THREE

# Placing Health in Austerity

*Ramjee Bhandari*

## Background

It is well acknowledged that place can create inequalities in health but there is a debate within geographical research as to whether the health and wellbeing of an individual is determined by their own attributes (the compositional theory) and/or the environmental attributes of the area where the person lives (contextual approach). More recently, it has been argued that these determinants interact with each other, signifying that they are 'mutually reinforcing' (relational). This chapter outlines this key debate and engages with it by using data from a longitudinal household survey conducted in the most and least deprived neighbourhoods of Stockton-on-Tees. It examines the explanatory role of compositional and contextual factors and their interaction. The survey results indicate that there is a significant gap in general and physical health in Stockton-on-Tees and compositional-level material factors, contextual factors and their interaction appear to be the major explanations of the health gap. The findings are discussed in relation to geographical theories of health inequalities and the political and economic context of austerity. It further highlights the importance of the 'relational approach' in understanding geographical inequalities in health.

Stockton-on-Tees has the highest health inequalities in England. Life expectancy at birth reveals a gap between the most and least deprived neighbourhoods of 17.3 years for men and 11.4 years for women (Public Health England, 2015). This is similar to differences in life expectancy between the US and Ghana or the UK and India (WHO, 2016). Life expectancy, though, is only a headline indicator, signifying the need to explore the extent and determinants of other aspects of health inequalities in that area (Bambra, 2016). A complex relationship exists between place, the people who live there and health. Complex in the sense that the characteristics of people (composition) and the nature and attributes of the place (context) act

individually and collectively (Macintyre et al., 2002; Cummins et al., 2007). Further, it has been argued that these health divides between areas are 'political' in nature, influenced by the wider socio-political and macroeconomic context, for example economic recession and austerity (Schrecker and Bambra, 2015). In this chapter, the health gap between the most and the least deprived areas of Stockton-on-Tees is examined using validated measures of physical and general health. It also examines the contribution of compositional and contextual factors and their interaction in explaining this gap. Uniquely, this was done in a time of economic recession and austerity within the UK. The chapter will therefore be of interest not only to those who study health inequalities in the UK but also to the international public health research community who are tackling similar geographical inequalities in health in major urban settings (Bambra, 2016).

## Understanding health and wellbeing

The World Health Organization defines health as 'a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity' (WHO, 1995). With this holistic view of health and wellbeing, the primary focus shifts from a specific body part or symptoms of a disease to an overall performance of an individual. The holistic approach looks into the physical, emotional and social factors of an individual and explores how these factors in a collective way produce the health outcome. The principle of holistic approach is to understand how individual functions within their set of environmental and social characteristics. With this in the background, this chapter asserts the importance of the interaction between individual and collective characteristics. In addition, exploration of the determinants of health and wellbeing from a geographical perspective will also help understand the complex and dynamic nature of the social, political and economic factors that shape health and wellbeing (Nyman and Nilsen, 2016). This approach not only helps to understand the issue at an individual level but also looks at the differential exposures to the social determinants which lead to health inequalities. By assessing health and wellbeing from a macro perspective, it is possible to move beyond the traditional approach of individual subjectivity (La Placa et al., 2013). As argued by Knight and McNaught (2011), effective measures of health and wellbeing are able to demonstrate the dynamic construction of these states from an interplay of the individual and social structures at a macro-level.

## Social determinants of health

The 'social determinants of health' are the collective set of conditions in which an individual is born, grows up, works and lives and which directly or indirectly affects their health. In their broadest form, they are identified as employment status, work and working environment, access to essential services (including health care), and housing and the living environment (Marmot, 2005; Bambra, 2011).

There is a strong research base that shows a relationship between unemployment and poor health (Warren et al., 2013; Beatty et al., 2017). Unemployment is an important life event, which not only induces stress, it is a primary determinant of health inequalities (Marmot et al., 2010; Marmot and Allen, 2014). Unemployment is associated with poor mental health conditions (Mattheys et al., 2016), and poor self-reported health and health damaging behaviours (Skalicka et al., 2009). The health impacts of unemployment are not limited to an individual, but can also extend to families (Bambra, 2011) and also contribute to geographical inequalities in health (Moller et al., 2013).

Work and working conditions also have strong relationships with health and health inequalities (Bambra, 2011). For example, exposure to hazardous chemicals (such as mercury and lead), vibrations (both hand-arm vibration and whole-body vibration with work which requires the use of hand-held power tools or who drive mobile machines) and physical load are associated increased risk of poor health. The psychosocial work environment (such as time pressure, job control and job security) also affects health (Bambra, 2011). Further, Bambra (2011) argues that the psychosocial work environment affects the social gradient among employees.

Access to essential services (including health care, goods and services) influences health and health inequalities from 'institutional mechanisms'. These services and health-affecting institutions (also referred to as 'opportunity structures'; for example, GP surgeries and fast food outlets) are socially constructed and can be of varied quality, availability and access (Macintyre et al., 2002; Sykes and Musterd, 2011).

Housing and the living environment are material determinants of health and wellbeing (Bambra, 2011). Housing issues (such as dampness, overcrowding and no heating) are negatively associated with health. Persistent exposure to housing problems results in poorer health conditions and exposure in the past could have health consequences in the present (Pevalin et al., 2017).

### *Geographical inequalities in health*

Neighbourhoods that are the most deprived have worse health than those that are less deprived – this follows a socio-spatial gradient, with each increase in deprivation resulting in a decrease in average health. In England, the gap in average life expectancy between the most and least deprived areas is nine years for men and around seven years for women. Traditionally, geographical research drawing on the wider social determinants of health literature has tried to explain these differences in neighbourhood-level health by looking at compositional and contextual factors – and their interaction (Pickett and Pearl, 2001; Cummins et al., 2007). The compositional explanation asserts that the health of a given area is the result of the characteristics of the people who live there (demographic, behavioural and socioeconomic). The contextual explanation, on the other hand, argues that area-level health is determined by the nature of the place itself, in terms of its economic, social, cultural and physical environments.

The profile of the people within a community (demographic [age, sex, ethnicity], health-related behavioural [smoking, alcohol, physical activity, diet, drugs] and socioeconomic [income, education, occupation]) influences its health outcomes. Generally speaking, health deteriorates with age and health also varies by ethnicity/race. Smoking, alcohol, physical activity, diet and drugs – the five so-called 'lifestyle factors' or health behaviours, all influence health significantly. For example, smoking remains the most important preventable cause of mortality in the wealthy world. Alcohol-related deaths and diseases, as well as obesity, are on the increase, while exercise rates are in decline, and drugs are an increasingly important determinant of death among young people (Bambra et al., 2010). However, arguably of most importance is socioeconomic status. The literature suggests that there are several interacting pathways linking individual-level socioeconomic status and health: behavioural, material and psychosocial (Bartley, 2004). The 'materialist' explanation argues that it is income levels and what a decent or high income enables compared with a lower one, such as access to health-benefitting goods and services and limiting exposures to particular material risk factors. The 'behavioural-cultural' theory asserts that the causal mechanisms are higher rates of health-damaging behaviours in lower socioeconomic groups. The 'psychosocial' explanation focuses on the adverse biological consequences of psychological and social domination, and subordination, superiority and inferiority (for further detail see Chapter Six).

The contextual perspective asserts that differential exposure to the 'local geographical circumstances', brings about the differences in health status of the population (Pearce, 2015). Galster (2010) for example has proposed four specific, yet broad, mechanisms to describe the role of place in creating unequal health status: the social-interactive mechanism; the environmental mechanism; the geographical mechanism and the institutional mechanism. The social-interactive mechanism defines health inequalities as the outcome of the influence that one's social neighbourhood has in shaping the health-affecting norms, values and attitudes (Brannstrom and Rojas, 2012). The environmental mechanism deals with the socio-spatial distribution of health-damaging factors ('pathogens' such as violence and pollutants) and health-promoting factors ('salutogens' such as public parks and healing places), which have a distinct concentration pattern, the former being more common in the socially deprived areas and latter in less deprived neighbourhoods (Pearce, 2015). The geographical mechanism, on the other hand, explains that living in deprived locations over the long term, with limited or poor quality services, may lead to a vicious cycle of poverty and ill health (Hedman et al., 2015). Finally, institutional mechanisms seek to understand the health-affecting roles of institutions and services (also referred to as 'opportunity structures'; for example GP surgeries, fast food outlets) that are socially constructed and can be of varied quality, availability and access (Macintyre et al., 2002, Sykes and Musterd, 2011).

Macintyre and Ellaway (2009) have argued that a clear differentiation between compositional and contextual factors determining health inequalities is, in general sense impossible. It is because they are not mutually exclusive: the characteristics of individuals are influenced by the characteristics of the area. For example, compositional-level individual factors such as employment and job status of the people living in an area are influenced by the contextual-level characteristics of the local labour market, while these contextual factors are in turn influenced by the wider political and economic environment – with recessions and austerity again affecting local labour markets (Bambra, 2016). Moving away, then, from the conventional approach of focusing only on the contribution of compositional *or* contextual factors, Cummins et al. (2007) therefore argue for a 'relational approach' that accounts for the horizontal and vertical interaction between these factors – in addition to their individual contributions. This approach not only reconnects people and place but attempts to signify the importance of scale in understanding geographical health inequalities. It highlights the dynamic nature of place – how it is constructed and

represented in research and how it is embedded in an individual's life. Place in this relational sense may not be defined by geographical administrative boundaries but by 'nodes in networks' (Horlings, 2016).

### *Recession, austerity and health inequalities*

The financial crisis of 2007 – the worst since the Wall Street crash of 1929 – led to the onset of what has been called the 'Great Recession'. There had been several post-war financial downturns in Western European countries (for example the 1970s and 1990s) but none as serious, on economic and social grounds, as that which has affected the whole of Europe and the UK since 2008 (Ifanti et al., 2013). The UK had some austerity policies in hand such as tax reforms before the full crisis came into existence; this has been described by Blyth (2013) as 'pre-emptive tightening'. The crisis, though, accelerated after the imposition of austerity policies from 2010 onwards. UK austerity has been characterised by significant cuts to public service budgets, most notably in terms of local authority budgets, significant reductions in social security expenditure, alongside a strong emphasis on relying on a renewed market to repay the national deficit (Kitson et al., 2011). Though there have been strong voices against austerity, it remains in place and its impacts are ongoing (Baker, 2010). These funding and welfare cuts in the UK are geographically patterned and the worst hit areas are those that are already the most socially disadvantaged (Beatty and Fothergill, 2016). This has led to fears of widening deprivation and increases in health inequalities (Pearce, 2013; Bambra and Garthwaite, 2014; Beatty and Fothergill, 2016).

However, there is little by way of empirical assessment of the effects of austerity on inequalities in health (Pearce, 2013). The studies that do exist, however, have suggested a negative impact. For example, Niedzwiedz et al. (2016) found that reductions in spending levels and increased welfare conditionality adversely affected the mental health of disadvantaged social groups. Austerity measures have also affected vulnerable old-age adults, as a study by Loopstra et al. (2016) has noted that rising mortality rates among pensioners were linked to reductions in social spending and social care. Loopstra et al. (2015) also found that foodbank use is associated with cuts to local authority spending and central welfare spending. Across England there has been a widening inequalities in mental health since 2010 (Barr et al., 2015), with the largest increases in poor mental health (including suicides, self-reported mental health problems and anti-depressant prescription rates) in the most deprived areas (Barr et al., 2016).

Furthermore, as well as being few in number, the studies in the UK conducted to date which explore the extent of geographical health inequalities during austerity have also been conducted on a national scale and utilised national-level datasets. National-level statistics are often criticised for failing to represent and explain the proximal area-level situations or even the inequalities that persist between/in regional and local levels (Shouls et al., 1996; Cummins et al., 2005; Bambra, 2013). Those studies exploring different localities have also focused on local authority-level data rather than looking at a finer geographical scale such as neighbourhood or ward level. The indicators used have often been mortality rather than morbidity. This identifies a clear need for more localised studies that apply geographical theories to better understand the extent and causes of geographical inequalities in health in a time of austerity. Furthermore, focusing at a local scale provides us with a unique opportunity to get detailed primary information on health and the social determinants at a small geographical scale, which is not the case with secondary data (such as the census or Health Survey for England).

## Methods

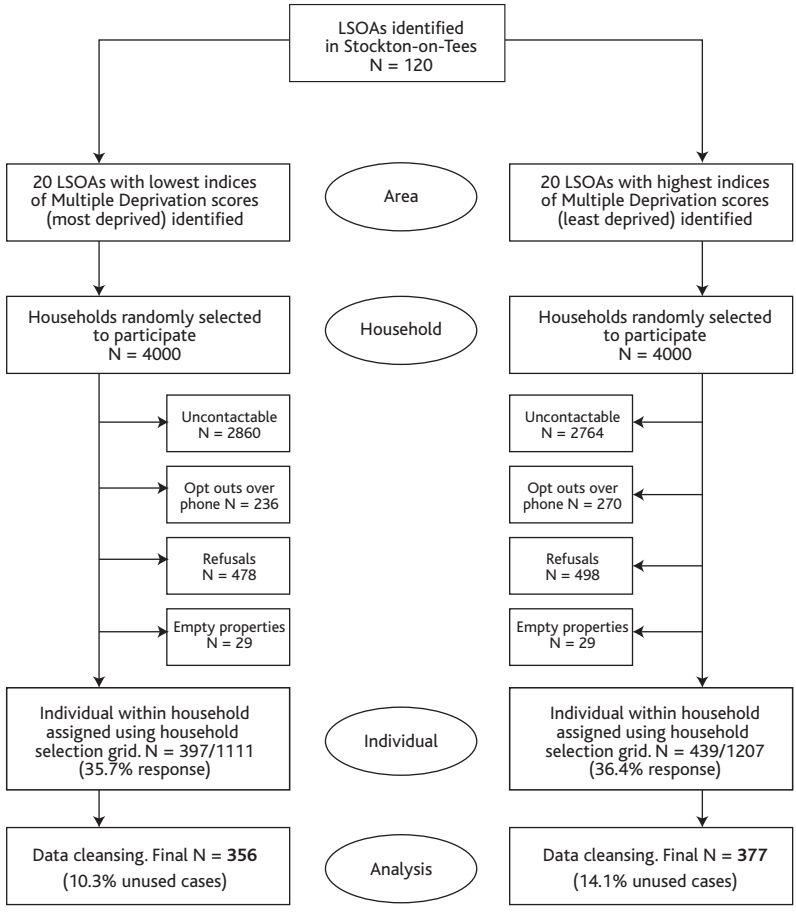
To understand the health of people living in the most and the least deprived areas of Stockton-on-Tees, a longitudinal survey was undertaken. The health gap in Stockton was examined using a stratified random sample of adults aged over 18, split between participants from the 20 most and 20 least deprived lower super output areas (LSOA). LSOAs are small areas of relatively even size, with around 1,500 people in each area; there are 32,484 LSOAs in England (DCLG, 2011). When studying deprivation status and relating it to health inequalities, LSOA is usually the preferred smallest spatial unit in England (Cairns-Nagi and Bambra, 2013). From 2010 the Index of Multiple Deprivation (IMD) scores for England was used to determine the 20 LSOAs in each of the extreme ends of deprivation within the borough. LSOA is the smallest geographical unit in England for which the IMD score is computed. IMD score is the key measure to identify area deprivation and its concentration in geographical units lower than local authorities in the England (Noble et al., 2006; Payne and Abel, 2012).

### *Survey recruitment*

The final targeted sample size of 800 (400 in each group) was based on a conservative power calculation, derived from experience of previous

health surveys in the same region of the UK (Warren et al., 2013). The sampling process utilised EQ5D (EQ5D is a part of EuroQol, which is a simple and generic health measure used in the clinical and economic appraisal) and SF8 (for detailed information on these indicators see the next section, 'Outcome variables', and Table 3.6), which assumed a 5% difference between the least and most deprived areas and the possible attrition in the follow-up surveys. Using a stratified random sampling technique (using 'R' statistical software program), a sample of 200 target households in each of the 40 LSOAs were created. Figure 3.1 shows the sampling strategy adopted for the study. For a detailed methodology, see Bhandari et al. (2017).

**Figure 3.1:** Sampling strategy for the survey



The baseline survey was conducted face-to-face and there were three follow up waves conducted by telephone (with the last one conducted 18 months after baseline). Table 3.1 presents a total number of survey participants in each wave and the dropout rates for each wave. In reaching the final wave, about half of the participants from the baseline cohort were retained, there was a higher rate of dropout in the least deprived areas which is typical of a longitudinal study (Eysenbach, 2005).

A data cleansing process was carried out and missing data were excluded for both outcome measures and predictor variables so that complete data were available for all cases allowing comparison between models. Table 3.1 summarises the number of participants that were included in the final analysis for each wave after dealing with the missing data. The rate of missing data was slightly over 12% for the baseline survey but it was 10% or less for all the follow-ups.

### *Outcome variables*

The focus of my research was to assess inequalities in general and physical health among the most and least deprived neighbourhoods of Stockton-on-Tees. General health was assessed using EuroQol (EQ5D-VAS) and physical health was measured using 'quality metric short form (SF8)'. Both EuroQol and SF8 have been well-validated for use in the general population.

EuroQol consists of two parts: EQ5D questionnaire and the 'Visual Analogue Scale' (EQ5D-VAS), also known as health thermometer (EuroQol Research Foundation, 2016). EQ5D-VAS represents the perceived health status of the participant, which is measured on a scale of 0–100, 0 being the worst and 100 the best health state they can imagine (Warren et al., 2014).

**Table 3.1:** Total number of survey participants before and after data cleaning

| | Least deprived | | | | Most deprived | | | | Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total cases | %* | Complete data | | Total cases | %* | Complete data | | Total cases | %* | Complete data | |
| | | | Cases | % | | | Cases | % | | | Cases | % |
| Baseline | 439 | – | 356 | 81.1 | 397 | – | 377 | 95.0 | 836 | – | 733 | 87.7 |
| 6m | 286 | 65 | 257 | 89.9 | 229 | 58 | 220 | 96.1 | 515 | 62 | 477 | 92.6 |
| 12m | 260 | 59 | 238 | 91.5 | 218 | 55 | 205 | 94.0 | 478 | 57 | 443 | 92.7 |
| 18m | 234 | 53 | 214 | 91.5 | 176 | 44 | 155 | 88.1 | 410 | 49 | 369 | 90.0 |

*Note:* * The percentages (%) represent the percentage of participants retained in the study relative to the number at baseline.

Using eight questions that focus on the health status of the participants during the last four weeks, SF8 produces two health scores: physical health score (SF8-PCS) and mental health score (SF8-MCS) (Warren et al., 2014). However, in this chapter, the analysis is limited to SF8-PCS only and one of the linked studies has used the SF8-MCS (see Chapter Six, this volume). The scores for this measure ranges between 0 and 100: the higher the score, the better the physical health state.

### *Statistical analysis*

Multilevel modelling has been used as a way of determining the role of compositional factors, contextual factors and their interaction simultaneously (Curtis and Rees Jones, 1998; Duncan et al., 1998). MLM analysis was carried out to establish: (1) the magnitude of inequalities in general and physical health (as measured by EQ5D-VAS and SF8PCS); (2) the associations between compositional and contextual variables and the health outcomes; (3) relative explanatory contribution of the compositional and contextual variables and how this changed over time. The gap in the health outcomes between the participants from the most and least deprived LSOAs is labelled as 'Deprivation' in the results and tables.

Percentage reduction, percentage change for the specific model and percentage contribution of the categories of explanatory factors were computed for each health outcome as well as the indirect (interactive) contribution.

To explore the mean difference of the measures of health outcomes, multilevel models were applied. While doing so, age and gender were adjusted as the existing literature suggest a significant association of these factors with health inequalities (Graham, 2009) and it also controlled for the potential clustering within the LSOAs. The analysis started with the univariate analysis of the individual variables to filter out redundant variables (Hosmer et al., 2013; Agresti, 2015). Final models were obtained using likelihood ratio test to ensure no substantial information was lost due to variable selection (Verbeke and Molenberghs, 2000). The relative contribution of the variable categories was then calculated from the final model. Direct (sole contribution) and indirect (interactions) contributions of the explanatory variable categories were computed to explain the inequalities.

## Results

### *Baseline characteristics*

Table 3.2 shows the baseline socio-demographic information of the study participants that remained in the final analysis after excluding the missing data. These show that, in terms of gender, the sample has a higher proportion of women (60%) compared with the census data for Stockton for 2011 (51%). I also have an older population with 29% of the sample aged over 65 compared with about 16% in the 2011 census (ONS, 2013). However, in terms of socioeconomic status then the participants were broadly in keeping with the census as around 88% of households in the least deprived areas were owner occupied compared with 91% in the census. In the most deprived areas then 28% of the sample were owner occupiers compared with 38% recorded in the 2011 census. My modelling, therefore, adjusts for age and gender to take this into account. Table 3.3 shows the compositional factors. The

**Table 3.2:** Sociodemographic characteristics of the baseline sample

| | Number (%) | |
|---|---|---|
| **Variables** | **Least deprived** | **Most deprived** |
| **Age** | | |
| Under 25s | 15 (4.0) | 37 (10.4) |
| 25–49 | 130 (34.5) | 131 (36.7) |
| 50–64 | 110 (29.2) | 95 (26.6) |
| 65 and over | 122 (32.4) | 94 (26.3) |
| **Gender** | | |
| Male | 162 (43.0) | 146 (41.0) |
| Female | 215 (57.0) | 210 (59.0) |
| **Marital status** | | |
| Married | 221 (58.6) | 90 (25.3) |
| Single | 67 (17.8) | 142 (39.9) |
| Divorced | 39 (10.3) | 58 (16.3) |
| Widowed | 39 (10.3) | 41 (11.5) |
| **Ethnicity** | | |
| White | 360 (95.5) | 340 (95.8) |
| Asian or Asian British | 10 (2.7) | 0 (0.0) |
| **Self-reported general health** | | |
| Good | 280 (74.3) | 174 (48.9) |
| Fair | 79 (20.9) | 119 (33.4) |
| Bad | 18 (4.8) | 63 (17.7) |
| **Self-reported mental health problem** | 26 (6.9) | 43 (12.0) |

**Table 3.3:** Characteristics of the baseline sample: compositional characteristics

| **Material** | | |
|---|---|---|
| *Highest Educational Level* | | |
| Higher or first degree | 100 (26.5) | 17 (4.8) |
| Higher diplomas/A-levels or equivalent | 106 (28.1) | 39 (10.9) |
| GCSE or equivalent | 87 (23.1) | 138 (38.8) |
| Entry level/no formal qualifications | 84 (22.3) | 162 (45.5) |
| *Housing Tenure* | | |
| Own outright | 193 (51.2) | 61 (17.1) |
| Mortgage or loan | 138 (36.6) | 37 (10.4) |
| Rent | 44 (11.7) | 254 (71.3) |
| Live rent free | 2 (0.5) | 4 (1.1) |
| Household receipt of benefits | 266 (70.6) | 311 (87.4) |
| Household receipt of Housing Benefit | 16 (4.2) | 193 (54.2) |
| Workless household (at least one member out of work) | 142 (37.7) | 237 (66.6) |
| *Current job skill type* | | |
| Professional | 43 (11.3) | 10 (2.8) |
| Unskilled | 27 (7.1) | 42 (11.8) |
| *Work status* | | |
| Participant in paid employment | 183 (48.5) | 89 (25.0) |
| Retired | 142 (37.5) | 112 (31.4) |
| Unemployed* | 53 (14.0) | 156 (43.7) |
| Household annual income (mode) | £36400–£41600 | £10400–£13000 |
| Problems with damp in the home | 10 (2.7) | 94 (26.4) |
| Home is too dark | 31 (8.2) | 62 (17.4) |
| Home is not warm enough in winter | 27 (7.2) | 72 (20.2) |
| Home without double glazing | 6 (1.6) | 19 (5.3) |
| Own motor vehicle(s) | 353 (93.6) | 153 (43.0) |
| **Psychosocial** | | |
| Lacking companionship | | |
| Hardly ever | 286 (75.9) | 239 (67.1) |
| Some of the time | 70 (18.6) | 76 (21.3) |
| Often | 21 (5.5) | 40 (11.2) |
| *Feeling left out* | | |
| Hardly ever | 318 (84.4) | 249 (69.9) |
| Some of the time | 47 (12.4) | 66 (18.5) |
| Often | 12 (3.2) | 41 (11.5) |
| *Feeling isolated* | | |
| Hardly ever | 310 (82.2) | 255 (71.6) |
| Some of the time | 54 (14.3) | 60 (16.9) |
| Often | 13 (3.4) | 41 (11.5) |

(continued)

**Table 3.3:** Characteristics of the baseline sample: compositional characteristics (continued)

| **Material** | | |
|---|---|---|
| **Behavioural** | | |
| Respondents who smoke | 39 (10.3) | 132 (37) |
| Respondents who drink alcohol | 297 (78.8) | 210 (59.0) |
| Fruit/vegetable intake: average units (standard deviation) | 4 (2.0) | 2.8 (1.9) |
| *Frequency of physical exercise* | | |
| Every day | 113 (30.0) | 128 (36.0) |
| Most days | 65 (17.2) | 44 (12.4) |
| Couple of times a week | 78 (20.7) | 42 (11.8) |
| Once a week | 14 (3.7) | 15 (4.2) |
| Less than once a week | 13 (3.4) | 14 (3.9) |
| Never | 94 (24.9) | 113 (31.7) |

proportion of participants reporting housing issues was significantly higher in the most deprived areas (inadequate heating – 20% vs. 7%; dampness – 26% vs. 3%; darkness – 17% vs. 8%; and lack of double glazing – 5% vs. 2%). While smoking was more prevalent in the most deprived areas (37% vs. 10%), the use of alcohol was higher in the least deprived areas (79% vs. 59%). Table 3.4 presents the contextual neighbourhood-related factors reported by the survey participants from both areas. A higher proportion of participants from the most deprived areas reported noise problems (24% vs. 11%), pollution (13% vs. 3%) and crime (29% vs. 6%) in their neighbourhood. More than 12% of people from the most deprived areas felt unsafe walking alone in their neighbourhood after dark compared with less than 2% in the least deprived areas.

**Table 3.4:** Characteristics of the baseline sample: contextual factors

| **Variables** | **Number (%)** | |
|---|---|---|
| **Categories** | **Least deprived** | **Most deprived** |
| Problems with neighbourhood noise | 42 (11.1) | 85 (23.9) |
| Problems with pollution | 13 (3.4) | 45 (12.6) |
| Problems with crime | 24 (6.4) | 105 (29.5) |
| *Feeling unsafe walking alone after dark* | | |
| Very safe | 207 (54.9) | 107 (30.1) |
| Safe | 141 (37.4) | 132 (37.1) |
| Unsafe | 23 (6.1) | 73 (20.5) |
| Very unsafe | 6 (1.6) | 44 (12.4) |

## Stockton-on-Tees: the health divide

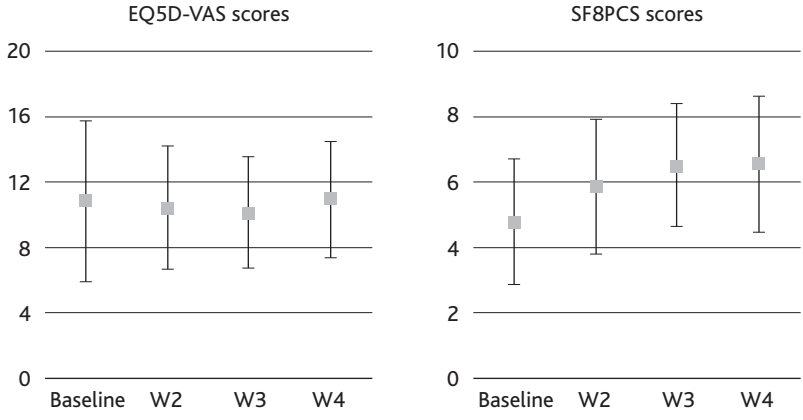
To explore the gap and relationship between area and the health outcomes, several multilevel models were fitted. Of the different models, the reference model (see Table 3.5) estimates the gaps in EQ5D-VAS and SF8PCS. For both health outcome measures and throughout the study period, there was a significant gap in physical and general health. People living in the least deprived areas had higher chances of having better general and physical health compared with those living in the most deprived areas. This supports the ongoing argument on the damaging effects of deprivation on people's health and wellbeing (Bambra and Garthwaite, 2015, Rahman et al., 2016, Stuckler et al., 2017).

Figure 3.2 shows the trend in estimated inequality gap in general and physical health between the areas. On average, people from the least deprived areas are likely to score more than 10 points higher on the EQ5D-VAS. Though no particular trend was observed with the general health measures, a steady increase in the gap between the two areas was observed with the physical health measure (SF8PCS). The estimate for SF8PCS increased from 4.76 (2.8, 6.73) during the baseline to 6.53 (4.42, 8.64) during the final wave, which is a 37% increase in the gap. When we correlate the findings presented in Table 3.4 and Figure 3.2, we can see that, over time, the people

**Table 3.5:** Trend of health inequalities in Stockton-on-Tees: estimates of fixed effects

| Health measures | Parameter | Estimate (95% confidence interval) | | | |
|---|---|---|---|---|---|
| | | Baseline | Wave 2 | Wave 3 | Wave 4 |
| EQ5D-VAS | Intercept | 71.85 (66.2, 77.47) | 77.37 (71.1, 83.65) | 77.02 (70, 83.33) | 76.91 (70, 83.72) |
| | Deprivation | 10.86 (5.89, 15.82) | 10.41 (6.57, 14.26) | 10.1 (6.69, 13.59) | 10.96 (7.38, 14.5) |
| | Gender | –0.14 (–3.15, 2.87) | 0.09 (–3.42, 3.59) | –1.93 (–5.44, 1.58) | –3.47 (–7.05, 0.12) |
| | Age | –0.15 (–0.24, –0.06) | –0.15 (–0.25, –0.04) | –0.1 (–0.20, 0.01) | –0.1 (–0.21, 0.01) |
| SF8PCS | Intercept | 54.1 (51.51, 56.78) | 51.1 (47.68, 54.4) | 50.3 (46.79, 53.86) | 50.36 (46, 54.38) |
| | Deprivation | 4.76 (2.8, 6.73) | 5.84 (3.71, 7.97) | 6.48 (4.55, 8.42) | 6.53 (4.42, 8.64) |
| | Gender | 0.99 (–0.56, 2.54) | 0.37 (–1.49, 2.23) | 0.90 (–1.07, 2.87) | 1.002 (–1.12, 3.12) |
| | Age | –0.17 (–0.2, –0.13) | –0.12 (–0.18, –0.07) | –0.11 (–0.17, –0.05) | –0.12 (–0.18, –0.05) |

**Figure 3.2:** Trend of estimated inequality gap in EQ5D-VAS and SF8PCS scores between most and least deprived areas with 95% confidence interval




from the most deprived areas are not doing as well in physical health measures as their counterparts in the least deprived areas.

These findings support the argument that during a time of austerity, inequalities in health get wider (Abebe et al., 2016; Barr et al., 2017; Stuckler et al., 2017). A study by Abebe et al. (2016) has found that there was a significant increase in poor self-reported health during the recession and after the welfare cuts in the UK and they have highlighted its role in widening health gap. Bambra and Garthwaite (2015) have suggested that during a time of austerity, spatial health inequalities will increase and this will disproportionately affect the older industrial areas such as Stockton-on-Tees. More recently, compared with the post-financial crisis period, the general health of UK has slowly improved, albeit this improvements has left a trail of inequalities, with the most disadvantaged groups lagging behind (Beatty et al., 2017).

### *Explaining the Stockton-on-Tees health divide*

After analysing the gap in general and physical health outcomes between the most and least deprived areas of Stockton-on-Tees, the next step was to explore the key compositional and contextual factors associated with this gap. Multilevel models were fitted for EQ5D-VAS and SF8PCS and for each wave. The associations between the health outcome measures and compositional and contextual factors are presented in Table 3.6. The relationship between health inequalities and the social determinants of health has been well established. This

**Table 3.6:** Association between health outcome measures and the explanatory variables (shaded blocks indicate the presence of significant association)

| Factors | Variables* | EQ5D-VAS | | | | SF8PCS | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | BL | W2 | W3 | W4 | BL | W2 | W3 | W4 |
| Material | Household income | ■ | | | | | | | ■ |
| | Household worklessness (Yes/No) | | ▒ | | | ▒ | | | |
| | Paid employment (Yes/No) | | | ■ | | | ■ | | |
| | Household benefits (Yes/No) | | | ▒ | | | | | |
| | Housing benefit (Yes/No) | | | | | | | ▒ | |
| | The house has double glazing (Yes/No) | | | | ■ | | | | |
| | The house is damp (Yes/No) | | | | | ▒ | | | |
| Psycho-social | Lacking companionship | | | ▒ | ▒ | | | | |
| | Happiness scale | ■ | ■ | | | ■ | ■ | | ■ |
| | Frequency of feeling left out | ▒ | ▒ | | | | ▒ | | ▒ |
| | Frequency of feeling isolated from others | | | ▒ | ▒ | | | ▒ | ▒ |
| Behavioural | Frequency of physical exercise** | ▒ | ▒ | ▒ | | ▒ | ▒ | | ▒ |
| | Alcohol use (Yes/No) | ■ | ■ | | ■ | | | | |
| | Alcohol Units | | | | | ■ | ■ | | |
| | Alcohol consumption above recommended limit (Yes/No) | | | | | | | ■ | |
| Contextual/ Neighbourhood | Feeling unsafe walking alone after dark (Yes/No) | ▒ | ▒ | ▒ | | ▒ | ▒ | ▒ | ▒ |
| | Neighbourhood noise (Yes/No) | ▒ | ▒ | | ▒ | ▒ | ▒ | ▒ | ▒ |
| | Pollution/Environmental problems (Yes/No) | ▒ | | | ▒ | | | | |
| | Neighbourhood crime (Yes/No) | | | | ▒ | | | | |
| | Belongingness to the area (Yes/No) | | | ■ | ■ | | | | |
| | Outdoor environment score-IMD | | | | | ▒ | | | |
| | Crime score-IMD | | | | | | ▒ | | |

*Notes:* * For the Yes/No response variables, 'No' was the reference group; **Daily exercise was the reference category

*Legend:* ■ Positive association ▒ Negative association

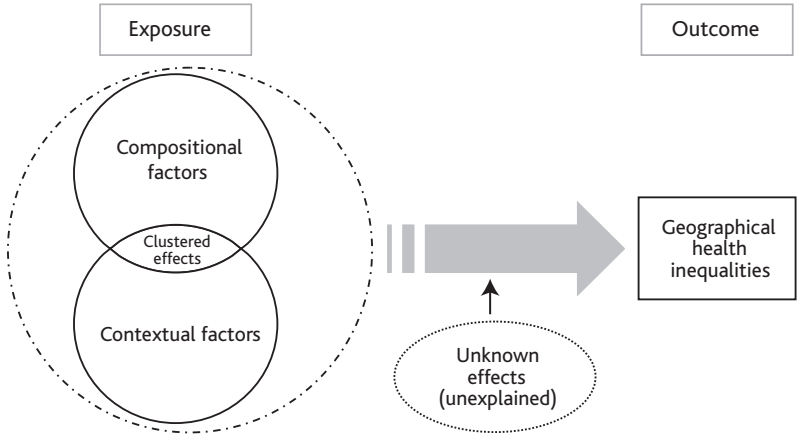
study adds to the substantial evidence on the role of individual/compositional (Marmot and Allen, 2014) and area level/contextual factors (Cummins et al., 2005) in creating the health gap. This was done by exploring the relative contributions of these determinants and further looking how this changed over time. Association between individual-level factors and health inequalities have been found which is consistent with previous research; for example, see Skalicka et al. (2009), Arber et al. (2014) and Pemberton et al. (2016).

Table 3.6 shows that having a higher household income, being in paid employment was positively associated with both the health outcome measures. Likewise, worklessness of an adult member, receipt of household and housing benefit were negatively associated with the health outcomes. Among the behavioural factors, people who are happier were more likely to have better general and physical health outcomes. However, frequency of feeling left-out, lacking of companionship and feeling isolated from others were all negatively associated with the health outcome measures. Compared with people who exercise daily, those exercising less frequently have lower EQ5D-VAS and SF8PCS scores. Interestingly, alcohol use was positively associated with the health outcome measures. People who felt belonging to their neighbourhood had better EQ5D-VAS scores (positive association). Feeling unsafe walking alone after dark, neighbourhood noise and pollution were all negatively associated with both EQ5D-VAS and SF8PCS scores. 'Crime scores' and 'outdoor living environment deprivation scores' (sub-domains of IMD) for IMD 2015 were significantly associated with lower SF8PCS scores.

The second part of model building process involved the exploration of the relative contribution of the variable categories from the final model. Direct (sole contribution) and indirect (interactions) contributions of the explanatory variable categories were computed to explain the inequalities. In this section, I will look into the percentage contribution of the various compositional and contextual factors to the health gap in Stockton-on-Tees borough, and explore who this contribution has changed over time. Figure 3.3 illustrates the approach.

Table 3.7 presents the standardised percentage contribution of the different categories to the gap in EQ5D-VAS. The percentage explanations of the final models were computed for each survey wave. Compared with the baseline survey, the percentage explanation of the health gap dropped in the subsequent follow-up surveys. The direct contribution refers to the unique share of a specific category in explaining the health inequalities gap. On the other hand, the indirect effect is the shared contribution of all the categories in explaining

**Figure 3.3:** Understanding geographical inequalities in health




the health gap. The relative contribution was computed from the percentage explanation of the full model and the percentage change for each model. The relative contribution of a category was calculated, which subtracts the percentage change of the model without this specific category from the percentage change of the full model. The indirect contribution or *clustering effect* was computed in which the sum of the percentage contribution of each category was subtracted from the percentage explanation of the full model.

For all waves and for both health outcome measures, clustered effects were high indicating the importance of interaction between the compositional and contextual factors in explaining the gap in physical health between the people living in the most and the least deprived areas of Stockton-on-Tees.

**Table 3.7:** Relative contribution of different categories standardised to the total explained percentage of the full model for the gap in general and physical health measures

| | EQ5D-VAS | | | | SF8PCS scores | | | |
|---|---|---|---|---|---|---|---|---|
| **Category** | **BL** | **W2** | **W3** | **W4** | **BL** | **W2** | **W3** | **W4** |
| All compositional | 57.8 | 35.1 | 52.7 | 68.6 | 46.6 | 25.7 | 54.2 | 54.8 |
| Material | 28.3 | 5.7 | 28.2 | 8.2 | 33.1 | 5.8 | 38.4 | 29.2 |
| Psychosocial | 1.0 | 14.9 | 14.4 | 28.9 | 0.4 | 11.4 | 4.3 | 0.8 |
| Behavioural | 6.0 | 9.9 | 2.4 | 28.5 | 5.1 | 0.3 | 8.1 | 15.8 |
| Contextual | 20.2 | 31.0 | 29.5 | 15.3 | 39.6 | 57.5 | 31.4 | 16.8 |
| Clustered | 44.6 | 38.4 | 44.6 | 19.1 | 21.7 | 25.0 | 17.9 | 27.5 |
| Total explained | 72.2 | 58.0 | 49.1 | 34.3 | 95.4 | 90.3 | 64.4 | 58.1 |
| Total unexplained | 27.8 | 42.0 | 50.9 | 65.7 | 4.6 | 9.7 | 35.6 | 41.9 |

## Discussion

The results show that the health gap in terms of physical health slightly increased over the 18-month study period while the gap in self-rated general health remained constant. Further, in terms of how different factors explained the gap, the results suggest that the contributions of the individual-level compositional factors were more pronounced than the neighbourhood-level contextual factors. For both health measures and for each wave, all compositional factors combined had significant direct contributions, which were higher than the contribution of the contextual factors, such as neighbourhood noise, pollution and crime. Among the compositional factors and in most of the cases, material factors related to income and employment status of the household (such as household income, paid job, worklessness within the household, dampness in the house and lack of central heating) were the most important predictors of the health gap.

These findings match the qualitative findings from other research from the UK (Egan et al., 2015; Moffatt et al., 2016). In keeping with Pevalin et al. (2017) I have found that persistent exposure to housing problems resulted in poorer health conditions and the exposure in the past could have health consequences in the present. Likewise, a study from Norway found that material factors were the most important compositional factors in explaining the inequalities in mortality (Skalicka et al., 2009). The important contribution of household income to the physical health inequalities is also demonstrated by Arber et al. (2014). With my research findings, I agree on the existence of a two-way relationship between worklessness and poor health. For example, a research conducted in England by Pemberton et al. (2016) found that the current labour market does not appropriately cater to the job needs of the people with existing health conditions, resulting in them staying out of the active labour market. Using data from population surveys for England, a study by Moller et al. (2013) has attributed higher prevalence of morbidity (mental health problems and limiting long-term illness) and mortality with rising unemployment. The gap in unemployment between the most and the least deprived groups increased in the UK following the financial crisis and I agree with the argument of Moller et al. (2013) that this difference has disproportionately affected vulnerable families and communities. Worklessness within the household affects individuals and their families (Bambra, 2011).

This means austerity may well exacerbate existing health inequalities. For example, in his report on austerity in Teesside, Edwards (2012)

highlighted a sharp rise and a high concentration of benefits claimants in the most deprived areas following the welfare cuts. The same report also highlighted the diminishing resources available to support the voluntary and community sector that are crucial in dealing with the issues (such as an increase in demand for advice and a penalty charge for 'under-occupation' also known as the 'bedroom tax') that can arise following dramatic welfare reform. The welfare changes mostly affected vulnerable families with low incomes, with members on out of work benefits, and/or who are long-term sick and disabled (Edwards et al., 2013). With more households from the deprived areas of Stockton-on-Tees facing economic hardships and the limited availability of collective resources and welfare support, the health of people from these households may suffer more, a concept known as *deprivation amplification*: area-level deprivation can amplify the health impacts of individual-level socioeconomic status (Macintyre, 2007; Bambra, 2016). The changing socioeconomic conditions of the households and that of the borough of Stockton-on-Tees as part of the welfare reforms when looked at in conjunction with the findings from my research could be correlated and used as an explanation of prevailing and/or widening health inequalities.

When compared with material and contextual factors, psychosocial and behavioural factors made relatively less contribution to the health inequality gap. Noticeably, people who had higher happiness scores were more likely to have higher scores for both health outcomes. These findings lend support to the argument of Friedli (2009) that happiness is a key element of general wellbeing. I agree with Veenhoven (2008) that happiness, as a compositional factor, is not just a predictor to better physical and mental wellbeing; it also has a strong correlation with contextual factors such as healthy living environment. Veenhoven (2008) further argues that happiness of an individual also depends on the wider socio-political context of the country – material wealth, political democracy, freedom and governance. Welfare reform and austerity were linked with a decrease in happiness score in Greece and Portugal (Blanchflower and Oswald, 2011), and as Veenhoven (2008) argues it is probable that the political context influences the happiness of individuals. Considering this alongside my findings that the average happiness scores decreased among the most deprived areas during the study period, I argue that the welfare cuts have negatively affected people's psychosocial wellbeing. Further, loneliness, which was assessed as feeling left out and/or isolated, was present in one or both forms in all the health inequalities models and made a significant negative contribution during each wave. These psychosocial factors

often affect health from a behavioural pathway, for example, Lauder et al. (2006) have found lonely people had higher odds of adopting sedentary lifestyles and smoking. This could be the case among my survey participants as well because relatively more people from the most deprived areas reported of feeling lonely and left out compared with those from the least deprived areas (12% vs. 3%). Likewise, smoking (37% vs. 10%) and people who never did physical exercise (32% vs. 25) were also more prevalent in the most deprived areas. In addition, frequency of physical exercise was significantly associated with all health outcome measures and during each survey wave.

Throughout the 18-month study period, it was found that the participants who did less physical exercise had a higher likelihood of poorer general and physical health, which is consistent with studies conducted in Spain, Switzerland and England (Chatton and Kayser, 2013; Galan et al., 2013; Maheswaran et al., 2013). As argued by Warburton et al. (2006), there is a two-way relationship between health outcomes and physical exercise: poor health outcome could be the cause or the consequence of less physical exercise. My research involved older population and their health conditions could have an impact on the frequency of physical exercise. However, my research was not designed to explore the frequency of physical exercise as an outcome measure. Consumption of alcohol was, however, positively associated with better health outcomes (participants consuming alcohol could expect to have better general and physical health), which is similar to the finding by Powers and Young (2008). The linked study of mental health outcomes (see Chapter Six), found a similar relationship and that people who had better mental health outcomes and who consumed alcohol did so while socialising with family and friends. I agree that the social aspect of alcohol consumption could have provided protective psychosocial roles in the overall health and wellbeing of the participants (for example via decreased loneliness). This finding, however, contradicts much of the existing evidence base on the detrimental long-term effects of alcohol consumption (Rehm, 2011) – particularly problematic or binge drinking. These behavioural factors were significantly associated with the health gap but their contributions were mostly smaller than that of material and contextual factors. This indicates that attempts to reduce health inequalities by concentrating on behaviour and ignoring other factors are unlikely to be the most efficient or effective.

My research is one of the few studies looking at the relative contribution of contextual factors to the health divide. Ross and Mirowsky (2008) have argued that to correctly infer the contextual

effects, multilevel modelling with adjustment of comprehensive individual characteristics is to be adopted in the study. People living in neighbourhoods where they felt unsafe walking alone after dark had higher chances of having significantly lower scores for both the health outcome measures included in this study. A longitudinal study conducted in Australia by Foster et al. (2016) has associated long-standing physical and mental health problems with the lower level of neighbourhood safety. The same study found a significant increase in recreational walking time with an increased perception of neighbourhood safety. I agree with Ruijsbroek et al. (2015) that the behavioural factors such as physical activities are often determined by contextual factors such as neighbourhood crime and feeling unsafe. Neighbourhood safety perception is a key feature of the contextual accounts of geographical health inequalities (Baum et al., 2009, Foster et al., 2016), with unsafe neighbourhoods particularly detrimental to people's general and physical health.

In my research, a higher proportion of survey participants from the most deprived areas reported the problems with pollution in their neighbourhood (12.6% vs. 3.4%) and neighbourhood noise (23.9% vs. 11.1%). The research findings suggest that the people living in areas with a higher level of neighbourhood noise and environmental problems can expect to have poorer physical and mental health outcomes. This is in keeping with a substantial body of literature which suggests an association between health inequalities and levels of outdoor air pollution (Marshall et al., 2009), with deprived areas being disproportionately and adversely affected. Marshall et al. (2009) has argued that neighbourhood pollution and environmental problems can have direct health impacts (cardiopulmonary morbidities such as chronic obstructive pulmonary disease – COPD) and indirect impacts through behavioural pathways (for example by limiting physical exercise). The disproportionate distribution of pollution and environmental problems between the most and the least deprived areas of Stockton-on-Tees could be linked to the health gap.

Most notably, though, this research shows the importance of the interaction of compositional and contextual variables, empirically supporting a relational view of health and place (Cummins et al., 2007). There were substantial indirect (clustered) effects for both health outcomes and for all waves, which is an indication of the interaction of the factors representing the different groups of explanatory variables. The clustered effects were as high as 44.6% for EQ5D-VAS (baseline and wave 3) and 27.5% for SF8PCS scores (wave 4). For both outcome measures, the combined analysis explains the highest percentage of the

health gap, which demonstrates the important interaction between the individual-level material and contextual environmental factors in causing the health gap. A study by De Clercq et al. (2012) among Flemish communities has revealed a complex interaction between individual material factors and the neighbourhood context to produce health inequalities. These findings lend support to the idea of the 'mutually reinforcing' nature of compositional and contextual factors, it also justifies the need of 'relational approach' in understanding the contribution of individual- and area-level factors (Cummins et al., 2007).

In this study, the secondary data sources used to measure context were based on fixed administrative boundaries and they had little influence on the health gap. However, the contextual factors from the survey measured at an individual level made a significant contribution to the health inequalities gap. This may be because individuals have relatively dynamic and fluid area definitions. They were not confined to the LSOAs of the study but to how participants viewed the relational structure of the neighbourhoods they felt that they belonged to and therefore there was variation by individual (Bernard et al., 2007; Horlings, 2016). This level of data is not usually available at a national or regional scale, which validates the relational approach that was adopted at a local level.

This survey started after the onset of austerity programme in the UK the timeline for the role-out of some specific welfare reform programmes are still underway. In this context, this study will be unable to show direct links of these programmes to health gap. It was, however, able to explore changes during the current period. While my research questions were concerned with the inequalities in general and physical health over time, I also wanted to explore if there was any link between austerity and the health gap. The longitudinal survey has highlighted the existence of a significant and almost constant gap in general health over time while the inequalities gap in physical health was increasing, with the most deprived areas having constantly declining average scores. There was a noticeable gap between the two areas for material and contextual factors: level of unemployment, not in paid jobs, receipt of benefits, worklessness in the household, housing tenure, household annual income, neighbourhood noise, neighbourhood pollution, crime and feeling safe walking out after dark. These findings add to the existing literature on how the global financial crisis of 2008 and the austerity that followed has caused, helped sustain or even widen the local inequalities in general and physical health (Nunn, 2016; Barr et al., 2017; Basu et al., 2017;

Ruckert and Labonte, 2017). Regarding the post-2010 period, Barr et al. (2017) have further argued that the increasing trend of inequalities is due to the 2008 financial crisis and resulting politics of austerity. As part of austerity, several large-scale health-promotion policies were reversed (Taylor-Robinson and Gosling, 2011; Barr and Taylor-Robinson, 2014; Loopstra et al., 2016) and the welfare sector received major budget cuts. Existing evidence suggesting that the impacts of welfare reform are more damaging to the poorest parts of society (Pearce, 2013), could be the explanation for the widening gap in physical health in Stockton-on-Tees.

## Conclusion

The work presented in this chapter contributes towards understanding the geographical health divide during the time of austerity. Exploiting the power of longitudinal data, this chapter has revealed the causal relationships between different compositional and contextual factors with the geographical health divide in Stockton-on-Tees. This research has shown the extent to which 'place' and its attributes matter for health inequalities; these contextual factors either contribute directly or interact with compositional factors in the creation of the health gap between the most and the least deprived neighbourhoods. The results presented in this chapter reinforce the need to understand composition and context of health inequalities from a relational perspective. The study has also found some damaging effects of austerity on physical health. Against a backdrop of continued austerity and further changes in welfare programmes (for example, the shift to universal credit), it is crucial that researchers and policy makers consider their adverse consequences for health and wellbeing.

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