opportunity and activity. This is a period when many mature adults no longer have (immediate) childcare or work responsibilities but continue to be in good health. Moen (2003) calls this period the "mid-course", which emphasises the possibility of developing new identities for older persons that are engaging productively in society. The third age is a time-period that allows for the revision of existing social relationships with dependent family members and friends, alongside the establishment of new ones.</p> <p>In contrast, the <i>fourth</i> age is defined by the three "Ds": decrepitude, dependence, and ultimately death (Angel and Settersten, 2011). Therefore, the ageing process should not be normalised as the homogenous notion of 'old age', but instead two functional categories - the active 'leisure years' versus those of physical dependency.</p> |
| | <p>6. Gender of 'Lone Pensioner HUT'</p> | <p>The term 'gender' refers to the socially constructed roles that are assigned to women and men within society (Scott, 2007), and should not be confused with the term 'sex' which should only be used in reference to determining biological differences between women and men. Instead, the 'sex' of a person determines those that are biologically determined.</p> <p>The term 'gender' often refers to the binary characterisation of persons as either being 'men' or women', based upon socially constructed characteristics. Yet gender extends to both personal and "culture-bound conventions, roles and behaviours" (McArdle <i>et al.</i>, 2002), which can shape relations between and among women, men, and those who identify as non-binary. In many societies, gender constitutes a fundamental</p> |

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| | | <p>basis for discrimination, including access to power, prestige and resources. Therefore, gender should not be assumed to simply be binary construct, as research needs to extend analyses to consider to the fundamental characteristics of everyone.</p> <p>Currently, research on gender and the later life has specifically focused on the disadvantaged position of older women in relation to accessing pensions, and access to health and social care, due to a woman's marital status (Estes, 2003). Although, increasing attention is being paid to the deprivation outcomes of older men, as their life expectancy begins to catch up with that experienced by women in the UK and Europe.</p> <p>Later in life, women are increasingly more likely to become widowed than men, which has important repercussions for gender differences in living arrangements and the quality of life experienced - especially for the over 85s. Such a contrast is reflected in the differences in widowhood between men and women, because not only do women live longer than men, they also tend to marry men who are older than them (Victor <i>et al.</i>, 2000). Furthermore, women are less likely to remarry once widowed (Davidson, 2002). Women are therefore more likely to live alone, relying on their non-dependent children for support, living with other family members or entering communal establishments, in comparison to men (Kruger & Levy, 2001).</p> <p>In addition, there is evidence that the relationship between self-assessed health and the presence of underlying medical conditions, differs between sexes, and that men and women have different trajectories of self-assessed health as they age (Rohlfen and Kronenfeld, 2014). Both considerations of gender in relation to determining the 'physical dependency in older ages' should be regarded as confounding factors for the purpose of this research.</p> |
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To summarise the theoretically informed dimensions and corresponding indicators for the social vulnerability of ‘Lone-Pensioner HUTs’, *Table 4.2.* has been constructed to provide a starting-point for the selection of variables in *Section 5.3.* The summary provided by *Table 4.2.* does not aim to provide a complete coverage of all the potential indicators which could be used to model the dimension, but instead ensures that the key theoretical components are reflected in the empirical analyses in *Chapters 6 & 8.* Furthermore, the wider intention of the indicators outlined in *Table 4.2.* also (partially) meets the requirements of the aims and objectives outlined in *Section 1.4.*

Looking ahead, as explained by Heise the social construct that can be induced by a composite measure “is not just a composite formed from its indicators; it is the composite that best predicts the dependent variable in the analysis” (1972: p. 160). Thus, the meaning of the latent construct (i.e. NSR outcomes) will be as much a function of the dependent variable as it will be a function of its indicators (in relation to the dimensions of social vulnerability). Consequently, it is anticipated that the theoretically informed indicators that evidently represent the dimensions of social vulnerability will allow appropriate variables to be deduced in *Sections 5.3. & 5.4.,* so that observable associations between indicators of social vulnerability and corresponding NSR outcomes can be demonstrated.

Table 4.2. Summary of indicators for the social vulnerability of ‘Lone-Pensioner HUTs’

| Domain | Indicators |
|--|--|
| <p style="text-align: center;">Neighbourhood Capacity</p> <p style="text-align: center;"><i>The ability to cope & resist the impact of NSR outcomes</i></p> | <p>1. Neighbourhood Resources</p> <p>2. Neighbourhood Opportunities</p> |
| <p style="text-align: center;">Exposure of Lone-Pensioner HUTs</p> <p style="text-align: center;"><i>A lack of protection to NSRs</i></p> | <p>3. Lack of Economic Resources</p> <p>4. Lack of Individual-Level Social Support</p> |
| <p style="text-align: center;">Susceptibility of Lone-Pensioner HUTs</p> <p style="text-align: center;"><i>The state of being likely to be influenced by NSRs</i></p> | <p>5. Age of Lone-Pensioner</p> <p>6. Gender of Lone-Pensioner</p> |

4.5. Selection of Indicators to Determine the Social Vulnerability of ‘Lone Parent HUTs’

The aim of this section is to determine the indicators that are theoretically relevant to determining the social vulnerability of ‘Lone-Parent HUTs’, to the NSR of ‘being unable to reconcile paid work with caring for dependent children’ (as previously stated in *Section 3.5.*). However, the indicators outlined in this section are also relevant to assessing the social vulnerability of ‘Lone-Parent HUTs’ to other NSRs (e.g. obtaining skills and training that over time become obsolete, which is further compounded by being unable to upgrade them through lifelong learning (Taylor-Gooby, 2004: p.5). Consequently, *Tables 4.3. & 4.4* provide a clear and modifiable structure if other ‘HUTs’ were to be considered in relation to the NSR of ‘being unable to reconcile paid work with caring for dependent children’ (e.g. ‘Couple HUTs’). Where possible the proposed indicators and their analytical interpretations are derived from the NSRs literature, and where this was

not possible (due to a lack of empirical research), a wider-scope of deprivation-related research.

Table 4.3. Overview of key indicators for the assessment of the Social Vulnerability of ‘Lone-Pensioner HUTs’

| Dimension | Proposed Indicators | Analytical Interpretation |
|--|--|---|
| <p>Neighbourhood Capacity - <i>the ability to cope and resist the impacts of NSR outcomes due to contextual attributes</i></p> | <p>1. Neighbourhood Resources</p> | <p>Access to the labour market: Atkinson & Kintrea (2001) identified that individuals with dependent children, tended to be more involved in the neighbourhood than other people, regardless of tenure because children’s activities were often locally based. Therefore, the accessibility of local services is once again essential for determining the capacity of the neighbourhood’s resources to cope and resist the impacts of NSR outcomes.</p> <p>The local service which, is most frequently accessed by parents with dependent children (especially those at younger ages), are primary schools (Merom <i>et al.</i>, 2006). Therefore, the ease of accessibility for parents being able to take their children frequently to and from school on a daily basis, is imperative to being able to reconcile paid work with their everyday care commitments (Karsten, 2003). Hence, the location of primary and (potentially) secondary schools, are key contextual indicators in predicting the potential ability of lone-parents to</p> |

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| | | | resist the NSR of being unable to reconcile their care commitments with paid work. |
| | 2. Neighbourhood Opportunities | | <p>Currently, affordable housing is a major challenge in the UK, in terms of the lack of opportunities for certain individuals to obtain a secure position in relation to one of the most basic goods in society. The accessibility and affordability to adequate housing provision are terms that are often used interchangeably and are recognised as being mutually important to influencing the outcomes of one another (Lund, 2011).</p> <p>In regard to how affordable housing ought to be located within sustainable mixed communities, there is a need to provide opportunities to a wider range of sociodemographic groups, including those who are most vulnerable (i.e. households with dependents – a primary focus of NSRs research e.g. Bonoli, 2006: pp.58-59).</p> <p>Also, the affordability of housing can also provide an indication of the desirability of an area, in terms of both the most desirable school catchment areas (Croft, 2004), and the accessibility to employment opportunities (e.g via distance travelled to work).</p> |
| Exposure of 'Lone-Parent HUTs' – <i>a lack</i> | 3. Labour Market Exclusion | | Due to the increasing length of the transition into adulthood, it has provoked a |

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| <p><i>of protection to NSR outcomes due to compositional characteristics</i></p> | | <p>debate regarding the presence of a new developmental phase of the life course between childhood and adulthood – termed as ‘emerging adulthood’ (Arnett, 2007: pp.68-69). This stage in life of ‘emerging adulthood’ is presented as a positive, yet unpredictable transition that allows young-adults (aged 18-34) to be able to undertake new opportunities, as well as face additional constraints in terms of accessing employment opportunities (Furlong & Cartmel, 2007)</p> <p>For example, many young-adults now choose to go on to Higher Education (Stone <i>et al.</i>, 2011). Although, these rising levels of individuals who continue onto Higher Education, has a restrictive effect on the (residential) independence of students and newly-formed graduates, who will have accumulated substantial student debts over recent decades (Briggs <i>et al.</i>, 2012). In addition, there are a high proportion of young-adults (especially those with dependent children) who have a lack of/inadequate skills and qualifications.</p> <p>However, an over reliance on the concept of ‘barriers to work’ could be seen to be limiting our potential to understanding the choices lone parents have to make about caring for their children, at different stages of theirs and their child’s life. For example, understanding</p> |
|--|--|--|

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|--|---|--|
| | | <p>the constraints lone parents experience in exercising their choices and in making decisions about work (DWP 2005), often replaced by the constraints that they face (Collins <i>et al.</i>, 2006). Of the two million lone-parent families in the UK, 92 per cent are headed by women (ONS, 2012b), with 91 per cent of lone parents not sharing child care responsibilities equally with their child(ren)'s other parent (Peacey and Hunt, 2008).</p> |
| | <p>4. Lack of individual-level support</p> | <p>From the outset it should be acknowledged, that being a lone-parent household is technically an exposure to the NSR of being 'unable to reconcile paid work with caring for dependent children'. Although, becoming a lone-parent should no longer be directly considered to always be a constraint, as an increasing proportion of women are choosing to independently undertake childbearing outside the context of formal relationships (Rowlingson & McKay, 2005).</p> <p>Yet, there is an ongoing tension, conflict, and negotiation around the question of who should care for young children (Sacareno, 2011). However, in the British context there is an ongoing assumption that most of the care needs will be provided for by parents, guardians, and family members (Jenson, 2006). This is an issue that is particularly inherent in lone-parent's lives, as they often rely on</p> |

| | | | |
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| | | | <p>co-ordinating a variety of support networks to care for their dependent children (potentially including their former partner or spouse). Therefore, determining informal social support networks which, often offer child care support on an <i>ad hoc</i> basis, provides a key understanding of neighbourhood opportunities which support lone-parents with their ongoing care requirements (McArthur <i>et al.</i>, 2010).</p> |
| <p>Susceptibility of 'Lone-Parent HUTs' – a <i>state of likely to be influenced to NSR outcomes due to compositional characteristics</i></p> | <p>5. Age of Youngest Dependent Child</p> | | <p>The most obvious susceptibility of lone-parents being likely to be influenced by the NSR of 'being unable to reconcile paid work with caring for dependent children is the age of their youngest, dependent child (Jenson, 2006: pp.22-28). As it is obvious that lone-parents who have children of pre-school age (i.e. aged 5 years old and under) will have greater care responsibilities, than those whose children are aged 5 years old and over (Plant & Sander, 2007).</p> |
| | <p>6. Transport Immobility</p> | | <p>Additionally, a key factor which makes lone-parents increasingly susceptible to being unable to gain employment whilst caring for dependent child(ren), is the personal transport mobility of a lone parent (Kenyon <i>et al.</i>, 2002). As there is evidence to suggest (e.g. Delbosc & Currie, 2011) that there is a strong correlation between a lack of access to adequate transport mobility, and lack of access to opportunities, social networks, goods and services, which in turn make individuals/groups more</p> |

| | | | |
|--|--|--|---|
| | | | <p>resilient to deprivation outcomes at the neighbourhood level. Recently it has been increasingly suggested that a lack of personal mobility has the most detrimental impact on those who are unemployed in society (Kenyon <i>et al.</i>, 2002).</p> <p>Furthermore, due to the increasing restrictions on the independent mobility of dependent children (e.g. due to time-constraints or safety fears), they are increasingly escorted by adults in cars (Barker, 2010). Thus, the car is becoming an increasingly significant social space of childhood, regarding the accessibility of resources and opportunities made available to both the children and their parents (Jenson, 2006). However, little is known about the decision-making processes that result in the choice of car use in relation to other forms of transport (i.e. public transport and walking).</p> |
|--|--|--|---|

Once again, to summarise the theoretically informed dimensions and corresponding indicators for the social vulnerability of ‘Lone-Parent HUTs’, *Table 4.4.* has been constructed to provide a starting-point for the selection of variables in *Section 5.4.* The summary provided by *Table 4.4.* does not aim to provide a complete coverage of all the potential indicators that could be used to model the dimension, but instead ensures that the key theoretical components are reflected in the empirical analyses in *Chapters 6 & 8.* Furthermore, the wider intention of the indicators outlined in *Table 4.4.* also (partially) meets the requirements of the aims and objectives outlined in *Section 1.4.*

Table 4.4. Summary of Indicators for the Social Vulnerability of ‘Lone-Parent HUTs’

| Domain | Indicators |
|---|---|
| <p style="text-align: center;">Neighbourhood Capacity</p> <p style="text-align: center;"><i>The ability to cope & resist the impact of NSR outcomes</i></p> | <p>1. Neighbourhood Resources</p> <p>2. Neighbourhood Opportunities</p> |
| <p style="text-align: center;">Exposure of Lone-Parent HUTs</p> <p style="text-align: center;"><i>A lack of protection to NSRs</i></p> | <p>3. Labour Market Exclusion</p> <p>4. Lack of Individual-Level Social Support</p> |
| <p style="text-align: center;">Susceptibility of Lone-Parent HUTs</p> <p style="text-align: center;"><i>The state of being likely to be influenced by NSRs</i></p> | <p>5. Age of Dependent Children</p> <p>6. Transport Immobility</p> |

4.6. Discussion

The concept of social vulnerability is utilised by this research to provide a lens in which to structure the process of determining how compositional and contextual determinants that may influence the differential distribution of social deprivation outcomes HUTs may potentially face, if they are exposed to NSRs. Of note, is the ability of the proposed social vulnerability framework to add geography to the assessment of social deprivation outcomes, which specific NSR profiles (HUTs) may experience if exposed to an NSR; a previously unaccomplished research task (Ranci, 2010). Furthermore, the proposed social vulnerability framework provides a clear and consistent frame of reference to evaluate and measure the social deprivation outcomes that any HUT may face, in relation to any relevant NSR. Therefore, the scope of the social vulnerability framework can extend beyond the multidimensional evaluation of the specific HUTs which are

investigated in this research enquiry, if required at a later stage. By comprehensively understanding the underlying social disparities that different HUTs may face at the neighbourhood level when exposed to an NSR, the reinforcing social processes which drive the resultant social inequities, may also be identified (Sampson *et al*, 2002).

The establishment of the social vulnerability framework and the key indicators as outlined by *Tables 4.1* and *4.3*. have ensured a comprehensive overview of the three fundamental dimensions (and corresponding indicators), pertaining to the ‘exposure’ and ‘susceptibility’ to NSRs, alongside the ‘neighbourhood capacity’ dimension in this research enquiry. The results of which will be used to inform the appropriate choice of data and methods in *Chapter 5*, to derive the resulting small-area level deprivation measures in *Chapters 6* and *7*. It is important to note that the proposed conceptual framework outlined in this chapter, is not intended to be a final output. Instead, the social vulnerability framework acts as a template to guide the design of the research process throughout this thesis, for example, to delineate the social indicators into variables. The social vulnerability framework will continue to be further developed throughout this research process, to determine the differential social deprivation outcomes which, ‘Lone-Pensioner HUTs’ and ‘Lone-Parent HUTs’ separately face at the neighbourhood level. Consequently, it is hoped that the utilisation of the social vulnerability framework from this point onwards, will demonstrate the reasoned, defensible choices of construction the social vulnerability indices (SVIs) in the following chapters (Ravitch & Riggan, 2012).

Chapter 5 – Data and Methods

5.1. Introduction

This chapter provides justification for the choice of data, methods and procedures used in the construction of the respective social vulnerability indices (SVIs) for the ‘Lone-Pensioner HUTs’, and ‘Lone-Parent HUTs’ (*Chapters 6 & 7, respectively*).

The first part of this chapter offers a clear and concise frame of reference as to how the systematic process of: obtaining, interpreting, and analysing the data was undertaken (Diener & Suh, 1997). Consequently, *Section 5.2.* provides a reflection of utilising spatial data, followed by a justification as to why the 2011 Census for England and Wales was chosen as the data source to obtain the compositional variables from. *Section 5.3.* then summarises the additional datasets that were used to operationalise the contextual indicators within the ‘neighbourhood capacity’ dimension. *Section 5.4.* demonstrates how the indicators outlined in *Sections 4.5.* and *4.6.* were operationalised into the final selection of compositional and contextual variables, in preparation for being assembled into the SVIs within *Chapters 6* and *7.*

The second part of this chapter provides an overview of the analytical structure used to guide the construction of the SVIs, as summarised by *Figure 5.1.* Subsequently, *Section 5.5.* provides an overview of the statistical method of multiple linear regression (MLR), that was used to inform the final selection of variables that make up the SVIs. The selection of variables is then followed by a summary of the aggregation and weighting procedures used to assemble the SVIs. Finally, *Section 5.6.* provides a discussion of the key theoretical and analytical implications of the proposed data, methods, and procedures.

5.2. Spatial Data

During the initial selection of the compositional and contextual variables the potential implications of the choice of spatial scale, and the geographic units to be utilised in the subsequent empirical analyses were considered. Despite the increasing prevalence of

literature regarding the measurement of so-called ‘neighbourhood effects’ (e.g. Sampson *et al*, 2002: pp.446-447), capturing the required aspects of neighbourhood environments at appropriate spatial scales continues to be somewhat problematic in geodemographic research (Martin, 2003). From a theoretical perspective this can be reflected by the ‘Modifiable Areal Unit Problem’ (MAUP), which Heywood *et al*. (2011: p.8) identifies as: “a problem arising from the imposition of artificial units of spatial reporting on continuous geographical phenomenon, resulting in the generation of artificial spatial patterns”. Thus, how the MAUP issues may impact on the empirical analyses, depending on the choice of scale and aggregation methods, are considered in *Sections 5.2.1.* and *5.2.2.* prior to the final selection of data.

Additionally, the importance of acknowledging the ecological fallacy must be considered when inferring relationships from spatial data, especially by refraining from making assumptions about a chosen areal unit that should not be directly made from alternative aggregations of a given dataset (Openshaw, 1984). An example of incorrectly making inferences from differential spatial scales, when referring to a given phenomenon at corresponding geography is given in *Table 5.1.*

Table 5.1. An example of the issues of Ecological Fallacy when using different spatial aggregations of data to infer results – for the electoral ward of Burngreave

| Geography | Area | % Long-term Unemployed |
|------------------------|--------------------------|-------------------------------|
| <i>Region</i> | Yorkshire and the Humber | 1.5 |
| <i>County</i> | South Yorkshire | 1.7 |
| <i>Local Authority</i> | Sheffield | 1.4 |
| <i>Electoral Ward</i> | Burngreave | 2.7 |
| <i>MSOA</i> | Sheffield 022 | 3.3 |

(Data: ONS, 2013b)

If the percentage of people who are long-term unemployed (2011) were required for the electoral ward of Burngreave, but the variables were to be reported at either: regional, county or local authority level, the value given would be unrepresentative of the population of interest (i.e. specific to Burngreave). For example, the required value for the unemployment rate in Burngreave from the 2011 Census is 2.7% which, is comparatively greater than 1.4% for the wider, local authority area of Sheffield. Furthermore, as the ecological fallacy occurs specifically due to the ‘aggregational variability inherent in areal data’ (Openshaw, 1984: p.18), it is also incorrect to assume that all, individual members of a group display the characteristics of the population group in its entirety (Robinson 1950). However, as all types of spatial data analysis will be influenced by the effects of the ecological fallacy it is problematic to completely avoid such issues, so a key objective of this research is to ensure that its effects are minimised where possible.

5.2.1. 2011 Census Data

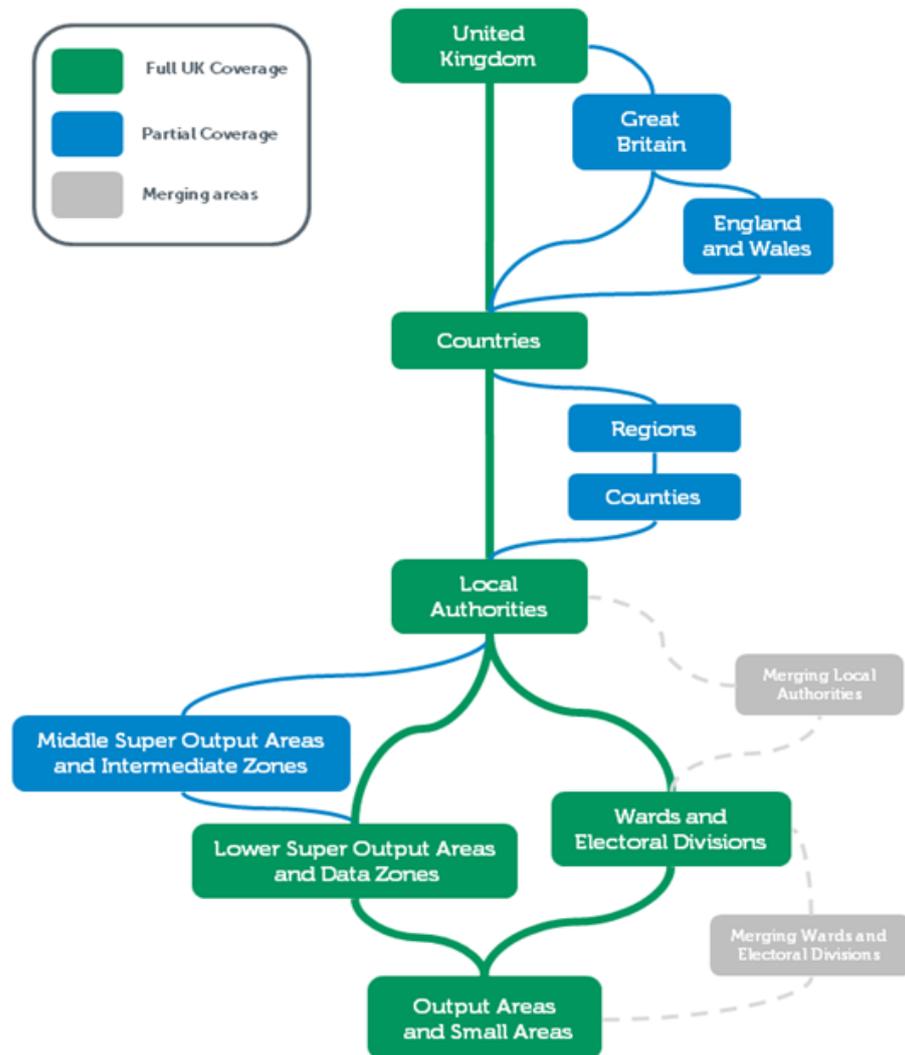
The main source of compositional data in this research is the 2011 Census for England and Wales. The administrative body responsible for the census in England and Wales is the Office for National Statistics (ONS), who undertook the latest census on Sunday 27th

March 2011. The 2011 Census questionnaire contained 56 questions - 14 questions about the physical structure of the accommodation and the composition of the household, and 42 questions about the sociodemographic characteristics of each individual household member (ONS, 2011b). The estimated proportion of the usually resident population of England and Wales, as covered by the Census was approximately 96% in 1991, 94% in 2001, and 94% in 2011 (ONS, 2012b). Because the dissemination of key outputs and tables is often readily available via open access, the Census has become established as a valuable source of demographic information for a variety of end-users; from laying the foundation to inform sub-population estimates (e.g. Rees *et al.*, 2011), to the creation and evaluation of social policies (Cabinet Office, 2008: p.17). Hence, the importance of undertaking a decennial census alongside its many extensive uses should continue to be acknowledged, as there is no other consistent source of sociodemographic data available at such a wide range of geographical scales for the population of England and Wales (Martin *et al.*, 2000).

Census Geographies

As part of the dissemination of the results of the 2011 Census undertaken by the ONS, emphasis was placed on responding to user requirements, on: content, format, data accessibility, and provision of key statistics to the highest possible standards (White, 2009: pp.71-72). Thus, the ONS ensured that all variables were produced at all possible levels of statistical and geographical detail (ONS, 2010), subject to the overriding requirement to protect statistical confidentiality. The dissemination of the standard outputs from the 2011 Census was undertaken across several spatial scales, from pre-existing hierarchical subdivisions of local government areas (e.g. government office regions), to the lower-level areal-units (e.g. output areas), as demonstrated by *Figure 5.1*.

Figure 5.1. Spatial scales for the 2001 and 2011 Censuses



[Source: ONS, 2012a]

As shown by *Figure 5.1.* there are several geographies for which census data can be obtained at, although the full coverage of certain outputs is only applicable to England and Wales. Of note, are the census geographies, which were specifically designed for the dissemination of census datasets from the 2011 Census onwards, with Output Areas (OAs) being the smallest areal-unit for producing census outputs at. Additionally, Lower Super Output Areas (LSOAs), and Middle Super Output Areas (MSOAs), are larger areas constructed from groupings of OAs; these are extensively used for the publication of a wide range of key and detailed statistics since the 2001 Census (see: Noble *et al.*, 2016). The unique role and ability of the 2001 and 2011 Censuses to provide reliable population statistics at stable, small-area level geographies, continues to remain unrivalled when used for geodemographic research for England and Wales (Baffour *et al.*, 2013).

Although census data can be obtained at a variety of small-area level geographies, there is no universally accepted standard unit of aggregation, at which to undertake neighbourhood-effects research (Sampson *et al.*, 2002; Galster, 2012). Accordingly, for this research, Middle Super Output Areas (MSOAs) were chosen as the most appropriate small-area level geography to reflect the neighbourhood context. For the 2001 Census, there were a total of 7,194 MSOAs; 6,781 for England, and 413 for Wales (ONS, 2004). In 2011 this figure increased to a total of 7,201 MSOAs, with England and Wales containing 6,791 and 410 MSOAs, respectively. This change in spatial boundaries represents an overall increase in the number of MSOAs at an increase of approximately 0.1% over the ten-year period (ONS, 2012b). Because of the new MSOAs that were created especially for the 2011 Census onwards, the redrawing of boundaries from the existing MSOAs (established from the 2001 Census) was required. In total, there were 63 'modified' MSOAs in 2011, an overall change of only 2.1% for MSOAs between censuses. Consequently, this (relative) continuity in MSOA boundaries between 2001 and 2011 Censuses enables the ability to compare census statistics and measures over time, if required (de Vaus, 2004).

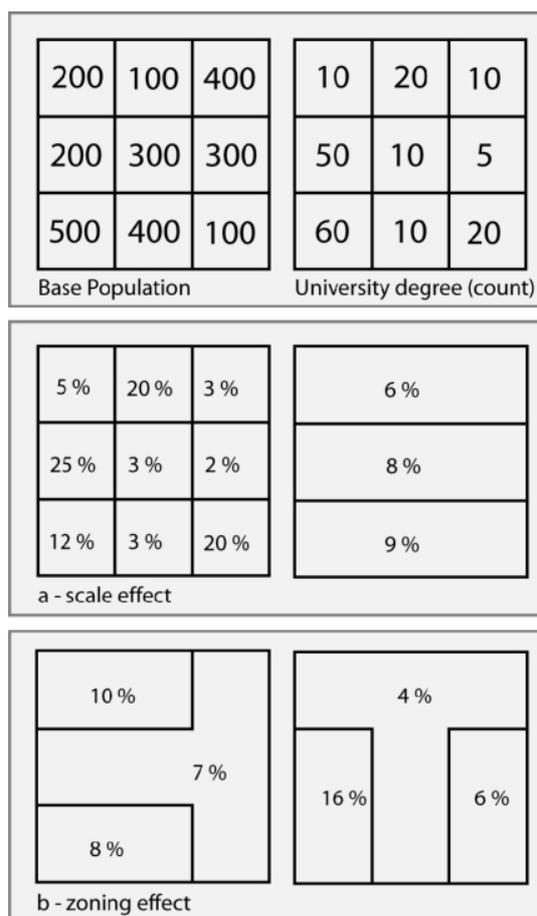
However, there are limitations of utilising MSOAs as areal-units for representing neighbourhoods as a unit of enquiry in research, as MSOAs may not correspond to what individuals perceive to be their own neighbourhoods (Flowerdew *et al.*, 2008). In everyday life, neighbourhoods do not represent discrete places that can be readily defined by a single, bounded space. Instead, boundaries are often fluid in nature, and individuals are commonly exposed to multiple neighbourhood contexts at specific points across their life course (Galster, 2001; Cummins *et al.*, 2007). A solution for reducing these potential issues has been proposed by VanHam & Manley (2012), and involves creating bespoke neighbourhoods for each unique analysis, in anticipation of reducing biased neighbourhood estimates that may result from boundary effects. However, the likelihood of achieving these ideological, bespoke areas at the neighbourhood level is questionable as it would be impractical and, in most cases impossible to collect the required data for each of the individual areal-units (McKnight *et al.*, 2007).

Considerations for utilising the pre-defined areal-units (MSOAs) in this research are also made about the issue of the MAUP (Wong, 2004). Changes to either the scale or areal-

partitioning of the spatial-units could potentially modify the associations determined between the independent and dependent variables, compared to the original choice of spatial scale (i.e. MSOA level). This effect is illustrated by *Figure 5.2.*, which uses the example of the percentage of the overall population who have obtained a university degree (Bell & Schuurman, 2010: p.1010). Both the spatial-subsets, 'a', and 'b' demonstrate how different arrangements of the nine cells that represent the numerator and denominator populations, could potentially alter the final percentage of university attainment.

Attempts to address the MAUP are primarily condensed into two distinct, but closely related problems. The 'scale effect', is demonstrated by the example illustrated by subset 'a' in *Figure 5.2.* As the name suggests, differing statistical results are obtained from the same set of areal-units, when they are organised into increasingly smaller or, conversely larger spatial scales (Waller & Gotway, 2004). However, a key benefit of using small-area level geographies (including MSOAs), in contrast to higher-level geographies (e.g. wards), is that these scale effects are likely to be comparatively reduced due to the higher resolution of the dataset.

Figure 5.2. The ‘scale’ and ‘zoning effect’ of the modifiable areal unit problem (MAUP)



[Source: Bell & Schuurman, 2010: p.1010]

Also shown by *Figure 5.2.* is the ‘zoning effect’, which is illustrated by the example in subset ‘b’ and refers to the effect of subdividing the same areal-units in different configurations (Goodchild, 2001). Conversely, the ONS considered the issue of the ‘zoning effect’, as part of the decision-making process to compile the census geographies in 2011. Therefore, the choice of aggregation method used to construct the small-area level census geographies, ensures that relatively equal numbers of individuals and households are captured by each MSOA, over time (ONS, 2005). Correspondingly, the average population per MSOA in England and Wales on 27 March 2011 was 7,787 individuals (varying between 5,000-15,000 individuals in each MSOA), or on average 3,245 households (varying between 2,000-6,000 households in each MSOA). The large sample size of the population, approximately 56.1 million (ONS, 2013b), across the 7,201 MSOAs in England and Wales, also reduces the potential error effects when aggregating the compositional data at small area-level geographies. Hence, when using standardised

census geographies, the effects of MAUP are reduced in comparison to using standard administrative units, such as postcodes or wards.

Specially Commissioned Census Datasets

In addition to the standard administrative outputs released by ONS, data-users can request specially commissioned census datasets. These datasets are commonly referred to as *ad hoc* tables and provide additional outputs that have not been previously included in the standard publication of key and detailed statistics provided by the ONS. Whereby, *ad hoc* tables are produced in response to specific requests by researchers, organisations, and members of the public, and can subsequently be obtained by anyone once released via the Open Government License (ONS, 2014). A key advantage of obtaining *ad hoc* tables is that they often provide access (where possible) to cross-tabulated datasets, which may potentially allow for the examination of (previously unexplored) relationships between three or more data characteristics, across a wider range of variables (than previously released), at all possible geographical scales.

Consequently, for this research enquiry eight, *ad hoc* tables from the 2011 Census were obtained from the ONS; the exact contents of which, are further discussed in *Sections 5.3.4. and 5.4.4.* These specially commissioned datasets enabled previously unexplored interactions between both compositional and contextual attributes, and the resulting deprivation outcomes for the two distinct NSR profiles of ‘Lone-Pensioner HUTs’, and ‘Lone-Parent HUTs’ to be undertaken. For example, an *ad hoc* table outlining the variables: ‘age’ by ‘gender’ by ‘housing tenure’, was obtained for ‘Lone-Pensioner HUTs’ (Census Table: *CT0532*). Furthermore, obtaining these *ad hoc* datasets also responds to the call made by Noble *et al.*, (2016) who suggests that the measurement of social issues in Britain should be undertaken for a greater range of sub-populations, using data which is routinely collected by the Census, but is often not disseminated publicly.

However, there are limitations to obtaining these datasets, due to the infrequent production of user-commissioned *ad hoc* tables by the ONS. In summary, the production of these tables are subject to: cost, data constraints, the availability of skilled staff who are required to compile them, and issues of statistical disclosure control (ONS, 2017).

Regarding this latter constraint, the ONS has a legal obligation, under the Statistics and Registration Service Act (2007) and the Data Protection Act (1998) (Ritchie *et al.*, 2013: p.102-104), to protect the attributes and characteristics of individuals/households that may potentially be revealed at small-area level geographies. For example, to ensure the anonymity of respondents in the standard outputs produced for the 2011 Census, methods and procedures of record swapping and manipulation were carried out between areas with cell counts of less than five respondents (ONS, 2012b). There are additional ethical and practical reasons for applying measures of statistical disclosure control, and these are further outlined in the ONS code of practice (see: Cabinet Office, 2008).

Furthermore, the ONS will also consider the similarity of requests to previous releases and those planned for the future, the result of which may prevent the subsequent release of specific datasets (ONS, 2014b). Thus, careful consideration of the desired outputs needs is required prior to submitting a user request form, in order to ensure the greatest likelihood of a researcher being able to obtain the required outputs in a timely manner, and at the desired areal-units. Alongside the limitations surrounding the production of the *ad hoc* tables, an additional constraint to the data-user is the cost of the final tables, which equated to approximately £500 for each of the eight, cross-tabulated census tables obtained for this research enquiry. The cost of the commissioned output reflects the amount of time taken to develop the table(s), together with statistical disclosure checks (pre- and post-production) and associated processes. Correspondingly, the time taken to obtain the tables for this research enquiry was approximately 6 months after submission of the final request forms, in relation to the time taken to fulfil the prior requests of other users, including the prioritisation of requests attributed to government agencies.

In summary, although there are several limitations to obtaining data from the 2011 Census, it continues to remain unrivalled as a comprehensive and consistent source of population data, especially at small-area level geographies for England and Wales (Thomas *et al.*, 2009; Dorling, 2013). Furthermore, although the 2011 Census provides a comprehensive source of data relating to the compositional characteristics of individuals and households at small-area level geographies, it is not a comprehensive source of contextual data. Therefore, additional administrative datasets were consulted to obtain

further contextual variables, to reflect the ‘neighbourhood capacity’ dimension and associated indicators, as previously outlined in *Sections 4.4.1.* and *4.5.1.*

5.2.2. Non-Census Datasets: Available at Small-Area Level Geographies

The continued development and interest of using spatial datasets for research enquiries has broadened the remit of geodemographics, from once being exclusively concerned with residential characteristics, to now include: travel to work patterns, leisure activities, transport mobility, and beyond (see: Delbosc & Currie, 2011). Consequently, it has been suggested by Singleton & Speilman (2014) that the increasing availability and accessibility of geodemographic data in contemporary society, corresponds with continued advances in technology alongside the increasing prevalence of the dissemination of research outputs via methods of open access. Yet, a fundamental problem with analysing multiple sources of geographical data occurs when area boundaries are not coincident with one another. Hence, the availability of appropriate data that could be obtained at the OA/MSOA level, in order to assess the contextual attributes of neighbourhoods (in relation to ‘Lone-Pensioner HUTs’ and ‘Lone-Parent HUTs’), was assessed. Subsequently, careful consideration was made when obtaining all the contextual variables, to ensure that all potential datasets were reviewed in terms of the quality and verifiability of the variables. In addition, an assessment was made on the ability to obtain complete datasets, including the adequate coverage of the chosen variables at the OA/MSOA level for England and Wales. Further discussion regarding the sources of data used to obtain the contextual variables within the ‘neighbourhood capacity’ dimension for ‘lone pensioners’ and ‘lone parents’ are summarised in *Tables 5.3.* and *5.8.*, respectively.

5.3. Variables to Assess the Social Vulnerability of ‘Lone-Pensioner HUTs’

The variables chosen to operationalise the previously outlined indicators (see *Table 4.1.*) for the assessment of the social vulnerability of ‘Lone-Pensioner HUTs’ at the neighbourhood level are briefly summarised in *Table 5.1.* More detailed considerations of the specific variables, and corresponding datasets that are used to assess the social vulnerability of ‘Lone-Pensioner HUTs’, are outlined in the relevant dimensions of

‘neighbourhood capacity’, ‘exposure’ and ‘susceptibility’ to NSR outcomes in *Tables 5.2.-5.5.*

Table 5.2. Summary of independent variables to assess the social vulnerability of ‘Lone-Pensioner HUTs’

| Dimension | Indicators | Variables <i>(obtained at MSOA level)</i> |
|--|--|---|
| <p>Neighbourhood Capacity</p> <p><i>The ability to cope & resist the impact of NSR outcomes</i></p> | <p>1. Neighbourhood Resources 1a. Inaccessibility of Local Services</p> <p>2. Neighbourhood Opportunities 2a. Lack of Potential for Active Living 2b. Lack of Area-Level Social Support</p> | <p>1a. Accessibility to health care services 1a. Accessibility of town centres</p> <p>2a. Population density 2b. 'Old age dependency ratios' (OADRs) 2b. Proportion of households who provide 'unpaid care'</p> |
| <p>Exposure of Lone-Pensioner HUTs</p> <p><i>A lack of protection to NSRs</i></p> | <p>3. Lack of Economic Resources 3a. Inadequate Pension Provision 3b. Lack of Financial Resources</p> <p>4. Lack of Individual-Level Social Support 4a. Removal of Social Support 4b. Lack of Relationship</p> | <p>3a. Proportion of HUTs who have no/low skills 3b. Proportion of HUTs who do not own their home outright.</p> <p>4a. Proportion of HUTs who have moved house in the last year. 4b. Proportion of HUTs who are 'single' (<i>never been in a legally-recognised relationship</i>)</p> |
| <p>Susceptibility of Lone-Pensioner HUTs</p> <p><i>The state of being likely to be influenced by NSRs</i></p> | <p>5. Age of Lone-Pensioner</p> <p>6. Gender of Lone-Pensioner</p> | <p>5. HUTs who are aged '65-74' & '75+' years old: cross-tabulated by all EXPOSURE variables</p> <p>6. HUTs who are either Men (M) or Women (F): cross-tabulated by AGE and all EXPOSURE variables</p> |

The summary of variables in *Table 5.1.* expands on the previously outlined indicators used to represent the three dimensions of social vulnerability: ‘neighbourhood capacity’, ‘exposure’, and ‘susceptibility’, of ‘Lone-Pensioner HUTs’ (*Tables 4.1. & 4.2.*). The addition of sub-indicators and variables in *Table 5.1.* also provides a more detailed indication of the relevant contextual and compositional attributes, which can be used to assess the deprivation outcomes of ‘Lone-Pensioner HUTs’. For example, a ‘lack of

pension provision’ and a ‘lack of financial resources’ are both examples of sub-indicators that provide an indication of the potential accumulation of economic resources at specific points of the life course for ‘Lone-Pensioner HUTs’.

5.3.1. Outcome Variable: ‘Physical Dependency’ in Old Age

Historically, in relation to the measurement of population health at older ages, mortality rates and life expectancies have frequently been used in the assessment of health outcomes across different geographies in England and Wales (Graham, 2007). Although these measures can provide a useful benchmark for the assessment of health inequalities in society (see: Woods *et al.*, 2005), they do not provide a measure of the overall health of the current population. Consequently, other measures of subjective health have been produced, to obtain both individual- and household-level assessments of specific health statuses for respondents (whilst they are alive), at a given point in time. Hence, the decision was taken to incorporate two, self-reported measures of individual-level health status from the 2011 Census (see *Table 5.2.*).

Table 5.3. Variables to represent the physical dependency of ‘Lone-Pensioner HUTs’

| Data Source | Data Source Reference | Variable | Variable Description |
|--------------------|--|--|---|
| 2011 Census | 2011 Census <i>ad hoc</i> table: CT0534* | ‘Not in Good Health’ (%) | The percentage of one-person households (aged 65 years old and over) who are self-reported to be in: ‘bad health’ or ‘very bad health’. |
| | 2011 Census <i>ad hoc</i> table: CT0533* | ‘Limiting Long-Term Illness or Disability’ (LLTI/D) (%) | The percentage of one-person households (aged 65 years old and over) who are self-reported to have their day-to-day activities limited ‘a little’ or ‘a lot’, because of a health problem/disability which, has lasted, or is expected to last, at least 12 months. |

*See the Appendix for the full cross-tabulated datasets

The first self-reported measure of general health is also referred to as ‘self-assessed’, ‘self-rated’, or ‘self-perceived health’ (Jylhä, 2009), to provide a broad indication of the general health of the respondent and is captured using a single-item question. The 2011 Census asks respondents “*How is your health in general?*”, on a 5-point scale of: ‘very good’, ‘good’, ‘fair’, ‘bad’, or ‘very bad’ (ONS, 2011). This subjective measure of ‘self-assessed health’ combines an individual’s perception of their overall health and wellbeing and can provide a useful indicator of general well-being and health-related quality of life (see: Linton, 2016). Accordingly, this measurement of general health status can provide an indication of the physical, mental, and social well-being of different demographic groups, as well as the presence of diseases and/or illnesses at small-area level geographies.

The second self-reported measure of health refers to ‘Limiting Long-Term Illness or Disability’ (LLTI/D), which provides an indication of the presence of long-term health condition(s) that may limit the daily activities of the respondent. The 2011 Census asks respondents “*Are your day-to-day activities limited because of a health problem or*

disability which, has lasted, or is expected to last, at least 12 months? Including problems related to old age". The responses for this question are assessed on a 3-point scale of: 'yes, limited a lot', 'yes, limited a little', or 'no' (ONS, 2011). The LLTI/D has been widely used to measure issues of health inequalities at small-areal level geographies, including as a key input variable to the NHS 'resource allocation formulae' for inpatient and GP services, as well as in the prediction for determining access to certain welfare benefits (Norman & Bambra, 2007). The result of which, was these self-reported measures of health were chosen as suitable measures to assess the deprivation outcomes that may potentially result from the 'physical dependency' NSR, in relation to the context of 'Lone-Pensioner HUTs'.

Subjective measures of population health are not without their limitations, and they are often criticised for not capturing the dynamic nature of health outcomes, which can vary substantially at different points across the life course (Wright *et al.*, 2016). Correspondingly, in relation to the assessment of health and wellbeing of older people, their current place of residence may not be entirely of relevance, as people have life histories unrelated to their current place of residence (Pickett & Pearl, 2001). Hence, the accumulation of individual-level resources and opportunities across the life course that may potentially modify health-related outcomes, should also be assessed in relation to understanding the resulting deprivation outcomes resulting from the NSR of 'physical dependency'.

5.3.2. Neighbourhood Capacity

As previously indicated in *Section 4.4.1.*, there is limited evidence for the influence of neighbourhood-level factors that are associated with the deprivation outcomes resulting from the social, and/or physical functioning of older people (Walters *et al.*, 2004). Therefore, a broader range of literature on how neighbourhood effects may influence the poverty and deprivation of older people was consulted, to inform the selection of contextual variables (e.g. Diez-Roux *et al.*, 2004). As a result, five contextual variables in relation to neighbourhood characteristics that are likely to modify or influence the 'physical dependency' of 'Lone-Pensioner HUTs' and are also variables that can be obtained at MSOA level are outlined in *Table 5.3.*

Neighbourhood Resources

The accessibility statistics for ‘GP surgeries’ and ‘local food shops’ were obtained as destination indicators, as opposed to origin indicators (that consider the average distance travelled to access the nearest local given service). These indicators of the inaccessibility of local services are based upon datasets that outline the specific proportion of users within a defined areal-unit (i.e. MSOA), who can access the nearest given service, within a set time limit, for a given mode(s) of transport (Johnson *et al.*, 2017). Specifically, the chosen variables provide measures for the percentage of all (usually-resident) households in a MSOA who are unable to get to their nearest GP surgery/local food shop, either by public transport or by walking in less than fifteen minutes. However, the reliability of these measures which are derived from a generalised measurement of travel time whilst using public transport, is somewhat uncertain due to the need to intuitively guess the potential waiting times and the availability of service (Martin *et al.*, 2000). Conversely, these accessibility measures have the advantage of it being simple to obtain a general understanding of personal transport mobility to health-related amenities, resulting in the utilisation of these (and similar) variables being common (Smith & Stenning., 2006: p.193).

Table 5.4. Variables relating to the ‘neighbourhood capacity’ of ‘Lone-Pensioner HUTs’

| Data Source | Data Source Reference | Variable | Variable Description |
|--|---|--|---|
| Office for National Statistics & Statistics for Wales | Organisation Data Service, Health and Social Care Information Centre (2014) | ‘Inaccessibility of Local GP Surgery’ (%) | 1a. The percentage of all (usually-resident) households in a MSOA who are unable to get to the nearest GP surgery by public transport or walking in less than 15 minutes. |
| | Ordnance Survey Data (2014) | ‘Inaccessibility of Local Food Store’ (%) | 1a. The percentage of all (usually-resident) households in a MSOA who are unable to get to the nearest grocery/supermarket or convenience store by public transport or walking in less than 15 minutes. |
| 2011 Census & Office for National Statistics | Population data derived from: 2011 Census table - QS102EW | ‘Population Density’ (rate - number of persons per hectare) | 2a. The measurement of all (usually-resident) individuals per unit area. |
| 2011 Census | Population data derived from: 2011 Census table - KS102EW | ‘Old Age Dependency Ratio’ (OADR) (ratio) | 2b. The ratio of individuals (aged 65 years old and over) in comparison to working-age individuals (those ages 18-64 years old). |
| | Population data derived from: 2011 Census table – QS301EW | ‘Provision of Unpaid Care’ (%) | 2b. The percentage of all (usually-resident) individuals who provide 1+ hour(s) of unpaid care a week. |

Neighbourhood Opportunities

Population density provides a measure of the average number of (usually resident) individuals per hectare, where a hectare is the metric unit of area defined as 10,000 square metres (ONS, 2011). The measurement of population density allows for the broad comparison of settlement intensity across geographic areas, as values provide an

indication of how many people would live within one hectare if the population were to be evenly distributed across its land area. It is widely demonstrated that population density has a positive relationship with deprivation outcomes at the neighbourhood level, as less densely populated areas have been theorised to be associated with specific issues of social disadvantage for older people (see: Wenger, 2001; Walters *et al.*, 2004). For example, the deprivation outcomes of older people who experience issues regarding personal mobility are theorised to be enhanced for those individuals who reside in more rural areas (Woods *et al.*, 2005). Hence, population density provides a useful (continuous) proxy measure of those older people who live in rural areas, which can be determined via the identification of less-densely populated areas.

It should be noted that the measurement of population density could be somewhat misleading if not interpreted correctly, as the social context and resulting deprivation outcomes may be vastly different for two areas that appear to have similar levels of population density (Smailies *et al.*, 2002). For example, two areal-units (MSOAs) may have the same population density, but in one area the population is widely dispersed, whereas in the other the population is concentrated to a small proportion of the given area (see: Martin *et al.*, 2000). Although this issue does not affect the general assessment of the rural/urban nature of the areal-units in question, it should be checked for when making inferences about the contextual attributes of individual MSOAs (i.e. by visually inspecting a street-level map of the specific MSOA in question).

Provision of Informal Social Support (Population-Level)

The provision of social care and support in later life is met via a combination of contributions from the public, private, and informal sectors (Tinker, 2002). It is unsurprising that informal networks, often consisting of family and friends constitute a high proportion of the social care and support given to older people who reside in their own residences (Grundy & Read, 2012). Accordingly, the decision was made to focus on measuring the informal provision of social support that ‘Lone-Pensioner HUTs’ may experience at the neighbourhood level.

Recent research has suggested that Old Age Dependency Ratios (OADRs) provide a useful measure of the proportion of 'dependent' members of the population aged 65 years and over (see: Sanderson & Scherbov, 2013; Spijker & MacInnes, 2013). Measures of OADR are often similar in nature, and usually provide an indication of the proportion of individuals who are typically not economically active (aged 65 years and over) in relation to the rest of the economically active population (aged 18-64 years). Areas with higher OADR values indicate that the current economically active population face a greater burden than other areas, in terms of the provision of welfare support and social care to meet the needs of the older people (Lloyd-Sherlock, 2012). Therefore, OADRs can provide an indication of areas, which may require additional economic and informal social support, and have been used to inform the allocation of resources at the neighbourhood level (Bettio & Plantenga, 2004).

In addition to OADRs, the 2011 Census asked whether respondents provided unpaid care to family members, friends, neighbours, or others - because of long-term physical/mental ill health, disability, or problems related to old age (ONS, 2010). This variable provides a more explicit measure of the informal care provided at the neighbourhood level by individuals aged 65 years old and over, who provide the greatest proportion of care given to other adults who are aged 65 years old and over (Harper, 2000). In 2011, 10% (5.8 million) of usually-resident individuals in England and Wales, aged 65 years old and over, provided unpaid care for someone with an illness or disability, whilst 37% of these carers (2.1 million) were providing 20 or more hours of unpaid care a week (ONS, 2014a). Note that this measure of unpaid care includes anyone who regularly provides one or more hours of unpaid care a week, so there will be substantial variation in the nature and type of informal care represented by this measure.

5.3.3. Exposure

There is a vast amount of existing work associated with exploring the lack of individual-level protection against deprivation outcomes that older people may face at the neighbourhood level (see: Grundy, 2003; Schroder-Butterfill & Marianti, 2006). Furthermore, the 2011 Census provides a comprehensive dataset to explore the compositional attributes of 'Lone-Pensioner HUTs' at the small-area level. As has previously been established, the Census still offers an unrivalled source of consistent, and

reliable, small-area level dataset for the entire population of England and Wales (Thomas *et al.*, 2009; Dorling, 2013). The ONS (2008; 2013) continues to suggest that the Census provides both a unique insight into the society in which we live, and a social benchmark that will be of relevance for many decades to come. *Table 5.5.* outlines the four compositional, theoretically-informed variables obtained from the 2011 Census, that are likely to influence the ‘exposure’ of ‘Lone-Pensioner HUTs’ to becoming ‘physically dependent’.

Table 5.5. Variables relating to the ‘exposure’ of ‘Lone-Pensioner HUTs’

| Data Source | Data Source Reference | Variable | Variable Description |
|--------------------|--|--|---|
| 2011 Census | 2011 Census ad-hoc table: <i>CT0529*</i> | ‘No/Obsolete Qualifications’ (%) | 3a. The percentage of one-person households (aged 65 years old) who have ‘no formal qualifications’. |
| | 2011 Census ad-hoc table: <i>CT0532*</i> | ‘Non-Homeowner’ (%) | 3b. The percentage of one-person households (aged 65 years old) who ‘do not own the house outright’. |
| | 2011 Census ad-hoc table: <i>CT0531*</i> | ‘Moved to A New House’ (in the last year) (%) | 4a. The percentage of one-person households (aged 65 years old) who ‘did not live at the same address a year ago’. |
| | 2011 Census ad-hoc table: <i>CT0530*</i> | ‘Single’ (no previous, legally-recognised relationship) (%) | 4b. The percentage of one-person households (aged 65 years old) who have ‘never married and never registered a same-sex civil partnership’. |

**See the Appendix for the full cross-tabulated datasets*

Inadequate Pension Coverage

As there are no available direct measures associated with the provision of pensions and/or pension-related benefits at the small-area level for England and Wales, the decision was taken to use the qualifications variable provided by the 2011 Census as a

proxy measure of private pension coverage for ‘Lone-Pensioner HUTs’. For instance, it has been demonstrated by Porterba *et al.*, (2007) that individuals who have higher levels of educational attainment are more likely to be covered by defined-benefit pension plans, in both the public and the private sectors. Thus, by classifying the different levels of qualifications obtained by ‘Lone-Pensioner HUTs, it allows for an estimation of the proportion of this NSR profile who potentially do not have access to additional private pensions and are more likely to experience deprivation outcomes to be defined. Accordingly, when classifying the educational attainment of ‘Lone-Pensioner HUTs’, the decision was taken to include the following options of response: ‘no qualifications’ and ‘other qualifications’ as a measure of those individuals who potentially have no, or obsolete qualifications (Taylor-Gooby, 2004). Hence, the inference was made that obtaining any type of formal qualification could potentially advantage the employment opportunities of those individuals from this age cohort. Thus, providing a proxy indicator of the proportion of the ‘Lone-Pensioner HUT’ population who potentially may not have access to private pensions due to a lack of earning power.

Financial Resources

Measures of housing tenure are frequently employed as conventional proxies of wealth, or social economic status, for older populations in geodemographic related research (e.g. Conklin *et al.*, 2013). Correspondingly, as the 2011 Census does not provide a question relating to the income or economic resources of the respondents, instead housing tenure was chosen as a proxy measure of the accumulation of financial resources which, ‘Lone-Pensioner HUTs’ may have encountered over their life course. Specifically, the 2011 Census provides five options in response to the status of housing tenure: ‘owns outright’, ‘owns with a mortgage or loan’, ‘part owns and part rents (shared ownership)’, ‘rents with or without housing benefit’, and ‘lives rent free’. This variable was chosen as a suitable proxy measure of income, because 75% of household reference persons aged 65 years old or over were classified as homeowners (either outright or with a mortgage/loan) by the 2011 Census. It is therefore the social norm for this cohort (aged 65 years old and over) to be homeowners, and so ‘Lone-Pensioner HUTs’ who are not homeowners (25%) can be inferred to be more financially constrained than those who are not.

Provision of Informal Social Support (at the Individual-Level)

A key determinant of the physical (and financial) dependency of older people is the loss of a partner or spouse due to either separation, divorce, or bereavement (Manzoli *et al.*, 2007). Furthermore, the loss of a partner has also been identified as a limiting factor in the choice of residential type and neighbourhood for individuals who are constrained by a LLTI/D (Victor *et al.*, 2005). The question asked by the 2011 Census regarding the relationship status was as follows: “On 27 March 2011, what is your legal marital or same-sex civil partnership status?”. There were nine potential options to this question, as outlined below:

- 1. Divorced**
- 2. Formerly in a same-sex civil partnership that is now legally dissolved**
- 3. Separated but still legally married**
- 4. Separated but still legally in a same-sex civil partnership**
- 5. Surviving partner from a civil partnership**
- 6. Widowed**
7. Never married and never registered a same-sex civil partnership
8. Married
9. In a registered same-sex civil partnership

[Source: 2011 Census Questionnaire, ONS]

For the purpose of this research, the first six options (1-6) were classified as ‘a loss of a partner’, whilst the remaining three options (7-9) indicate the respondent was either still in a legally-recognised relationship (unlikely for ‘Lone-Pensioner HUTs’) or had never been in a legally-recognised relationship. The only potential limitation of utilising this detailed measure of relationship status, is that it cannot provide an indication of non-legally recognised couples who ‘live apart, together’ (Duncan & Phillips, 2010). This corresponds to individuals who are in a committed relationship but choose to keep their own separate residences; a contemporary lifestyle choice, which is estimated to be slowly increasing amongst older people (Duncan & Phillips, 2010).

The final exposure variable as a proxy for the removal of informal support, is the proportion of ‘Lone-Pensioner HUTs’ who have moved to a new house in the last twelve months. This data can be readily derived from the 2011 Census and can be classified as a binary measure of the ‘Lone-Pensioner HUTs’ who ‘have’ and who ‘have not’ moved in the last 12 months. The examination of the provision of informal support is becoming standard practice when assessing the vulnerability of dependent populations, within neighbourhood effects research. For example, Cattell (2001) established the importance of including indicators of providing informal support to older people at the neighbourhood level, especially by neighbours and friends, in the absence of household members. Furthermore, neighbourhood research is increasingly demonstrating the value of indicators that show how the presence of neighbourhood connections can reduce the deprivation outcomes of specific vulnerable groups. Accordingly, the removal of informal support (by an immediate social network) is a key, compositional variable for determining the potential exposure of ‘Lone-Pensioner HUTs’ in becoming ‘physically dependent’ due to old age.

5.3.4. Susceptibility

Whilst considering the selection of variables to inform the ‘susceptibility’ of ‘Lone-Pensioner HUTs’ to experiencing NSRs, an assessment was made of the potential viability of cross-tabulating the variables in this ‘susceptibility’ dimension (variables previously outlined in the ‘exposure’ dimension, see *Section 5.3.3*). Cross-tabulating several variables for the sub-population of ‘Lone-Pensioner HUTs’ at the MSOA-level yielded a potential risk of producing a high proportion of cells with low population counts ($n < 10$). The problem of obtaining too many low cell counts in one table, is that they can potentially produce issues of statistical disclosure control, as well as rendering as ‘noise’ in statistical analyses. Hence, after careful deliberation, the three, compositional measures likely to modify or influence the ‘susceptibility’ of ‘Lone-Pensioner HUTs’ becoming ‘physically dependent’ were selected and are outlined in *Table 5.6*.

Table 5.6. Variables relating to the ‘susceptibility’ of ‘Lone-Pensioner HUTs’

| Data Source | Data Source Reference | Variable | Variable Description |
|--------------------|------------------------------|---|--|
| 2011 Census | CT0529-CT0534* | Age of one-person households (aged 65 years old and over) (%) | 5. ‘Age of lone-pensioner households’ categorised ‘65-74 years old’ & ‘75 years old and over’: cross-tabulated with the variables ‘not in good health’; ‘limiting long-term illness and disability’; ‘no/obsolete qualifications’; ‘non-homeowner’; ‘moved to a new house’ & ‘single’ (no previous, legally-recognised relationship). |
| | CT0529-CT0534* | Gender of one-person households (aged 65 years old and over) (%) | 6. ‘Age of lone-pensioner households’ categorised as ‘women’ & ‘men’: cross-tabulated with the variables ‘not in good health’; ‘limiting long-term illness and disability’; ‘no/obsolete qualifications’; ‘non-homeowner’; ‘moved home’ & ‘single’ (no previous, legally-recognised relationship). |
| | CT0529-CT0534* | Age & Gender of one-person households (aged 65 years old and over) (%) | 5. & 6. ‘Age of lone-pensioner households’ categorised ‘65-74 years old’ & ‘75 years old and over’/ ‘women’ or ‘men’: cross-tabulated with the variables ‘not in good health’; ‘limiting long-term illness and disability’; ‘no/obsolete qualifications’; ‘non-homeowner’; ‘moved to a new house’ & ‘single’ (no previous, legally-recognised relationship). |

**See the Appendix for the full cross-tabulated datasets*

Age of ‘Lone-Pensioner HUT’

It has been suggested by Willets *et al.*, (2004) that attention should be given to those who are aged 75 years old and over, in relation to assessments of inequalities in health, as this age group is often taken as a proxy for those who are most in need of health and social care provision. In addition, those aged 75 years old and over are currently the fastest growing age cohort in recent decades (Harper, 2006; Allen, 2008), and will increasingly make up a higher proportion of the population who are ‘physically dependent’ in years to come. However, neighbourhood effects research on the older population commonly focuses on those aged 65 or over as an entire population sub-group, as it is only recently that disaggregated tables from administrative datasets have become available, allowing for the separate investigation of populations aged 75 years old, and 85 years old and over to be examined in empirical analyses (ONS, 2011b). For this research enquiry, the decision was taken to disaggregate the datasets for ‘Lone-Pensioner HUTs’ by those aged ‘65-74 years old’, and those aged 75 years old and over’. These categories were chosen based on the disaggregation a sample of existing compositional data for ‘Lone-Pensioner HUTs’ (see: *Section 5.3.3.*), by those who were aged 85 years old and over, which yielded too high a proportion of small and zero cell counts.

Gender of ‘Lone-Pensioner HUT’

The gender disparities of the health outcomes individuals may face due to problems commonly encountered in old age, are widely documented at the neighbourhood-level (see: Macintyre *et al.*, 2002; Stafford *et al.*, 2005). Furthermore, Macintyre *et al.*, (2005) also demonstrate through examining the distribution of diseases that are prevalent in the older population, that gender-based differences in health vary across different stages of the life course. Hence, the decision was taken to also obtain cross-tabulated datasets for the ‘Lone-Pensioner HUTs’ that are disaggregated by both age and gender. Most theoretical descriptions of the social categorisation of gender provide only reference to these two categories, referring to the respondent as either a ‘woman’ or a ‘man’, or correspondingly ‘female’ or ‘male’, if referring to the sex of the respondent; as is the case in the 2011 Census (Entwisle, 1994; Stafford *et al.*, 2005). Although, there are cases of individuals who do not categorise themselves within this binary classification of gender or sex, which, has been highlighted as a key criticism and limitation of existing administrative surveys (Bauer, 2017), including the existing censuses.

5.4. Variables to Assess the Social Vulnerability of ‘Lone-Parent HUTs’

The variables chosen to operationalise the previously outlined indicators (see *Table 4.2.*) for the assessment of the social vulnerability of ‘Lone-Parent HUTs’, at the neighbourhood level, are summarised in *Table 5.7.* A more detailed consideration of the specific variables and corresponding datasets used to assess the social vulnerability of ‘Lone-Parent HUTs’, are outlined in the relevant dimensions of ‘neighbourhood capacity’, ‘exposure’ and ‘susceptibility’ to NSR outcomes (*Tables 5.7.-5.11.*).

Table 5.7. Summary of independent variables to assess the social vulnerability of ‘Lone-Parent HUTs’

| Dimension | Indicators | Variables <i>(obtained at the MSOA level)</i> |
|---|--|--|
| <p>Neighbourhood Capacity</p> <p><i>The ability to cope & resist the impact of NSR outcomes</i></p> | <p>1. Neighbourhood Resources 1a. Inaccessibility of Local Services</p> <p>2. Neighbourhood Opportunities 2a. Lack of Area-Level Social Support 2b. Lack of Affordable Housing 2c. Lack of Accessible Employment</p> | <p>1a. Inaccessibility of health care services 1a. Inaccessibility of primary schools</p> <p>2a. Child dependency ratios (CDRs) 2b. House Price to Income ratios 2c. Median distance travelled to work</p> |
| <p>Exposure of Lone-Parent HUTs</p> <p><i>A lack of protection to NSRs</i></p> | <p>3. Labour Market Exclusion 3a. Lack of/inadequate skills 3b. Being a young adult</p> <p>4. Lack of Individual-Level Social Support</p> | <p>3a. Proportion of HUTs who have no/lack of qualifications 3b. Proportion of HUTs (aged 18-34) out of all lone-parent households</p> <p>(4. No appropriate data).</p> |
| <p>Susceptibility of Lone-Parent HUTs</p> <p><i>The state of being likely to be influenced by NSRs</i></p> | <p>5. Age of Dependent Children</p> <p>6. Transport Immobility</p> | <p>5. HUTs whose youngest dependent child is aged '0-4' & '5+' years old: cross-tabulated with the EXPOSURE variables</p> <p>6. HUTs who do not have regular access to a car/van: cross-tabulated with PRE-SCHOOL AGE CHILDREN and all EXPOSURE variables</p> |

The summary of variables in *Table 5.7.* expands on the table of indicators used to represent the three social vulnerability dimensions of the ‘neighbourhood capacity’, ‘exposure’ and ‘susceptibility’ of ‘Lone-Parent HUTs’, as previously outlined in *Tables 4.3 & 4.4.* The addition of sub-indicators and variables in *Table 5.7.* provides a more detailed indication of the theoretically-informed, contextual and compositional attributes which, can be used to assess the deprivation outcomes of ‘Lone-Parent HUTs’.

5.4.1. Outcome Variable: The ‘Inability of Lone-Parent HUTs to Reconcile Paid Work with Caring for Dependent Children’

The proportion of ‘Lone-Parent HUTs’ who were economically active but not in full-time employment are shown by *Table 5.8.* The decision was made to include ‘Lone-Parent HUTs’ deemed to be economically active, rather than considering all lone parents (aged 18-34 years old). This group is defined as “people without a job who have been actively seeking work within the last four weeks and are available to start work within the next two weeks, and people waiting to start a new job” (ONS, 2014a: p.4). Specifically, these particular ‘Lone-Parent HUTs’ are attempting to enter/remain in the labour market, rather than choosing to be a full-time parent; a key component of the NSR of ‘reconciling paid work with caring for dependent children’ (Taylor-Gooby, 2004; Jenson, 2006).

Table 5.8. Variable to represent the inability of ‘Lone-Parent HUTs’ to reconcile paid work with caring for dependent children

| Data Source | Data Source Reference | Variable | Variable Description |
|--------------------|---|--------------------------------------|--|
| 2011 Census | 2011 Census <i>ad hoc</i> table: CT0613 | ‘Not in Full-Time Employment’ (%) | The percentage of lone-parent households (aged 18-34 years old) who are economically-active, but not in full-time employment |

**See the Appendix for the full cross-tabulated datasets*

5.4.2. Neighbourhood Capacity

The five contextual measures, in relation to neighbourhood characteristics that are likely to modify or influence the inability of ‘Lone-Parent HUTs’, to ‘reconcile paid work with caring for dependent children’ are outlined in *Table 5.9*.

Table 5.9. Variables relating to the ‘neighbourhood capacity’ of ‘Lone-Parent HUTs’

| Data Source | Data Source Reference | Variable | Variable Description |
|--|---|--|--|
| Office for National Statistics & Statistics for Wales | Organisation Data Service, Health and Social Care Information Centre (2014) | ‘Inaccessibility of Local GP Surgery’ (%) | 1a. The percentage of all (usually-resident) households in a MSOA who are unable to get to the nearest GP surgery by public transport or walking in less than 15 minutes. |
| | Department for Education Edubase (2014) | ‘Inaccessibility of the Local Primary School’ (%) | 1a. The percentage of all 5-10-year olds in a MSOA who are unable to get to the nearest primary school by public transport or walking in less than 15 minutes. |
| 2011 Census | Population data derived from: 2011 Census table - KS102EW | ‘Child Dependency Ratio (CDR)’ (ratio) | 2a. The ratio of dependent children (aged 0-15 years old) in comparison to the working-age individuals (aged 18-64 years old). |
| Office for National Statistics | House price data derived from: Land Registry database (2014) | ‘House Price to Income Ratio (HPIR)’ (ratio) | 2b. The ratio of the median house price, for a given area, in relation to the (estimated) net annual income for individuals (aged 18 years old and over). |
| Department for Transport | Workday population data derived from: 2011 Census table - WD702EW | ‘Average Distance Travelled to Work’ (km) | 2c. The ‘average distance (km)’ is calculated as the ‘total distance (km) travelled to a workplace’ divided by the workday population of an area (aged 16-74) – excluding those who ‘work mainly at/from home’, ‘at no fixed address’, or ‘at an offshore installation’. |

Neighbourhood Opportunities

There is research to suggest that Child Dependency Ratios (CDRs) provide a useful measure of the proportion of ‘dependent’ members of the population aged 17 years old

and under in the population (see: Folbre, 2006). Measures of CDR are often similar in their methods of construction to OADRs (see: *Section 5.3.2.*), and usually provide an indication of the proportion of dependent children (aged 17 years old and under) in relation to the rest of the economically-active population (aged 18-64 years old) (Falkingham, 1989). Areas with higher CDR values indicate that the current economically-active population may potentially face a greater burden than other areas, in terms of the provision of welfare support and social care to meet the specific care needs of dependent children (Folbre, 2006). Hence, CDRs can provide a useful indication of neighbourhood area, which may require additional economic and informal social support, and can be used to inform the allocation of childcare services at the small-area level.

Housing affordability is frequently used as an indicator of social deprivation for the entire population (Noble *et al.*, 2016), but has been proven to be a key predictor of deprivation outcomes associated with lone-parent households (Stone, 2006). A measure of housing affordability was produced by calculating the ratio of the median house price, for a given area, in relation to the (estimated) net annual income for individuals aged 18 years old and over (Jones, 2010). A key constraint of this measure is the lack of data regarding the availability of adequate and affordable housing types to meet the needs of common household compositions (Bover *et al.*, 2009, for example relating to lone-parent households).

Being able to readily access employment opportunities is also a key requirement of any parent who wishes to reconcile paid work with caring for dependent children but is especially important for 'Lone-Parent HUTs' who will have less flexibility in terms of being able to obtain suitable employment (Bonoli, 2005). The 'average distance travelled to work (km)', is calculated as the 'total distance (km) travelled to a workplace' divided by the 'usual workday population of an area' (aged 16-74 years old) – excluding those who 'work mainly at/from home', 'at no fixed address', or 'at an offshore installation'. Both contextual variables are obtained from the 2011 Census. A potential limitation of this contextual measure is that it does not provide any indication of the type of employment opportunities available and that could meet the needs of the 'Lone-Parent HUTs', e.g. those employers who offer flexible working arrangements. However, this variable does provide an adequate proxy measure of 'easily-accessible' employment, a

key requirement of ‘Lone-Parent HUTs’ who wish to undertake formal employment opportunities (Jenson, 2006).

5.4.3. Exposure

There is limited use of ‘lone parents’ as a unit of interest in the assessment of deprivation outcomes at small-area level geographies, as lone parents are frequently used as an independent (explanatory) variable in neighbourhood-effects research (Minh, 2017). For example, Atkinson & Kintrea (2001) use lone parents as an independent variable in their examination of contextual effects of neighbourhoods in Scotland and find a strong association between the presence of lone-parent households and the outcome of being unable to gain employment due to issues relating to social stigma. Due to the lack of empirical analyses that examine the lone parents as a unit of analysis in neighbourhood-related research, the chosen variables were informed by population-wide assessments of the determinants of employment opportunities at the neighbourhood level. The compositional measures likely to influence the ‘exposure’ of ‘Lone-Parent HUTs’ to ‘being unable to reconcile paid work with caring for dependents’ are outlined in *Table 5.10*.

Table 5.10. Variables relating to the ‘exposure’ of ‘Lone-Parent HUTs’

| Data Source | Data Source Reference | Variable | Variable Description |
|--------------------|--|----------------------------|---|
| 2011 Census | 2011 Census <i>ad hoc</i> table: CT0614* | ‘No Qualifications’ (%) | 3a. The percentage of lone-parent households (aged 18-34 years old) who have ‘no’; ‘level 1’; or ‘other’ formal qualifications. |
| | 2011 Census <i>ad hoc</i> table: CT0614* | ‘Young Adult’ (%) | 3b. The percentage of lone-parent households who are aged 18-34 years old, out of the total number of lone-parent households (with dependent children) in a MSOA. |

*See the Appendix for the full cross-tabulated datasets

Labour Market Exclusion

Several analyses have identified that the level of qualification obtained by lone parents is a significant predictor of the non-employment of lone parents, when controlling for other compositional factors (Marsh, 2001). Due to the definition of a potential exposure to NSRs for ‘Lone-Parent HUTs’ with no or *inadequate* qualifications, a consideration of how to categorise which qualifications were to be classified as *inadequate*. Accordingly, in addition to the previously outlined summary in *Section 5.3.3.*, further investigation of the ‘classification of qualifications’ that could potentially be produced from the 2011 Census was required. Briefly, the levels of standard categorisation are as follows: no formal qualifications, other qualifications, Level 1 (1-4 GCSEs), Level 2 (5 GCSEs), Level 3 (2 or more A-levels and Apprenticeships), and Level 4 (bachelor’s degree or above). And so, the decision was taken to have ‘no’, ‘Level 1’, and ‘Level 2’ qualifications as being within the remit of ‘no or inadequate’ qualifications for ‘Lone-Parent HUTs’. The decision to include Level 3 qualifications and above was made, due to this level of educational attainment increasingly becoming a standard requirement of accessing standard forms of salaried employment (McQuaid & Lindsay, 2005), especially for those who are (re-)entering the labour market.

Furthermore, it has been suggested by Willets *et al.*, (2004) that attention should be given to young-adults, in relation to assessments of labour market exclusion, as it is this age group that is often taken as a proxy for those who are most likely to be unable to enter and/or remain in the labour market. Therefore, for the purpose of this research enquiry, an emphasis was placed upon investigating ‘Lone-Parent HUTs’ that are aged ‘18-34 years old’.

5.4.4. Susceptibility

Whilst considering the selection of both indicators and variables for the ‘susceptibility’ of ‘Lone-Parent HUTs’ experiencing NSRs, an assessment was made for the viability of cross-tabulating the variables in this ‘susceptibility’ dimension (variables previously outlined in the ‘exposure’ dimension, see *Section 5.4.3.*). Once again, the potential risk of yielding a high proportion of cells with low or zero population counts ($n < 10$) had to be considered, due to issues of statistical disclosure control and the invalidity of (certain) statistical analyses. Hence, after careful deliberation, the three, compositional measures

likely to modify or influence the ‘susceptibility’ of ‘Lone-Parent HUTs’ being ‘unable to reconcile paid work with caring for dependent children’ were selected and are outlined in *Table 5.11*.

Age of Youngest Dependent Child

The decision was taken to categorise the age of the youngest dependent child between ‘0-4 years old’ and ‘5 years old and over’. It was anticipated that by disaggregating the existing dependent and independent variables by this binary categorisation of ages, an indication of the level of care required to be given by the ‘Lone-Parent HUTs’ would be obtained. There has always been tension, conflict, and negotiation around the question of who should care for young children (Sacareno, 2011). However, in the British context, there is an assumption that most of the care needs will be provided for by parents, guardians and family members (Jenson, 2006). Accordingly, parents whose youngest child is of preschool age (i.e. 4 years old and under) will be more constrained in terms of being able to access employment opportunities, than those whose children are school age and above.

Table 5.11. Variables relating to the ‘susceptibility’ of ‘Lone-Parent HUTs’

| Data Source | Data Source Reference | Variable | Variable Description |
|--------------------|------------------------------|---|---|
| 2011 Census | CT0613-CT0614* | ‘Age of Youngest Dependent Child’ within lone-parent households (aged 18-34 years old) (%) | ‘Age of Youngest Dependent Child’ categorised ‘0-4 years old’ and ‘5-15 years old’: cross-tabulated with the variables ‘no/obsolete qualifications’ & ‘not in full-time employment’ for lone-parent households (aged 18-34 years old). |
| | CT0613-CT0614* | ‘No Access to Car/Van’ for lone-parent households (aged 18-34 years old) (%) | ‘No access to a car/van’ and ‘access to a car/van’: cross-tabulated with the variables ‘no/obsolete qualifications’ & ‘not in full-time employment’ for lone-parent households (aged 18-34 years old). |
| | CT0613-CT0614* | ‘Age of Youngest Dependent Child’ & ‘No Access to Car/Van’ for lone-parent households (aged 18-34 years old) (%) | ‘Age of Youngest Dependent Child’ categorised ‘0-4 years old’ and ‘5-15 years old’/ ‘no access to a car/van’ and ‘access to a car/van’ cross-tabulated with the variables ‘no/obsolete qualifications’ & ‘not in full-time employment’ for lone-parent households (aged 18-34 years old). |

**See the Appendix for the full cross-tabulated datasets*

Access to a Car and/or Van

A key susceptibility of ‘Lone-Parent HUTs’ to the NSR of the ‘inability to reconcile paid work with caring for dependent children’ is the lack of individual transport mobility (Bostock, 2001). The importance of transport mobility is highlighted by the Child Poverty Act (2010), which argues that transport mobility (together with infrastructure) is a key determinant of the accessibility of local services for children and parents (Department for Education, 2010). Therefore, the 2011 Census question of households ‘without access to a car or van’ was included as a measure of a lack of personal transport mobility for this research enquiry. However, there are currently only limited indicators in the neighbourhood-effects literature that use *access* to a car/van as an indicator of

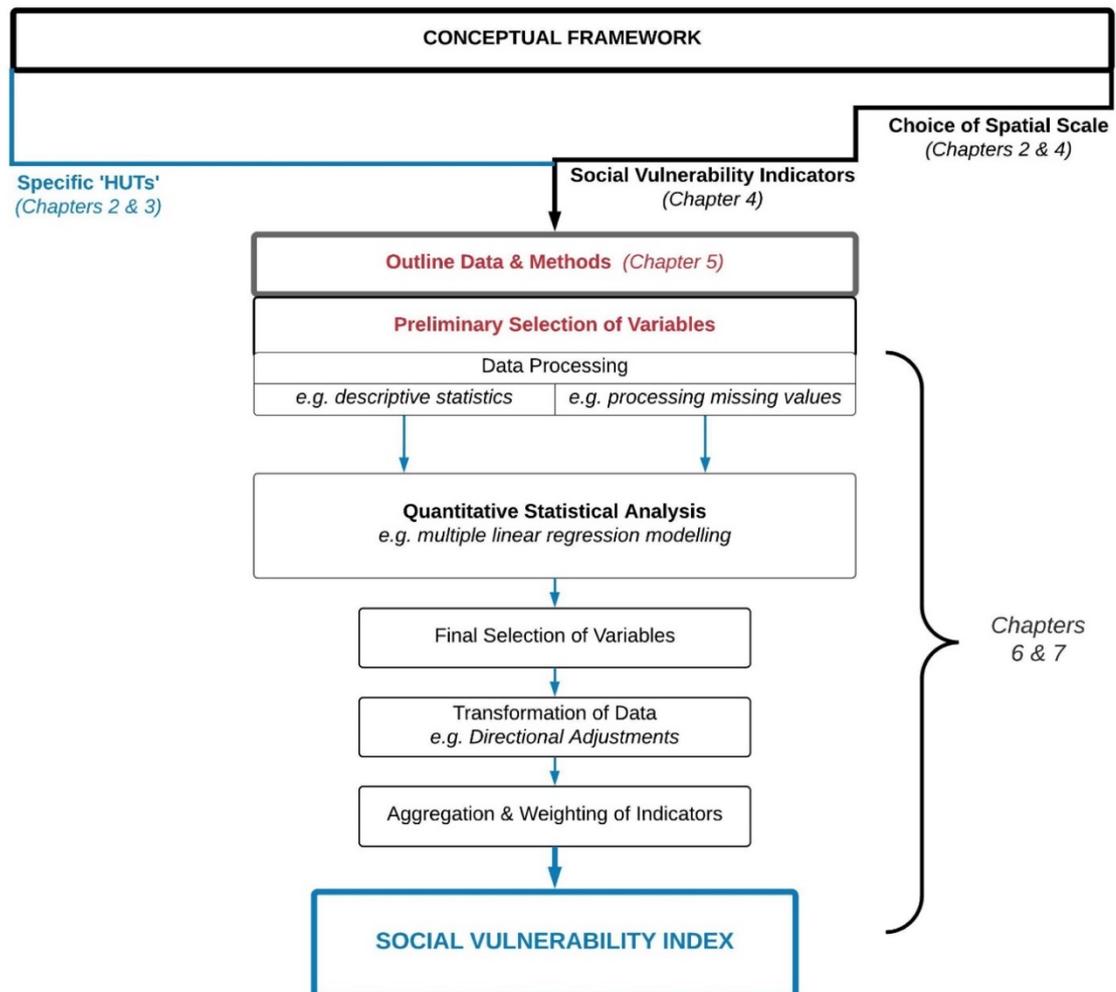
personal mobility and has instead been frequently used as a (now outdated) proxy of the income and/or wealth of a household (e.g. Townsend *et al.*, 1988). And so, the inclusion of this census question as an indicator of personal transport mobility should not be confused with previous approaches of small-area level measures of deprivation that have included ‘no access to a car/van’ as a proxy of low socioeconomic status of the household.

5.5. Analytical Structure for the Construction of the Social Vulnerability Indices (SVIs)

The conceptual framework outlined in *Chapter 4* has been vital to informing the selection and combination of indicators, and subsequently the variables (*Chapter 5*), for the construction of the SVIs for both the ‘lone-pensioner’ and ‘lone-parent’ HUTs (*Chapters 6 and 7*). However, technical and practical considerations of creating a composite summary measure must also be acknowledged when finalising the SVIs. Due to there being no universally accepted method of constructing composite measures in social research, a variety of approaches were consulted prior to the implementation of the chosen procedure (see: Alkire, 2002; Atkinson, 2003; Ligon & Schechter, 2003; Nardo *et al.*, 2005; Dewilde, 2008; Bradshaw & Richardson, 2009). As previously shown by *Figure 1.3.*, each step of the decision-making process when constructing the SVIs builds upon the procedures outlined in the OECD ‘Checklist for the Construction of Composite Social Measures’ (Nardo *et al.*, 2005).

A more detailed summary of the proposed analytical structure is informed by the conceptual framework of social vulnerability as outlined in *Chapter 4*, including: the statistical assessment of relationships between associated variables, the treatment of missing values and outliers (if present), the standardisation of final variables to render them comparable, and the aggregation and weighting of the variables to form a single-figure measure (Nardo *et al.*, 2005). An overview of this analytical structure is presented in *Figure 5.3.*

Figure 5.3. Summary of the analytical structure for the construction of the social vulnerability indices (SVIs)



As can be identified by *Figure 5.3.*, there are several steps (covered by several chapters of this thesis) which are required to construct the final SVIs, with each step complementing the next. However, a key methodical step in the construction of the SVIs is the quantitative statistical analysis undertaken by the multiple linear regression (MLR) modelling in *Chapters 6 and 7.* All statistical analyses in this research, as required by *Figure 5.3.* (e.g. descriptive statistics, Pearson’s correlation, MLR modelling), were performed using the software package IBM SPSS Statistics for Windows, *Version 23.0* (IBM Corp, 2015). A brief consideration of the statistical method of multiple linear regression (MLR), and the procedure that informs the final selection and aggregation of variables is provided in *Sections 5.5.1. and 5.5.2.,* respectively.

5.5.1. Multiple Linear Regression (MLR)

Prior to undertaking any parametric statistical testing, an assessment of the normality of data needs to be undertaken, as the utilisation of normally distributed data is an underlying assumption in parametric testing. However, with a large enough sample size, as used in this research (> 200 samples), issues of violating the assumption of normality is considerably reduced (Field, 2009: pp.132-133).

A summary of the key assumptions of Multiple Linear Regression (MLR) that should be adhered to are as follows:

- Regression residuals are normally distributed.
- There is a linear relationship between the dependent variable and the independent variables.
- The residuals are homoscedastic and approximately rectangular shaped.
- There is an absence of multicollinearity in the model, meaning that the independent variables are not too highly correlated.

[Source: Field, 2009]

Further discussion of testing for and meeting the requirements of, the assumptions of MLR are discussed at the points of analysis in *Sections 6.2.* and *7.2.*

MLR is a method that allows for the exploration of relationships between one continuous, dependent variable (outcome) and several, either continuous or categorical, independent variables (predictors). MLR comprises of several procedures, which, allow associations between the independent variables and the dependent variable to be statistically verified, after accounting for all other variables. The formulae for the regression equation are as shown:

$$Y_i = (a + b_1X_{i1} + b_2X_{i2} + \dots + b_nX_{in}) + \varepsilon_i \quad (5.1)$$

Y = outcome variable

a = Y -intercept

b_1 = the coefficient of the first predictor (X_1)

b_2 = the coefficient of the second predictor (X_2)

b_n = the coefficient of the n th predictor (X_n)

ε = Error Term

As shown by *Equation 5.1.*, MLR models the relationship between two or more explanatory variables and a response variable, by fitting a linear equation to observed data. Every value of the independent variable ‘ X ’ is associated with a value of the dependent variable ‘ Y ’. The MLR models will be used for explanatory purposes, to inform the final selection of variables, and will be included in the construction of the SVIs in *Chapters 6* and *7*. The MLR models will also be used for the detection and elimination of any potential outliers in the dataset, through examining the residual values for any values greater than three standard deviations from the mean (assuming a normal distribution of the dataset). The problem with the inclusion of outliers is that they can result in an increase error variance, in addition to reducing the power of statistical tests (a problem of predictive modelling). Also, if the outliers are non-randomly distributed, they can decrease normality (and in multivariate analyses, violate assumptions of sphericity and multivariate normality), thereby altering the odds of making both Type I and Type II errors, and possibly bias or influence estimates that may be of substantive interest (Osborne & Overbay, 2004).

5.5.2. Construction of the Social Vulnerability Indices (SVIs)

As summarised by Adger *et al.*, (2004), there are four distinct approaches to formulating a composite index, namely by constructing either: a single index by aggregating all relevant proxies, a single index by defining geographical groupings, separate indices representing different elements of vulnerability, or vulnerability profiles for each geographical entity. As the former approach to constructing a composite measure by reducing all variables to a single-figure measure has been established as the “holy grail” of social vulnerability assessment (Alwang *et al.*, 2001: p.15), the decision was made to

undertake this approach for the construction of the SVIs in this research. The remainder of this section provides an overview of how the decision-making process will inform the final selection of variables, the choice of aggregation, and the weighting procedure of the variables within the final composite measure.

Once the selection of variables has been statistically verified it is necessary to standardise the dataset to account for differences in units, ensuring that the final variables are comparable during the process of aggregation. The potential transformations which, could be used for the standardisation of the variables are informed by Nardo *et al.*, (2005). *Table 5.12.* outlines six potential procedures that could be used to standardise the final selection of variables, prior to aggregation. The selection of a suitable method is not trivial (Ebert & Welsh, 2004), and the choice of procedure will only be determined once the final selection of variables has been made in *Chapters 6* and *7*. The reason for this is that the objectives of the composite measures, along with the examination of the properties of the data (including the distribution of values for the final selection of variables), will need to be made in order to determine which, procedure is the most appropriate.

Table 5.12. Summary of potential standardisation procedures for the social vulnerability indices (SVIs)

| STATISTICAL PROCEDURE | EQUATION | DESCRIPTION |
|--|---|---|
| z-scores | $z_i = \frac{x_i - \mu}{\sigma}$ | Where μ is the mean, and σ is the standard deviation of the variable |
| Equal Variance | $z_i = \frac{x_i}{\sigma}$ | Where σ is the standard deviation of the variable |
| Range Standardisation | $z_i = \frac{x_i - x_{min}}{x_{max} - x_{min}}$ | Where x_{min} is the minimum value and x_{max} the maximum value of the variable |
| Interquartile Range Standardisation | $z_i = \frac{x_i - x_{Q2}}{x_{Q3} - x_{Q1}}$ | Where x_{Q2} is the quantile at 50%; x_{Q3} at 75%; and x_{Q1} at 25% of values |
| Interdecile Range Standardisation | $z_i = \frac{x_i - x_{Q2}}{x_{90} - x_{10}}$ | Where x_{Q2} is the quantile at 50%; x_{90} at 90%; and x_{10} at 10% of values |
| Rank Standardisation | $z_i = Rank(x_i)$ | (Transformed variable with mean: $(n+1)/2$, and range: $n-1$) |

There is much debate in the wider social-indicator literature as to how to select the most appropriate aggregation procedure, with which to inform the reduction of the standardised values into a final composite measure (see: de Vaus, 2004; Nardo *et al.*, 2005). Nevertheless, due to the innovative and exploratory nature of this work the standardised variables will be aggregated according to the configuration of the theoretically informed indicators and dimensions, as outlined previously in the conceptual framework (*Chapter 4*). Furthermore, a consideration of the weighting of each of the variables within the relevant dimensions will also be considered, as decisions about the weights can change the values of the ranks of the social indicators which would affect the perceived relative social vulnerability of each neighbourhood area (Mackenzie *et al.*, 1998). However, it is

acknowledged that although the weightings will be informed by standard methodological procedures, they will always be subject to the biased judgement of the researcher(s) responsible for compiling the overall composite measures (Nardo *et al.*, 2005). Correspondingly, the results of each of the MLR models will be used to inform the final choice of weights used to compile the individual SVIs, as part of the final step of constructing the small-area level measures of deprivation.

5.6. Concluding Statement

To summarise, this chapter has provided an overview of the decision-making process followed to inform the selection of the data and methods used in the construction of the SVIs, for both the ‘Lone-Pensioner HUTs’ and ‘Lone-Parent HUTs’ (*Chapters 6 and 7*, respectively). The construction of this measure follows on from the initial steps summarised in *Figure 5.3*. and is informed by gold standard measures compiled by the OECD (Nardo *et al.*, 2005). Whilst undertaking the construction of any composite measure, a series of subjective choices and decisions ultimately must be made in terms of how researchers interact with their chosen datasets, in order to formulate the required outputs (Ravitch & Riggan, 2012). However, the aim of this chapter was not to question the choice or selection of variables, or to demonstrate that one type of measurement is superior to another, but to ensure the transparency of the decision-making process followed to obtain the chosen data and methods. This methodical approach includes highlighting the key limitations at each relevant step of the decision-making process. It is hoped that by clarifying the conceptual and methodological choices, in addition to the rigorous selection of analytical procedures, the validity of the final composite measures is ensured.

Chapter 6 – The Social Vulnerability of ‘Lone-Pensioner HUTs’

6.1. Introduction

This chapter outlines the process of constructing the social vulnerability index (SVI), relating to the ‘physical dependency’ of ‘Lone-Pensioner HUTs’ at a neighbourhood level. *Sections 6.1.-6.4.* demonstrate how multiple linear regression (MLR) can be used to assess which compositional and contextual variables are statistically significant in predicting the outcome of ‘physical dependency’, for ‘Lone-Pensioner HUTs’. The previously unexplored contextual indicators associated with the ‘neighbourhood capacity’ dimension, are initially modelled to determine the association between contextual variables and the physical dependency of ‘Lone-Pensioner HUTs’. In addition, compositional variables associated with the ‘exposure to NSRs’ and ‘susceptibility to NSRs’ dimensions, to determine if there is an improvement in predictive power of the previous MLR model (after, the contextual variables have been controlled for). The final, significant regression equation (6.1) produced from this modelling procedure is then used to inform which, predictors should be included in the construction of the SVI; as discussed from *Section 6.5* onwards.

Section 6.5 outlines the process in which, the theoretically and statistically informed predictors are transformed into a composite measure. Correspondingly, the decision-making process behind each analytical step will be discussed, to ensure the transparency and clarity of the construction of the final SVI for ‘Lone-Pensioner HUTs’. Once the SVI has been finalised a summary of the overall measure, alongside further discussion of the theoretical and empirical implications which, can be drawn from the empirical results of this chapter are subsequently given in *Chapter 8*.

6.2. Multiple Linear Regression (MLR)

Prior to exploring via MLR the interrelationships between the potential predictors of the ‘physical dependency’ outcome for ‘Lone-Pensioner HUTs’, the required datasets presented an issue of merged cases being present for a limited number of the 7,201 MSOAs (cases).

6.2.1. Merged Cases: Issues of Statistical Disclosure Control

As previously outlined by *Section 5.2.4.*, the ONS has a legal obligation to prevent the disclosure of the identity and/or private information relating to households and their residents. Therefore, when obtaining the specially commissioned census datasets from the ONS, checks were implemented by the ONS to ensure these rigorous standards of preventing issues of statistical disclosure control were adhered to. As part of this process, two MSOAs were identified as potentially providing statistical information that could compromise the anonymity of individuals or households (*from tables: CT0529-CT0534*). Accordingly, the ONS liaised with the researcher of this analytical work as how best to proceed with the procedure of statistical disclosure control for both MSOAs, to ensure the overall integrity of this research.

Consequently, to prevent any missing values, from what are otherwise complete datasets (a rarity in the wider-discipline of social indicator research – as discussed by Solt, 2009); the decision was taken to merge the two compromising MSOAs with two neighbouring MSOAs respectively. The four MSOAs, which, were modified during the process of statistical disclosure control, are: Thurrock 019; Thurrock 020; Swindon 026; and Swindon 027. *Table 6.1.* provides a (real) example dataset of how the merged MSOAs were equally split into separate cases for analytical purposes; for the variable of ‘housing tenure’ of ‘Lone-Pensioner HUTs’ (*taken from table: CT0532*).

As shown by *Table 6.1*, for ease and simplicity the values for both sets of merged MSOAs were equally distributed between the two corresponding MSOAs once split. For example, there were 20 ‘Lone-Pensioner HUTs’ who were non-homeowners in Thurrock 019/020 (merged) When Thurrock 019 and Thurrock 020 are split this equates to 10 (20/2) ‘Lone-Pensioner HUTs’ who are non-homeowners in each area. Therefore, equally splitting the values for the merged MSOAs allows for the inclusion of all combinations of cases and variables for all 7,201 MSOAs in England and Wales, in all subsequent statistical analyses. Of note, is that this modification to the datasets will not compromise the consistency of the overall rankings produced by the SVIs, as the purpose of such measures is to categorise areas which, are the ‘least’ and most vulnerable to social deprivation outcomes (for ‘Lone-Pensioner HUTs’).

Table 6.1. An example from table: CT0532 – how the merged Middle Super Output Areas (MSOAs) were split into individual cases

| MSOA | Total: 'Lone-Pensioner HUTs' | | Outright Homeowner | | Non-Homeowner | |
|--------------|------------------------------|--------------|--------------------|--------------|---------------|--------------|
| | <i>Merged</i> | <i>Split</i> | <i>Merged</i> | <i>Split</i> | <i>Merged</i> | <i>Split</i> |
| Thurrock 019 | 116 | 58 | 96 | 48 | 20 | 10 |
| Thurrock 020 | | 58 | | 48 | | 10 |
| Swindon 026 | 94 | 47 | 68 | 34 | 26 | 13 |
| Swindon 027 | | 47 | | 34 | | 13 |

6.2.2. Descriptive Statistics

Prior to exploring the relationships between variables, it is vital to inspect the nature and distribution of the values for each individual variable, to ensure the most appropriate statistical test is undertaken. In this instance, the distribution of the dependent and independent variables for each dataset were examined to determine an overview of the key descriptive characteristics for each variable of interest; as shown by *Table 6.2*.

Of note, is that *Table 6.2* shows the standard deviations (SD) for each of the variables. Whereby, a lower SD (close to 0) indicates that the data points tend to be very close to the mean (also called the expected value) of the data, in comparison a higher SD indicates that the data points are spread out over a wider range of values. Therefore, the SD provides a summary measure of the deviation of the observed values from the mean, as the presence of variation in the data is a requirement for MLR to be undertaken. Subsequently, as no value of the SD was equal to zero, all independent variables were included potential as predictors in the MLR analysis in *Sections 6.3 & 6.4*.

Table 6.2. Descriptive statistics of all ‘Lone-Pensioner HUTs’

| Variable | Mean | SD | Min | Max |
|--|-------------|-----------|------------|------------|
| ‘Neighbourhood Capacity’ | | | | |
| Inaccessibility of Local Services | 8.59 | 4.41 | 3.00 | 70.00 |
| Old Age Dependency Ratio | 0.13 | 0.14 | 0.01 | 1.04 |
| Provision of Unpaid Care | 0.10 | 0.02 | 0.03 | 0.16 |
| Population Density | 0.31 | 0.12 | 0.02 | 1.11 |
| ‘Exposure’ to NSRs | | | | |
| Non-Homeowner | 0.41 | 0.17 | 0.05 | 0.98 |
| No/Obsolete Qualifications | 0.61 | 0.13 | 0.13 | 0.91 |
| Moved to A New House | 0.03 | 0.02 | 0.00 | 0.21 |
| Single (no previous relationship) | 0.15 | 0.06 | 0.03 | 0.58 |
| Outcome: Physical Dependency | | | | |
| ‘In Bad Health’/‘Physically Inactive’ <i>(weighted proxy)</i> | 0.38 | 0.06 | 0.17 | 0.59 |

n = 7,201 (all MSOAs in England and Wales)

Correlation Analysis

Correlation analysis was used to verify the strength and direction of the linear relationship between each of the hypothesised predictor variables against the outcome variable. As highlighted by *Table 6.3.*, there was a strong, positive correlation ($p < 0.01$) for two of the four, contextual predictors (‘inaccessibility of local services’ and ‘OADR’) with the outcome variable (‘physical dependency’). Moreover, there was a strong, positive correlation ($p < 0.01$) for two of the four, compositional predictors (‘no/obsolete qualifications’ and ‘non-homeowners’), with the outcome variable (physical dependency). The presence of the positive relationships that are statistically significant between each of these four predictors and the outcome variable, verifies the theorised direction of the relationships. As, when the proportion of ‘Lone-Pensioner HUTs’ who experience each of these predictors increases at the neighbourhood level, the proportion

of physically dependent ‘Lone-Pensioner HUTs’ also increases at the neighbourhood level. The remaining two, contextual predictors (‘population density’ and ‘the provision of unpaid care’) had a weak, positive correlation ($p > 0.05$), with the outcome variable (‘physical dependency’).

In addition, *Table 6.3.* also outlines the compositional predictors (‘moved to a new house in the last year’) which, had a moderate, negative correlation ($p < 0.01$), with the outcome variable (‘physical dependency’). As it could be suggested that the ability of an older person to readily move to a new house, may reflect the increased social and economic mobility of such ‘Lone-Pensioner HUTs’, in comparison to their counterparts who have not moved to a new house (see: Hansen & Gottschalk, 2006). Therefore, the observed values for the ‘Lone-Pensioner HUTs’ goes against the assumption previously outlined in *Section 4.4.2.*, which theorised the indicator of ‘moving to a new house’ may be associated with the potential breakdown of a collective social support network, at the neighbourhood level (e.g. Young *et al.*, 2004).

An additional compositional predictor (being ‘single’) also had a weak, negative correlation ($p > 0.05$) with the outcome variable. Accordingly, a suggestion can be made about the increased social resilience of ‘Lone-Pensioner HUTs’ who have relied upon a spouse for socioeconomic support, in comparison to their other counterparts (see: Grundy, 2006). Accordingly, ‘never being in a legally-recognised relationship’ does not necessarily indicate reduced economic capacity as previously hypothesised, as these observed ‘Lone-Pensioner HUTs’ have *not* experienced the loss of partner. As it can be theorised that the loss of partner, can be a significant predictor of deprivation outcomes for the surviving partner (see: Schroder-Butterfill & Marianti, 2006: p.22). Suggesting, that the observed ‘Lone-Pensioner HUTs’ who have ‘never been in a legally recognised relationship’ are more likely to be financially and socially independent than other who have previously been married or in a civil partnership.

Although, the direction of the relationship between these predictors of ‘moved to a new house in the last year’ and ‘never been in a legally-recognised relationship’ were not as theorised, the decision to include both predictors in the MLR analyses was made due to

their theoretical importance to the outcome of 'physical dependency'. Although, correlation analysis has measured the relationships between predictor variables paired with the outcome variable, MLR takes this process one step further and allows the independent variable of 'physical dependency' of 'Lone-Parent HUTs' to be predicted from several dependent variables.

Table 6.3. Correlation matrix of contextual and compositional predictors of the physical dependency of ‘Lone-Pensioner HUTs’ in England and Wales (at MSOA Level)

| | <i>Outcome</i> | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. |
|--------------------------------|---|---------|---------|---------|---------|---------|---------|--------|-------|
| <i>Outcome</i> | — | | | | | | | | |
| Contextual Variables | 1. Inaccessibility of Local Services | .238** | — | | | | | | |
| | 2. Old Age Dependency Ratio (OADR) | .242** | .020 | — | | | | | |
| | 3. Population Density | .015 | .121** | -.014 | — | | | | |
| | 4. Provision of Unpaid Care | .007 | .065** | -.571** | -.003 | — | | | |
| Compositional Variables | 5. No/Obsolete Qualifications | .780** | .243** | .078** | .025* | .024* | — | | |
| | 6. Non-Homeowner | .620** | .143** | .466** | .013 | -.454** | .505** | — | |
| | 7. Moved to A New House in the Last Year | -.055** | -.018 | .014 | -.001 | -.183** | -.162** | .177** | — |
| | 8. Single (no previous relationship) | -.007 | -.077** | .640** | -.039** | -.524** | -.261** | .352** | .12** |

*statistically significant ($p < 0.05$), **statistically significant ($p < 0.01$)

6.3. Examining Compositional and Contextual Predictors of the ‘Physical Dependency’ of ‘Lone-Pensioner HUTs’

Initially, this section utilises a hierarchical MLR model (*Model 1*) to explore the association of contextual predictors with the outcome of the ‘physical dependency’ of ‘Lone-Pensioner HUTs’. This step is followed by an additional MLR model (*Model 2*), which, adds compositional predictors to explore the association of both the contextual and compositional predictors with the outcome of ‘physical dependency’ of ‘Lone-Pensioner HUTs’. The hierarchical modelling process will be used to inform which, predictors (and from which, dimensions) to include in the final composite measure; of the social vulnerability of neighbourhoods in terms of the ‘physical dependency’ of ‘Lone-Pensioner HUTs’.

6.3.1. Examining the Association of the Dimensions of ‘Neighbourhood Capacity’ and ‘Exposure’ in Determining the ‘Physical Dependency’ of ‘Lone-Pensioner HUTs’

From the outset, for simplicity and to aid the comparison of models, the adjusted R-squared value is reported for all *Models 1-10* as R^2 .

Model 1: ‘Neighbourhood Capacity’

An MLR was calculated to predict the physical dependency of ‘Lone-Pensioner HUTs’ based upon the contextual predictors associated with the ‘neighbourhood capacity’ dimension (*Model 1*). As shown by *Table 6.4.*, the MLR included the four, contextual predictors of: the ‘inaccessibility of local services’; ‘Old Age Dependency Ratio’ (OADR); ‘the provision of unpaid care’; and ‘population density’.

A statistically significant regression equation ($F(4, 7196) = 289.030, p < 0.01$) was found for *Model 1*. The ‘inaccessibility of local services’ ($B = 0.003, p < 0.01$), the ‘OADR’ ($B = 0.161, p < 0.01$), and ‘provision of unpaid care’ ($B = 0.571, p < 0.01$) all contributed to the MLR model. However, the fourth predictor of ‘population density’ ($B = -0.005, p = 0.447$) did not. The $R^2 = 0.138$, indicating that the three significant, contextual predictors

accounted for 13.8% of the variation in the outcome of ‘physical dependency’ of ‘Lone-Pensioner HUTs’.

Table 6.4. MLR exploring the association of the ‘neighbourhood capacity’ dimension with the NSR outcome of ‘physical dependency’ of ‘Lone-Pensioner HUTs’ – Model 1

| Variable | B | SE B | β | T |
|--|-------|------|---------|----------|
| Model 1: ‘Neighbourhood Capacity’ | | | | |
| R² = 0.138 | | | | |
| (Constant) | .276 | .005 | | 50.271** |
| Inaccessibility of Local Services | .003 | .000 | .234 | 21.221** |
| Old Age Dependency Ratio (OADR) | .161 | .006 | .347 | 26.036** |
| Provision of Unpaid Care | .571 | .043 | .175 | 13.133** |
| Population Density | -.005 | .006 | -.008 | -.761 |

**statistically significant ($p < 0.01$)

Model 1 also shows three, statistically significant predictors all have positive B-values, indicating positive relationships with the outcome variable. For example, when the proportion of (all) households who ‘provide unpaid care’ in a neighbourhood (MSOA) increases by 1%, the outcome of ‘physical dependency’ increases by 0.57%. Overall, this model validates the assumption that these three, contextual variables contribute significantly to understanding the NSR outcome of the ‘physical dependency’ of ‘Lone-Pensioner HUTs’ at the neighbourhood level. Indicating that as the ‘capacity of the neighbourhood’ becomes more constrained in reacting/providing for NSR outcomes, an association can be made with an increasing proportion of ‘Lone-Pensioner HUTs’ who are ‘physically dependent’. Therefore, suggesting that as the ‘capacity of the neighbourhood’ becomes more constrained, it may contribute to the social vulnerability of ‘Lone-Pensioner HUTs’; specifically, to the NSR outcome of ‘physical dependency’.

Model 2: 'Neighbourhood Capacity' and 'Exposure to NSRs'

The second stage to the hierarchical MLR was calculated to predict the physical dependency of 'Lone-Pensioner HUTs', based upon predictors associated with the addition of the 'exposure to NSRs' dimension. As indicated by *Table 6.6.*, the addition of predictors relating to the 'exposure to NSRs' dimension was included in *Model 2*, in addition to the predictors relating to the 'neighbourhood capacity' dimension (as previously explored in *Model 1*). As shown by *Table 6.6.*, the MLR also included the four, compositional predictors of: 'no/obsolete qualifications'; 'non-homeowners'; 'moved to a new house in the last year'; and 'single' relationship status. These four, compositional predictors were modelled along with the four, previously outlined contextual predictors (in *Model 1*).

Table 6.5. MLR exploring the association of the ‘neighbourhood capacity’ dimension and the ‘exposure to NSRs’ with the NSR outcome of ‘physical dependency’ of ‘Lone-Pensioner HUTs’ – *Model 2*

| Variable | B | SE B | β | T |
|---|----------|-------------|----------|----------|
| Model 2: ‘Neighbourhood Capacity’ & ‘Exposure to NSRs’ | | | | |
| R² = 0.717 | | | | |
| (Constant) | .034 | .005 | | 7.817** |
| Neighbourhood Capacity | | | | |
| Inaccessibility of Local Services | .001 | .000 | .036 | 5.551** |
| Old Age Dependency Ratio | .060 | .004 | .129 | 13.960** |
| Provision of Unpaid Care | .789 | .027 | .242 | 29.096** |
| Population Density | -.002 | .003 | -.004 | -.578 |
| Exposure to NSRs | | | | |
| No/Obsolete Qualifications | .314 | .005 | .623 | 66.779** |
| Non-Homeowner | .118 | .004 | .315 | 31.866** |
| Moved to A New House | -.002 | .027 | -.001 | -.085 |
| Single (no previous relationship) | .099 | .011 | .088 | 9.062** |

**statistically significant ($p < 0.01$)

A significant regression equation ($F(8, 7192) = 2282.905, p < 0.01$) was found for *Model 2*. Regarding the ‘neighbourhood capacity’ dimension: the ‘inaccessibility of local services’, ($B = 0.001, p < .0.01$); the ‘OADR’ ($B = 0.060, p < 0.01$); and ‘provision of unpaid care’ ($B = 0.789, p < 0.01$) all contributed to the MLR model. However, as indicated by the comparison of standardised Beta-coefficients, the ‘importance’ of the contribution of each of the contextual predictors decreased between *Model 1* and *Model 2*. Once again, ‘population density’ ($B = 0.002, p = 0.563$) did not contribute any statistical significance to the MLR model. Also, in relation to the addition of the dimension of ‘exposure to NSRs’, the compositional predictors of: ‘no/obsolete

qualifications' ($B = 0.314$, $p < 0.01$); 'non-homeowners' ($B = 0.118$, $p < 0.01$); and 'single' relationship status ($B = 0.099$, $p < 0.01$) all contributed significantly to the MLR model. However, the proportion of 'Lone-Pensioner HUTs' (at the MSOA level) who had 'moved to a new house in the last year' ($B = -0.002$ $p = -0.085$) did not contribute significantly to the MLR model.

The $R^2 = 0.717$, indicating that the six significant, contextual and compositional predictors accounted for 71.7% of the variation in the outcome of 'physical dependency' of 'Lone-Pensioner HUTs'. This demonstrates that, after the entry of the compositional predictors in the second stage of the hierarchical MLR model (*Model 2*), the three, statistically significant predictors explained an additional 57.9% of the variance in the outcome of 'physical dependency' of 'Lone-Pensioner HUTs' after controlling for the contextual predictors.

As can be shown from *Model 2* the six, statistically significant predictors all have positive B-values, indicating positive relationships with the outcome variable of 'physical dependency' for 'Lone-Pensioner HUTs'. Overall, this model (2) validates the assumption that three, statistically significant contextual variables and three, statistically significant compositional variables contribute to understanding the NSR outcome of the 'physical dependency' of 'Lone-Pensioner HUTs'; at the neighbourhood level. Furthermore, *Model 2* verifies the importance of the contribution of both contextual and compositional attributes in understanding the NSR outcome of the 'physical dependency' of older people; a key aim of this research. This suggests that both the 'neighbourhood capacity' and 'exposure to NSRs' dimensions (as previously outlined in the social vulnerability framework in *Chapter 4*) should be included when constructing the composite measure from *Section 6.5* onwards.

The final regression equation which, was selected to model the proportion of 'physically dependent' 'Lone-Pensioner HUTs' at a neighbourhood level, was based upon: the three, statistically significant contextual predictors related with the 'neighbourhood capacity' dimension, and the three, statistically significant compositional predictors related with the 'exposure' to NSRs' dimension (see: *Equation 6.1*).

$$Y = 0.034a + (0.001X_1) + (0.060X_2) + (0.789X_3) + (0.314X_4) + (0.118X_5) + (0.099X_6) \quad (6.1)$$

Y = outcome variable: *'physical dependency'* X_1 = *Inaccessibility of Local Services (km)*

a = Y -intercept X_2 = *Old Age Dependency Ratio (OADR)*

X_3 = *Provision of Unpaid Care (MSOA level)*

X_4 = *'Lone-Pensioner HUTs' with no/obsolete qualifications (%)*

X_5 = *'Lone-Pensioner HUTs' who are non-homeowners (%)*

X_6 = *'Lone-Pensioner HUTs' who have never been in a legally-recognised partnership (%)*

6.3.2. Assumptions of MLR

As part of the process of examining the results of the MLR analyses, further assumptions relating to *Model 2* were assessed to ensure the MLR model can generalise beyond the results obtained from the sample population, of all 'Lone-Pensioner HUTs'. These diagnostic tests included exploring issues of: multicollinearity; linearity; normality; and homoscedasticity for the residuals obtained from the MLR, whereby the residuals are the differences between the obtained and predicted values of the outcome variable.

Checking the Assumption of Multicollinearity

The correlation matrix in *Table 6.2.* also provides the opportunity to check for any issues of multicollinearity (pairwise) between the predictors. Issues of, multicollinearity between the predictor variables can influence the standard errors of the regression coefficients, which, can lead to a decrease in the predictive power of the overall MLR model. Therefore, the assessment of issues of multicollinearity should be made to identify if any of the predictors included in the MLR models are either; highly correlated, or, if one of the predictors is highly associated with a combination of the other independent variables in the model (Tabachnick & Fidell, 2013).

On the first run of the correlation matrix, prior to the output produced in *Table 6.2.* (and prior to undertaking: *MLR Models 1 & 2*), 'access to GP surgeries' and 'access to nearest

food shop' were highly correlated with one another ($p > 0.9$). As both variables had a strong, positive relationship with the outcome variable ($r = 0.731, p < 0.01$; and $r = 0.738, p < 0.01$ respectively), for simplicity the decision was taken to form a composite variable of 'the inaccessibility of local services' from the values of the two variables. The two predictors were aggregated into a single variable using the value of the arithmetic mean, as both predictors utilised the same measurement unit (minutes) and came from the same datasets. Hence, allowing the theoretically-informed contributions of 'being in poor health' (e.g. Lund, 2011) and 'daily activities being limited' (e.g. Victor *et al.*, 2000) to be equally considered in determining the outcome variable of 'physical dependency' for 'Lone-Pensioner HUTs'.

Once the indicator of the 'inaccessibility of services' was constructed, the correlation analysis was re-run to produce the output in *Table 6.2*. As illustrated by *Table 6.2.*, none of the predictors were highly correlated with one another ($r < 0.9$); as the highest correlation of $r = 0.64$ was between the predictors of 'OADR' and being 'single'. However, there are limits to being able to detect issues of multicollinearity by solely examining the correlation coefficients between pairs of predictors. It is possible that the pairwise correlations can be small, and yet a linear dependence may exist amongst three or more of the predictor variables. And so, additional checks of the variance inflation factors (VIFs) and Tolerance statistics were examined to detect any further issues of multicollinearity between the predictor variables. Bowerman & O'Connell (2000) recommend that multicollinearity may be of concern if any VIF value is *greater than 10* and any tolerance value is *less than 0.1*.

As shown by the predictors in *Table 6.6.*, all values for the VIF and tolerance statistics were within accepted limits (as previously outlined), indicating no issues relating to the multicollinearity between independent variables.

Table 6.6. Collinearity statistics: VIF and tolerance values for MLR: Model 2 - 'neighbourhood capacity' and 'exposure to NSRs'

| Variable | VIF | Tolerance |
|-----------------------------------|------------|------------------|
| 'Neighbourhood Capacity' | | |
| Inaccessibility of Local Services | 1.09 | 0.92 |
| Old Age Dependency Ratio | 2.19 | 0.46 |
| Provision of Unpaid Care | 1.77 | 0.57 |
| Population Density | 1.02 | 0.98 |
| 'Exposure to NSRs' | | |
| Non-Homeowner | 2.49 | 0.40 |
| No/Obsolete Qualifications | 2.21 | 0.45 |
| Moved to A New House | 1.17 | 0.86 |
| Single (no previous relationship) | 2.41 | 0.41 |

In addition to checking the assumptions of multicollinearity, further checks had to be adhered to. As outlined by Field (2009: p.220), the examination of the relevant histogram and residual plots allowed for the following checks to be conducted:

- Normality: the residuals should follow a normal distribution (*Figures 6.1-6.2*).
- Linearity: the residuals should have a linear relationship (*close to = +/-1*) with the predicted values of the outcome variable (*Figure 6.3*).
- Homoscedasticity: the variance of the residuals should be similar across all values (*Figure 6.3*).

Figure 6.1. Histogram of the frequency of the residuals from the outcome variable of ‘physical dependency of ‘Lone-Pensioner HUTs’

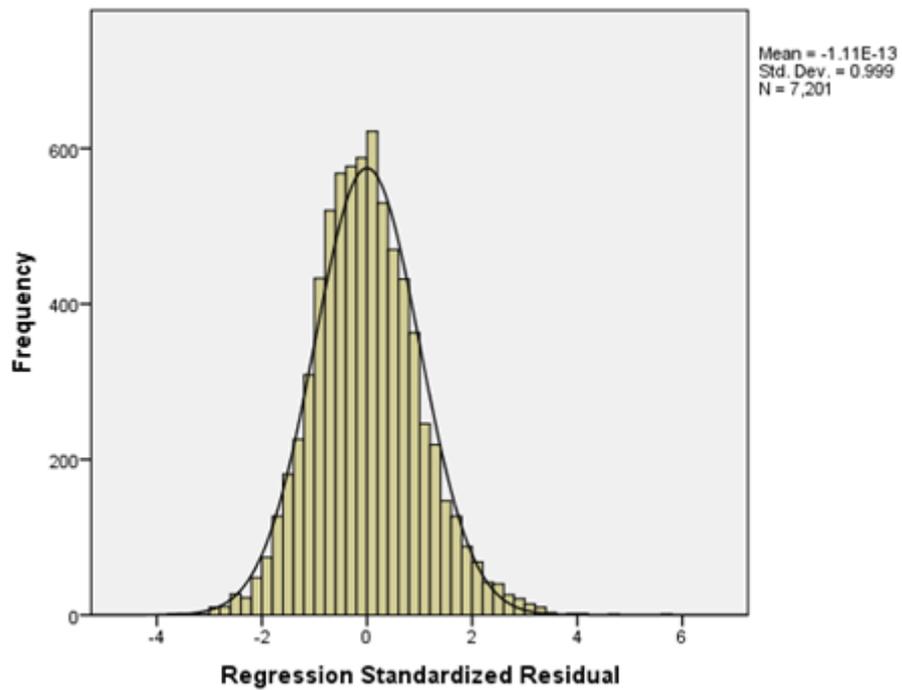
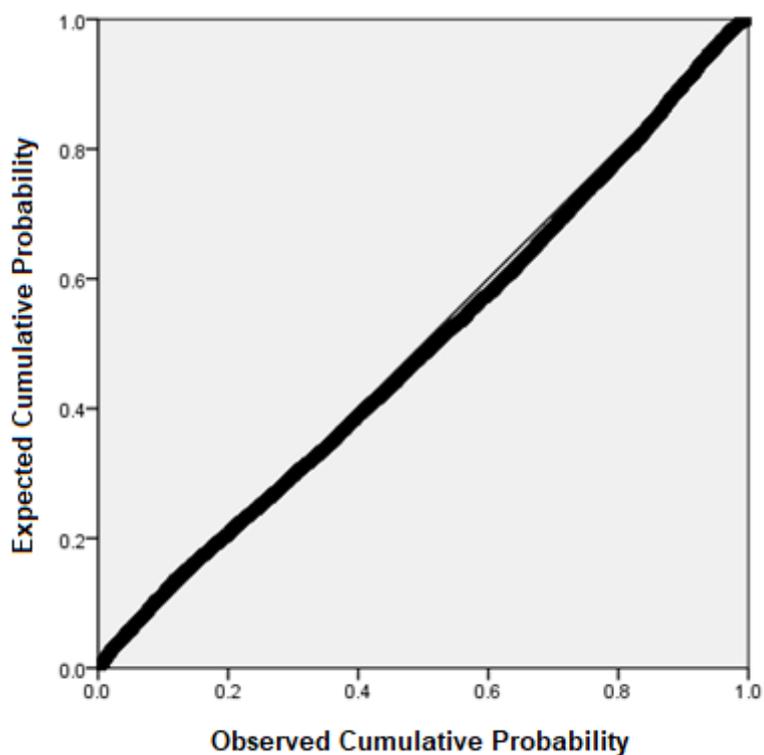


Figure 6.2. Normal P-P plot of regression standardised residuals for the dependent variable: physical dependency of ‘Lone-Pensioner HUTs’



To test the normality of residuals the histogram (*Figure 6.1.*) and the normal probability-probability plot (P-P plot) (*Figure 6.2.*) were visually inspected for the dependent variable: physical dependency of ‘Lone-Pensioner HUTs’. And so, as illustrated by *Figure 6.1.* the histogram demonstrates an approximate normal distribution of the residuals for the dependent variable (bell-shaped curve). Furthermore, *Figure 6.2.* outlines a P-P plot, in which, the fit of the observed residuals can be clearly identified as being close to the line, again supporting the condition of a normal distribution of the residuals for the dependent variable: physical dependency of ‘Lone-Pensioner HUTs’

An Assessment of the Residuals for Potential Outliers

The final assumption to be checked, is the detection of any residuals that may be potential outliers, as certain cases may exert undue influence on the MLR model and may need to be removed from the analysis (Field, 2009: p.217). The standardised residuals were examined to check that 99.7% of the residuals (i.e. the difference between the predicted and observed values for the dependent variable) were within the accepted limits of ± 3 SD. I.e. that (up to) $\sim 1\%$ of MSOAs (7 out of 7,201 MSOAs) can extend beyond this limit and be classified as potential outliers, in keeping with the assumption of normality of the residuals. Accordingly, the casewise diagnostics were examined for dependent variable: physical dependency of ‘Lone-Pensioner HUTs’, with 39 MSOAs being identified as residuals with a $SD < \pm 3$, which, was not within the theoretically accepted limits. Additionally, further examination of whether any of the residuals was undertaken by visually inspecting the plots of *ZRESID against *ZPRED in *Figure 6.3.*

As outlined by *Figure 6.3.* the data points are randomly and evenly dispersed throughout the plot of *ZRESID against *ZPRED, with this pattern being indicative of a situation, in which, the assumption of linearity and homoscedasticity being met, for the most part. Furthermore, the plot allows for a clear visual indication of which, cases are potential outliers in the dataset. Of note, are the standardised residuals for the cases of: Sheffield 073 (*Table 6.7.*) and Sutton 002 (*Table 6.8.*).

Figure 6.3. Plot of *ZRESID against *ZPRED – ‘physical dependency’ of ‘Lone-Pensioner HUTs’

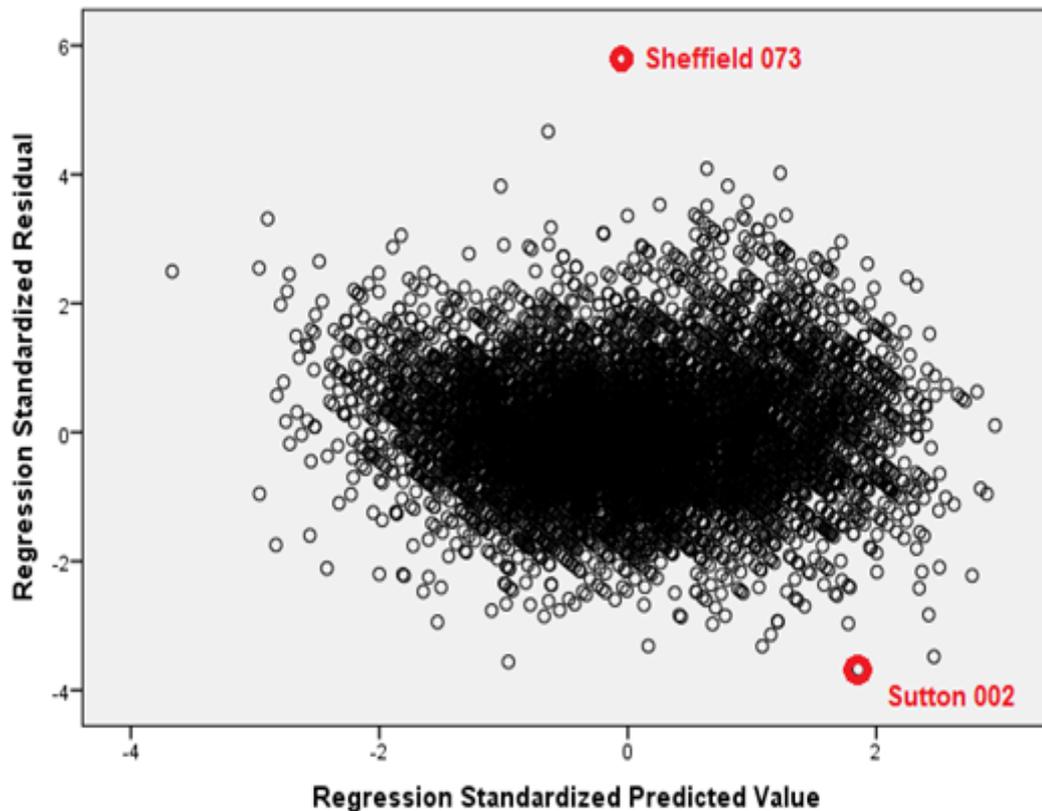


Table 6.7. Examination of the standardised residual for Sheffield 073 – Model 2 (higher than expected value)

| MSOA Name | Standardised Residual | Observed Physical Dependency | Predicted Physical Dependency |
|----------------------|-----------------------|------------------------------|-------------------------------|
| Sheffield 073 | 5.792 | 0.58 | 0.38 |

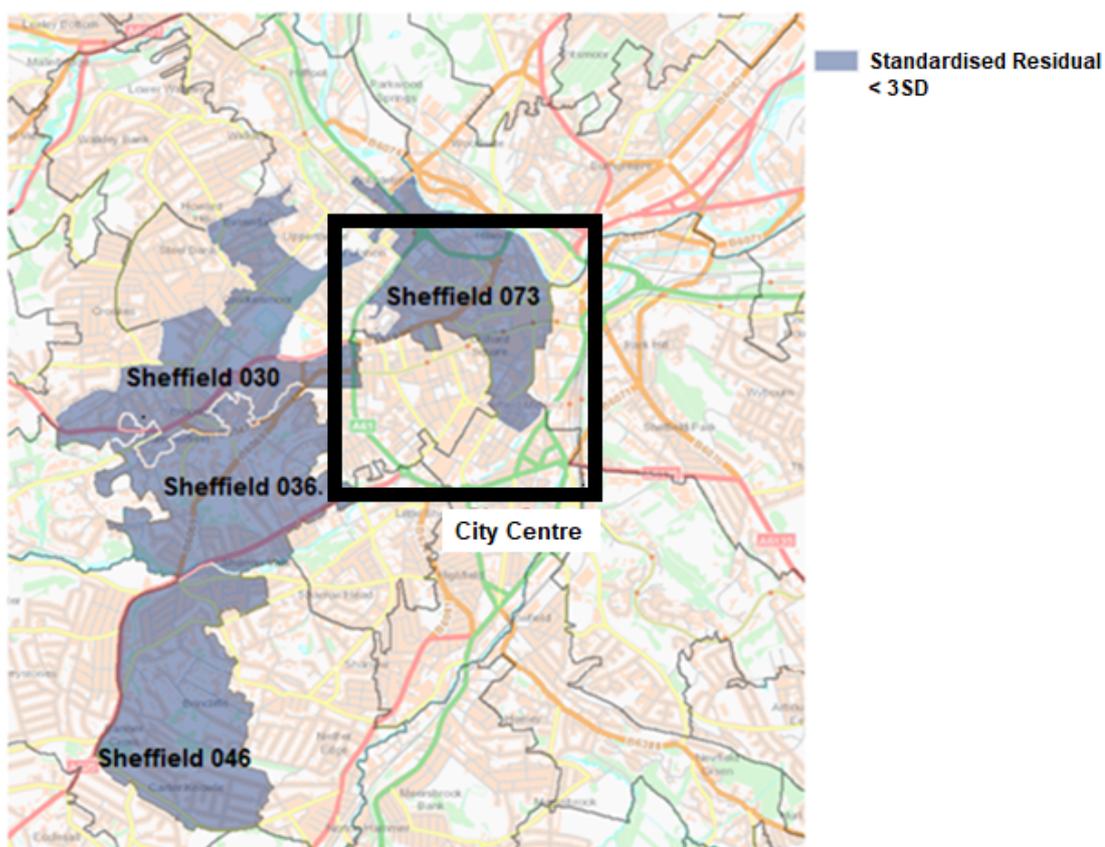
MSOA Sheffield 073 had the greatest deviation of the observed value from the predicted value, for the NSR outcome of ‘physical dependency’ of ‘Lone-Pensioner HUTs’; with 58% of ‘Lone-Pensioner HUTs’ being observed as ‘physical dependent’ in comparison to the predicted value of 38%. When the compositional and contextual predictors were further examined for Sheffield 073, the values of all but one of compositional and contextual predictors were all comparatively low, in relation to the mean and SD for the variable (see: *Table 6.1*).

Furthermore, 'non-homeowners' was the only (compositional) predictor contributing to *model 2* which, had an unusually high value (in relation to the low values of the other predictors); as 86% of 'Lone-Pensioner HUTs' in the area are non-homeowners in comparison to the mean value (41%). Although this proportion is comparatively higher than expected, it is unsurprising as the neighbourhood area of Sheffield 073 is in the city centre of Sheffield. This influential variable can be explained by the trend in city centre areas, which, tend to have fewer owner occupiers in comparison to the national average due to the demand for rental properties, resulting from the high rate of population turnover in these areas (DCLG, 2011).

Subsequently, as the value of the outcome variable was comparatively high, the suggestion of a potential (unaccounted for) confounding contextual effect could be made (even after examining the observed values of the predictors). In response to these unaccounted-for relationship, further examination of the underlying context of this MSOA (Sheffield 073) was carried out to determine potential moderating factors between the predictors and outcome variable (*Figure 6.4.*).

As shown by *Figure 6.4.*, the MSOA of Sheffield 073 is near, both the University of Sheffield and Hallam University (central) campuses, containing a combined total of approximately 50,000 full-time students (Higher Education Statistics Agency, 2017). The result of which, is the uncharacteristically high, proportion of university students, residing in the surrounding neighbourhood areas (i.e. Sheffield 073). Correspondingly, the atypical concentration of the student population within Sheffield 073 (and connecting) neighbourhood(s) can be suggested to have contributed to unusually high values of the compositional predictor of 'non-homeowners', associated with the (minority) of 'Lone-Pensioner HUTs' who reside in Sheffield 073.

Figure 6.4. Potential outlier of Sheffield 073 (higher than expected value) - Model 2



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The identification of atypical population groups at small-area level geographies, via geodemographic classification is not a new phenomenon. For example, Vickers & Rees (2011) discuss how the presence of atypical areas within Leeds that were associated with densely populated student areas within the city (e.g. university halls of residence), whilst developing the 2001 Output Area Classification (OAC). Therefore, the unusual occurrence of such atypical areas (often containing communal establishments), which, have a dominance of specific sub-populations, should almost be expected when classifying small-area geographies by their compositional attributes. The consideration of which, led to Sheffield 073 not being deemed to be a theoretically influential case to the MLR model, due to it containing an unusually high proportion of a population (i.e. university students), which, are not of direct concern, regarding the assessment of social vulnerability of ‘Lone-Pensioner HUTs’.

Conversely, not only were there MSOAs whose observed values of the outcome of the ‘physical dependency’ of ‘Lone-Pensioner HUTs’ was higher than the expected (see: *Table 6.8*), there were also MSOAs whose observed values of the outcome were lower than expected (for *Model 2*).

Table 6.8. Examination of the standardised residual (lower than expected value) for Sutton 002 – Model 2

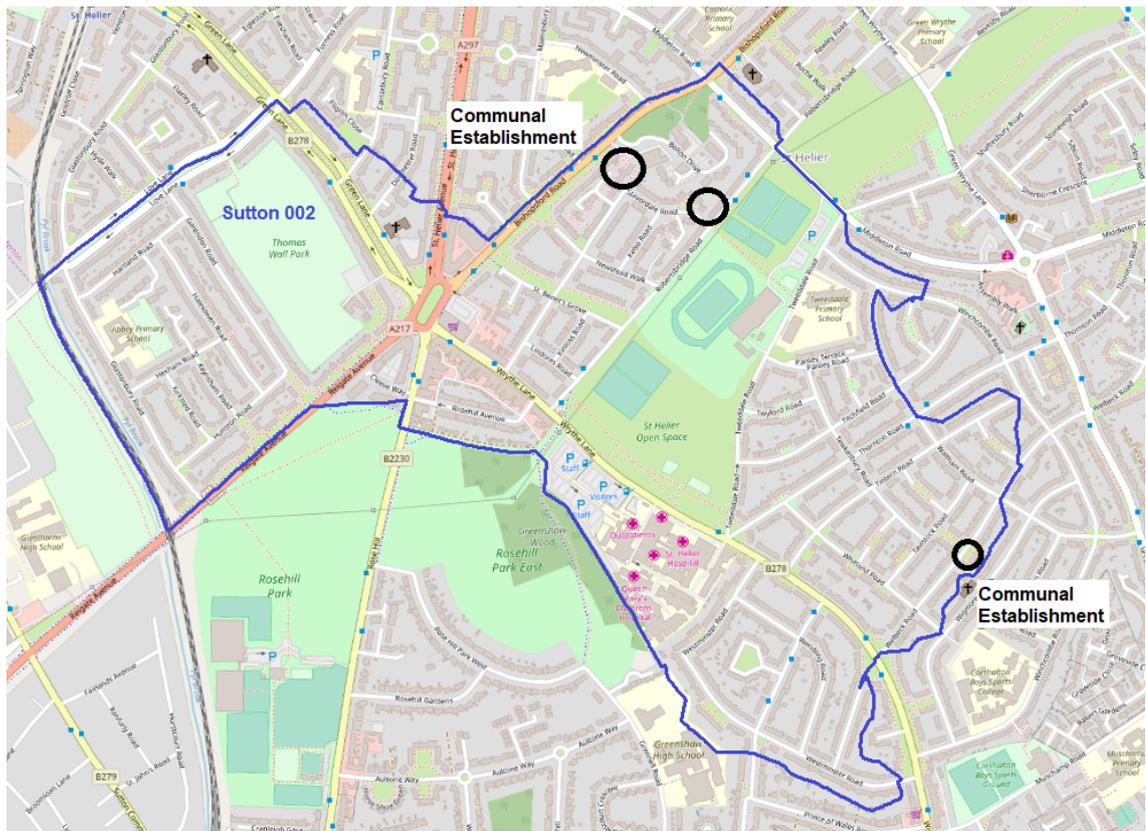
| MSOA Name | Standardised Residual | Observed Physical Dependency | Predicted Physical Dependency |
|-------------------|-----------------------|------------------------------|-------------------------------|
| Sutton 002 | -3.678 | 0.36 | 0.48 |

The MSOA of Sutton 002 had the greatest deviation, with a lower observed (36%) outcome for the ‘physical dependency’ of ‘Lone-Pensioner HUTs’ than predicted (48%). Correspondingly, when the compositional and contextual predictors were further examined for Sutton 002, the compositional predictor of ‘non-homeowners’ (72%) was relatively high in relation to the values of the mean and SD for the variables (*Table 6.1*). Thus, indicating a potential, unaccounted for, confounding compositional effect (or collective neighbourhood attribute), which, may have potentially modified the relationship between the predictors and outcome variables. Therefore, in response to these unaccounted-for relationships, further examination of the underlying compositional and collective features of the Sutton 002 MSOA was carried out, to determine the atypical presence of these compositional features.

When the MSOA of Sutton 002 was examined in further detail, it was apparent that there was a relatively high proportion of forms of sheltered and supported accommodation, which, would not be classified as ‘households’ by the 2011 Census definition (see: *Section 3.2.1*). As identified from the website ‘www.housingcare.org’, three large-scale residential units (for supported living) were identified, as shown in *Figure 6.5*. It is estimated that 73 one-person (rented) flats are contained between the three ‘supported living’ establishments. Subsequently, the dominance of such communal establishments (which, could be accounted for) in the MSOA of Sutton 002, results in it being identified

as an atypical area, and is not of central concern to this research. As, it could be argued that additional social support needs (e.g. 24-hour care) will be met for ‘Lone-Pensioner HUTs’ living in these types of supported accommodation, which, would not occur in a usual residential household or independent living establishment, the key unit of analysis in this research.

Figure 6.5. Potential outlier of Sutton 002 (lower than expected value) - Model 2



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Due to the presence of potential outliers being detected from an initial inspection of the residual terms for the dependent variable of ‘physical dependency’ for ‘Lone-Pensioner HUTs’, further assessment to ensure that no residual was overly influential on the results of the MLR *Model 2* was undertaken. Hence, the values of Cook’s Distance statistic (D) were examined, to check that no residual (for any of the 39 MSOAs) was overly influential to the results of MLR *Model 2*. The highest value detected ($D = 0.015$) was for MSOA Havant 009, with all values for the residuals occurring within the accepted limits ($D < 1$). And so, the decision was made to not remove any of the expected outliers from the MLR model (2) and in the subsequent construction of the SVI in *Section 6.6*.

As shown by the preliminary statistical assessment of the dependent and independent variables, the underlying assumptions of undertaking further (parametric) statistical testing have been checked and adhered to.

6.4. The Prediction of Potentially ‘Susceptible’ ‘Lone-Pensioner HUTs’

As outlined by the conceptual framework in *Chapter 4.*, there are three key dimensions which, can contribute to assessing the social vulnerability of ‘Lone-Pensioner HUTs’ becoming ‘physically dependent’ at older ages. This chapter has already established the importance of the compositional and contextual attributes associated with the dimensions of ‘exposure to NSRs’ and ‘neighbourhood capacity’ in determining the NSR outcome of ‘Lone-Pensioner HUTs’ who are unable to ‘reconcile paid work with caring for dependent children’ at the neighbourhood level. However, the third dimension of the ‘susceptibility’ of ‘Lone-Pensioner HUTs’ in experiencing the NSR outcome of being unable to ‘reconcile paid work with caring for dependent children’ has yet to be explored.

The aim of this section is to provide a comparative assessment of the fit of the MLR Model (2), in predicting the outcomes of potentially ‘susceptible’ sub-groups, to the NSR outcome of ‘physical dependency’; specifically, relating to the age and the gender of the ‘Lone-Pensioner HUTs’. This, in turn, will further inform the construction of the social vulnerability indices in later sections, as the following MLR models (*Tables 6.9-6.11*) are not used as a standalone output, but are instead used for predictive purposes in justifying the final selection of variables.

6.4.1. Gender Differences

First, a comparison was gender (*Model 3*) and male ‘Lone-Pensioner HUTs’ (*Model 4*). As, male, ‘Lone-Pensioner HUTs’ have been (previously) theorised to be ‘more susceptible’ to becoming ‘physically dependent’.

Table 6.9. MLR exploring the association of the ‘neighbourhood capacity’ dimension with the NSR outcome of ‘physical dependency’ of male and female ‘Lone-Pensioner HUTs’ – Models 3 & 4

| Variable | B | SE B | β | T |
|---|----------|-------------|----------|-----------|
| FEMALES: Model 3 - ‘Neighbourhood Capacity’ & ‘Exposure to NSRs’ R² = 0.673 | | | | |
| (Constant) | .174 | .012 | | 14.538** |
| Inaccessibility of Local Services | .001 | .000 | .035 | 5.109** |
| Old Age Dependency Ratio | .060 | .005 | .123 | 12.985** |
| Provision of Unpaid Care | .513 | .029 | .150 | 17.760** |
| No/Obsolete Qualifications | .304 | .005 | .602 | 59.965** |
| Non-Homeowner | .121 | .004 | .310 | 33.013** |
| Single (no previous relationship) | .108 | .014 | .076 | 7.781** |
| MALES: Model 4 - ‘Neighbourhood Capacity’ & ‘Exposure to NSRs’ R² = 0.532 | | | | |
| (Constant) | .120 | .005 | | 23.387** |
| Inaccessibility of Local Services | .001 | .000 | .048 | 5.895** |
| Old Age Dependency Ratio | .072 | .005 | .142 | 13.079** |
| Provision of Unpaid Care | .657 | .036 | .186 | 18.393** |
| No/Obsolete Qualifications | .269 | .005 | .517 | 51.678** |
| Non-Homeowner | .107 | .004 | .269 | 24.503** |
| Single (no previous relationship) | -.087 | .009 | -.101 | -10.146** |

**statistically significant ($p < 0.01$)

^All previous assumptions as outlined in Section 6.3.2. were once again checked and adhered to, with no results producing any cause for concern.

A statistically significant regression equation ($F(6, 7194) = 2467.375, p < 0.01$) was found for *Model 3*. However, as indicated by the comparison of standardised Beta-coefficients, the ‘importance’ of the contribution of all the compositional and contextual predictors slightly lower in comparison to *Model 2*. For *Model 3*, $R^2 = 0.673$, indicating that the six, statistically significant contextual and compositional predictors accounted for 67.3% of the variation in the outcome of ‘physical dependency’ of female ‘Lone-

Pensioner HUTs', demonstrating, that the predictive power of *Model 3* is similar to that of *Model 2* ($R^2 = 0.717$). Therefore, suggesting that *Model 3* provides an effective fit, in terms of predicting the 'physical dependency' of female 'Lone-Pensioner HUTs'; in comparison to the equivalent model (2) for *all* 'Lone-Pensioner HUTs' at the neighbourhood level.

In comparison a statistically significant regression equation ($F(6, 7194) = 1364.452, p < 0.01$) was found for *Model 4*. The $R^2 = 0.532$, indicating that the six, statistically significant contextual and compositional predictors accounted for 53.3% of the variation in the outcome of 'physical dependency' of male 'Lone-Pensioner HUTs'. This demonstrates that although the predictive power of *Model 4* is lower in comparison to *Model 2* ($R^2 = 0.717$), the fit of *Model 4* still provides a moderate fit for the outcome of 'physical dependency' for male, 'Lone-Pensioner HUTs'.

However, of note is the alteration in direction of the compositional predictor of 'single' relationship status for 'Lone-Pensioner HUTs' who are *men*; from being positively associated to negatively associated with the outcome variable. Suggesting that as the proportion of 'Lone-Pensioner HUTs' who are men and are 'single' increases, the proportion of 'Lone-Pensioner HUTs' who are men and 'physically dependent' decreases at the neighbourhood level. Although, this relationship initially appears to differ to what would be expected, it can be theorised that (the relatively small proportion in society of) male 'Lone-Pensioner HUTs' who have 'never been in a legally-recognised relationship', are more likely to be resilient against deprivation outcomes than their counterparts who have experienced the 'loss of a partner' (either through death or relationship breakdown). For example, it has been demonstrated by Waite (1995) that men who uphold formal positions in the church and subsequently never get married due to their religious duties, tend to have a wide social-support network in the community to rely upon in times of need. Accordingly, this small sub-section of 'Lone-Pensioner HUTs' can be demonstrated to experience specific social deprivation outcomes which, are unique to this particular cohort.

As can be shown from both *Model 3* and *Model 4*, for the most part all the six predictors of ‘physical dependency’ for ‘Lone-Pensioner HUTs’ have statistically significant relationships in terms of their association with the outcome variable of ‘physical dependency’. Therefore, the chosen predictors provide an adequate fit in terms of predicting the outcome of ‘physical dependency’ for all ‘Lone-Pensioner HUTs’, as well as independently for female, and male ‘Lone-Pensioner HUTs’. Of note, is the ability of the model to provide an adequate fit for predicting the ‘physical dependency’ for male, ‘Lone-Pensioner HUTs’, who are theorised to be more susceptible to issues of deprivation than women (based upon certain compositional attributes).

6.4.2. Age Differences

As shown by *Table 6.10*, an MLR was calculated (*Model 5*) to predict the physical dependency of ‘Lone-Pensioner HUTs’, aged 65-74; based upon the same predictors as outlined in *Model 2*.

A statistically significant regression equation ($F(6, 7194) = 3035.973, p < 0.01$) was found for *Model 5*, with all the six predictors obtaining positive B-values, indicating (the expected) positive relationships with the outcome variable. For *Model 5*, $R^2 = 0.717$ indicating that the six, statistically significant contextual and compositional predictors accounted for 71.7% of the variation in the outcome of ‘physical dependency’ of ‘Lone-Pensioner HUTs’- aged 65-74. This demonstrates that the predictive power of *Model 5* is equivalent to that of *Model 2* ($R^2 = 0.717$), suggesting that ‘Lone-Pensioner HUTs’ - aged 65-74, can also be modelled effectively by the chosen predictors (established in *Model 2*).

Table 6.10. MLR exploring the association of the ‘neighbourhood capacity’ dimension with the NSR outcome of ‘physical dependency’ of ‘Lone-Pensioner HUTs’ aged 65-74 years old and 75 years old and over – Models 5 & 6

| Variable | B | SE B | β | t |
|---|----------|-------------|----------|-----------|
| AGED 65-74 YEARS OLD | | | | |
| Model 5: ‘Neighbourhood Capacity’ & ‘Exposure to NSRs’ | | | | |
| R² = 0.717 | | | | |
| (Constant) | -.056 | .005 | | -11.622** |
| Inaccessibility of Local Services | .000 | .000 | .023 | 3.627** |
| Old Age Dependency Ratio | .069 | .005 | .113 | 13.061** |
| Provision of Unpaid Care | .626 | .034 | .145 | 18.467** |
| No/Obsolete Qualifications | .330 | .005 | .556 | 64.562** |
| Non-Homeowner | .189 | .005 | .377 | 41.880** |
| Single (no previous relationship) | .067 | .010 | .055 | 6.643** |
| AGED 75 YEARS OLD AND OVER | | | | |
| Model 6: ‘Neighbourhood Capacity’ & ‘Exposure to NSRs’ | | | | |
| R² = 0.598 | | | | |
| (Constant) | .164 | .004 | | 37.041** |
| Inaccessibility of Local Services | .001 | .000 | .053 | 6.927** |
| Old Age Dependency Ratio | .058 | .004 | .133 | 12.908** |
| Provision of Unpaid Care | .496 | .028 | .163 | 17.525** |
| No/Obsolete Qualifications | .265 | .005 | .556 | 55.500** |
| Non-Homeowner | .094 | .003 | .280 | 27.264** |
| Single (no previous relationship) | .017 | .011 | .015 | 1.498 |

**statistically significant ($p < 0.01$)

^All previous assumptions as outlined in Section 6.3.2. were once again checked and adhered to, with no results producing any cause for concern.

A statistically significant regression equation ($F(6, 7194) = 1787.838, p < 0.01$) was also found for *Model 6*, with all the six predictors obtaining positive B-values, indicating (the expected) positive relationships with the outcome variable of ‘physical dependency’ of ‘Lone-Pensioner HUTs’ - aged 75 and over (also, Table 6.10.). When examining the

compositional variable of 'single' relationship status ($B = 0.017$, $p = 0.134$) in greater detail, the cell counts for this variable were relatively small ($> 5\%$). Suggesting a lack of variance in the data for truly meaningful, statistical results to be produced. For *Model 6*, $R^2 = 0.598$ indicating that the five, statistically significant contextual and compositional predictors accounted for 59.8% of the variation in the outcome of 'physical dependency' of 'Lone-Pensioner HUTs'- aged 75 and over. This demonstrates that the predictive power of *Model 6* is lower than that of *Model 2* ($R^2 = 0.598$), but that it is still effective for predicting physical dependency of 'Lone-Pensioner HUTs'- aged 75 and over, at the neighbourhood level.

As can be shown from both *Model 5* and *Model 6*, for the most part all the six predictors have a, statistically significant relationship in terms of their association with the outcome variable of 'physical dependency'. Subsequently, the chosen predictors provide an adequate fit in terms of predicting the outcome of 'physical dependency' for all 'Lone-Pensioner HUTs', as well as independently for female, and male 'Lone-Pensioner HUTs'.

6.4.3. Age and Gender Differences

Finally, in *Table 6.11*. a comparison in terms of female 'Lone-Pensioner HUTs' aged 65-74 (*Model 7*); female 'Lone-Pensioner HUTs' aged 75 and over (*Model 8*); male 'Lone-Pensioner HUTs' aged 65-74 (*Model 9*); and male 'Lone-Pensioner HUTs' aged 75 and over (*Model 10*) was made.

Table 6.11. MLR exploring the association of the ‘neighbourhood capacity’ dimension with the NSR outcome of ‘physical dependency’ of ‘Lone-Pensioner HUTs’ by age and sex – Models 7-10

| Variable | B | SE B | β | T |
|---|----------|-------------|----------|-----------|
| FEMALES – AGED 65-74 YEARS OLD | | | | |
| Model 7: ‘Neighbourhood Capacity’ & ‘Exposure to NSRs’ (R² = 0.674) | | | | |
| (Constant) | -.069 | .006 | | -12.165** |
| Inaccessibility of Local Services | .001 | .000 | .027 | 3.896** |
| Old Age Dependency Ratio | .104 | .006 | .158 | 16.910** |
| Provision of Unpaid Care | .773 | .040 | .168 | 19.310** |
| No/Obsolete Qualifications | .284 | .005 | .494 | 52.478** |
| Non-Homeowner | .219 | .005 | .416 | 42.746** |
| Single (no previous relationship) | .055 | .013 | .038 | 4.216** |
| FEMALE – AGED 75 YEARS OLD AND OVER | | | | |
| Model 8: ‘Neighbourhood Capacity’ & ‘Exposure to NSRs’ | | | | |
| R² = 0.563 | | | | |
| (Constant) | .162 | .005 | | 32.062** |
| Inaccessibility of Local Services | .001 | .000 | .049 | 6.099** |
| Old Age Dependency Ratio | .069 | .005 | .149 | 14.116** |
| Provision of Unpaid Care | .449 | .032 | .138 | 14.214** |
| No/Obsolete Qualifications | .257 | .005 | .514 | 47.949** |
| Non-Homeowner | .107 | .004 | .301 | 29.187** |
| Single (no previous relationship) | .016 | .015 | .011 | 1.083* |
| MALE – AGED 65-74 YEARS OLD | | | | |
| Model 9: ‘Neighbourhood Capacity’ & ‘Exposure to NSRs’ | | | | |
| R² = 0.528 | | | | |
| (Constant) | -.027 | .007 | | -3.759** |
| Inaccessibility of Local Services | .001 | .000 | .043 | 5.142** |
| Old Age Dependency Ratio | .090 | .007 | .134 | 12.403** |
| Provision of Unpaid Care | .924 | .049 | .198 | 18.754** |

| | | | | |
|--|------|------|------|----------|
| No/Obsolete Qualifications | .279 | .006 | .441 | 44.870** |
| Non-Homeowner | .197 | .006 | .374 | 33.646** |
| Single (no previous relationship) | .050 | .009 | .052 | 5.591** |
| MALE – AGED 75 YEARS OLD AND OVER | | | | |
| Model 10: ‘Neighbourhood Capacity’ & ‘Exposure to NSRs’ | | | | |
| R² = 0.361 | | | | |
| (Constant) | .194 | .006 | | 31.208** |
| Inaccessibility of Local Services | .001 | .000 | .059 | 6.082** |
| Old Age Dependency Ratio | .064 | .006 | .124 | 9.894** |
| Provision of Unpaid Care | .788 | .044 | .218 | 17.834** |
| No/Obsolete Qualifications | .198 | .005 | .403 | 36.162** |
| Non-Homeowner | .101 | .005 | .262 | 20.547** |
| Single (no previous relationship) | .069 | .009 | .083 | 7.407 |

**statistically significant ($p < 0.01$). ^All previous assumptions as outlined in Section 6.3.2. were once again checked and adhered to, with no results producing any cause for concern.

A statistically significant regression equation ($F(6, 7194) = 2482.589$, $p < 0.01$) was found for *Model 7*, with all six predictors obtaining positive B-values, indicating (the expected) positive relationships with the outcome variable. For *Model 7*, $R^2 = 0.674$ indicating that the six, statistically significant contextual and compositional predictors accounted for 67.4% of the variation in the outcome of ‘physical dependency’ of ‘Lone-Pensioner HUTs’. The predictive power of *Model 7* is nearly equivalent to that of *Model 2* ($R^2 = 0.717$), suggesting that the model is effective for predicting physical dependency amongst this demographic group. Also, a statistically significant regression equation ($F(6, 7194) = 1545.472$, $p < 0.01$) was found for *Model 8*. For *Model 8*, $R^2 = 0.563$ indicating that the six, statistically significant contextual and compositional predictors accounted for 56.3% of the variation in the outcome of ‘physical dependency’ of ‘Lone-Pensioner HUTs’.

A statistically significant regression equation ($F(6, 7194) = 1341.507$, $p < 0.01$) was found for *Model 9*, with all six predictors obtaining positive B-values, indicating (the expected) positive relationships with the outcome variable. For *Model 9*, $R^2 = 0.528$

indicating that the six, statistically significant contextual and compositional predictors accounted for 52.8% of the variation in the outcome of ‘physical dependency’ of male ‘Lone-Pensioner HUTs’ -aged 65-74 years old.

A statistically significant regression equation ($F(6, 7194) = 678.366, p < 0.01$) was found for *Model 10*, with five out of six predictors obtaining positive B-values, indicating (the expected) positive relationships with the outcome variable. The $R^2 = 0.361$ indicating that the six, statistically significant, contextual and compositional predictors accounted for 36.1% of the variation in the outcome of ‘physical dependency’ of male ‘Lone-Pensioner HUTs’ - aged 75 years old and over. The lack of a statistically verifiable association between male ‘Lone-Pensioner HUTs’ who are aged 75 and over and are ‘single’ against the outcome variable of ‘physical dependency’, may be just due to small cell counts for this variable ($30\% < 10$). Suggesting that the overall model is still moderately effective in predicting the outcome of ‘physical dependency’ for ‘Lone-Pensioner HUTs’ aged 75 and over, but this is somewhat lower in comparison the fit of the model for *all* ‘Lone-Pensioner HUTs’ ($R^2 = 0.717$). However, the lower predictive power of this overall model may also be explained for by other confounding factors, which, may potential affect the physical dependency ‘more susceptible’ sub-groups of ‘Lone-Pensioner HUTs’.

The purpose of *Section 6.4*. was to validate whether the *Model 2* in predicting the outcome of the ‘physical dependency’ of the ‘Lone-Pensioner HUT’ sub-groups that are most likely to be susceptible to this outcome. Establishing that although the predictive power of these models (3-10) is lower in comparison to that of *Model 2*, all the models still provide an adequate fit in terms of the relationship of the predictors to the outcome of the outlined sub-groups. Therefore, further validating the inclusion of the predictors to be included in the final SVI of the ‘physical dependency’ of ‘Lone-Parent HUTs’.

6.5. Final Selection of Variables

The final section of the three, contextual variables and the three, compositional variables, which, were both theoretically-informed and statistically-verified as robust predictors of

the outcome of ‘physical dependency’ of ‘Lone-Pensioner HUTs’ at a neighbourhood level, are summarised *Table 6.12*.

Table 6.12., demonstrates that all variables have a positive relationship with the outcome variable of ‘physical dependency’, indicating that as the value of each of the predictors increases, the proportion of ‘Lone-Pensioner HUTs’ within neighbourhoods who are ‘physically dependent’ also increases. Furthermore, the variables as summarised by *Table 6.12*. the direction of the each of the predictors (for the most part) reflects that, which, was originally theorised by the conceptual framework in *Chapter 4*.

Table 6.12. Final selection of variables for the SVI of ‘Lone-Pensioner HUTs’ to becoming ‘physical dependent’

| Variable | Units | Direction of Relationship (with ‘physical dependency’) |
|-----------------------------------|--------------|---|
| ‘Neighbourhood Capacity’ | | |
| Inaccessibility of Local Services | <i>Mins</i> | As the distance travelled to access local services increases, the greater the risk of vulnerability (+) |
| Old Age Dependency Ratio (OADR) | <i>Ratio</i> | As the OADR increases, the greater the risk of vulnerability (+) |
| Provision of Unpaid Care | <i>%</i> | As the provision of unpaid care increases, the greater the risk of vulnerability (+) |
| ‘Exposure to NSRs’ | | |
| No/Obsolete Qualifications | <i>%</i> | As the proportion of ‘Lone-Pensioner HUTs’ who have no/obsolete qualifications increases in a neighbourhood, the greater the risk of vulnerability (+) |
| Non-Homeowner | <i>%</i> | As the proportion of ‘Lone-Pensioner HUTs’ who are non-homeowners increases in a neighbourhood, the greater the risk of vulnerability (+) |
| Single (no previous relationship) | <i>%</i> | As the proportion of ‘Lone-Pensioner HUTs’ who are ‘single’ increases in a neighbourhood, the greater the risk of vulnerability (+) |

6.5.1. Standardisation of Variables

As outlined by *Table 6.12.*, the chosen variables are not derived from the same units of measurement, therefore requiring the standardisation of variables to be undertaken, in order to ensure the comparability of the final values (Gilthorpe, 1995). Hence, a standardisation procedure allows for all values of (any numeric) variable to be scaled, which, allows for a fair comparison between the required values of each case, and for every variable. And so, the decision was made to normalise the outcome and predictor variables, by using the ‘min-max’ standardisation procedure (as informed by *Section 5.5.*). The ‘min-max’ procedure was primarily chosen because, it allows the standardised

values to fall between 0-1 which, is a key consideration when aggregating and interpreting the values in the final composite measures.

The chosen method of the ‘min-max’ standardisation procedure, which, performs a linear transformation on the original data, is shown by *Equation 6.2*.

$$X^i = \frac{X - X_{min}}{X_{max} - X_{min}} \quad (6.2)$$

As part of the standardisation procedure outlined in *Equation 6.2*., minimum and maximum values (see *Table 6.1*.) were set, in order to transform the existing, observed values into new values within the range of 0-1; whereby, the minimum and maximum values for each variable, refer to the largest and smallest observed values, respectively. Once all six, of the variables had been standardised, the next step in the constructing the SVI, was the aggregation of the selected compositional and contextual variables, within and between their corresponding dimensions (as illustrated by *Figure 5.1*.)

6.6. Weighting and Aggregation

Finally, to be able to adequately represent the theoretical concept that is being modelled in the final composite measure, the choice of aggregation procedure, should consist of an informed method in which, to combine the relevant variables and dimensions of a proposed measure together. Consequently, the purpose of weighting the variables within and between the outlined dimensions is to provide an indication of ‘the importance’ of each of the variables in contributing the overall outcome; in a meaningful and purposeful way (Polites *et al.*, 2012). Therefore, the configuration of each of the chosen indicators within their dimensions was informed by the social vulnerability framework, proposed in *Chapter 4*.

In addition, the geometric mean was chosen as the aggregation method, as it has advantages from a measurement theory point of view (Roberts, 1979), in obtaining an

average of the indicators to form a ‘dimension score’ in comparison to using the arithmetic mean. A key benefit of using the geometric mean is that the poor performance of any indicator (i.e. higher values) within a dimension will not be compensated for by the good performance (i.e. lower values) of another, unlike the arithmetic mean where such effects tend to be linearly compensated for (Maggino & Nuvolati, 2012: p.72.).

Therefore, the geometric mean reduces the level of substitutability of values between dimensions, allowing the individual contribution of each indicator to be considered by the overall value obtained for the dimension. Reflecting the previously stated assumption that the effects of each variable are independent of one another. Moreover, see: Nardo *et al.*, 2005 and for further discussion as to the increasing usage and benefits of calculating the geometric mean. Also, key benefit of keeping the compositional (exposure) and contextual (neighbourhood capacity) dimensions separate until this point, is the ability to examine the two separate dimensions independently of one another, if required by a future user.

The equation used to calculate the geometric mean for each of the dimensions from the assigned indicators is outlined in *Equation 6.3*.

$$GM = \sqrt[n]{X_1 X_2 X_3 \dots X_n} \quad (6.3)$$

GM = Geometric mean

n = number of variables

X_i = ⁿth value of variable X

Once, the scores for each dimension were calculated, the final step of constructing the SVI, requires the aggregation of the scores for the two dimensions of ‘neighbourhood capacity’ and ‘exposure to NSRs’. The decision was taken to weight the two dimensions of the ‘neighbourhood capacity’ and, ‘exposure’ to NSRs by the approximate regression weightings, which, were identified from the *MLR Models 1* and *2*. Thus, the ‘neighbourhood capacity’ dimension was weighted by a factor of 0.2 and the ‘exposure to NSRs’ was weighted by a factor of 0.8 – with the two weighted dimensions being

combined by using a simple additive process to create the final SVI of the ‘physical dependency’ of ‘Lone-Pensioner HUTs’.

6.7. Discussion

The ultimate focus of this chapter was to construct the theoretically and statistically informed SVI for the ‘physical dependency’ of ‘Lone-Pensioner HUTs’, in order to partially meet the objectives, set out to successfully accomplish *Aim 3* (see: *Section 1.4*). Correspondingly, the ability of the SVI to identify the most vulnerable ‘Lone-Pensioner HUTs’ to facing issues of social deprivation as a result of potentially becoming ‘physical dependent’ at the neighbourhood level, will be further explored and discussed in *Chapter 8*.

The importance of the contextual attributes associated with the ‘neighbourhood capacity’ dimension, have been established as important in modifying the specific NSR outcome of ‘physical dependency’ in old age. Thus, meeting the objectives set out in order to achieve to *Aim 1*. The MLR analyses in *Sections 6.3 and 6.4*, have identified three, contextual variables, which, are statistically significant, positive predictors of the outcome of the ‘physical dependency’, for ‘Lone-Pensioner HUTs’: ‘the inaccessibility of local services’, ‘old age dependency ratio’, and ‘provision of informal care’. Suggesting that, as the capacity of a neighbourhood becomes increasingly constrained in terms of being able to meet the needs of ‘Lone-Pensioner HUTs’, the proportion of lone-pensioners residing in the neighbourhood who are ‘physically dependent’ also increases.

Furthermore, the importance of compositional attributes which, can influence the exposure of ‘Lone-Pensioner HUTs’, were also determined in relation to the specific NSR outcome of ‘physical dependency’ in old age. Consequently, meeting the objectives set out in order to achieve to *Aim 2*. The MLR analyses in *Sections 6.3 and 6.4*, have identified three, compositional variables that are statistically significant predictors for the outcome of the ‘physical dependency’ for ‘Lone-Pensioner HUTs’: those who have ‘no/obsolete qualifications’, are ‘non-homeowners’, and who are ‘single’ (never been in a legally recognised relationship). Suggesting that, as an increasing proportion of ‘Lone-

Pensioner HUTs' who are at greater disposition of being 'exposed to NSRs' increases due to compositional characteristics, the proportion of lone-pensioners residing in the neighbourhood who are 'physically dependent' also increases.

The construction of the SVI *Section 6.4*. provides an exploratory approach to determine the fit of the chosen regression equation (6.1) for different sub-groups attributed to 'Lone-Pensioner HUTs' which, are theorised to be susceptible to the outcome of 'physical dependency'. Accordingly, the MLR model (2), is modified for each sub-group to validate whether the six, predictors still provide an adequate fit of the MLR model when predicting the outcome of 'physical dependency' for 'Lone-Pensioner HUTs' which, are 'male' and/or 'aged 75 and over'. Overall, this section has provided further understanding as to how potentially confounding factors based upon the susceptibility of specific sub-groups, may influence the overall predictive power of the chosen MLR model (2).

Chapter 7 – The Social Vulnerability of ‘Lone-Parent HUTs’

7.1. Introduction

This chapter outlines the process of constructing the SVI, relating to the inability of ‘Lone-Parent HUTs’ to ‘reconcile paid work with caring for dependents’ at a neighbourhood level; and reflects a similar structure to that given in *Chapter 6*. Subsequently, *Sections 7.1.-7.4.* demonstrate how MLR can be used to assess which, compositional and contextual variables are statistically significant in predicting the outcome of the inability of ‘Lone-Parent HUTs’ to ‘reconcile paid work with caring for dependents’.

The previously unexplored contextual indicators associated with the ‘neighbourhood capacity’ dimension, are initially modelled to determine the association between contextual variables and the inability of ‘Lone-Parent HUTs’ to ‘reconcile paid work with caring for dependent children’. In addition, compositional variables associated with the ‘exposure to NSRs’ and ‘susceptibility to NSRs’ dimensions, to determine if there is an improvement in predictive power of the previous MLR model (after, the contextual variables have been controlled for). The final, statistically significant regression equation (7.1.) produced from this modelling procedure is then used to inform which, predictors should be included in the construction of the SVI, as discussed from *Section 7.5.* onwards.

Section 7.5. outlines the process in which, the theoretically and statistically-informed predictors are transformed into a composite measure. Correspondingly, the decision-making process behind each analytical step will be discussed, in order to ensure the transparency and clarity of the construction of the final SVI for ‘Lone-Parent HUTs’. Once, the SVI has been finalised, a summary of the overall measure will be outlined. A further discussion of the theoretical and empirical implications which, can be drawn from the empirical results of this chapter is subsequently given in *Chapter 8*.

7.2. Multiple Linear Regression (MLR)

Prior to exploring, the interrelationships between the predictors of ‘being unable to reconcile paid work with care responsibilities’ for ‘Lone-Parent HUTs’ via MLR, several steps were taken to ensure the required datasets were processed into an appropriate format to be analysed (as outlined in *Section 5.5.1.*).

7.2.1. Descriptive Statistics

Once again, prior to exploring the relationships between the dependent and independent variables, the nature and distribution of the values for each variable was inspected, to ensure the most appropriate statistical test was undertaken. In this instance, the distribution of the dependent and independent variables for each dataset were examined to determine an overview of the key characteristics for each population of interest, including: the mean, and standard deviation (as outlined in the example in *Table 7.1.*).

Table 7.1. Descriptive statistics of all ‘Lone-Parent HUTs’ (aged 18-34 years old)

| Variable | Mean | SD | Min | Max |
|---|-------|------|------|-------|
| ‘Neighbourhood Capacity’ | | | | |
| (Average) Distance Travelled to Work | 15.13 | 4.06 | 5.90 | 37.50 |
| Child Dependency Ratio | 0.22 | 0.08 | 0.03 | 0.66 |
| House Price to Income Ratio | 7.30 | 3.33 | 0.00 | 78.78 |
| Inaccessibility of Local Services | 10.53 | 5.18 | 4.00 | 87.00 |
| ‘Exposure to NSRs’ | | | | |
| No/Inadequate Skills | 0.45 | 0.12 | 0.00 | 1.00 |
| Proportion of Lone Parents Aged 18-34 | 0.32 | 0.11 | 0.03 | 0.61 |
| Outcome: Unemployment | 0.52 | 0.12 | 0.00 | 1.00 |
| <i>(proxy for: the inability to reconcile paid work with caring for dependent children)</i> | | | | |

n = 7,201 (all MSOAs in England and Wales)

The SD for each of the variables is shown by *Table 7.1*. As, the SD provides a measure for the deviation of the observed values from the mean, the presence of which, is a requirement for MLR to be undertaken. Therefore, as no value of the SD was equal to 0, all independent variables were included potential as predictors in the MLR analysis in *Sections 7.3 and 7.4*.

Correlation Analysis

Correlation analysis was again, used to verify the strength and direction of the linear relationship between each of the hypothesised predictor variables against the outcome variable for ‘Lone-Parent HUTs’. As highlighted by *Table 7.2.*, there was a moderate, positive correlation ($p < 0.01$) for three of the four, contextual predictors (‘average distance travelled to work’, ‘inaccessibility of services’ and ‘CDR’) with the outcome variable (‘unemployment’). Furthermore, there was a weak, positive correlation ($p < 0.01$) for one of the contextual predictors (‘House Price to Income Ratio’), with the outcome variable (‘unemployment’). The presence of the statistically significant relationships between each of these three, contextual predictors and the outcome variable verifies the hypothesised direction of the relationships when the proportion of each of these predictors relating to the contextual attributes of ‘Lone-Parent HUTs’ increases at the neighbourhood level, the proportion of ‘Lone-Parent HUTs’ who are ‘unemployed – but seeking work’ also increases at the neighbourhood level.

Furthermore *Table 7.2.*, also outlines that the two, compositional predictors of ‘no/inadequate qualifications’ and ‘proportion of young lone-parents’ had a strong, positive correlation ($p < 0.01$), with the outcome variable (‘unemployment’). The presence of positive relationships which, are statistically significant between both compositional predictors and the outcome variable verifies the hypothesised direction of the relationships when the proportion of each of these predictors relating to the compositional attributes of ‘Lone-Parent HUTs’ increases at the neighbourhood level, the proportion of ‘Lone-Parent HUTs’ who are ‘unemployed – but seeking work’ also increases at the neighbourhood level.

Table 7.2. Correlation matrix of contextual and compositional predictors of the ‘unemployment’ of ‘Lone-Parent HUTs’ (aged 18-34 years old) in England and Wales (MSOA Level)

| | Outcome | 1. | 2. | 3. | 4. | 5. | 6. |
|--------------------------------|---|-----------|-----------|-----------|-----------|-----------|-----------|
| Outcome | — | | | | | | |
| contextual Variables | 1. (Average) Distance Travelled to Work | .300** | — | | | | |
| | 2. Child Dependency Ratio | .222** | -.391** | — | | | |
| | 3. House Price to Income Ratio | .076** | -.050** | .238** | — | | |
| | 4. Inaccessibility of Local Services | -.261** | .620** | -.318** | -.020 | — | |
| Compositional Variables | 5. No/Inadequate Qualifications | .603** | -.311** | .146** | -.059** | -.230** | — |
| | 6. Proportion of Lone Parents Aged 18-34 | .438** | -.444** | .148** | -.381** | -.348** | .490** |

**statistically significant ($p < 0.01$)

Additionally, there was also a moderate, negative correlation ($p < 0.01$) for the remaining contextual predictor ‘inaccessibility of local services’ with the outcome variable of ‘unemployment’ of ‘Lone-Parent HUTs’. The presence of the statistically significant, negative relationship between this contextual predictor and the outcome variable does not verify the hypothesised direction of the relationship as, when the ‘inaccessibility of local services increases at the neighbourhood level, the proportion of ‘Lone-Parent HUTs’ who are unemployed decreases at the neighbourhood level. It could be suggested that, the locations of local of key services could also be associated with potential locations of employment especially as, ‘Lone-Parent HUTs’ are more likely to commute locally in order to be able to meet the childcare needs of their children (e.g. Charles, 2012). Thus, providing further justification for the inclusion of the contextual variable of ‘average distance travelled to work’ in the MLR model(s).

However, as the direction of the relationships between the contextual and compositional predictors with the outcome variable, mostly reflect that which, was hypothesised, the decision was taken to include all the predictors in the subsequent MLR analyses (*Table 7.2*). Although, correlation analysis has measured the relationships between predictor variables paired with the outcome variable, MLR takes this process one step further and allows the dependent variable of ‘physical dependency’ of ‘Lone-Parent HUTs’ to be predicted from several independent variables.

7.3. Examining Compositional and Contextual Predictors of the Inability of ‘Lone-Parent HUTs’ to ‘Reconcile Paid Work with Caring Responsibilities’

This section utilises a hierarchical MLR model to initially explore the association of contextual predictors with the outcome of the ‘unemployment’ of ‘Lone-Parent HUTs’ (*Model 11*). This is followed by a second MLR model, which, adds compositional predictors to explore the association of both the contextual and compositional predictors with the outcome of ‘unemployment’ of ‘Lone-Parent HUTs’ (*Model 12*). The hierarchical modelling process will be used to inform which, predictors (and from which, dimensions) to include in the final composite measure of the social vulnerability of

neighbourhoods in terms of the inability of ‘Lone-Parent HUTs’ to ‘reconcile paid work with caring for dependents’.

7.3.1. Examining the Association of the Dimensions of ‘Neighbourhood Capacity’ and ‘Exposure’ in Determining the Inability of ‘Lone-Parent HUTs’ to ‘Reconcile Paid Work with Caring for Dependents’.

Once again, for simplicity and to aid the comparison of all the models, the adjusted R-squared value is reported for *Models 11-16* as R^2 .

Model 11: ‘Neighbourhood Capacity’

An MLR was calculated to predict the unemployment of ‘Lone-Parent HUTs’ based upon predictors associated with the ‘neighbourhood capacity’ dimension (*Model 11*). As shown by *Table 7.4.*, the MLR included the four, contextual predictors of: the ‘distance travelled to work’; ‘CDR’; ‘House Price to Income Ratio’; and ‘Inaccessibility of Local Services’.

Table 7.3. MLR exploring the association of the ‘neighbourhood capacity’ dimension with the ‘unemployment’ of ‘Lone-Parent HUTs’ – Model 11

| Variable | <i>B</i> | <i>SE B</i> | β | T |
|--|----------|-------------|---------|-----------|
| Model 11 | | | | |
| $R^2 = 0.111$ | | | | |
| <i>‘Neighbourhood Capacity’</i> | | | | |
| (Constant) | .589 | .008 | | 70.568** |
| Average Distance Travelled to Work | -.006 | .000 | -.189 | -12.856** |
| Child Dependency Ratio (CDR) | .157 | .019 | .104 | 8.295** |
| House Price to Income Ratio (HPIR) | .001 | .000 | .040 | 3.490** |
| Inaccessibility of Services | -.003 | .000 | -.110 | -7.743** |

**statistically significant ($p < 0.01$)

A statistically significant regression equation ($F(4, 7196) = 225.691, p < 0.01$) was found for *Model 11*. The ‘average distance travelled to work’ ($B = -0.006, p < 0.01$), the ‘CDR’ ($B = 0.157, p < 0.01$), the ‘HPIR’ ($B = 0.001, p < 0.01$) and the ‘inaccessibility of services’ ($B = -0.003, p < 0.01$) all contributed to the MLR model. The $R^2 = 0.111$, indicating that all four of the statistically significant, contextual predictors accounted for 11.1% of the variation in the outcome of ‘unemployment’ of ‘Lone-Parent HUTs’.

As can be shown from *Model 11* two out of the four, statistically significant predictors have positive B-values, the ‘CDR’ and the ‘HPIR’; indicating positive relationships with the outcome variable. For example, when there is a one-unit increase in the CDR in a neighbourhood (MSOA), the outcome of ‘unemployment’ increases by 0.15%. Also, two out of the four, statistically significant predictors have negative B-values, ‘the distance travelled to work’ and ‘the inaccessibility of services; indicating negative relationships with the outcome variable. Overall, this model (*11*) validates the assumption that all four of these contextual variables contribute to understanding the ‘unemployment’ of ‘Lone-Parent HUTs’ at the neighbourhood level. Therefore, suggesting that as the ‘capacity of the neighbourhood’ may contribute to the social vulnerability of ‘Lone-Parent HUTs’, specifically to the NSR outcome of ‘the inability to reconcile paid work with caring for dependents’.

Model 12: ‘Neighbourhood Capacity’ and ‘Exposure to NSRs’

The second stage to the hierarchical MLR was calculated to predict the unemployment of ‘Lone-Parent HUTs’, based upon predictors associated with the addition of the ‘exposure to NSRs’ dimension. As indicated by *Table 7.4.*, the addition of predictors relating to the ‘exposure to NSRs’ dimension was included in *Model 12*, in addition to the predictors relating to the ‘neighbourhood capacity’ dimension (as previously explored in *Model 11*). As shown by *Table 7.5*, the MLR also included the two, compositional predictors of: ‘no/inadequate qualifications; and ‘the proportion of ‘Lone-Parent HUTs’ aged 18-34’. Both, of the compositional predictors were modelled along with the four, previously outlined contextual predictors (in *Model 11*).

Table 7.4. MLR exploring the association of the ‘neighbourhood capacity’ dimension and the ‘exposure to NSRs’ with the outcome of ‘unemployment’ of ‘Lone-Parent HUTs’ – Model 12

| Variable | B | SE B | β | T |
|---|----------|-------------|----------|----------|
| Model 12 | | | | |
| R² = 0.434 | | | | |
| ‘Neighbourhood Capacity’ | | | | |
| (Constant) | .135 | .010 | | 13.135** |
| Average Distance Travelled to Work | .001 | .000 | .035 | 2.804** |
| Child Dependency Ratio (CDR) | .097 | .015 | .064 | 6.359** |
| House Price to Income Ratio (HPIR) | .007 | .000 | .191 | 18.400** |
| Inaccessibility of Services | -.001 | .000 | -.058 | -5.039** |
| ‘Exposure to NSRs’ | | | | |
| No/inadequate Qualifications | .476 | .010 | .472 | 45.682** |
| The Proportion of Lone-Parent Households Aged 18-34 | .306 | .014 | .265 | 21.519** |

**statistically significant ($p < 0.01$)

A statistically significant, regression equation ($F(6, 7194) = 919.979, p < 0.01$) was found for *Model 12*. Regarding the ‘neighbourhood capacity’ dimension: the ‘average distance travelled to work’, ($B = 0.001, p < .01$); the ‘CDR’, ($B = 0.097, p < .01$); the ‘HPIR’ ($B = 0.007, p < 0.01$); and ‘inaccessibility of local services’ ($B = -0.001, p < 0.01$) all contributed to the MLR model. However, as indicated by the comparison of standardised Beta-coefficients, the ‘importance’ of the contribution of each of the contextual predictors decreased between *Model 11* and *Model 12*. Also, in relation to the addition of the dimension of ‘exposure to NSRs’, the compositional predictors of: ‘no/inadequate qualifications’ ($B = 0.476, p < 0.01$); ‘the proportion of ‘Lone-Parent HUTs’ aged 18-34’ ($B = 0.306, p < 0.01$); both contributed significantly to the MLR model.

The $R^2 = 0.434$, indicating that all six, statistically significant contextual and compositional predictors accounted for 43.4% of the variation in the outcome of ‘unemployment’ of ‘Lone-Parent HUTs’. This demonstrates that, after the entry of the compositional predictors in the second stage of the hierarchical MLR model (*Model 12*), the two, statistically significant predictors explained an additional 32.3% of the variance in the outcome of ‘unemployment’ of ‘Lone-Parent HUTs’ after controlling for the contextual predictors. Of note, is that the direction of the relationship between the predictor of ‘distance travelled to work’ and the outcome of ‘unemployed - but seeking employment’ switched from a negative relationship in *Model 11* to a positive relationship in *Model 12*. It can be suggested that the addition of the proportion of ‘Lone-Parent HUTs’ who are aged 18-34 years old to the MLR model may have influenced this modification to the model. Potentially, it may be the case that when not accounting for younger ‘Lone-Parent HUTs’ in the model, the distance travelled to work will not be a potential issue of social vulnerability. Therefore, further justifying the relevance of the predictor of ‘distance travelled to work’, for the proposed ‘Lone-Parent HUTs’ (who are aged 18-34 years old).

Overall, this model (*12*) validates the assumption that all four of the statistically significant, contextual variables and the two, significant compositional variables contribute significantly to understanding the outcome of ‘the unemployment’ of ‘Lone-Parent HUTs’ at the neighbourhood level. Furthermore, *Model 12* verifies the importance of the contribution of both contextual and compositional attributes in understanding the NSR outcome of the inability of ‘Lone-Parent HUTs’ to ‘reconcile paid work with carping for dependent children’; a key aim of this research. This suggests that both the ‘neighbourhood capacity’ and ‘exposure to NSRs’ dimensions (as previously outlined in the social vulnerability framework in *Chapter 4*) should be included when constructing the composite measure from *Section 7.5*. onwards.

The regression equation which, was selected to model the proportion of ‘unemployment’ ‘Lone-Parent HUTs’ at a neighbourhood level, was based upon: the four, significant contextual predictors related with the ‘neighbourhood capacity’ dimension and the two, significant compositional predictors related with the ‘exposure to NSRs’ dimension is outlined in *Equation 7.1*.

$$Y = 0.135a + (0.001X_1) + (0.097X_2) + (0.007X_3) + (-0.001X_4) + (0.476X_5) + (0.306X_6) \quad (7.1)$$

Y = outcome variable: 'Unemployment'

a = Y -intercept

X_1 = Average Distance Travelled to Work (km)

X_2 = Child Dependency Ratio (CDR)

X_3 = House Price to Income Ratio (HPIR)

X_4 = Inaccessibility of Local Services (km)

X_5 = 'Lone-Parent HUTs' with no/inadequate qualifications (%)

X_6 = 'Lone-Parent HUTs' who are aged 18-34 years old (%)

7.3.2. Assumptions of Multiple Linear Regression (MLR)

Once again, as part of the process of examining the results of the MLR analyses, further assumptions relating to *Model 12* were assessed to ensure the MLR model can generalise beyond the results obtained from the sample population; of all 'Lone-Parent HUTs'. These diagnostic tests included exploring issues of: multicollinearity; linearity; normality; and homoscedasticity for the residuals obtained from the MLR, whereby the residuals are the differences between the obtained and predicted values of the outcome variable of the 'unemployment' of 'Lone-Parent HUTs'.

Checking the Assumptions of Multicollinearity

The correlation matrix in *Table 7.2.* also provided the opportunity to check for any issues of multicollinearity (pairwise) between the predictors. On the first run of the correlation matrix, prior to the output produced in *Table 7.2.*, 'access to GP surgeries' and 'access to the nearest primary school' were highly correlated with one another ($r < 0.8$). As both variables had a moderate, negative relationship with the outcome variable: ($r = -0.56$, $p < 0.01$; and $r = -0.48$, $p < 0.01$ respectively). Subsequently, the decision was taken to form a composite variable of 'the inaccessibility of local services' from the values of the two variables. The two predictors were aggregated into a single variable using the value of the arithmetic mean, as both predictors utilised the same measurement unit (minutes) and came from the same datasets.

Once the indicator of the ‘inaccessibility of services’ was constructed, the correlation analysis was re-run to produce the output in *Table 7.2*. As illustrated by *Table 7.2*., none of the predictors were highly correlated with one another ($r < 0.8$); as the highest correlation value was obtained between the predictors of ‘inaccessibility of local services’ and ‘average distance travelled to work’ of $r = 0.62$. However, there are limits to being able to detect issues of multicollinearity by solely examining the correlation coefficients between pairs of predictors. And so, additional checks of the variance inflation factors (VIF) and Tolerance statistics were examined to detect any further issues of multicollinearity between the predictor variables (VIF value is *greater than 10* and any tolerance value is *less than 0.1*).

Table 7.5. Collinearity statistics – VIF and tolerance values for MLR – *Model 12*

| Variable | VIF | Tolerance |
|---|------|-----------|
| ‘Neighbourhood Capacity’ | | |
| Distance Travelled to Work | 1.98 | 0.51 |
| Child Dependency Ratio (CDR) | 1.27 | 0.79 |
| House Price to Income Ratio (HPIR) | 1.36 | 0.73 |
| Inaccessibility of Services | 1.66 | 0.60 |
| ‘Exposure to NSRs’ | | |
| No/Inadequate Qualifications | 1.36 | 0.74 |
| Proportion of Lone Parents (Aged 18-34) | 1.93 | 0.52 |

As shown by the predictors in *Table 7.5*., all values for the VIF and tolerance statistics were within accepted limits (as previously outlined), indicating no issues relating to the multicollinearity between independent variables.

In addition to checking the assumptions of multicollinearity, further checks had to be adhered to. As outlined by Field (2009: p.220), the examination of the relevant histogram and residual plots allowed for the following checks to be conducted:

- Normality: the residuals should follow a normal distribution (*Figures 7.1-7.2*).
- Linearity: the residuals should have a linear relationship (*close to = +/-1*) with the predicted values of the outcome variable (*Figure 7.3*).
- Homoscedasticity: the variance of the residuals should be similar across all values (*Figure 7.3*).

To test the normality of residuals the histogram (*Figure 7.1*) and the normal probability-probability plot (P-P plot) (*Figure 7.2*) were visually inspected for the dependent variable: 'unemployment' of 'Lone Parent HUTs'. As, is illustrated by *Figure 6.1*, the histogram demonstrates an approximate normal distribution of the residuals for the dependent variable (bell-shaped curve). Furthermore, *Figure 6.2* outlines a P-P plot, in which, the fit of the observed residuals can be clearly identified as being close to the line, again supporting the condition of a normal distribution of the residuals for the dependent variable: 'unemployment' of 'Lone Parent HUTs'.

Figure 7.1. Histogram of the frequency of the residuals from the outcome variable for the ‘unemployment’ of ‘Lone-Parent HUTs’ – economically active (aged 18-34 years old)

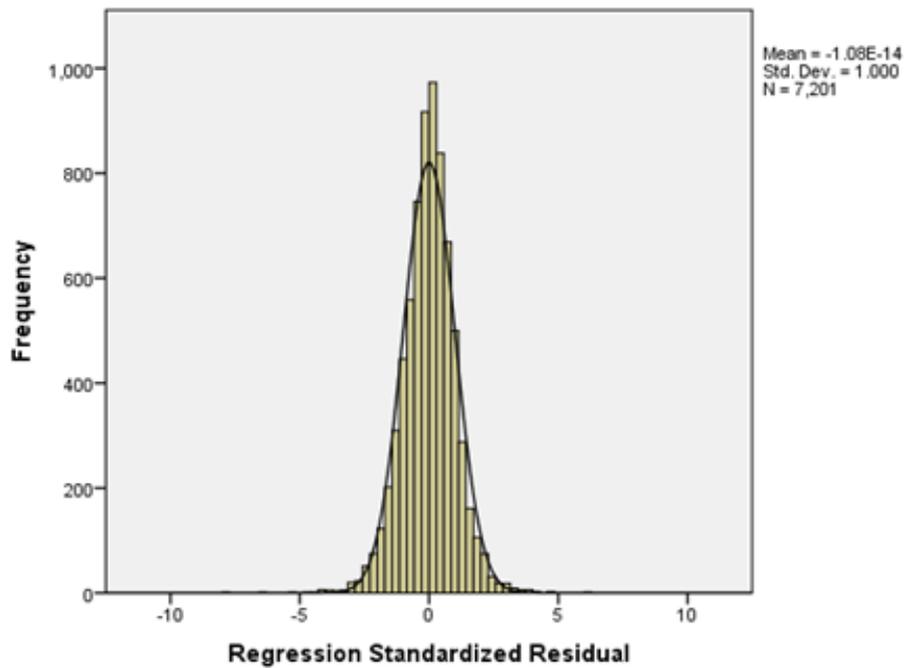
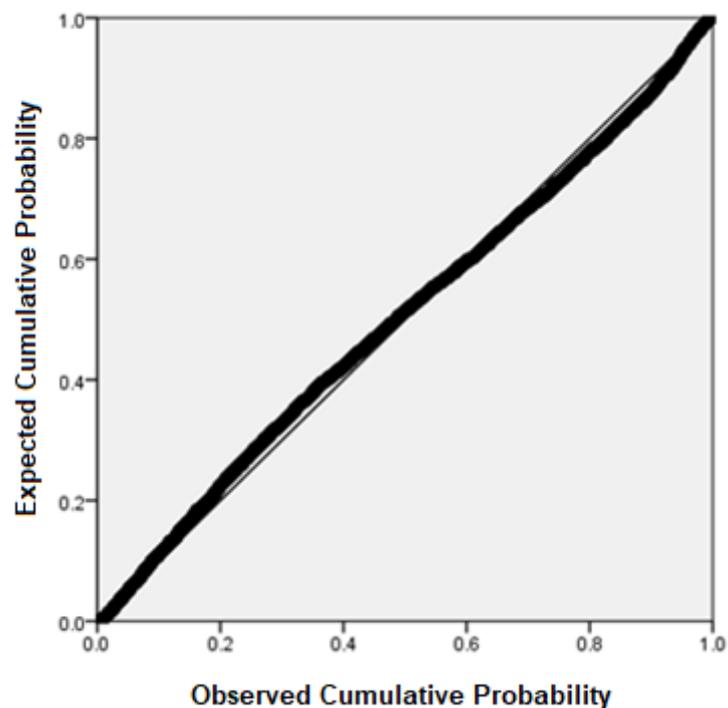


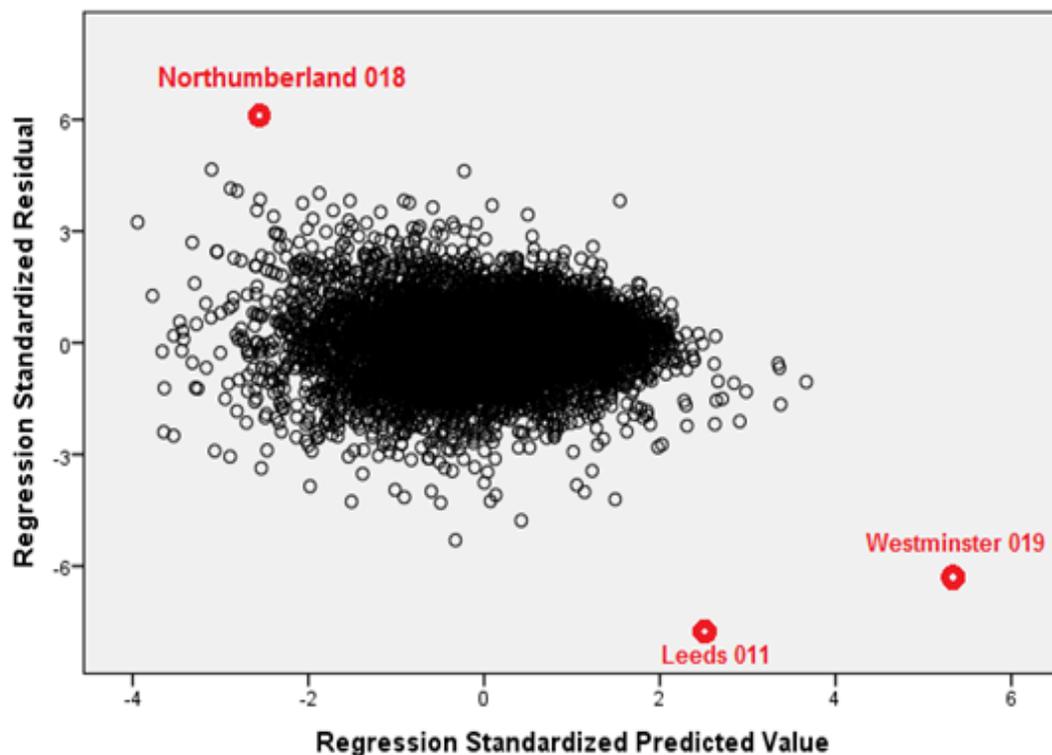
Figure 7.2. Normal P-P plot of regression standardised residuals for the dependent variable: ‘unemployment’ of ‘Lone-Parent HUTs’ – economically active (aged 18-34 years old)



An Assessment of the Residuals for Potential Outliers

The final assumption to be checked, is the detection of any residuals which, may be potential outliers, to ensure no potential outlier exerts undue influence on the MLR model. The standardised residuals were examined to check that 99.7% of the residuals (i.e. the difference between the predicted and observed values for the dependent variable) were within the accepted limits of ± 3 SD. I.e. that (up to) $\sim 1\%$ of MSOAs (7 out of 7,201 MSOAs) can extend beyond this limit and be classified as potential outliers, in keeping with the assumption of normality of the residuals. Accordingly, the case wise diagnostics were examined for dependent variable: unemployment of ‘Lone-Parent HUTs’, with 55 MSOAs being identified as residuals with a SD $< \pm 3$, which, was not within the theoretically accepted limits. Therefore, a statistical examination of whether any of the residuals exerted any undue influence on the MLR model, was undertaken.

Figure 7.3. Plot of *ZRESID against *ZPRED – ‘unemployment’ for ‘Lone-Parent HUTs’



As outlined by *Figure 7.3*, the data points are randomly and evenly dispersed throughout the plot of *ZRESID against *ZPRED, with this pattern being indicative of a situation, in

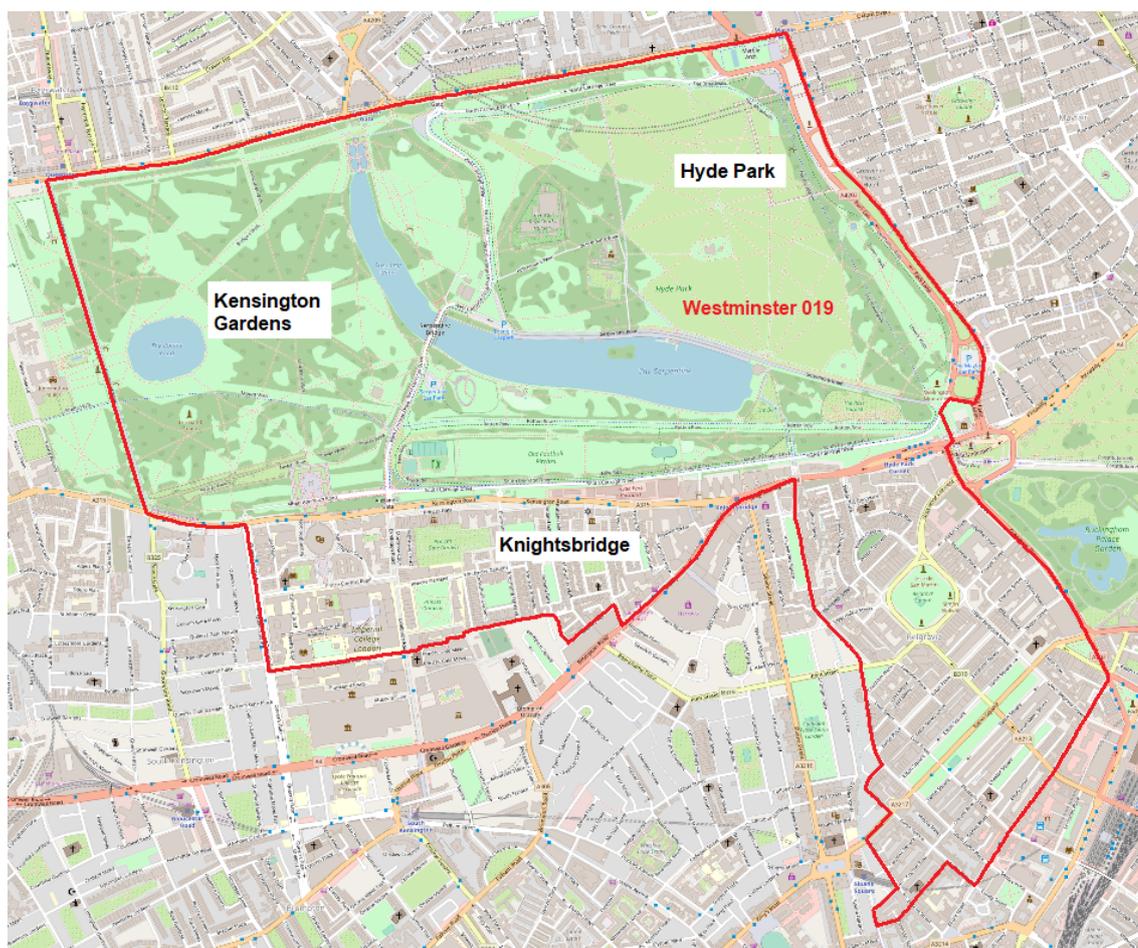
which, the assumption of linearity and homoscedasticity being met, for the most part. Furthermore, the plot allows for a clear visual indication of which, cases are potential outliers in the dataset. Of note, are the standardised residuals for the cases of: Leeds 011, Westminster 019 (*Table 7.6.*) and Northumberland 018 (*Table 7.7.*).

Table 7.6. Examination of the standardised residuals (lower than expected values) for Westminster 019 and Leeds 011

| MSOA Name | Standardised Residual | Observed Unemployment | Predicted Unemployment |
|------------------------|-----------------------|-----------------------|------------------------|
| Leeds 011 | -7.778 | 0.37 | 0.95 |
| Westminster 019 | -6.290 | 0.03 | 0.72 |

As shown by *Table 7.6.* Leeds 011 had the greatest deviation of the lowest observed value from the predicted value, for the outcome of ‘unemployment’ of ‘Lone-Parent HUTs’; with 37% of ‘Lone-Parent HUTs’ being observed as ‘unemployed’ in comparison to the predicted value of 95%. However, when visually inspecting the P-P plot in *Figure 7.3.* the MSOA of Westminster 019 is clearly identifiable as the outlier of greatest interest, as the residual for Westminster 019 furthest away from the general plot of residuals. When investigated further, as illustrated by *Table 7.6.* Westminster had the second greater deviation of the observed lowest value from the predicted value for the outcome of ‘unemployment’ of ‘Lone-Parent HUTs’; with only 3% of ‘Lone-Parent HUTs’ being observed as ‘unemployed’ in comparison to the predicted value of 72%. Therefore, further investigation for potentially unaccounted for confounding factors for the low unemployment rate in Westminster 019 beyond the observed compositional and contextual factors will be considered (*Figure 7.4.*).

**Figure 7.4. Potential outlier of Westminster 019 (lower than expected value) –
Model 12**



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Furthermore, as illustrated by *Figure 7.4.*, Westminster 019 MSOA contains the affluent areas of Belgravia and Mayfair, where house prices include some of the most expensive in the country, as illustrated by the median price paid for a 1-2 bedroom flat of approximately £1.5million - £2million (Zoopla, 2017). A price which, is theorised to be prohibitive for most ‘Lone-Parent HUTs’ who are aged 18-34 years old. Also, this neighbourhood area is an atypical location due to its proximity to several key tourist attractions, such as: Buckingham Palace, Hyde Park, The Harrods Department Store, and the Victoria and Albert Museum within walking distance. Therefore, making MSOA 019 a site of a transient population, who will have very specific and contrasting social needs, in relative comparison to other neighbourhood areas. Hence, Westminster 019 was to be an uncharacteristic location, due to the dominance of a very affluent and transient population in the area and so, it was deemed not to be a key influence on determining the overall categorisation of socially vulnerable ‘Lone-Parents’.

Conversely, not only were there MSOAs whose observed values of the outcome of the ‘unemployment’ of ‘Lone-Parent HUTs’ was higher than the expected (see: *Table 7.7.*), there were also MSOAs whose observed values of the outcome were higher than expected (for *Model 12*).

Table 7.7. Examination of the standardised residual (higher than expected value) for Northumberland 018

| MSOA Name | Standardised Residual | Observed Unemployment | Predicted Unemployment |
|---------------------------|-----------------------|-----------------------|------------------------|
| Northumberland 018 | 6.148 | 0.88 | 0.31 |

Table 7.7., shows that Northumberland 018, had the greatest deviation of the highest observed value from the predicted value, for the outcome of ‘unemployment’ of ‘Lone-Parent HUTs’, with 88% of ‘Lone Parent HUTs’ being observed as unemployed in comparison to the predicted value of 31%. From further inspection of the compositional and contextual predictors, although the observed unemployment rate is comparatively high, the observed proportion of ‘Lone-Parent HUTs’ – economically active (aged 18-34 years old) with ‘no/inadequate qualifications’ was comparatively low at 13%. Furthermore, the average distance to work travelled was also comparatively high at 22km, therefore suggesting that a lack of employment opportunities in the area may be present for this area. As, this is a distance which, would be prohibitive for ‘Lone-Parents to travel each day, especially if their youngest dependent child is of preschool age (4 years old and under). Although, the addition of a contextual measure of the ratio of job seekers to the number of jobs within a (set) distance to an MSOA would potentially be beneficial in future work, as this issue has only been identified as a potential issue for 1 MSOA, the decision not to explore this additional contextual indicator was made.

Due to the presence of potential outliers being detected from an initial inspection of the residual terms for the dependent variable of the ‘unemployment’ for ‘Lone-Parent HUTs’, further assessment to ensure that no residual was overly influential on the results of the MLR *Model 12* was undertaken. Hence, the values of Cook’s Distance statistic (D) were

examined, to check that no residual (for any of the 65 MSOAs) was overly influential to the results of MLR *Model 12*. The highest value detected ($D = 0.56$) was for MSOA Westminster 019, with all values for the outliers occurring within the accepted limits ($D < 1$). And so, the decision was made to not remove any outliers from the MLR model (12) and in the subsequent construction of the SVI in *Section 7.5*.

As shown by the preliminary statistical assessment of the dependent and independent variables, the underlying assumptions of undertaking further (parametric) statistical testing have been checked and adhered to.

7.4. Examining the Fit of the Multiple Linear Regression (MLR) Equation

As outlined by the conceptual framework in *Chapter 4.*, there are three key dimensions which, can contribute to assessing the social vulnerability of the inability of ‘Lone-Parent HUTs’ to ‘reconcile paid work with caring for dependent children. This chapter has already established the importance of the compositional and contextual attributes associated with the dimensions of ‘exposure to NSRs’ and ‘neighbourhood capacity’ in determining the NSR outcome of ‘Lone-Parent HUTs’ who are unable to ‘reconcile paid work with caring for dependent children’ at the neighbourhood level. However, the third dimension of the ‘susceptibility’ of ‘Lone-Parent HUTs’ to experiencing the NSR outcome of being unable to ‘reconcile paid work with caring for dependent children’ has yet to be explored.

Therefore, the aim of this section is to provide a comparative assessment of the fit of the MLR Model (12), in predicting the outcomes of potentially ‘susceptible’ sub-groups, to the NSR outcome of being unable to ‘reconcile paid work with caring for dependent children’ specifically, relating to the age of the dependent children and personal mobility of the ‘Lone-Parent HUTs’. This, in turn, will further inform the construction of the social vulnerability indices in later sections, as the following MLR models (*Tables 7.8. and 7.9.*) are not used as a standalone output but are instead used for predictive purposes in justifying the final selection of variables. It should be noted from the outset that when

undertaking the additional MLR analyses in this section, all previous assumptions as outlined in *Sections 7.2.3. & 7.3.2.* were once again checked and adhered to, with no results producing any cause for concern.

7.4.1. Age of Youngest Dependent Child

First, a comparison was made between ‘Lone-Parent HUTs’, whose youngest child is aged 0-4 years (*Model 13*) and ‘Lone-Parent HUTs’, whose youngest child is aged 5 years old and above (*Model 14*). As, ‘Lone-Parent HUTs’ with dependent children under pre-school age (0-4 years old) have previously been hypothesised to be ‘more susceptible’ to the NSR outcome of being unable to ‘reconcile paid work with caring for dependent children’.

Table 7.8. MLR exploring the association of the ‘neighbourhood capacity’ dimension with the NSR outcome of ‘unemployment’ of ‘Lone-Parent HUTs’: by the age of the youngest dependent child (0-4 years old) and (5 years old and over) – Models 13 & 14

| Variable | B | SE B | β | T |
|--|----------|-------------|----------|----------|
| YOUNGEST DEPENDENT CHILD – 0-4 YEARS OLD | | | | |
| Model 13: ‘Neighbourhood Capacity’ & ‘Exposure to NSRs’ | | | | |
| R² = 0.339 | | | | |
| (Constant) | .199 | .012 | | 15.974** |
| Average Distance Travelled to Work | .002 | .000 | .063 | 4.668** |
| Child Dependency Ratio (CDR) | .074 | .019 | .043 | 3.975** |
| House Price to Income Ratio (HPIR) | .008 | .000 | .181 | 16.173** |
| Inaccessibility of Local Services | -.002 | .000 | -.061 | -4.963** |
| No/Inadequate Qualifications | .444 | .011 | .443 | 41.280** |
| Proportion of Lone-Parents Aged 18-34 | .306 | .017 | .234 | 17.988** |
| YOUNGEST DEPENDENT CHILD – 5 YEARS OLD AND OVER | | | | |
| Model 14: ‘Neighbourhood Capacity’ & ‘Exposure to NSRs’ | | | | |
| R² = 0.235 | | | | |
| (Constant) | .111 | .015 | | 7.258** |
| Average Distance Travelled to Work | -.001 | .001 | -.036 | -2.453* |
| Child Dependency Ratio (CDR) | .143 | .023 | .072 | 6.218** |
| House Price to Income Ratio (HPIR) | .006 | .001 | .130 | 10.876** |
| Inaccessibility of Local Services | -.001 | .000 | -.025 | -1.863 |
| No/Inadequate Qualifications | .313 | .011 | .317 | 28.513** |
| Proportion of Lone-Parents Aged 18-34 | .332 | .020 | .221 | 16.259** |

**statistically significant ($p < 0.01$)

*statistically significant ($p < 0.05$)

[^]All previous assumptions as outlined in Section 6.3.2. were once again checked and adhered to, with no results producing any cause for concern.

A statistically significant regression equation ($F(6, 7194) = 617.147, p < 0.01$) was found for *Model 13*. However, as indicated by the comparison of standardised Beta-coefficients, the ‘importance’ of the contribution of all the compositional and contextual predictors slightly lower in comparison to *Model 12*. For *Model 13*, $R^2 = 0.339$, indicating that the six, statistically significant contextual and compositional predictors accounted for 33.9% of the variation in the outcome of the ‘unemployment’ of ‘Lone-Parent HUTs’, demonstrating, that the predictive power of *Model 13* is somewhat lower in comparison to *Model 12* ($R^2 = 0.434$). However, *Model 13* still provides an effective fit, in terms of moderately predicting the ‘unemployment’ of ‘Lone-Parent HUTs’, with the youngest child aged 0-4 years old; in comparison to the equivalent model (*12*) for all ‘Lone-Parent HUTs’ at the neighbourhood level.

A statistically significant regression equation ($F(6, 7194) = 368.129, p < 0.01$) was found for *Model 14*. The $R^2 = 0.235$ indicating that for the five, statistically significant contextual and compositional predictors accounted for 23.5% of the variation in the outcome of ‘unemployment’ of ‘Lone-Parent HUTs’. This demonstrates that although the predictive power of *Model 14* is comparatively lower in relation to *Model 12* ($R^2 = 0.434$), the fit of *Model 14* still provides a moderate fit for the outcome of ‘unemployment’ for ‘Lone-Parent HUTs’ whose youngest dependent child is aged 5 years old and above.

However, of note is the alteration in direction and non-significance of the contextual predictor of ‘inaccessibility of local services’ for ‘Lone-Parent HUTs’, from being positively associated to negatively associated with the outcome variable of ‘unemployment’. Suggesting that the inaccessibility of local services is no longer associated with unemployment ‘Lone-Parent HUTs’ whose youngest dependent child is aged 5 years old and above, at the neighbourhood level. Therefore, suggesting that ‘Lone-Parent HUTs’ whose youngest child is of school age and above, are not as constrained to living their daily lives in their local neighbourhood areas, as those ‘Lone-Parent HUTs’ whose children are of preschool age. This is unsurprising as when children are in school, this provides the opportunity for parents to be able to travel further distances, to access a

great range of paid employment opportunities; a finding that is relatively unsurprising (see: Stone, 2006).

As can be shown from both *Model 13* and *Model 14*, for the most part all the six predictors have a, statistically significant relationship in terms of their association with the outcome variable of ‘unemployment’ for ‘Lone-Parent HUTs’. Hence, the chosen predictors provide an adequate fit in terms of predicting the outcome of the inability of ‘Lone-Parent HUTs’ to ‘reconcile paid work with caring for dependents’, as well as independently for ‘Lone-Parent HUTs’ with the youngest dependent child aged 0-4 years old and aged 5 years old and over.

7.4.2. Personal Mobility

Second, a comparison in terms of ‘Lone-Parent HUTs’ who do not have personal access to a car/van (*Model 15*) and ‘Lone-Parent HUTs’ who do have personal access to a car/van (*Model 16*) was made.

Table 7.9. MLR exploring the association of the ‘neighbourhood capacity’ dimension with the NSR outcome of ‘unemployment’ of ‘Lone-Parent HUTs’: in terms of access to a car/van – Models 15 & 16

| Variable | B | SE B | β | T |
|--|----------|-------------|----------|----------|
| NO ACCESS TO A CAR/VAN | | | | |
| Model 15: ‘Neighbourhood Capacity’ & ‘Exposure to NSRs’ | | | | |
| R² = 0.148 | | | | |
| (Constant) | .382 | .016 | | 23.457** |
| Average Distance Travelled to Work | .003 | .001 | .072 | 4.743** |
| Child Dependency Ratio (CDR) | -.014 | .024 | -.007 | -.578 |
| House Price to Income Ratio (HPIR) | .002 | .001 | .039 | 3.127** |
| Inaccessibility of Local Services | -.001 | .000 | -.034 | -2.397* |
| No/Inadequate Qualifications | .337 | .011 | .351 | 31.395** |
| Proportion of Lone-Parents Aged 18-34 | .178 | .021 | .120 | 8.520** |
| ACCESS TO A CAR/VAN | | | | |
| Model 16: ‘Neighbourhood Capacity’ & ‘Exposure to NSRs’ | | | | |
| R² = 0.247 | | | | |
| (Constant) | .054 | .013 | | 4.290** |
| Average Distance Travelled to Work | .002 | .000 | .057 | 3.980** |
| Child Dependency Ratio (CDR) | .108 | .019 | .066 | 5.693** |
| House Price to Income Ratio (HPIR) | .011 | .000 | .278 | 23.229** |
| Inaccessibility of Local Services | .000 | .000 | -.008 | -.574 |
| No/Inadequate Qualifications | .387 | .011 | .367 | 33.965** |
| Proportion of Lone-Parents Aged 18-34 | .208 | .017 | .167 | 12.437** |

**statistically significant ($p < 0.01$), *statistically significant ($p < 0.05$)

^All previous assumptions as outlined in Section 6.3.2. were once again checked and adhered to, with no results producing any cause for concern.

A statistically significant regression equation ($F(6, 7194) = 208.940, p < 0.01$) was found for *Model 15*, with five out of the six predictors obtaining significant, positive B-values, indicating (the expected) positive relationships with the outcome variable. For *Model 5*, $R^2 = 0.148$ indicating that the five, statistically significant contextual and compositional predictors accounted for 14.8% of the variation in the outcome of the ‘unemployment’ of ‘Lone-Parent HUTs’. This demonstrates that the predictive power of *Model 15* is not equivalent to that of *model 12* ($R^2 = 0.434$), suggesting that ‘Lone-Parent HUTs’, who are restricted in terms of personal mobility cannot be modelled effectively by the chosen predictors (established in *Model 12*).

A statistically significant regression equation ($F(6, 7194) = 393.950, p < 0.01$) was found for *Model 16*, with five out of the six predictors obtaining significant, positive B-values, indicating (the expected) positive relationships with the outcome variable. However, the ‘inaccessibility of local services’ ($B = 0.000, p = 0.566$) did not contribute to the model. For *Model 16*, $R^2 = 0.247$ indicating that the five, statistically significant contextual and compositional predictors accounted for 24.7% of the variation in the outcome of ‘unemployment’ of ‘Lone-Parent HUTs’. This demonstrates that the predictive power of *Model 16* is less than that of *Model 11* ($R^2 = 0.434$), but that it is still moderately effective for predicting physical dependency of ‘Lone-Parent HUTs’, who do have personal access to a car/van at the neighbourhood level.

The purpose of this section has been to validate whether the predictors outlined in *Model 12*, could predict the outcome of ‘unemployment’ for the lone-parent ‘sub-groups’ which, are most likely to be susceptible to NSR outcome of being unable to ‘reconcile paid work with caring for dependent children’. Establishing that although the predictive power of the *Model 13* and *Model 14* are lower in comparison to that of *Model 12*, the models still provide an adequate fit in terms of the relationship of the predictors to the outcome of the outlined sub-groups of ‘Lone-Parent HUTs’ with dependent children ‘aged 0-4 years old’ and ‘5 years old and over’, respectively. Subsequently, although the predictive power of the *Model 15* and *Model 16* is less than that of *Model 12*, the models still provide an adequate fit in terms of the relationship of the predictors to the outcome of the outlined sub-groups of ‘Lone-Parent HUTs’ who ‘do not have personal access to a car/van’ and ‘Lone-Parent HUTs’ who ‘do have personal access to a car/van’, respectively. Also, no

unexpected relationships between the compositional and contextual predictors and the outcome variable were expected (*Section 4.5*). Therefore, further validating the inclusion of the predictors to be included in the final SVI.

7.5. Final Selection of Variables

The final selection of the four, contextual variables and the two, compositional variables, which, were both theoretically-informed and statistically-verified as robust predictors of the outcome of the ‘unemployment’ of ‘Lone-Parent HUTs’ at a neighbourhood level, are summarised *Table 7.12*.

Table 7.10. Final selection of variables for the SVI of ‘Lone-Parent HUTs’ who are unable to ‘reconcile paid work with caring for dependent children’

| Variable | Units | Direction of Relationship (with ‘unemployment’) |
|------------------------------------|--------------|--|
| ‘Neighbourhood Capacity’ | | |
| Average Distance Travelled to Work | <i>km</i> | As the average distance to work increases, the greater the risk of vulnerability (+) |
| Child Dependency Ratio | <i>ratio</i> | As the CDR increases, the greater the risk of vulnerability (+) |
| House Price to Income Ratio (HPIR) | <i>ratio</i> | As the HPIR increases, the greater the risk of vulnerability (+) |
| Inaccessibility of Local Services | <i>mins</i> | As the inaccessibility of local services increases in a neighbourhood, the lesser the risk of vulnerability (-) |
| ‘Exposure to NSRs’ | | |
| No/Inadequate Qualifications | <i>%</i> | As the proportion of ‘Lone-Parent HUTs’ who have no/inadequate qualifications increases in a neighbourhood, the greater the risk of vulnerability (+) |
| Lone Parents Aged 18-34 years old | <i>%</i> | As the proportion of ‘Lone-Parent HUTs’ who are aged 18-34 years old increases in a neighbourhood, the greater the risk of vulnerability (+) |

Table 7.10. demonstrates that five out of six predictors have a positive relationship with the outcome variable of ‘unemployment’, indicating that as the value of each of the predictors increases, the proportion of ‘Lone-Parent HUTs’ within neighbourhoods who may potentially be vulnerable to becoming ‘unemployed’ also increases. Additionally, one of the predictors has a negative relationship with the outcome variable of ‘unemployment’, indicating that as the value of the predictor increases, the proportion of ‘Lone-Parent HUTs’ within neighbourhoods who may potentially be vulnerable to

becoming ‘unemployed’ decreases. Therefore, suggesting that the variable of ‘inaccessibility of local services’ requires transforming prior to aggregation, as the direction of the associations between each of the predictor variables and the outcome variable should be the same, ensuring the equal contribution of each variable in the final SVI. And so, the transformation of the ‘inaccessibility of services’ variable will be undertaken as part of the standardisation procedure.

7.5.1. Standardisation of Variables

Once again, the same standardisation procedure as previously outlined in *Section 6.5.1.* will be utilised in order to ensure all values of the chosen predictor variables were scaled within the range of 0-1. The result of which, is to allow for a fair comparison between the required values of each case, which, corresponds to every variable, when calculating the final composite scores. And so, the decision (informed by *Section 5.5*) was once again made (as in: *Section 6.5.1.*), to standardise all six, chosen variables using the ‘min-max’ standardisation procedure. And so, the chosen method of the ‘min-max’ standardisation procedure, which, performs a linear transformation on the original data, was undertaken using *Equation 6.2.* As part of the standardisation procedure, minimum and maximum values (see *Table 7.1.*) were set in order to transform the existing, observed values into new values within the range of 0-1; whereby, the minimum and maximum values for each variable, refer to the largest and smallest observed values, respectively.

The next step in the constructing the SVI, was the aggregation of the selected compositional and contextual variables, within and between their corresponding dimensions (as illustrated by *Figure 5.1.*)

7.6. Aggregation

Following a similar procedure to *Section 6.6.*, the geometric mean was used to comprise the summary scores for both the dimensions of ‘neighbourhood capacity’ and ‘exposure’ to NSR, from the chosen contextual and compositional variables respectively (see: *Table 7.10.*). The equation used to calculate the geometric mean for each of the dimensions from the assigned indicators is outlined in *Equation 6.3.*

Subsequently, once the summary scores for the ‘neighbourhood capacity’ and ‘exposure to NSRs’ had been established, the final step of constructing the SVI, requires aggregating the scores together. The decision was taken to weight the two dimensions of the ‘neighbourhood capacity’ and, ‘exposure’ to NSRs by the approximate regression weightings, which, were identified from the MLR *Models 11* and *12*. Thus, the ‘neighbourhood capacity’ dimension was weighted by a factor of 0.25 and the ‘exposure to NSRs’ was weighted by a factor of 0.75 – the two dimensions were then combined by using a simple additive process.

7.7. Discussion

The ultimate focus of this chapter was to construct the theoretically and statistically informed SVI for the ‘unemployment’ of ‘Lone-Parent HUTs’ – economically active (aged 18-34 years old) in order to partially meet the objectives, set out to successfully accomplish *Aim 3* (see: *Section 1.4.*). Correspondingly, the ability of the SVI to identify the most vulnerable ‘Lone-Parent HUTs’ to facing issues of social deprivation resulting from their potential ‘inability to reconcile paid work with caring for dependents’, will be further explored and discussed in *Chapter 8*.

Consequently, the importance of the contextual attributes associated with the ‘neighbourhood capacity’ dimension, has been established as important in modifying the specific NSR outcome of the inability of ‘Lone-Parent HUTs’ to ‘reconcile paid work with caring for dependent children’. Thus, further meeting the objectives set out to achieve to *Aim 1* (in addition to: *Sections 6.3.* and *6.4.*). The MLR analyses in *Sections 7.3. and 7.4.*, have identified four, contextual variables, which, are statistically significant, predictors of the outcome of the ‘unemployment’, for ‘Lone-Parent HUTs’: ‘average distance travelled to work’, ‘Child Dependency Ratio (CDR)’, ‘House Price to Income Ratio (HPIR)’, and the ‘inaccessibility of local services’. Suggesting that, as the capacity of a neighbourhood becomes increasingly constrained in terms of being able to meet the needs of ‘Lone-Parent HUTs’, the proportion of ‘Lone-Parent HUTs’ residing in the neighbourhood who are ‘unable to reconcile paid work with caring for dependent children’ increases.

Furthermore, the importance of compositional attributes which, can influence the exposure of ‘Lone-Parent HUTs’, were also determined in relation to the specific NSR outcome of the inability of ‘Lone-Parent HUTs’ to ‘reconcile paid work with caring for dependent children’. Thus, further meeting the objectives set out to achieve to *Aim 2* (in addition to: *Sections 6.3. and 6.4.*). The MLR analyses in *Sections 7.3. and 7.4.*, have identified two, compositional variables, which, are statistically significant, positive predictors for the outcome of the ‘unemployment’, for ‘Lone-Parent HUTs’: those who have ‘no/inadequate qualifications’, and the proportion of ‘Lone-Parent HUTs’ who are aged 18-34, at the neighbourhood level. Suggesting that, as an increasing proportion of ‘Lone-Parent HUTs’ who are at greater disposition of being ‘exposed to NSRs’ increases due to compositional characteristics, the proportion of lone-parents residing in the neighbourhood who are ‘unemployment’ also increases.

The implications of both contextual and compositional attributes being associated with determining the social vulnerability of ‘Lone-Parent HUTs’ to the NSR outcome to becoming ‘physically dependent’, will be further discussed in *Chapter 8*; in terms of how compositional and contextual characteristics may influence the deprivation outcomes resulting from specific NSRs at a neighbourhood level.

The construction of the SVI *Section 7.4.* provides an exploratory approach to determine the fit of the chosen regression equation (7.1) for different sub-groups attributed to ‘Lone-Parent HUTs’. which are theorised to be susceptible to the outcome of ‘unemployment’. Accordingly, the MLR model (12), is modified for each sub-group to validate whether the six chosen predictors still provide an adequate fit of the MLR model when predicting the outcome of ‘unemployment’ for ‘Lone-Parent HUTs’ which, ‘do not have access to car/van’ or ‘the youngest child is of preschool age’. Overall, this section provided further understanding as to how potentially confounding factors based upon the susceptibility of specific sub-groups, may influence the overall predictive power of the chosen MLR model (2).

Chapter 8 – Overview of the Social Vulnerability Indices for ‘Lone-Pensioner HUTs’ and ‘Lone-Parent HUTs’

8.1. Introduction

This chapter aims to provide an overview of the two, SVIs for the ‘Lone-Pensioner HUTs’ and ‘Lone-Parent HUTs’ which, were constructed in *Chapters 6* and *7* respectively.

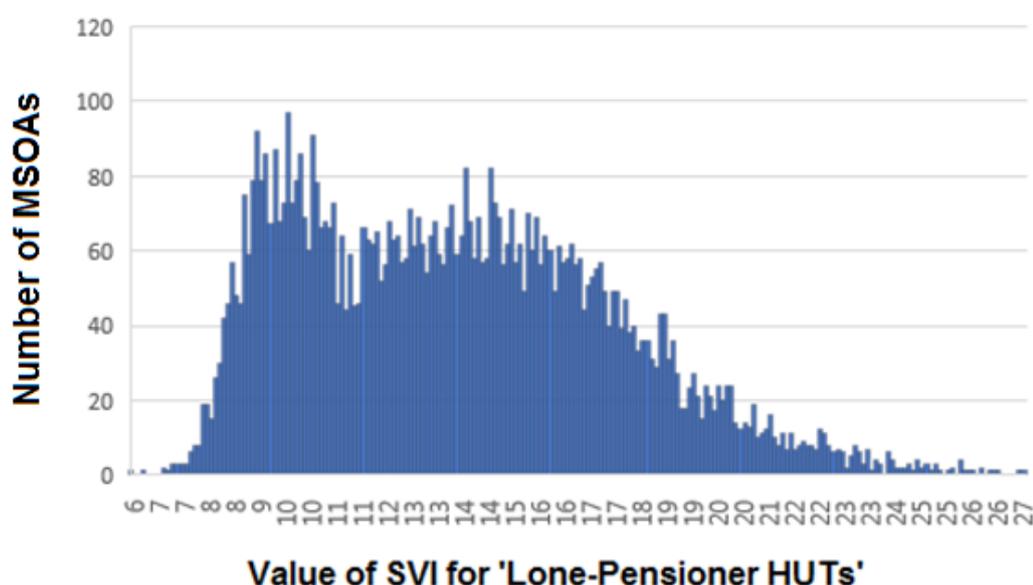
In the context of any research study that aims to develop a new: analytical test, procedure, method and/or, measure, should do so by comparing it with a time-honoured alternative which, is the current standard in the field. Whereby, the researcher understands a gold standard measure to be either an authoritative or recognised exemplar of quality or correctness. The purpose of proposing this comparative method is to allow for the degree of agreement between two (or more) quantitative measurements or in this instance geodemographic classifications, to be ascertained. Hence, a primary objective of comparing the SVIs from *Chapters 6* and *7*, against well recognised measures of small-area level deprivation, is to validate that the general trend of the newly constructed SVI fits with what would be expected. However, upon accomplishing the first objective, a second objective can be made, of determining which, areas (MSOAs) would be determined to be most vulnerable to experiencing issues of deprivation by the SVI but would not be categorised as being the most vulnerable by the gold standard measure. Therefore, this procedure may be an *ad hoc* validation process, in which, to establish the additional empirical contributions which, can be ascertained by the newly constructed measure, in comparison to existing measures.

Prior to exploring the key findings of the SVI in further detail, it should be noted that not every HUT in the most vulnerable MSOAs will necessarily be experience a negative NSR outcome. Equally, there will be also be HUTs which, experience the consequences and contingencies of NSR outcomes, who live within the least vulnerable MSOAs. And so, the overall aim of the SVI, is to provide an indication as to the neighbourhoods which, are the most (and least) vulnerable to the social deprivation outcomes resulting from HUTs facing exposure to the consequences and contingencies of NSR outcomes.

8.2. An Overview of the SVI of the Physical Dependency of ‘Lone-Pensioner HUTs’

This section provides an overview of the SVI for the ‘physical dependency’ of ‘Lone Pensioner HUTs’, based upon the most appropriate thresholds in which, to understand the obtained summary values. And so, the values of the SVI for ‘Lone-Pensioner HUTs’ were examined as a histogram (*Figure 8.1*).

Figure 8.1. Histogram of the distribution of values for the SVI for ‘Lone-Pensioner HUTs’



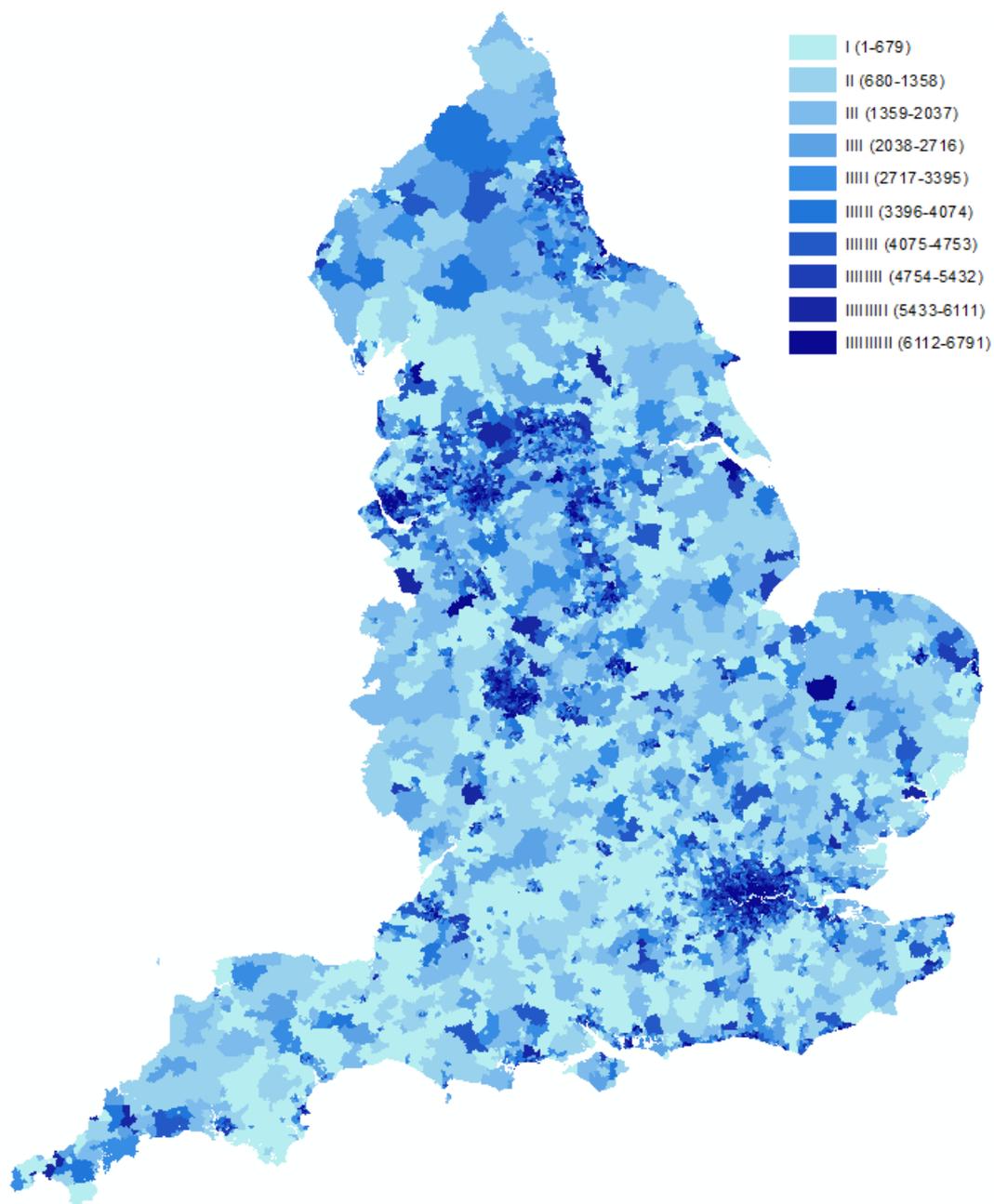
As illustrated by *Figure 8.1*, the values for the SVI for ‘Lone-Pensioner HUTs’ form a bimodal distribution that is negatively skewed. On further inspection of the dataset by the researcher, the bimodal distribution can be interpreted as resulting from a rural/urban divide between the outcomes of SVI for the two (distinct) population groups. With the mode of the first ‘peak’ reaching a value of ~10 on the SVI for ‘Lone-Pensioner HUTs’ predominately residing in urban areas, in comparison to the mode of the second ‘peak’ reaching a value of ~14 on the SVI for ‘Lone-Parent’ HUTs who predominately reside in rural areas. In addition, further confirmation of this trend was established by comparing the results of the SVI for ‘Lone-Pensioner HUTs’ with the 2011 rural-urban classification which, allows for a consistent rural/urban view of datasets at small-area level geographies. It can be established that there is approximately a 75% overlap of areas

classified as ‘urban’ in the first distribution, and ‘rural’ in the second distribution, respectively.

Due to the lack of normality in the distribution of the data for the SVI for ‘Lone-Pensioner HUTs’, a form of standardisation procedure was required to transform the SVI values into a meaningful output which, could be easily interpreted by the end user. Subsequently, a series of deciles from the dataset was constructed, each of which, contained an equal number of MSOAs in order to, evaluate the values attributed to the ‘Lone-Pensioner HUTs’ in a standardised format. The results for all 6,791 MSOAs in England for the SVI for ‘Lone-Pensioner HUTs’ are equally displayed in deciles in *Figure 8.2*.

When *Figure 8.2*. is inspected, a clear pattern of the most vulnerable ‘Lone-Pensioner HUTs’ can be visualised as being clustered at the core urban centres of England, of Leeds, Manchester, Birmingham and London, amongst other city areas. Furthermore, as would be expected, some of the most vulnerable MSOAs for the ‘physical dependency’ of ‘Lone-Pensioner HUTs, are in the South West and North East coasts. However, a visual inspection of MSOAs at the national level, can only tell the reader so much, so a more detailed interpretation of the SVI will be undertaken in *Section 8.3*.

Figure 8.2. The SVI of ‘Lone-Pensioner HUTs’ for MSOAs in England (equal decile ranks)



8.3. A Comparison of the Social Vulnerability Index (SVI) for ‘Lone-Pensioner HUTs’ Against an Existing Gold Standard Deprivation Measure

8.3.1. Overview of the ‘Income Deprivation Affecting Older People Index’ (IDAOPI)

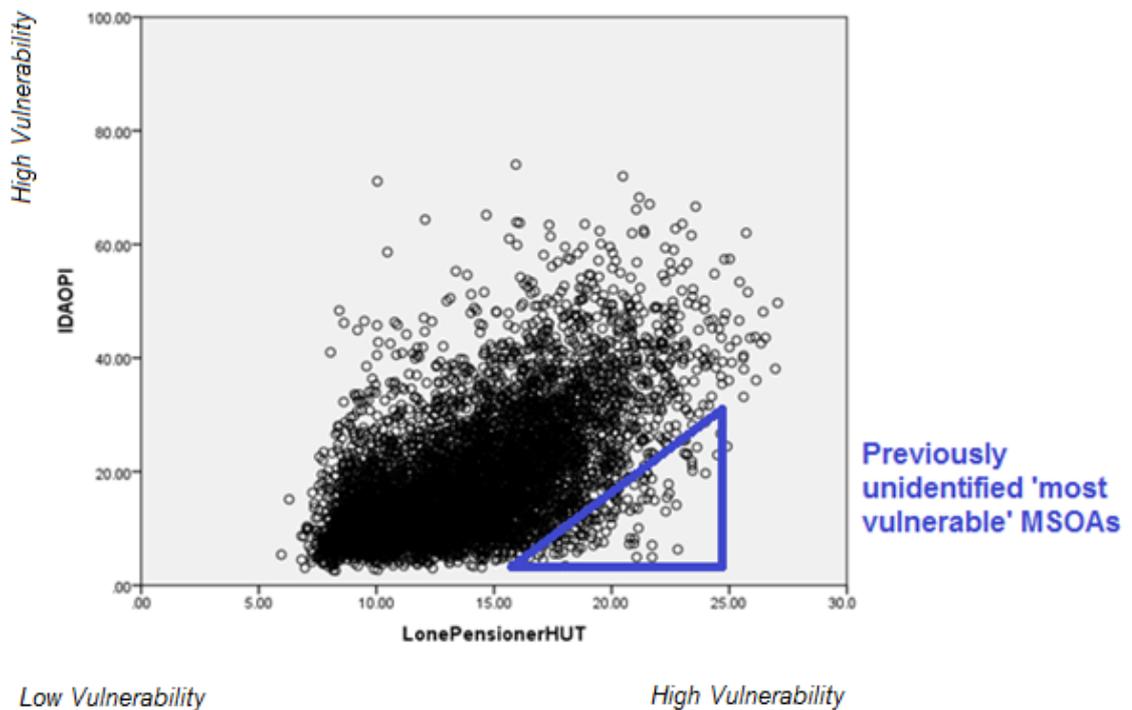
This section compares a supplementary index from the English IMD (2015), of the ‘Income Deprivation Affecting Older People Index’ (IDAOPI), which, is comprised of a subset of the ‘income deprivation’ domain which, is one of seven domains of the English IMD. As the IDAOPI is comprised of four, variables relating to welfare-benefits, it provides the ideal gold standard measure, in which, to compare the SVI for ‘Lone-Pensioner HUTs’ becoming ‘physically dependent’, as no issues of multicollinearity will be present between the two composite measures (as no welfare benefits data were utilised in the construction of the SVI). The IDAOPI (2015) is comprised of the proportion of usually-resident older people who experience income deprivation, based on the percentage of the population aged 60 years old and over, who receive either/or a combination of (ONS, 2017):

- income support
- income-based job seekers allowance
- pension credit or child tax credit claimants (if applicable)

However, the IDAOPI is only provided for lower layer super output areas (LSOAs), but not directly for MSOAs. An official method to readily convert LSOA into MSOAs is to use a ‘lookup’ table of LSOA to MSOAs, which, provided by the ONS via their ‘open geoportal’. Furthermore, the decision was made to obtain data for the 2015 IDAOPI as is published using 2011 Census boundaries, in comparison to the 2010 IDAOPI which, is only published for 2001 Census boundaries. Therefore, to mitigate against having to undertake the complex process of fitting the 2010 IDAOPI data, the practical decision to use the 2015 IDAOPI was made.

Subsequently, in order to statistically verify the strength and direction of the linear relationship between the empirical SVI for ‘Lone-Pensioner HUTs’ becoming ‘physically dependent’ against the existing IDAOPI, a correlation analysis was undertaken. As shown by *Figure 8.3*, there is a moderate, positive correlation ($r = 0.60$) which, statistically verifies the occurrence of a linear relationship between the two composite deprivation measures relating to older people in England. Therefore, it can be suggested that the proposed SVI for ‘Lone-Pensioner HUTs’ provides a statically valid measure for the assessment of underlying deprivation outcomes, which, are present in the ‘Lone-Pensioner HUT’ population.

Figure 8.3. Scatterplot of the SVI for ‘Lone-Pensioner HUTs’ (2011) against the IDAOPI (2015)



Furthermore, what also can be established by *Figure 8.3*, is the instance in which, a MSOA identified by the SVI for Lone-Pensioner HUTs with a high score, (i.e. ‘most vulnerable’) but has a low score for the IDAOPI (i.e. ‘not vulnerable’). As highlighted (in blue) on the scatterplot, there are a high frequency of values which, meet this general criterion, suggesting the presence of MSOAs which, contain dependent children in household who are facing issues of social deprivation, which, are currently unaccounted for by income-deprivation measures. Therefore, signifying the presence of unaccounted

for compositional and/or contextual effects, for what could be termed ‘extremely vulnerable’ MSOAs (due them previously being unaccounted for).

Correspondingly, as the presence of ‘extremely’ vulnerable MSOAs were visually identified by inspecting the plot in *Figure 8.3*. Further investigation into the exact frequency of the MSOAs which, would be determined to be most vulnerable by the SVI for ‘Lone-Pensioner HUTs’ but would be deemed not too vulnerable by the IDAOPI. And so, the decision was made to compare the deciles (equal number of values), for each of the composite measures against one another. The result of which, was to determine the MSOAs which, would be identified by the SVI for Lone-Pensioner HUTs with a score in the 9th and 10th deciles, (i.e. ‘most vulnerable’) but has a score in the 5th decile or below for the IDAOPI (i.e. ‘not vulnerable’). When the MSOAs were sorted by the above search criteria, 186 MSOAs out of 6,792 MSOAs were identified in relation to the above criteria, as being “extremely vulnerable”, which, is approximately 3% of all areas.

In addition, when the extremely vulnerable MSOAs were examined regionally, the South East area was identified as having the most ‘extremely vulnerable MSOAs’ outside the atypical context of London, with 23 MSOAs being identified as extremely vulnerable in the region. Furthermore, the South East Region also had the Local Authority with the highest number of MSOAs which, were extremely vulnerable, outside of London. Therefore, the decision was taken to examine this context in further detail. Once, an initial overview of the fifteen MSOAs as outlined in *Table 8.1*. was undertaken, the decision was undertaken to explore five of the most spatially clustered MSOAs which, were deemed to ‘extremely vulnerable’ in relation to the inability of ‘Lone-Pensioner HUTs’ to being unable to reconcile paid work with caring for dependent children to be explored in further details as outlined in *Figures 8.12-8.16*.

Table 8.1. The ‘extremely’ vulnerable MSOAs in the South East of England which, are identified by the SVI for Lone-Pensioner HUTs with a score in the 9th and 10th deciles, (i.e. ‘most vulnerable’) but has a score in the 5th decile or below for the IDAOPI (i.e. ‘not vulnerable’).

| Local Authority | Ward | MSOA Name |
|------------------------|-----------------------------|---------------------|
| Arun | Middleton-on-Sea | Arun 013 |
| Arun | Felpham West | Arun 015 |
| Aylesbury Vale | Bedgrove | Aylesbury Vale 017 |
| Dartford | Brent | Dartford 008 |
| Dover | Lydden and Temple Ewell | Dover 010 |
| Eastbourne | Old Town | Eastbourne 009 |
| Elmbridge | Oxshott and Stoke D'Abernon | Elmbridge 018 |
| Epsom and Ewell | Nonsuch | Epsom and Ewell 010 |
| Gravesham | Higham | Gravesham 010 |
| Hart | Hook | Hart 006 |
| Hastings | St Helens | Hastings 002 |
| Havant | Waterloo | Havant 004 |
| Lewes | Seaford South | Lewes 013 |
| Maidstone | South | Maidstone 012 |
| Medway | Watling | Medway 019 |
| Oxford | Marston | Oxford 004 |
| Portsmouth | Copnor | Portsmouth 008 |
| Portsmouth | Copnor | Portsmouth 011 |
| Portsmouth | Baffins | Portsmouth 014 |
| Portsmouth | Milton | Portsmouth 017 |
| Portsmouth | St Thomas | Portsmouth 024 |
| Woking | Goldsworth Park | Woking 005 |
| Woking | St John's | Woking 009 |

As demonstrated with *Figure 8.5.*, the MSOA of Portsmouth 024 is located on the tip of the coastline, for the area and is therefore the site of several ferry ports. The result of Portsmouth 024, being in situated in such a unique location extends beyond being a key transport hub, as it is also the location for Her Majesty's Naval Base (HMNB) Portsmouth, which, is one of three operating bases in the UK for the British Royal Navy. Portsmouth Naval Base is part of the city of Portsmouth and it is located on the eastern shore of Portsmouth Harbour, north of the Solent and the Isle of Wight. Until the early 1970s it was officially known as Portsmouth Royal Dockyard, and it historically played a critical role in both World War II and the Gulf War. Hence, due to the HMNB covering such a vast site Portsmouth naval base is home to two-thirds of the Royal Navy's surface ships and employs approximately 15,000 people in both civilian and military roles.

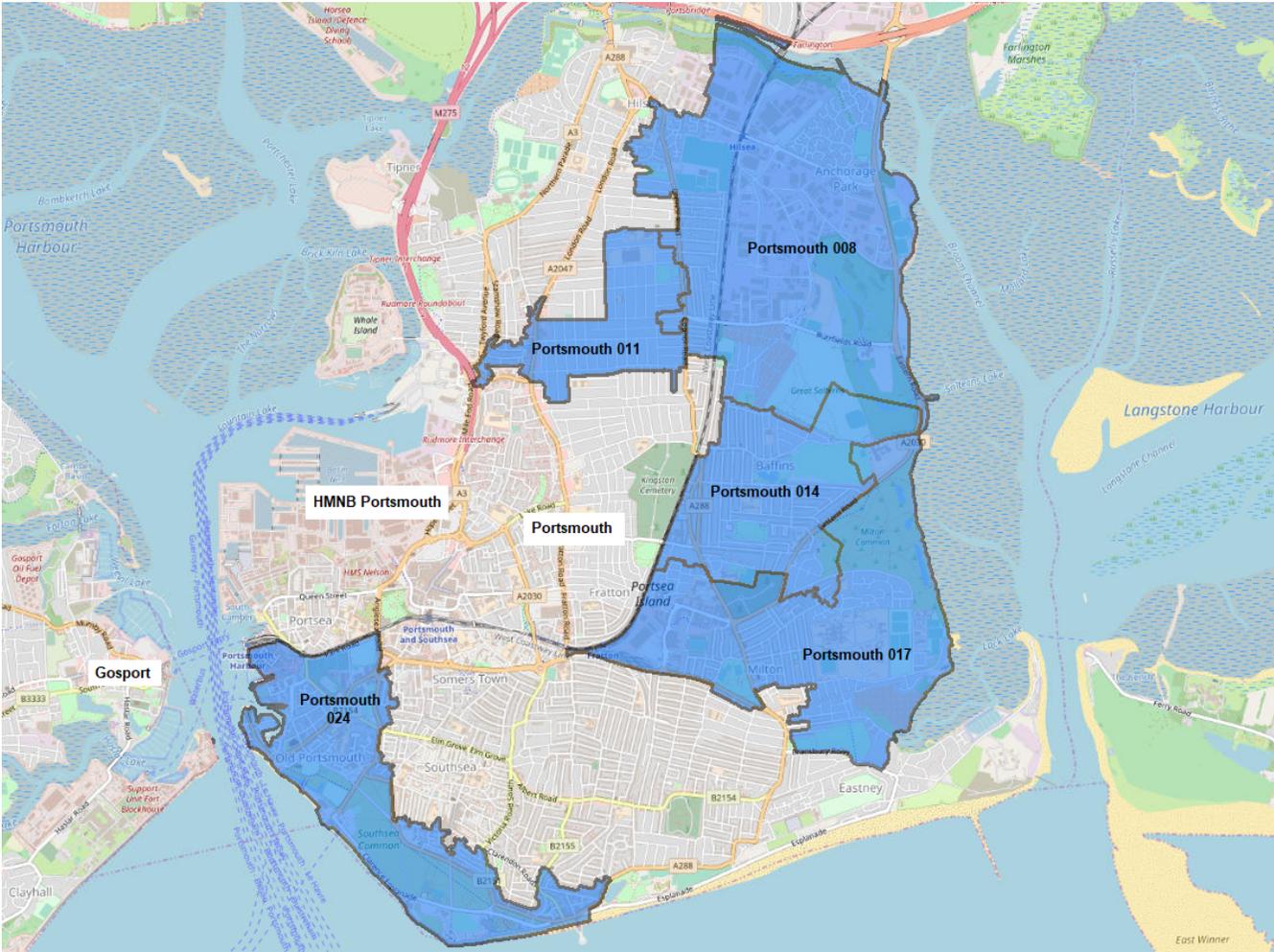
And so, for this particular MSOA and surrounding MSOAs (potentially extending to Portsmouth 017 – as shown by *Figure 8.4.*), the sociohistorical nature of this site, has resulted in a high proportion of older men, who once served in the Navy, still remaining within the area. Thus, although these may not be identified as being income deprived for older people, a consideration of the legacy effects of serving in the Navy should be considered. For example, Langston *et al.*, (2010) suggest that there is a culture of stigma associated with mental health problems, which, have led to issues of PTSD within the veteran population. Furthermore, as part of the mental and physical health problems associated with being a navy veteran, there is an issue of alcohol abuse within the veteran navy population, with recent studies have suggested that older, single males and those who have undergone particularly stressful experiences are at greatest risk of misusing alcohol. (Jones & Fear, 2011).

In addition, consideration was given to the presence of contextual attributes for each of the remaining MSOAs (identified by *Table 8.3.*), which, may have had confounding effect on the SVI for 'Lone-Pensioner HUTs'. Of interest, was the dominance of communal establishments, which, are for 'independent living' in Portsmouth 014 (*Figure 8.7.*), and Portsmouth 011 and Portsmouth 008 (*Figure 8.8.*). The largest identifiable communal establishment which, could be made by the researcher, was the presence of the multi-location "Milton Village", which, is in Portsmouth 014 - with approximately 100 x1 person flats being identified across, three sites in Portsmouth 014. The nature of such

communal establishments which, are catered to the 'independent living' of older people, in comparison to supported/care establishments, is that these forms of atypical residences, are counted as 'households' for purposes of categorisation by the 2011 Census. Specifically, these forms of residence are conceptualised as 'extracare housing' within the literature (see: Buckner *et al.*, 2013). The provision of extracare housing, comes in many built forms, including blocks of flats, bungalow estates and retirement villages, making their conceptualisation somewhat problematic to further define.

The consequence of which, is that they are included as part of the data obtained in relation to 'Lone-Pensioner HUTs'. Consequently, although it could be suggested that individuals situated in such establishments 'extremely vulnerable' to physical dependency as their will be appropriate care and support given to meet the needs of residents. Conversely, the argument could be met that these are the 'Lone-Pensioner HUTs' which, are of most interest, as these individuals essentially live behind closed doors and do not experience the same levels of comprehensive care and support that would be provided in other, communal establishments which, are for the over 65s. And so, as no conclusive decision can be made as to whether or not these areas contain 'extremely vulnerable' Lone-Pensioner HUTs, it can be suggested that future research is required into determining the vulnerability status of 'Lone-Pensioner HUTs' within these atypical forms of communal establishments (e.g. determining issues of social isolation). Especially as, there will be considerable variation in the accommodation and services provided, as a paper for the Department of Health's Housing, Learning and Improvement Network (HLIN) stated that the need to assess the provision of support services between the different services at the point of delivery, for independent living establishments (Wright *et al.*, 2010).

Figure 8.4. The presence of ‘extremely’ vulnerable ‘Lone-Pensioner HUTs’ in the city of Portsmouth



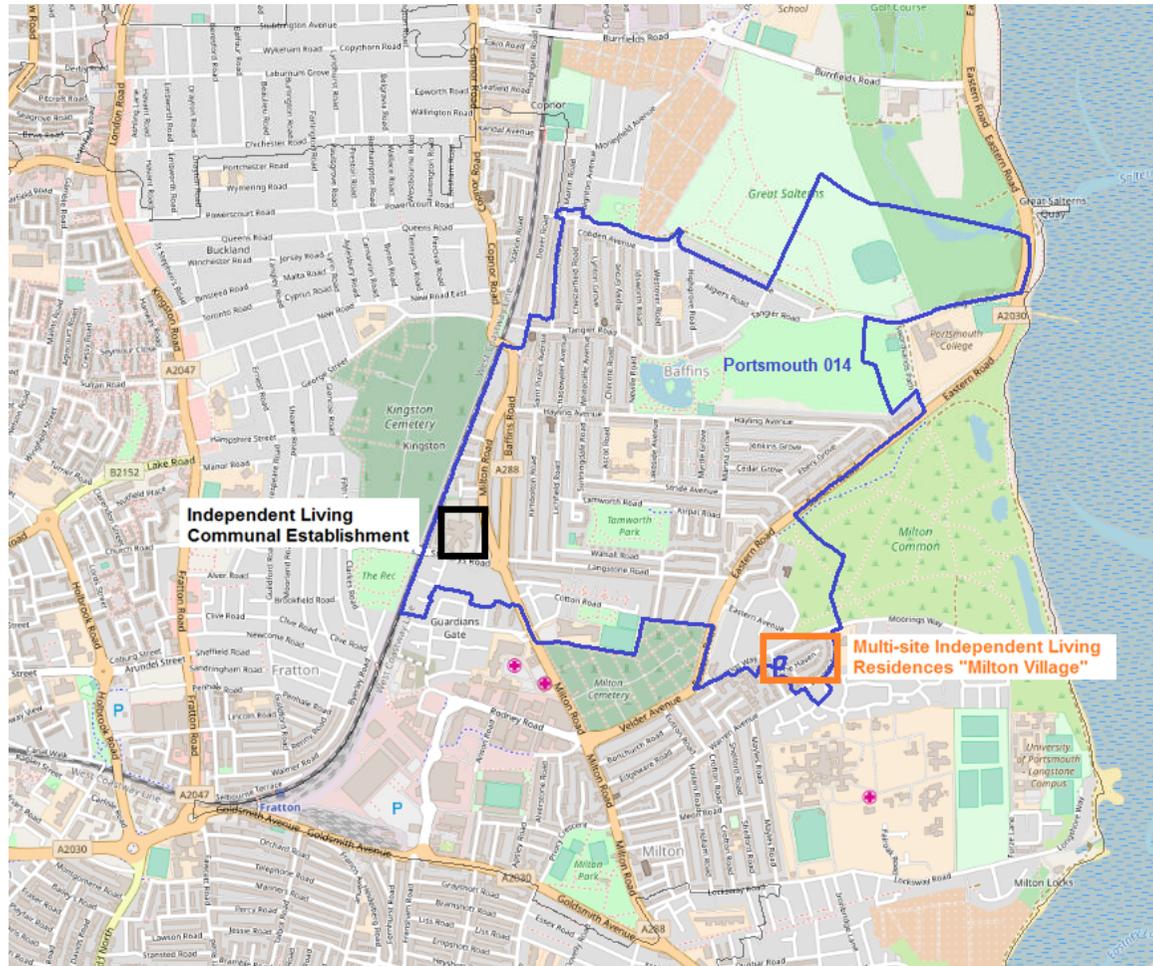
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Figure 8.5. The 'extremely vulnerable' MSAO of Portsmouth 024



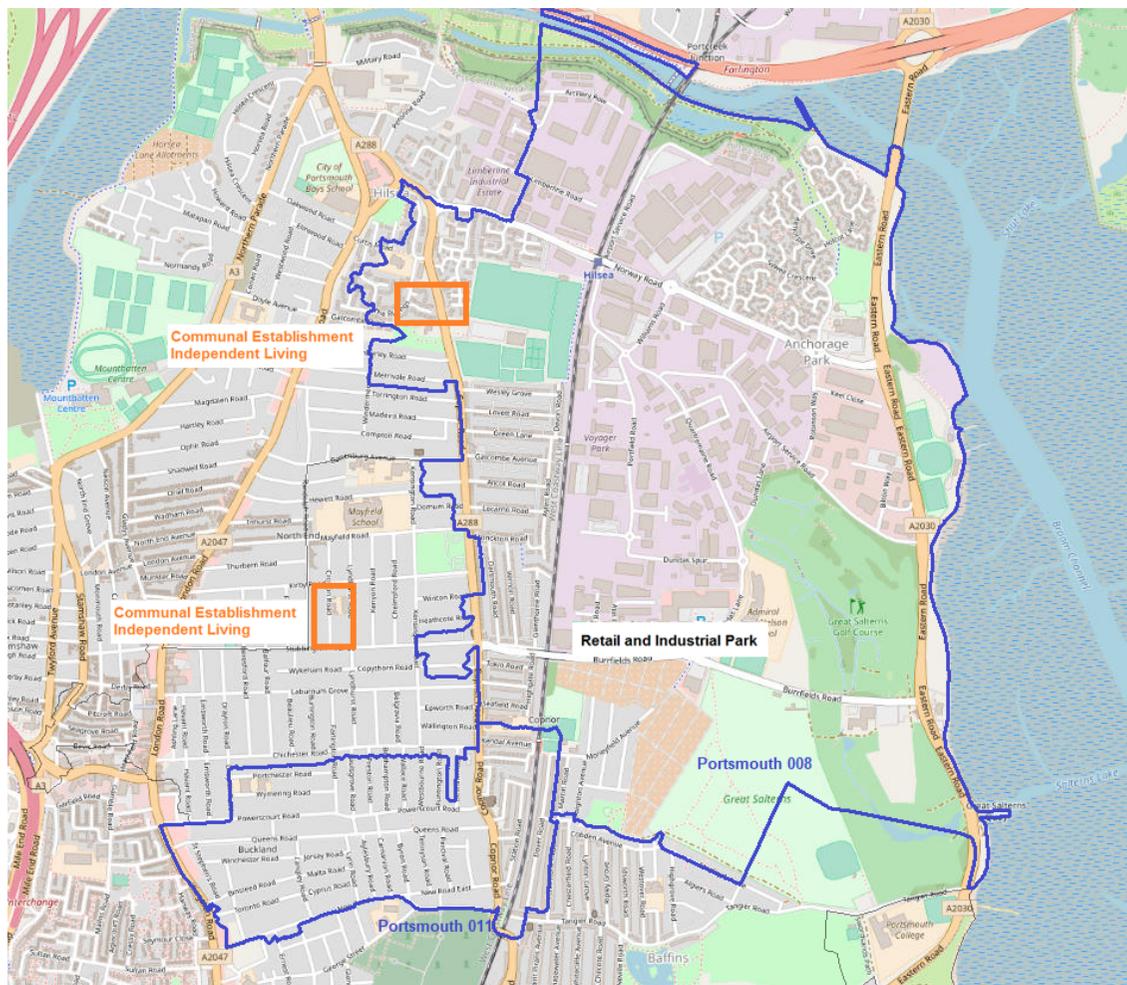
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Figure 8.7. The 'extremely vulnerable' MSAO of Portsmouth 024



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Figure 8.8. The 'extremely vulnerable' MSOAs of Portsmouth 008 and 011

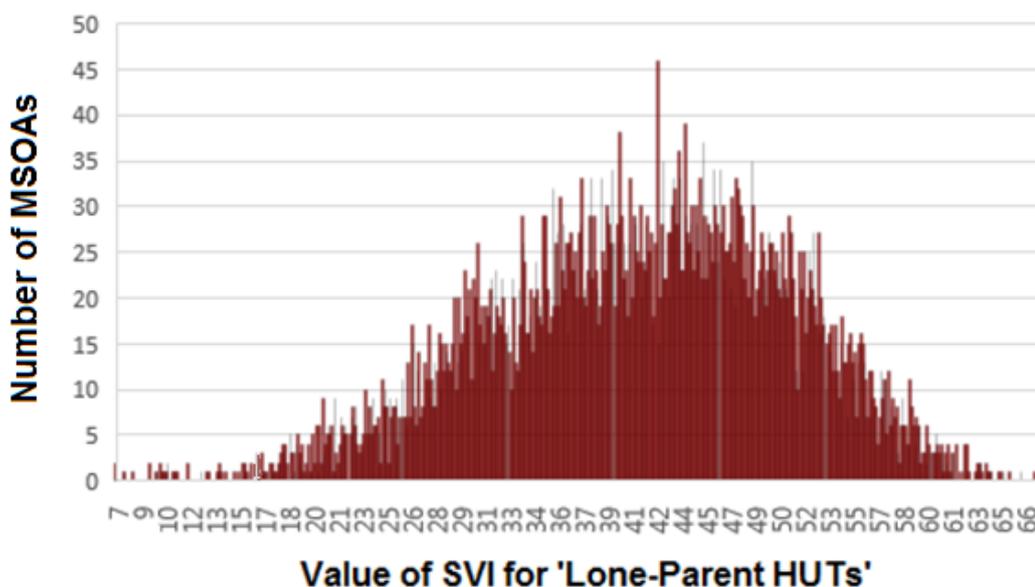


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8.4. An Overview of the SVI of the Inability of Lone-Parent Households to Reconcile Paid Work with Care Responsibilities.

This section provides an overview of the SVI for the inability of ‘Lone Parent HUTs’ to reconcile paid work with caring for dependent children’, based upon obtaining the most appropriate thresholds in which, to understand the summary values. And so, the values of the SVI for ‘Lone-Pensioner HUTs’ were examined as a histogram (*Figure 8.9.*).

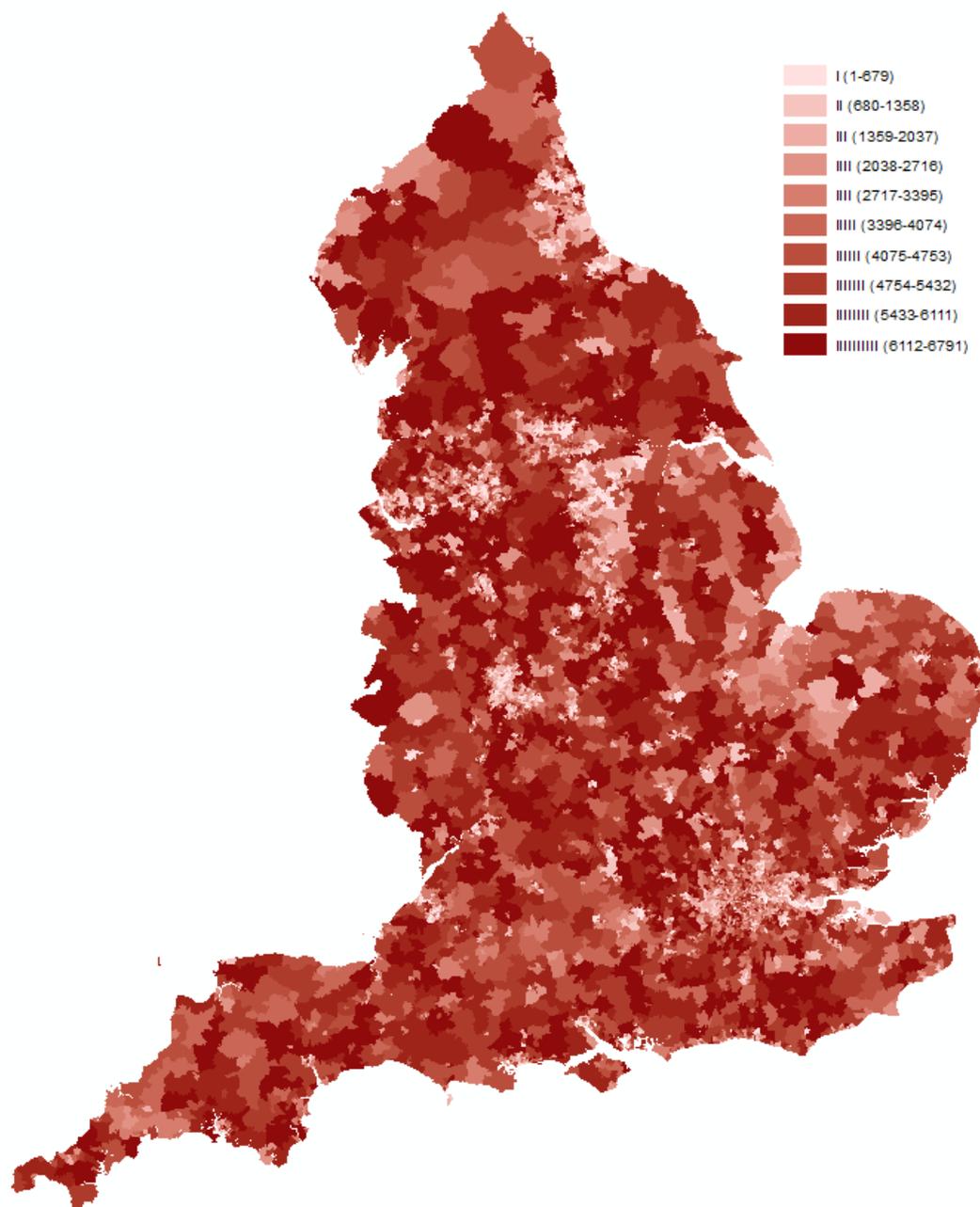
Figure 8.9. Histogram of the distribution of values for the SVI for ‘Lone-Parent HUTs’



As can be illustrated by *Figure 8.9.* the values for the SVI for ‘Lone-Parent HUTs’ are almost normally distributed for the dataset. However, to follow the consistency of procedures outlined for the ‘Lone-Pensioner HUT’ SVI (in *Section 8.3.*), the decision was made to also transform the SVI values into a meaningful output, which, could be easily interpreted by the end user. Accordingly, a series of deciles from the dataset was constructed, each of which, contained an equal number of MSOAs in order to, evaluate the values attributed to the ‘Lone-Parent HUTs’ in a standardised format. The results for all 6,791 MSOAs in England for the SVI for ‘Lone-Pensioner HUTs’ are equally displayed in deciles in *Figure 8.2.*

When *Figure 8.9.* is visually inspected, a clear pattern of the most vulnerable ‘Lone-Parent HUTs’ can be determined as being dispersed around the peripheries of towns and cities especially in the South West region around areas of Bristol and Cornwall. Furthermore, in contrast to the SVI for ‘Lone-Pensioner HUTs’, the least vulnerable ‘Lone-Parent HUTs’ are in the major urban areas of Manchester, Leeds and London. However, as previously stated a visual inspection of MSOAs at the national level, can only tell the reader so much, so a more detailed interpretation of the SVI will be undertaken in *Section 8.5.*

Figure 8.10. The SVI of ‘Lone-Parent HUTs’ for MSOAs in England (equal decile ranks)



8.5. A Comparison of the Social Vulnerability Index (SVI) for ‘Lone-Parent HUTs’ Against an Existing Gold Standard Deprivation Measure

8.5.1. Overview of the ‘Income Deprivation Affecting Children Index’ (IDACI)

This section compares a supplementary index from the English IMD 2015, of the ‘Income Deprivation Affecting Children Index’ (IDACI), which, is also comprised of a subset of the ‘income deprivation’ domain which, which, is one of seven domains of the English IMD 2015. Once again, as the IDACI is comprised of four, variables relating to welfare-benefits, it provides the ideal gold standard measure, in which, to compare the SVI for ‘Lone-Parent HUTs’ becoming ‘physically dependent’, as no issues of multicollinearity will be present between the two composite measures (as no welfare benefits data was used to construct the SVI) The IDACI is comprised of the proportion of usually-resident lone parents (with dependent children) who experience income deprivation, based on the percentage of the population of children aged 0-15 years old, who receive either/or a combination of (ONS, 2016):

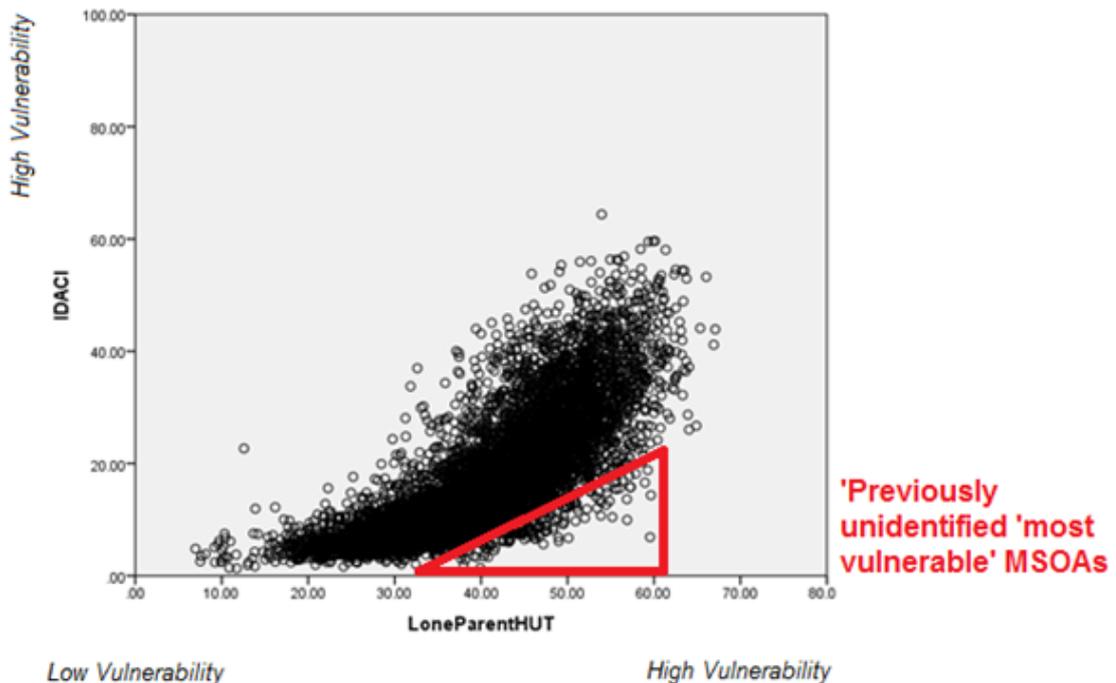
- income support
- income-based job seekers allowance
- in receipt of pension credit or child tax credit claimants: with an equivalised income (excluding housing benefits) below 60% of the national median before housing costs

Subsequently, as the IDACI is only provided for LSOAs and not directly for MSOAs, the required data was obtained by using the procedure of utilising an official ‘look up’ table of values. Once, the data for the IDACI had been obtained, a correlation analysis was used to verify the strength and direction of the linear relationship between the values obtained from the SVI for the inability of ‘Lone-Parent HUTs’ to ‘reconcile paid work with caring for physically dependent children’, against the IDACI. As shown by *Figure 8.10.*, there was a moderate, positive correlation ($r = 0.77$) which, was statistically significant between the two composite measures of deprivation corresponding to dependent children for England at the neighbourhood level. Therefore, it can be suggested that the proposed SVI for Lone-Parent HUTs provides a valid measure for the assessment of underlying deprivation outcomes, which, are present in the ‘Lone-Parent

HUT’ population – especially in relation to the deprivation outcomes experienced by younger children.

Furthermore, what also can be established by *Figure 8.10.*, is the instance in which, a MSOA identified by the SVI for Lone-Parent HUTs with a high score (i.e. ‘most vulnerable’) but has a low score in the bottom quintile for the IDACI (i.e. ‘not vulnerable’). As highlighted (in red) on the scatterplot, there are a high frequency of values which, meet this general criterion, suggesting the presence of MSOAs which, contain dependent children in household who are facing issues of social deprivation, which, are currently unaccounted for by income-deprivation measures. Therefore, suggesting the presence of unaccounted for compositional and/or contextual effects, for what could be termed ‘extremely vulnerable’ MSOAs (due them previously being unaccounted for).

Figure 8.11. Scatterplot of the SVI for ‘Lone-Parent HUTs’ (2011) against the IDACI (2015)



Again, the presence of ‘extremely’ vulnerable MSOAs were visually identified by inspecting the plot in *Figure 8.10*. Therefore, further investigation was required into the

exact frequency of the MSOAs which, would be determined to be most vulnerable by the SVI for 'Lone-Parent HUTs' but would be deemed not to be vulnerable by the IDACI. And so, the decision was made to compare the deciles (equal number of values), for each of the composite measures against one another. The result of which, was to determine the MSOAs which, would be identified by the SVI for Lone-Parent HUTs with a score in the 9th and 10th deciles, (i.e. 'most vulnerable') but has a score in the 5th decile of below for the IDACI (i.e. 'not vulnerable'). When the MSOAs were sorted by the above search criteria, 44 MSOAs out of 6,792 MSOAs were identified in relation to the above criteria, as being "extremely vulnerable", which, is approximately 1% of all areas. In addition, when the extremely vulnerable MSOAs were examined regionally, the South East area was identified as having the most 'extremely vulnerable MSOAs' with 15 out of 44 MSOAs being located within the region. Hence, the decision was taken to examine this context in further detail (*Table 8.2*).

Table 8.2. The ‘extremely’ vulnerable MSOAs in the South East of England which, are identified by the SVI for Lone-Parent HUTs with a score in the 9th and 10th deciles, (i.e. ‘most vulnerable’) but has a score in the 5th decile or below for the IDACI (i.e. ‘not vulnerable’).

| Local Authority | Ward | MSOA Name |
|------------------------|-----------------------------|----------------------------|
| Bracknell Forest | Harmans Water | Bracknell Forest 006 |
| Crawley | Northgate | Crawley 004 |
| Medway | Rochester South and Horsted | Medway 033 |
| New Forest | Totton Central | New Forest 004 |
| Oxford | Quarry and Risinghurst | Oxford 007 |
| Reading | Katesgrove | Reading 014 |
| Rushmoor | Wellington | Rushmoor 008 |
| South Bucks | Burnham Church & Beeches | South Bucks 007 |
| South Oxfordshire | Berinsfield | South Oxfordshire 006 |
| Tonbridge and Malling | Hadlow and East Peckham | Tonbridge and Malling 008 |
| West Berkshire | Northcroft | West Berkshire 012 |
| | Mortimer | West Berkshire 022 |
| Windsor and Maidenhead | Belmont | Windsor and Maidenhead 005 |
| Wokingham | Bulmershe and Whitegates | Wokingham 005 |
| Wycombe | Sands | Wycombe 012 |

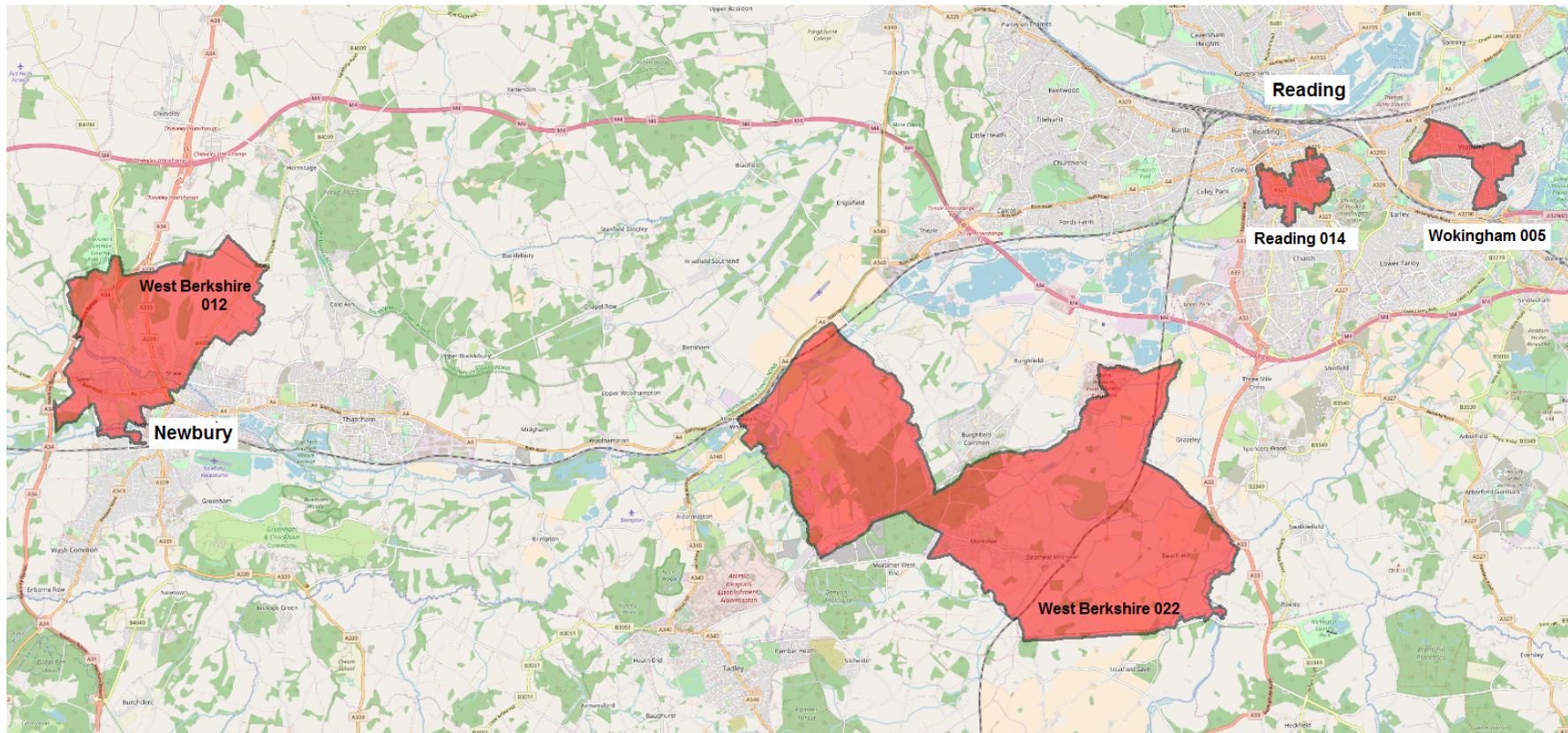
Following on from undertaking an initial overview of the fifteen MSOAs (as outlined in *Table 8.2.*), the decision was undertaken to explore five of the most spatially clustered

MSOAs which, were deemed to ‘extremely vulnerable’ in relation to the inability of ‘Lone-Pensioner HUTs’ to being ‘unable to reconcile paid work with caring for dependent children’, in further detail. From an initial inspection of *Figure 8.12.*, it is apparent that Reading 014 (*Figure 8.13.*) and Wokingham 008 (*Figure 8.14.*) are located close to the University of Reading - Main University Campus. Correspondingly, a similar argument can be made as in *Section 6.4.*, as to the impact of these high-densely populated student areas (including University Halls of Residence), pertaining to the atypical nature of these areas for the purpose of classification (see Vickers & Rees, 2011).

However, it may be suggested that the dominance the student population in these areas, may potentially have implications for the availability of adequate housing in the area to meet the needs of Lone-Parents HUTs, who are vulnerable to being unable to ‘reconcile paid work with caring for dependent children’ (due to the relatively small size of Reading, in comparison to other university towns and cities e.g. Sheffield). As, lone parents who are not able to obtain secure forms of employment with, adequate incomes will be limited in terms of housing options (Andrew & Meen, 2003) along with the additional constraint of having to compete with the student market for rental properties (Ruggles, 2012).

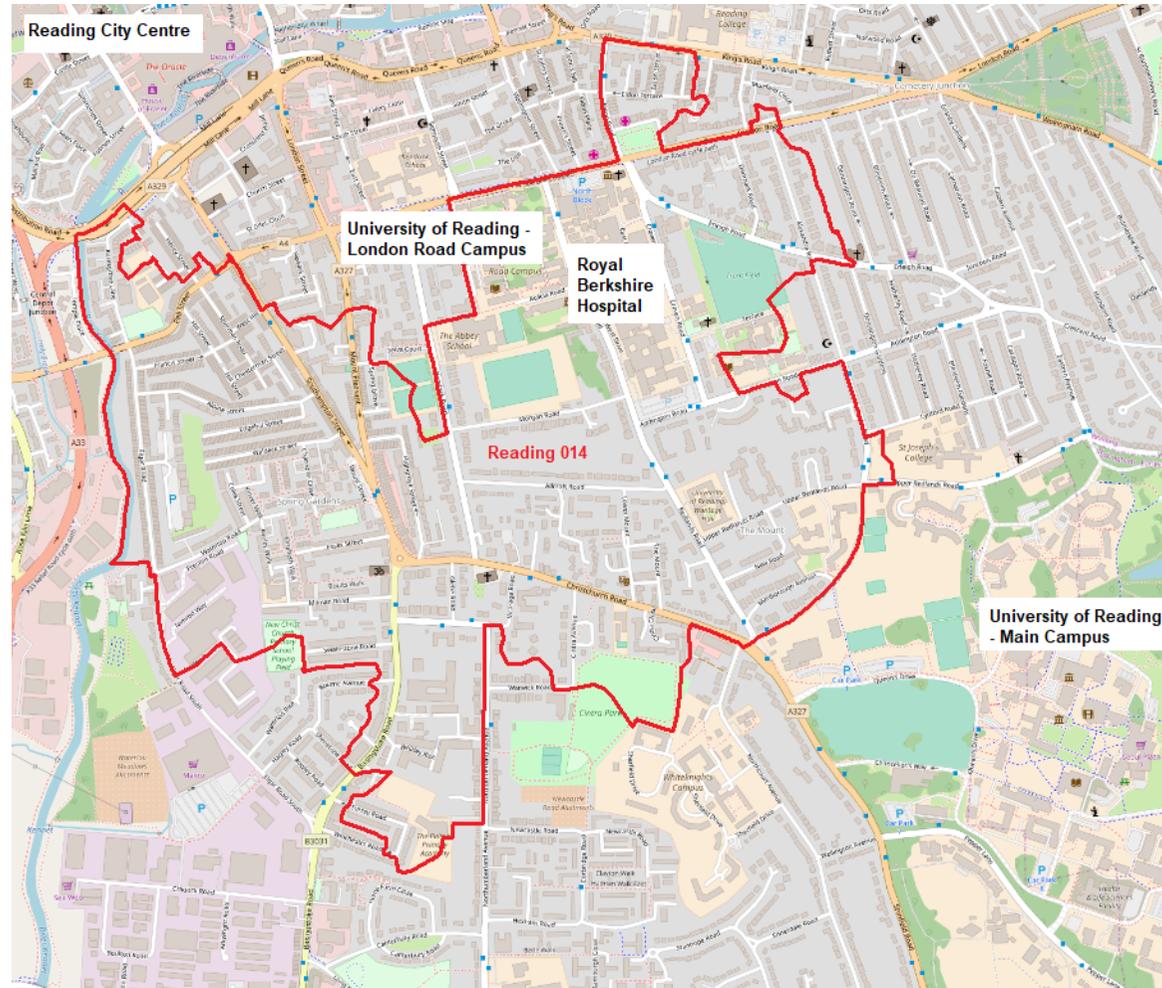
Furthermore, when West Berkshire 012 (*Figure 8.15*) and West Berkshire 022 (*Figure 8.16.*) were visually inspected, there was no clear indication as to the presence of any contextual attributes which, may be confounding affects to these areas being “extremely vulnerable” to the outcome of being unable to reconcile paid work with caring for dependent children. The only contextual point of note is the location of both of these MSOAs to business parks, including MSOA 012 (*Figure 8.15.*) containing the headquarters for Vodaphone UK. Additionally, these MSOAs are also part of the “commuter” belt from central London. Consequently, there is suggestion that people residing in these relatively affluent areas are have high concentration of individuals undertaking professional and managerial (graduate-level jobs), rather than other forms of employment. Thus, the potential dominance of a specific employment type in an area, may constrain the ability to secure other forms of employment, which, may be more suitable for lone parents who wish to reconcile paid work with caring for dependent children.

Figure 8.12. The presence of ‘extremely vulnerable’ MSOAs in West Berkshire



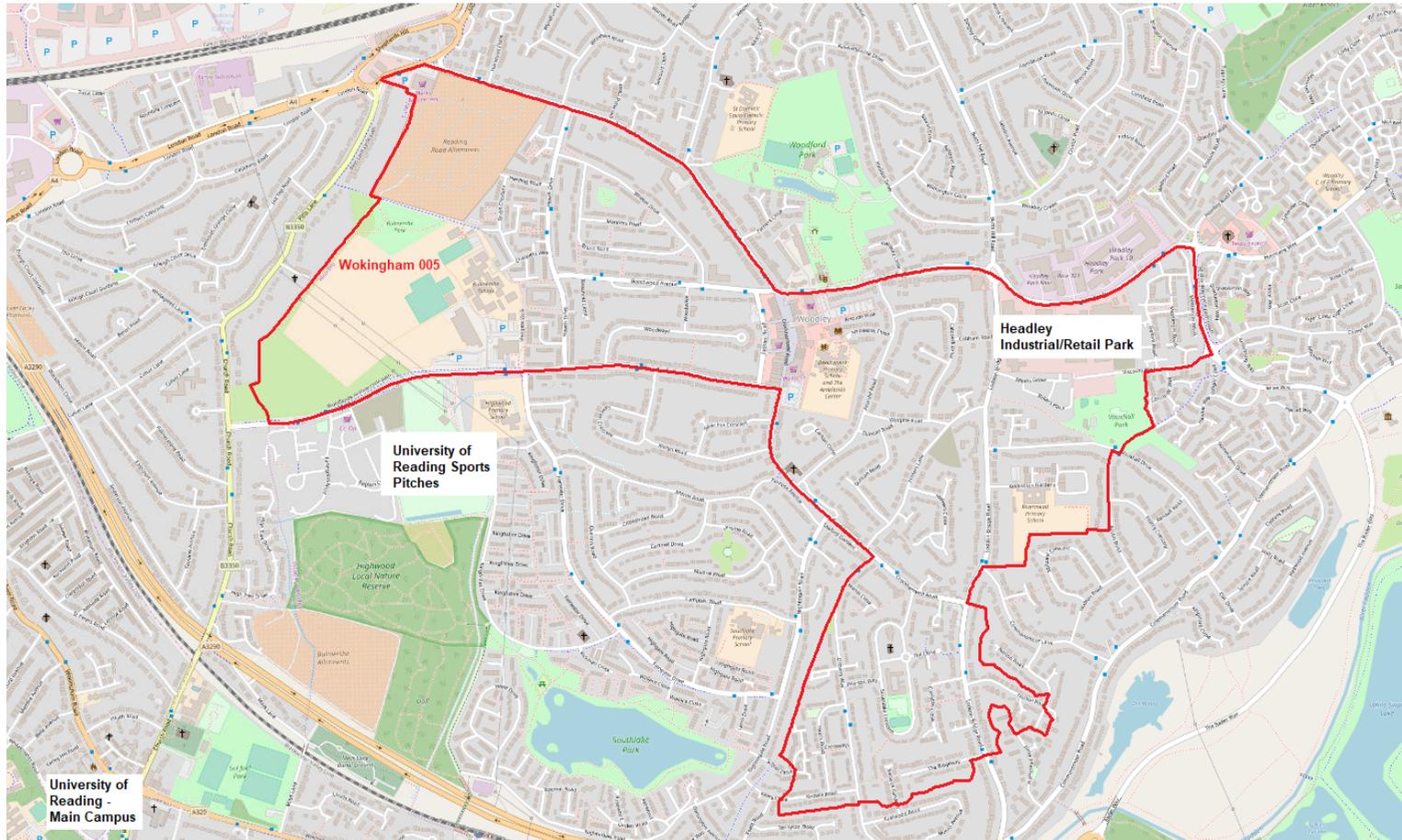
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Figure 8.13. The 'extremely vulnerable' MSOA of Reading 014



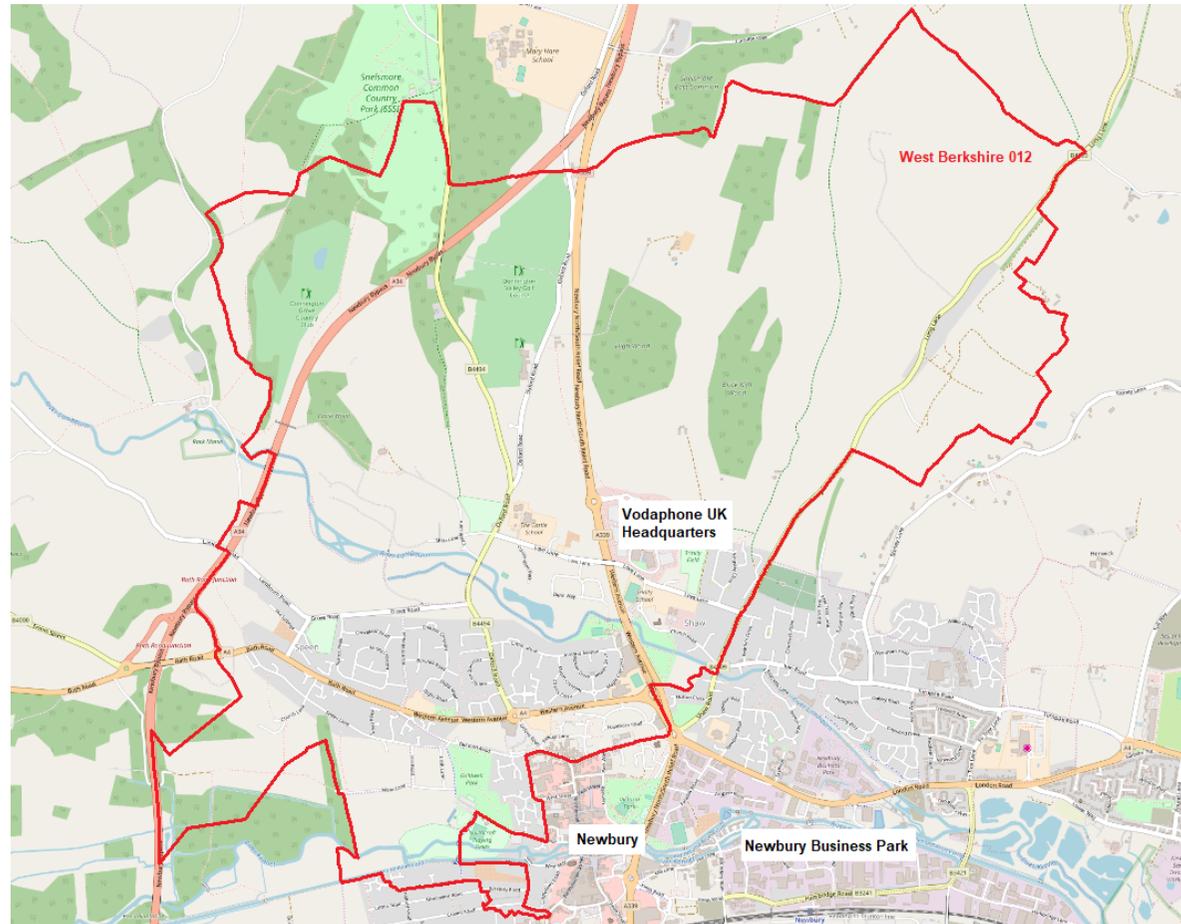
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Figure 8.14. The ‘extremely vulnerable’ MSOA of Woking 005



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Figure 8.15. The 'extremely vulnerable' MSOA of West Berkshire 012



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Figure 8.16. The ‘extremely vulnerable’ MSOA of West Berkshire 022



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8.6. Discussion

The construction of the proposed SVIs for the ‘Lone-Pensioner HUTs’ and ‘Lone Parent HUTs’, have focused upon addressing specific social deprivation issues which, may occur for these groups, that would otherwise go unaccounted for by current deprivation measures. By comparing the two, proposed SVIs against existing gold standard measures that are derived (i.e. the IDAOPI and the IDACI) from the well-established small-area level deprivation measure of the IMD, it can be ascertained that the SVIs provide an adequate overview of deprivation outcomes, for the NSR profiles (HUTs) which, they are attributed to. Furthermore, as part of this process of comparison, the MSOAs which, are identified as ‘most vulnerable’ by the SVIs, but as being ‘not vulnerable’ by the existing gold standard measures, have demonstrated the value of the proposed SVIs. Because, the ability of the proposed SVIs to be able to identify MSOA which, are vulnerable due to specific compositional and contextual affects, which, are currently unaccounted for in existing (well-utilised and respected) measures. Therefore, validating the contribution of the proposed SVIs, to establishing understanding of social deprivation outcomes at the neighbourhood level, which, result from NSRs attributed to the relatively unexplored domain of the ‘household’.

Overall, this chapter provides a more nuanced understanding of the increasing prevalence and diversity of deprivation outcomes that result from NSRs in contemporary society. Moreover, as demonstrated by the examples outlined in *Sections 8.3. and 8.5.*, the compositional and contextual neighbourhood attributes of different NSR profiles, can influence the resultant inequality of outcomes (Phillips, 2004). The suggested 1 explanations, tended to focus on the compositional constraints faced by HUTs, with similar compositional groups often concentrated to particular neighbourhoods. Also, the contextual explanations, on the other hand, refer to opportunity structures in the local physical and social environment, such as the (lack of) of availability of local services, and the presence of affordable housing within specific areas. In addition, to this proposed dichotomy of compositional and contextual attributes determined for the HUTs at the neighbourhood level, were the additional collective explanations of neighbourhood outcomes which, were provided for by the identification of the ‘extremely vulnerable’ MSOAs. Such collective outcomes drew our attention to socio-cultural and historical features of communities (MacIntyre *et al.*, 2002), which, would have otherwise been

unaccounted for due to the underlying confounding effects. Fundamentally, whilst it is well established that the compositional and contextual attributes of neighbourhoods, will continue to have an important role in the assessment of issues of deprivation in contemporary society (as confirmed by the MLR models in *Sections 6.3-6.4* and *Sections 7.3.-7.4.*), the collective attributes of neighbourhoods should also be considered as being influential to the assessment of issues of social inequality in future work.

Chapter 9 – Discussion

9.1. Introduction

This chapter provides an overview of the key theoretical contributions and empirical analyses that have been documented in the previous chapters. And so, the overall aim of this chapter is to bring this specific research enquiry to a close, and to establish potential avenues for further work. *Section 9.2.* provides a summary of the key research findings, which meet the three aims and corresponding objectives outlined in *Section 1.4.* Following on from this, *Section 9.3.* discusses an overview of the potential limitations of this research enquiry. Finally, *Section 9.4.* outlines potential directions for future research, including how this thesis could be situated within the wider debate of ‘social risk management’ (SRM) strategies. The approach undertaken in this chapter allows for the key messages and conclusions of this research enquiry to be illustrated succinctly.

9.2. Summary and Context of Key Findings

The principal aim of this research was to quantify issues of social deprivation, which NSR profiles may experience, due to being exposed to NSRs at the neighbourhood level (*Aim 3*). Specifically, the intention of this aim, was to add an understanding of geography to the exploration of *social* deprivation outcomes attributed to specific NSRs that *distinct* NSR profiles may experience in contemporary society, a previously unaccomplished research task within the NSRs literature. However, prior to meeting this overall aim, the importance of identifying the contextual attributes associated with modifying the resulting social deprivation outcomes, which, distinct NSR profiles may also experience at the neighbourhood level, first had to be determined (*Aim 1*). Additionally, the compositional attributes associated with influencing the resulting social deprivation outcomes, which distinct NSR profiles may experience at the neighbourhood level, also had to be determined (*Aim 2*). Correspondingly, how these three aims were met will be discussed in relation to the main findings from this research.

At the beginning of this research enquiry, the literature review (*Chapter 2*) introduced an overview of how the social and societal changes associated with the transition to a post-

industrial society, have generated the occurrence of NSRs. However, it was discovered that the terms ‘social risks’ (of industrial society) and ‘new social risks’ (of post-industrial society), were used synonymously with one another in the literature. The result of which, led to a lack of conceptual clarity as to what an NSR exactly entailed. Therefore, this research responded by providing a clear interpretation of what the key NSRs of post-industrial society could be determined as (see *Table 1.1.*). The consequence of this, was NSRs being defined by this researcher as ‘events or transitions which, occur at critical junctures across the life course, which, may prevent an individual and/or household from fully participating in contemporary society’ (as informed by the literature review undertaken in *Chapter 2*).

Moreover, as part of the process of clarifying how NSRs are conceptualised, a clear gap emerged in the literature as to NSRs which, could be potentially attributed to the ‘household’ domain, in comparison to the more widely-cited domains of the ‘labour market’ and the ‘welfare state’ (see: Taylor-Gooby, 2004; Ranci, 2010). The NSRs which, could be potentially attributed to the proposed ‘household’ domain, reflected wider changes to family and gender roles in society. Specifically, the key social changes were associated to the continued ageing population in Britain and the increased participation of women in the labour market (see: *Section 2.2.2.*). And so, the two key NSRs which, were most commonly theorised as being attributed to, the proposed domain of social participation and provision in society, of the ‘household’, were determined as: the ‘physical dependency’ of old people, and individuals who were ‘unable to reconcile paid work with caring for dependent children’. Correspondingly, the decision was undertaken to focus upon solely examining these two NSRs and their resulting social deprivation outcomes, in relation to ‘critical junctures’ associated with the newly determined domain of the ‘household’.

Chapter 3 then established the NSR profiles attributed to the household domain as ‘HUTs’, for the purpose of this research enquiry. A key strength of the proposed HUTs is that they are identified at ‘critical junctures’ across the life course where NSRs, which, are specifically attributed to the ‘household’ domain, are most likely to occur (see: Armingeon & Bonoli, 2006). Therefore, HUTs have been constructed be an appropriate unit of analysis in which, to provide a more detailed consideration of the social

deprivation outcomes, occurring from specific NSRs. Also, the commonality of shared attributes which, the HUTs will have, allow for a more nuanced approach to obtaining the compositional attributes which are specific to the group in question. This is in comparison to more general-purpose measures, includes compositional and contextual attributes, which are relevant at the societal level, rather than for a specific sub-population (e.g. the Index of Multiple Deprivation, 2015). Correspondingly, not only does this chapter provide an innovative approach to establishing the ‘household’ as a key domain of empirical analysis in the wider NSRs literature, but it also allows for a comprehensive and measured approach to be undertaken.

Furthermore, the proposal of examining specific NSRs within the ‘household’ domain, provided the impetus to provide an appropriate conceptual framework as part of a continuous process to inform the development of composite measures. The result of this piece of empirical research has extended current theoretical and analytical approaches to examining NSRs and their corresponding deprivation outcomes, at key stages across the life course at the neighbourhood level. Furthermore, the social vulnerability framework has acted as a critical lens in which, to align the chosen research questions with appropriate analytical tools and methods, at the neighbourhood level (*Section 4.3.1*). As, the research tradition of ‘neighbourhood effects’ stems from an understanding of society that adheres to one overarching assumption, that ‘where you live affects your life chances’ (Slater, 2013; p.368). And so, the social vulnerability framework allows for an explanation of the distribution of a negative outcome in a population (i.e. social deprivation outcomes), to be made in relation not to the cause (NSR) which, determined it, but greater or lesser exposure of the population to suffer the consequences of the cause. In other words, vulnerability identifies a situation that is characterised by a state of weakness which, *exposes* a person (or a family) to suffer particularly negative or damaging consequence if a problematic situation arises (Adger, 2010).

In addition, the notion of exposure can extend beyond an individual/household into the community in which, they live i.e. the *capacity* of the neighbourhood to respond to if the occurrence of negative outcomes from a risk event occurs. In addition, the social vulnerability framework allows for the introduction of ‘susceptibility’ to be considered, as some individuals/households within a given NSR profile will be more likely to be

influenced to the negative consequences and contingencies of the occurrence of an NSR than others. The use of a social vulnerability framework was therefore implemented as a guide, to integrate and interpret the findings of this research, as exploring the differential outcomes resulting from different HUTs being exposed to specific NSRs. Accordingly, a key contribution of the conceptual framework established in this research is that it allows for a variety of different compositional and contextual associations to be investigated for different HUTs and NSRs at the neighbourhood-level.

Subsequently, once the conceptual framework had been established in *Chapter 4*, it was then used to partially inform the selection of variables in *Chapter 5*. The result of which, was obtaining specially commissioned census datasets, providing the opportunity to offer insights into exploring previously unexamined compositional dimensions and indicators, which, may result in deprivation outcomes for specific HUTs at the small-area level geographies. Also, a key benefit of utilising the 2011 Census, was that specially commissioned datasets could be obtained to meet the specific requirements of this research. The utilisation of these previously unused datasets and resulting combinations of variables, is a key strength and empirical contribution of this research.

Prior to the construction of appropriate and rigorous social measures (Ravin & Riggan, 2012), the clear and accepted normative interpretations established in *Chapter 4* needed to be statistically validated, which, was undertaken by a process of MLR modelling. The result of which, was that the compositional attributes were determined to be more influential for explaining the differential outcomes in comparison to contextual variables, as would be expected (Cummins *et al.*, 2007). But the contextual variables were shown to add further predictive power to the MLR models for predicting the NSR outcomes, even once the compositional variables had been controlled for. Thus, reinforcing the importance of the neighbourhood context, in modifying the social deprivation outcomes which, distinct HUTs may potentially face.

Once the selection of variables had been theoretically and statistically validated, the construction of the small-area level measures of deprivation were undertaken in *Chapters 6 and 7*, for ‘Lone-Pensioner HUTs’ and ‘Lone-Parent HUTs’, respectively. The SVIs

which, were produced allowed for the complexities of the 7,201 MSOAs to be summarised in a meaningful and purposeful way, in which, a vast amount of information was condensed into a single-figure measure, for ease of understanding, of what are complex social phenomena.

Finally, it has been demonstrated by the evaluation and discussion of the SVIs in *Chapter 8*, that not only have the dimensions of exposure, susceptibility and neighbourhood capacity been established as informing the occurrence of NSR outcomes, but that the marginality of distinct HUTs can also be ascertained. Forrest & Kearns (2001) describe a widely accepted view that the neighbourhood is relatively more important for those sub-populations in society who are disadvantaged and that, “the contextual effects of neighbourhoods may be particularly marked. in the most disadvantaged areas” (p.2132). Therefore, an additional contribution of this research, is the establishment of the MSOAs which, are most vulnerable to NSR outcomes for specific populations.

As outlined in *Sections 8.2.* and *8.3.*, the proposed SVIs have produced a greater understanding of the most socially vulnerable ‘Lone-Pensioner HUTs’ and ‘Lone-Parent HUTs’ respectively, beyond existing gold-standard measures which, relate to the HUTs in question. Thus, meeting the key objective of undertaking the construction of any new composite social measure (in comparison to using/adapting an existing metric), of the ability to generate new information that otherwise would not have been visible. As, a principal contribution of this research enquiry, is the ability of the SVIs to uncover issues of social deprivation for neighbourhood areas, which, existing income-based measures of deprivation would have ‘missed’ (i.e. the IDAOPI [2015] and the IDACI [2015]).

9.3. Limitations

However successful a research project has been it is important to recognise the limitations of the research as purpose of reflection, and to inform future research efforts. Whilst, it has previously been ensured that efforts were made to justify crucial decisions throughout the thesis, as well as acknowledge the key theoretical and analytical limitations pertaining

to constructing the small-area level measures of deprivation, the key limitations of the overall research process should also be considered.

As argued by Saisana *et al.*, (2005), at the core of the non-aggregators' argument to identifying multidimensional social issues, is the subjective nature of any form of quantitative social measure. A key limitation of any proposed model which, aims to quantitatively measure the properties of a social system, will only be able to reflect (some) of the characteristics which are truly present. However, this researcher believes that subjectivity cannot be avoided when representing complex systems, instead a compromise can be met by utilising well established procedures of data and methods, as well as ensuring the transparency of the decision-making process behind any quantitative measure. Ultimately, there are several varied approaches to the measurement of small-area level deprivation measures, each of which will have produced a different outcome – that cannot be avoided. Specifically, this occurrence will be more acute in relation to the choice of indicators and subsequent variables, to represent the proposed domain and dimensions (as provided by the conceptual framework in *Chapter 4*).

Correspondingly, a general limitation of the principal data source used by this research, relates to the definition of the 'usually resident population' in the 2011 Census as, inevitably not all members of population who are usually resident in England and Wales on Census day will be accounted for. For example, at the time of the 2011 census it was estimated by the ONS that between one to two percent of the usually resident population in England and Wales were estimated to be homeless (ONS, 2017). This potentially means up to one million people are unaccounted for in the 2011 Census. Such examples of individuals who are homeless, include individuals living in temporary accommodation, 'sofa-surfing', or physically living on the streets and thus not captured through the Census survey (ONS, 2010). Consequently, the truly 'most vulnerable' HUTs might be missed due to the current processes of enumeration employed by the ONS.

The choice of compositional indicators proposed by this research is reflected by the choice of subjective measures of health, from with which, the outcome variable of 'physical dependency' for 'Lone-Pensioner HUTs' is comprised. A potential limitation

of the measurement of LLTI/D in the 2011 Census, is that the question relies on a subjective assessment of issues of health by the respondent and can be open to much interpretation as to what ‘daily activities limited – a little’ and ‘daily activities limited – a lot’ corresponds to in reality. Furthermore, the 2011 Census did not provide the opportunity for respondents to provide further details about the specific nature or duration of the specific illnesses, health problems, handicaps or disabilities which, they may potentially face, in response to both ‘self-assessment of health’ question. Thus, failing to capture valuable information about the nature of the issues which, may impact upon the health and wellbeing of respondents. Instead, a consideration of utilising other contextual indicators (at the MSOA level) to uncover a more objective assessment of particular issues of health and wellbeing, for instance hospital admissions for specific health problems, e.g. accident and emergency admissions for children aged 5 years old and under.

Moreover, in relation to the choice of contextual indicators, although the chosen measures of ‘accessibility of local services’ used in the construction of both of the SVIs, encapsulates the time taken to travel to the “nearest” service location, it does not however provide any indication about the availability of choice of service (Lovett *et al.*, 2002; Martin *et al.*, 2002). Therefore, a notable limitation of using these measures indicating the ‘accessibility of services’, is that no indication of how certain neighbourhood areas are further disadvantaged due to being located far away from a specific-type of local service which, is deemed to be more appropriate to meet the needs of the service-user (e.g. which, is potentially more efficient or deemed “more attractive” by the service user). Furthermore, the implemented measures of ‘accessibility to local services’ do not provide any indication of service-users being constrained to utilising inadequate services, due to a limited choice of options. Subsequently, to enhance reliability of the proposed SVIs, the analysis of accessibility of key local services, could be undertaken by using spatial network analysis instead (Morrissey *et al.*, 2010: p.17), as this method can potentially provide further understanding of the parameters which, may affect levels of service accessibility.

To ensure the most robust and durable results, composite social measures are never complete, instead they are a process of evolution, whereby a tentative and theoretical

proposition is empirically tested, and results are fed back into (further) conceptual development. Furthermore, even though a comprehensive understanding of the conceptual and theoretical underpinnings of NSRs and the resulting deprivation outcomes has been established by this thesis, indicators can necessarily only be a snapshot in the time and thus are limited in their ability to represent dynamic processes. Thus, the ability to hypothesise new forms of valid and reliable indicators for the SVIs, is a process which, is critical for ensuring the ongoing development and relevance of the proposed SVIs (e.g. the proposed suggestion of a metric pertaining to the ‘availability of jobs’ as a contextual indicator, is proposed for the SVI for ‘Lone-Parent HUTs’, in Section 7.3.2.). Therefore, the SVIs produced in *Chapters 6 and 7*, and which, are further utilised and discussed in *Chapter 8*, are deemed to be theoretically ‘incomplete’ for all intents and purposes.

9.4. Directions for Future Research

A key area of consideration for future research efforts, is to undertake the construction of the SVIs for other HUTs which, may be susceptible to NSRs and the resulting social deprivation outcomes attributed with the ‘household’ domain. Due to the proposed categorisation of HUTs as outlined by *Table 3.2.*, there are several HUTs for which, an SVI could be constructed. For instance, to further explore the NSR of ‘the inability to reconcile paid work with caring for dependent children’, could be investigated via ‘couple-HUTs’ who were originally considered as a potential unit for exploration in *Section 3.4.*, but their inclusion was beyond the scope of this thesis. Hypothetically, once, a more complete picture of all the SVIs has been established for all potential HUTs attributed to both the NSRs of the ‘physical dependency’ of older people and the ‘inability to reconcile paid work with caring for dependents’, a comparison could be made to overall measures of deprivation (e.g. the Index of Multiple Deprivation, 2015). In order to provide further understanding of how the established and proposed SVIs, can be used to provide a more nuanced perspective of social deprivation outcomes, at the small-area level for England and Wales.

Furthermore, the utilisation of the proposed HUTs in *Table 3.2.*, is not limited to the two previously outlined NSRs attributed to the ‘household’ domain. As although there was a practical advantage of this research only utilising HUTs that only contain one adult, as it

is easier to determine who the compositional characteristics of the HUT are attributed to (e.g. age and gender). Correspondingly, if a HUT did contain more than one adult, individual attributes could still be determined for the 'Household Reference Person' instead. Instead, the proposed HUTs could be used to uncover issues relating to other NSRs which, are less commonly cited in the literature. For example, this researcher proposes that 'emerging-adulthood' could be anticipated as a third (unexplored) NSR, which, is attributed to the household domain. As emerging adulthood is the proposed categorisation by Arnett (2001) of young adults who would be classified as 'non-dependent children' for administrative purposes (e.g. by the ONS), but who are unable to enter or successfully remain in the labour market. Thus, the resulting outcome is that these 'non-dependent' children, become 're-dependent' on their families for social and economic support. Therefore, the process of 'emerging adulthood' in society (Berrington *et al.*, 2009), due to a few social and societal constraints, could be proposed as a third 'dependent' group of empirical interest.

Holzmann & Jorgensen (1999) coined the term social risk management (SRM), to refer to how society as a whole manages risks. The SRM can include reference to the broad range of formal and informal risk management strategies undertaken by individuals, communities, and nations (Alwang *et al.*, 2001). Furthermore, it can be suggested that the aim of such SRM strategies, allows for a holistic approach to understanding and managing the risks, outcomes and responses, which, occur in our daily lives. Therefore, when undertaking any form of risk-related research, especially in relation to any form of socially-constructed risk (i.e. NSRs), a consideration of how the approach fits within a wider SRM framework should be determined. Hence, at the start of this thesis, the hypothesised location of this research enquiry within a wider SRM framework was made (see: *Figure 1.2.*), the exact contribution of this study in relation to other overlapping approaches could further investigated via collaborative research attempts in the future.

Overall, this thesis has detailed the rationale for the development, and the empirical use, of innovative small-area level measures, in which, to access the social deprivation outcomes which, distinct HUTs (NSR profiles) may experience, resulting from being exposed to NSRs in society. To conclude, it is hoped that this research enquiry will hopefully inspire more research of a similar vein, to identify, as well as encourage wider

research enquiries, which, attempt to go beyond existing attempts to explore NSR outcomes from national-level perspectives of the labour market and welfare state contexts.

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Appendix

Listed below are the specially commissioned datasets from the 2011 Census which, were obtained from the Office for National Statistics (ONS) to (partially) meet the data requirements of this research enquiry.

2011 Census table CT0529: *older persons (aged 65-74 years old & 75+ years old, respectively) who reside in one person households. Whereby, the age (category) of the household member, is cross-tabulated by gender and by highest level of qualification – at National to MSOA level for England and Wales*

<http://www.ons.gov.uk/ons/about-ons/business-transparency/freedom-of-information/what-can-i-request/published-ad-hoc-data/census/qualifications/ct0529-2011-census---sex-by-age-by-highest-level-of-qualification---national-to-msoa.xls> [Last accessed: 02/10/18]

2011 Census table CT0530: *older persons (aged 65-74 years old & 75+ years old, respectively) who reside in one person households. Whereby, the age (category) of the household member, is cross-tabulated by gender and by marital and civil partnership status – at National to MSOA level for England and Wales*

<http://www.ons.gov.uk/ons/about-ons/business-transparency/freedom-of-information/what-can-i-request/published-ad-hoc-data/census/demography/ct0530-2011-census---sex-by-age-by-marital-and-civil-partnership-status---national-to-msoa.xls> [Last accessed: 02/10/18]

2011 Census table CT0531: *older persons (aged 65-74 years old & 75+ years old, respectively) who reside in one person households. Whereby, the age (category) of the household member, is cross-tabulated by gender and by usual address the year before the census – at National to MSOA level for England and Wales*

<http://www.ons.gov.uk/ons/about-ons/business-transparency/freedom-of-information/what-can-i-request/published-ad-hoc-data/census/migration/ct0531-2011-census---sex-by-age-by-usual-address-the-year-before-the-census---national-to-msoa.xls> [Last accessed: 02/10/18]

2011 Census table CT0532: *older persons (aged 65-74 years old & 75+ years old, respectively) who reside in one person households. Whereby, the age (category) of the household member, is cross-tabulated by gender and by housing tenure – at National to MSOA level for England and Wales*

<http://www.ons.gov.uk/ons/about-ons/business-transparency/freedom-of-information/what-can-i-request/published-ad-hoc-data/census/housing-and-accommodation/ct0532-2011-census---sex-by-age-by-tenure---national-to-msoa.xls>
[Last accessed: 02/10/18]

2011 Census table CT0533: *older persons (aged 65-74 years old & 75+ years old, respectively) who reside in one person households. Whereby, the age (category) of the household member, is cross-tabulated by gender and by LLTI/D – at National to MSOA level for England and Wales*

<http://www.ons.gov.uk/ons/about-ons/business-transparency/freedom-of-information/what-can-i-request/published-ad-hoc-data/census/health/ct0533-2011-census---sex-by-age-by-long-term-health-problem-or-disability---national-to-msoa.xls>
[Last accessed: 02/10/18]

2011 Census table CT0534: *older persons (aged 65-74 years old & 75+ years old, respectively) who reside in one person households. Whereby, the age (category) of the household member, is cross-tabulated by gender and by general health status – at National to MSOA level for England and Wales*

<http://www.ons.gov.uk/ons/about-ons/business-transparency/freedom-of-information/what-can-i-request/published-ad-hoc-data/census/health/ct0534-2011-census---sex-by-age-by-general-health---national-to-msoa.xls> [Last accessed: 02/10/18]

2011 Census table CT0613: *lone parent households (aged 18-34 years old) with dependent children aged 0 to 15. Whereby, the age of youngest dependent child is cross-tabulated by car/van availability and by economic activity – at National to MSOA level for England and Wales*

<https://www.ons.gov.uk/peoplepopulationandcommunity/educationandchildcare/adhocs/005888ct06132011censusageofyoungestdependentchildbycarorvanavailabilitybyeconomicactivitynationaltomsoa> [Last accessed: 02/10/18]

2011 Census table CT0614: *lone parent households (aged 18-34 years old) with dependent children aged 0 to 15. Whereby, the age of youngest dependent child is cross-tabulated by car/van availability and by formal qualifications – at National to MSOA level for England and Wales*

<https://www.ons.gov.uk/peoplepopulationandcommunity/educationandchildcare/adhocs/005887ct06142011censusageofyoungestdependentchildbycarorvanavailabilitybyhighestlevelofqualificationnationaltomsoa> [Last accessed: 02/10/18]