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ABSTRACT

Previous studies have identified an area-level association between socio-economic deprivation and poorer population health. However, some recent studies have suggested that some areas exhibit better health outcomes than would be expected given their level of deprivation. This has been conceptualised in terms of 'health resilience'. This study is the first to explore area-level 'health resilience' at different geographical scales and by using mixed-methods. Regression Tree Classification was used to identify local areas (Local Authority Districts and Census Area Statistical Wards) in England that performed relatively well in terms of mortality (premature mortality 1998-2003) or morbidity (2001 Census measures of self-reported general and limiting long-term illness) despite experiencing long term deprivation (Townsend scores 1971-2001). Five Local Authority Districts (LADs) and 90 Census Area Statistical Wards (CASWARDS) exhibited 'health resilience' in terms of self-reported health, three LADs and 88 CASWARDS for limiting long-term illness, and three LADs and 62 CASWARDS for premature mortality. Potential mechanisms underpinning this resilience were explored using focus groups and in-depth interviews in one case study area in the North East of England. This suggested that for this case study area, place attachment, the natural environment and social capital may have played a role in mediating the detrimental health effects of long term deprivation. The study concludes by exploring the implications of these findings within the context of the study limitations and by outlining future avenues for research and policy.

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INTRODUCTION

There is a well-established geographical literature that demonstrates the area-level relationship between socio-economic deprivation and poorer population health (Townsend et al., 1988a/b; Phillimore, 1990; Carstairs and Morris, 1991; Congdon et al., 1997; Shaw et al., 1999; Mitchell et al., 2000). Within this field of research, particular attention has been paid to outlying cases, most notably those areas that have worse health than similarly deprived areas. The excess mortality in Glasgow (the so-called Glasgow effect) is an example (Sridharan et al., 2007; Shelton, 2009; Walsh et al., 2010; Popham and Boyle, 2011). More recently though, there has been an interest in those areas that exhibit better health outcomes than would be expected given their level of deprivation (Doran et al., 2006; Tunstall et al., 2007; Van Hooijdonk et al., 2007; Mitchell et al., 2009; Cairns et al., 2012). For example, Doran and colleagues (2006) found that life expectancy was negatively associated with deprivation across English local authorities, but they also identified some local authorities that had higher life expectancy than would be expected given their levels of deprivation. Similarly, Tunstall and colleagues (2007) examined mortality rates between 1981 and 2001 in 54 deprived parliamentary constituencies throughout the UK. They found that eighteen areas had lower mortality than would be expected given their levels of deprivation. This 'defying the odds' has been conceptualised in the literature as 'health resilience': the capability of communities *"to cope successfully (in terms of health) in the face of significant adversity or risk"* (Tunstall et al, 2007, p.337).

This study expands this new field by being the first to explore area-level 'health resilience' at different geographical scales and by utilising mixed-methods to identify resilient areas and explore potential underpinning mechanisms. The study thereby addresses some of the current limitations of area-level 'health resilience' research such as the uni-dimensional analysis of 'health resilience' (previous studies examine only one health outcome), the use of large geographical units (which potentially overlooks variations within these areas), and the limited use of qualitative research to explore why some deprived areas fare better than others. This study seeks to address these limitations and knowledge gaps by using quantitative methods to identify local areas at different scales (English Local Authority Districts and Census Area Statistical Wards) that performed relatively well in terms of mortality (premature mortality 1998-2003) or morbidity (2001 Census measures of self-reported general and limiting long-term illness) despite experiencing long-term economic deprivation

(Townsend scores 1971-2001). This is complemented by qualitative research to explore the potential mechanisms underpinning resilience in one case study area in the North East of England.

METHODS

This study adopted a mixed-methods approach, combining statistical area-level analysis with an in-depth qualitative case study. There were two phases to the research: (1) Quantitative identification of resilient socio-economically deprived areas in England using a multi-dimensional operationalization of 'health resilience' across different geographical scales; and (2) qualitative exploration of potential mechanisms underlying 'health resilience' in one case study area.

Phase One: Quantitative Identification of Resilient Areas

Geographical Units of Analysis

There are multiple levels of organisation that are important for the social determinants of health (DiezRoux, 2003). Conceptually, this means that since geographies have different social organisations operating at different levels which influence health outcomes and methodologically, altering spatial scales will determine variability in the outcome and therefore about the types of inferences that can be made (Diez Roux, 2003). Indeed, MacIntyre and Ellaway (2003, p.35) argue that 'If the study of neighbourhoods and health is to move forward ... it is crucial that we have better models and theories about how neighbourhoods may influence health and that we use them to determine the appropriate scale and type of area influence we wish to measure.'

Units at two geographical scales were therefore examined in this research: Local Authority Districts (LADs) and Census Area Statistical Wards (CASWARDs). LADs were examined as they correspond to the organisation of agencies responsible for covering many of the wider social determinants of health including housing, education, transport, leisure facilities, and social services. In addition, a more fine-scale approach was taken, which explored health outcomes and factors that may influence 'health resilience' in census wards. This approach allowed for the exploration of whether or not deprived LADs have better health outcomes because they have some health resilient smaller areas within their boundaries or because health is better for the whole LAD population. Conducting the analysis at a finer scale was also an appropriate methodological step since factors such as social

capital, which may buffer against deprivation effects by playing a mediating role, may be more evident at the local community level. There may be disputes over what constitutes a 'community' and notable reservations over definitions of communities that are bounded by geography (Cohen, 1985). However, while wards may not accurately reflect social 'communities' they are more likely to be socially homogeneous and meaningful areas than more extensive LADs. With this in mind, by examining CASWARDS as well as LADs the research sought to examine factors operating at different spatial levels.

In total, 354 LADs and 7,942 CASWARDS were examined in this research. There are 7,969 English CASWARDS in total but the City of London and Isles of Scilly CASWARDS were merged due to small population sizes and CASWARDS with populations below 200 in 1971, 1981, 1991 or 2001 were excluded. The mean number of households in the English LADs examined in this study was 57,770 compared to 2,570 in the CASWARDS. Pre-2009 local authority boundaries (from 2001) were used in this study since some LADs were merged in the 2009 local government reorganisation, influencing local geographies in the North East, the West Midlands and the South West. For example in the North East, the 2009 changes merged some former coalfield areas with distinctive socio-economic conditions into larger districts. This merging into larger units could mask variations between smaller communities and deprivation profiles might be hidden by the averaging of a higher number of households. Therefore, it was felt that pre-2009 boundaries were more appropriate for the purpose of this analysis.

Measure of Deprivation

Townsend scores were used to measure long-term socio-economic deprivation (Townsend et al., 1988a). These scores are created using four Census variables: percentage unemployed; percentage of overcrowded households; percentage non-home owners; and percentage non-car owners. Townsend scores are standardised with England as a reference group. The Townsend score was the preferred measure of deprivation as the scores are comparable over time unlike the Indices of Deprivation (Noble et al., 2004). The Townsend measure of deprivation is also useful when examining deprivation in small geographic units, such as wards.

However, data from successive Censuses are not directly comparable as geographic boundaries, including CASWARDS and LADs, are frequently revised. As such there were some difficulties trying to obtain data at consistent boundaries (1971 to 2001) at the ward level. Previous research has used the Geographically Converted Table (GCT) approach, which involves using postcode directories to link a source geography for which the data pre-exist to the target geography that will be examined (Norman, 2010). This study had access to previously calculated Townsend scores (1971-2001) using a GCT at the CASWARD level and the GCT outputs were obtained for this research. For LADs, the Linking the Censuses Through Time (LCTT) project was used as a straightforward comparison to previous Local Authority boundaries prior to 2001 and mapped onto older boundaries (<http://cdu.mimas.ac.uk/lct/>).

As this paper was interested in identifying areas with long-term as opposed to intermittent deprivation, areas which fell into the fifth quintile (worst 20%) for all four decades (1971, 1981, 1991 and 2001) were classified as persistently deprived.

Measures of Health

To enable a multi-dimensional analysis of area-level 'health resilience', three measures were selected to cover both morbidity and mortality: Self-reported general health, self-reported limiting long-term illness and premature mortality. The self-reported health and limiting long-term illness measures were obtained from the 2001 Census. General health was assessed using the following question: "*Over the last twelve months would you say your health has on the whole been... Good? Fairly good? Not good?*" This multinomial measure was converted into a binary variable: 'good' (good and fairly good categories) and 'not good' health. The dichotomous yes/no question on limiting long-term illness was worded as follows: "*Do you have any long-term limiting illness, health problem or disability which limits your daily activities or the work you can do?*" Five years (1998–2003) of premature mortality data were obtained from the Office for National Statistics (ONS). Premature mortality was defined as those who died below the age of 75 years. This age threshold was considered to be the most appropriate since life expectancy has increased and current estimates show that life expectancy is 82.3 years for females and 78.2 years for men (ONS, 2011). In addition, 75 years is favoured by the ONS after sensitivity analyses (Wheller et al., 2006). All health data were indirectly age and sex standardised using England as the reference population. A Standardised Mortality or Morbidity Ratio (SMR) of 100

is the average for England; an SMR above 100 is worse than the national average; and an SMR below 100 is better than the national average.

Statistical Analysis

Regression Tree Classification (RTC) is a decision tree methodology, also referred to as '*recursive partitioning*' (Lemon et al., 2003, p. 172). This was chosen as the appropriate statistical technique for this study since it is able to work with the concept of outliers – a key purpose of this study. RTC is able to identify such areas by dividing them into meaningful sub-groups. Within these sub-groups, areas can then be identified as outliers (either doing better or worse than might be expected given their levels of deprivation). The RTC method starts with a 'root node' and then recursively splits the data into 'child nodes'. The general idea is to find nodes with minimal within-variance, indicating homogeneous groups. Standardised residuals of <-1.96 were classified as *health resilient* areas (those with high levels of deprivation over time but better than expected health) with residuals of >1.96 considered to be *health underachievers* (low deprivation but worse than expected health). RTC is in principle very similar to multiple regression except that it does not enforce a linear relationship between the dependent and the predictor variables as it is a nonparametric statistical test. The analysis was conducted in the statistical software package, *R*. Arc GIS (v8.0) was used to present the data in thematic maps through a geographical examination of 'health resilience' versus those that were not found to be health resilient.

Phase Two: Case Study

Case selection

The case study area was selected as it was found to be a resilient outlier in premature mortality and limiting long-term illness in the statistical analysis outlined above. The case study ward is located in the former coalfield area of Chevington, in Northumberland, in the North East of England. The ward boundaries (as defined in 2001) encompass four distinct settlements: Hadston, Red Row, Broomhill (North and South) and West Chevington. Chevington fell into the previous Castle Morpeth local authority district, which is classified as a semi-rural 'town and fringe' by the Department for Environment, Food and Rural Affairs. Although Castle Morpeth is on average relatively affluent, Chevington shows a high concentration of deprivation.

A case study site in the North East of England was selected for two reasons: Firstly, previous qualitative research (Mitchell et al, 2009) into 'health resilience' in the UK conducted case study research in four regional settings: Wales, the West Midlands, the North West and London. Although they also identified some areas that were health resilient in the North East of England, they did not conduct any qualitative work in this particular region. Secondly, given that the North East of England has been found to have the worst health outcomes (as a region) in England (Marmot, 2010), it was felt that the identification of 'health resilience' in this region was important and warranted more in-depth research.

Focus groups and Interviews

Focus groups and in-depth semi-structured interviews were conducted. In total, 33 research participants took part in three focus groups and fifteen interviews. There were between four and nine participants in each focus group. Two focus groups were evenly split by gender whilst the third all-women. Ten men and eight women were interviewed. These focus groups and interviews took place over a six month period between May and October 2011. Focus groups lasted one to two hours and interviews lasted 25 to 90 minutes. Only one participant took part in both a focus group and interview. Participants were initially recruited via local organisation stakeholders from two community centres, a church, a local history group, and the area Sure Start centre. Subsequent recruitment was done via purposive snowballing with a focus on recruiting local residents of varying ages, length of residence, as well as gender. Focus group and interview discussions were recorded and transcribed verbatim by the researcher. Data were thematically coded and analysed using the Nvivo (Version 8) software package for qualitative research. In line with the ethical guidelines set out by the Economic and Social Research Council, written informed consent was obtained from all research participants prior to conducting the interviews and focus groups.

RESULTS

Statistical Analysis Results

Tables 1–3 and the corresponding regression tree classification diagrams (Figures 1–3) show that five LADs were identified as resilient in terms of 'not good' self-reported health, three were resilient for

limiting long-term illness, and another three were resilient in respect of premature mortality. These resilient LADs fall within the regions of London and the East of England only. The left-hand side maps displayed in Figures 4–6 show the limited geographical spread of ‘health resilience’ at the LAD level.

At the CASWARD level, 90 areas were found to be resilient for ‘not good’ self-reported health, 88 for limiting long-term illness and 62 for premature mortality (tables not shown). There was a more balanced geographical spread as shown in the right-hand maps in Figures 4–6. There were 36 areas identified as resilient for all three health measures. Many of the CASWARDS fall outside of the LADs found to be health resilient. Whilst there was some variation across the three health indicators, on average London had the most health resilient CASWARDS (77%), followed by the South East (7%), East of England (6%), North East (3%), Yorkshire & Humber (2%), East Midlands (1%), West Midlands (1%), South West (1%). There were no resilient areas identified in the North West for any of the health indicators.

Case Study Results

The case study was used to explore the potential mechanisms underpinning ‘health resilience’ in one particular resilient ward in the North East of England. For this case study area, three potential resources for ‘health resilience’ emerged: place attachment, social capital, and the natural environment.

Place Attachment

Place attachment has been defined as ‘an affective bond or link between people and specific places’ (Hidalgo and Hernández, 2001, p. 274). It refers to the emotional attachment acquired by individuals to their environmental surroundings which enables them to develop a strong sense of belonging, which is important for personal identity and emotional well-being. Place attachment, or sense of place, is increasingly being examined in relation to health and wellbeing with Eyles and Williams (2008), for example, arguing that it is vital for health at both the individual- and the community-level. Gesler’s (1991) *therapeutic landscapes* concept has also been instrumental in recognising that places and ‘rootedness’ are important for physical, mental and spiritual well-being (Gesler, 1992, p.738).

This was evident in the case study research with many local residents speaking about their attachment to the locality. For example, one of the focus group participants spoke of her reasons for remaining in the area all of her life and never wanting to move with reference to this idea of 'rootedness': "*We've got roots here and they're deep roots... If I go somewhere else I'm nobody*". (Anne, Local Resident, Focus group). She went on to discuss how the locality is almost an extension of herself, her identity, and the importance of this for her own wellbeing. Likewise, even amongst 'newcomers' to the area, there is a feeling of being more 'grounded' in this locality than others: "*I feel more grounded here than I have done I think in probably any other place I've lived actually*". (Rachel, Local resident, Interview). She links this to her health, stating that she feels that this has "*had a positive impact on my health*". This was echoed by others, for example local resident Derek commented in an interview that "*It is just a sense of belonging. I really feel this is where I belong (...)* *Not in a kinda parochial sort of way...but like sort of my heart is here*". Whilst not directly relating this to health, it may be argued that through this sense of belonging Derek was able to overcome hardship. At the time of interview, Derek's wife had recently left him and he states that the "structure" (family and friends in the local area) has helped him cope with this, otherwise he said he would have been "*sitting around*" and "*going mental*".

Participants partially linked this place attachment to the former coal mining industry that operated in the area:

I think, you know, wherever you go, whenever you go to a former mining community that there is always a strong sense of community because, you know, those people had to work together, support each other and protect each other. Because, well you know, when you're down the mines and you know it's about teamwork. (Michael, Parish Councillor, Interview)

"Everybody was close - everybody. I've never known a closeness like this anywhere". (Jim, Previous Resident, Interview)

Social Capital

The impact of social capital on health has received increasing interest among public health researchers in recent years (Kawachi et al., 2007). Social capital generally includes civic engagement and participation, local civic identity, solidarity, reciprocity, a sense of mutual obligation to help others as well as levels of trust in the community. 'Normative' social capital is expected to improve health through the encouragement of healthy behaviours; by enhancing access to facilities and activities that promote health; enhancement of self-efficacy and self-esteem; and, the reduction of anxiety and fear as a result of improved levels of trust in society (Curtis, 2010).

A strong sense of community was important to many of the local residents interviewed in the case study research. For instance, in a focus group at one of the community centres based in Chevington, it was reported that the local residents raise money through a weekly draw in order to have groups meet in the centre. They pay rent and find the funds to host such groups and meetings; when asked why they do this one of the residents responded as follows: *"This is 'cos we're like the old Drifters [miners] still trying to keep the community together"*, (Pauline, Local Resident, Focus group). There was also evidence of strong social ties and networks between residents with the majority of residents having extensive close social ties consisting of family and friends in the neighbourhood: *"That fascinated me when I came here. They all had their relatives across the corner; across the road. It was amazing; they had this great network of people"*, (Dorothy, Mother's Union Leader, Focus group). This social support was highly valued especially as local community facilities and services were limited. One resident explained how the local Sure Start centre had its funding cut so it could no longer supply child care services. This meant that she would be at a loss without the help of her family: *"If I was stuck and if I didn't have my family around then I would have had nothing"* (Laura, Local Resident, Interview). Similar narratives prevailed with regard to social support for shopping. For example, Mick heavily relies on his daughters for transport: *"the daughters picks us up every time"*. Additionally, others depended on social support for coping with debilitating health problems, or caring for spouses with such health problems. Doreen, for instance, cared for her husband who had been unwell for over four years. She says that her son helps her two to three times a week and *that "a friend who lives across comes and helps Gordon [husband] with the garden"*. Narratives such as these suggest that community social capital may mediate the effects of the social determinants of health.

Natural environment

Conceptually, geographical research draws on biophilia, topophilia and therapeutic landscapes to explain the connections between health and the natural environment. Biophilia theory argues that *“our response to nature today is influenced by universal, inherited human characteristics, which would have conveyed primeval evolutionary advantages for the human species”* (Curtis, 2010, p.38). Subsequently, humans have preferences for natural settings which offer *“resources for life and protection”* (ibid.). Topophilia literally means love of place. Tuan defines it to include ‘all of the human being’s affective ties’ (1974, p. 93) with the environment. Similarly, the therapeutic landscapes literature considers the natural environment (natural surroundings, such as nature, water, and fresh air) to have curative properties.

The natural environment emerged as another aspect of Chevington that was prominent in the minds of local residents when considering their health and wellbeing. This is related to the nostalgia of the past and local heritage, the therapeutic element of being around nature, and their sense of belonging and place attachment as already discussed. The North East region is home to many national parks, national trails, and heritage coastal sites. Northumberland has many local nature reserves, conservation sites and public bridleways. More specifically, the locality of Chevington is surrounded by countryside with public access, there is a country park - Druridge Bay which was restored from an old opencast mine- and the coast is nearby. Some narratives relating to significance of these natural surroundings to the wellbeing of local residents are presented below.

“The beach is something that I certainly use quite a lot and being able to get to the coast is very important. For playing around or chilling out; it allows you to escape. It’s not only health as in fitness and exercise but also freedom and being able to relax is very important.” (Daniel, Local Resident, Interview)

“A lot of people go there[Druridge Bay Country Park] ‘cos they’re going back home; they’re going to the Drift... Like I go to the beach via the road, which I still call the Drift road, ‘cos they put a road back in to get to the beach.” (Anne, Local Resident, Focus group)

“I mean you look at the pitmen [miners] painters and artists in the area and they proved that just because you’re from this area you can understand art and you can understand this closeness between nature and the people. Sometimes the local people might not understand or know why there is a closeness but there is a closeness.” (Jim, Previous Resident, Interview).

DISCUSSION

This mixed-methods study has expanded the literature on area-level ‘health resilience’ by identifying resilient areas at different geographical scales, by using a multi-dimensional operationalisation of ‘health resilience’ and by exploring potential underpinning mechanisms via case study research. The study has thereby addressed some of the existing limitations of area-level ‘health resilience’ research (uni-dimensional analysis of ‘health resilience, analysis limited to large heterogeneous geographies, and limited qualitative research). The statistical analysis identified a number of health resilient areas in terms of morbidity and mortality at both LADs and CASWARD levels in England. Considerable local variations in the relationship between health and deprivation were identified with many of the resilient CASWARDS falling outside of the resilient LADs. Such small-scale geographies were ignored by previous research that has focused solely on large, heterogeneous geographies (Doran et al., 2006; Tunstall et al., 2007; Mitchell et al., 2009; Cairns et al., 2012). The study has thereby reinforced the importance of scale in health geography (MacIntyre and Ellaway, 2003). The identification of small-scale geographies that exhibited ‘health resilience’ also enabled the execution of in-depth qualitative case study research in one resilient CASWARD area.

The case study findings suggested some possible mechanisms, most notably place attachment, social capital and access to the natural environment, that may underpin ‘health resilience’ in one particular locality. Whilst acknowledging that these findings are explorative and relate to only one resilient case study area, they are reinforced by other empirical studies that have examined the determinants of area-level health. In terms of place attachment, a study by Theodori (2001) examined

the effects of community satisfaction and attachment on individual wellbeing. It found that levels of community satisfaction and place attachment were positively associated with perceived wellbeing. Another study by Wiles and colleagues (2009) concluded that place attachment was a significant factor for increased wellbeing amongst older adults. There is a large literature on the importance of social capital for health with most studies finding a positive association across a range of health indicators including self-rated health (Kawachi et al 1999), mortality (Lochner et al 2003) and mental health (Whitley and Prince, 2005; Kawachi and Berkman, 2001). Social capital is also considered to be a mediator of the area-level relationship between inequality and health (Cattell, 2001; Wilkinson, 1999 and 1996). The positive health effect of the natural environment is most evident in the green space literature. Here studies have found a fairly consistent relationship between access to green space and better health and wellbeing (Mitchell and Popham, 2007 and 2008). For example, Mass et al (2006) found that those residing in 'green areas' reported less poor health than those with 'less green' surroundings. Access to a garden or living only a short distance from green spaces are also associated with lower levels of stress and a decreased likelihood of obesity (Nielson and Hansen, 2007). Research also indicates that place can impact on health by attention restoration, stress reduction and/or evocation of positive emotions (Abraham et al, 2010). Furthermore, the case study results presented here for the North East of England are in keeping with the findings of other case studies of 'health resilience' conducted by Mitchell and colleagues (2009) in four other British regional settings: Wales, the West Midlands, the North West and London. They found that community cohesion (derived from a common industrial heritage) and supportive social networks were among the strongest themes to emerge from these case studies (Mitchell et al, 2009). Some participants also referred to the quality of the natural environments including access to the countryside.

In terms of policy and practice, this study suggests that there is a need for policy makers to take a more localised and targeted approach to tackling area-level health inequalities in England, as there are fine-scale local health variations within LADs. For areas where there are local protective resources, such as those identified in this paper, that may buffer against the ill health effects of deprivation. These need to be harnessed and the local communities supported in using these assets to further enhance health and wellbeing. In England, the responsibility for public health has shifted into

local authorities and this may enable a more localised and joined up approach to area-level health inequalities to be taken. Further research into 'health resilience' can only help this process.

The study is of course subject to a number of limitations. 'health resilience' has been examined using a particular statistical method and as such other resilient areas may have been identified if a different method was used or if different health outcome indicators were chosen. However, the RTC method used in this paper has many benefits in terms of classifying areas into meaningful and homogeneous groups and then identifying outliers. The advantage of using a case study area is that nuanced understandings of the potential mechanisms underpinning population health can be developed. However, this study does not claim generalizability as it is possible that the resources identified in this particular area are unique to this area and may not play out in the same way an area with a different socio-historical context or a more urban geography. Further, it is possible that deprived areas with similar levels of place attachment, social capital and access to the natural environment may not exhibit 'health resilience'. The case study research was exploratory rather than definitive and it is clear that future comparative case research into different resilient areas is required to more fully identify common mechanisms underlying 'health resilience'. The findings do, however, complement previous case study findings conducted in diverse regional settings.

CONCLUSION

This study has used mixed-methods to identify and explore underlying processes of 'health resilience'. Firstly, quantitative research was used to identify a number of 'health resilient' areas in terms of morbidity and mortality at different geographical scales in England. It has reinforced the importance of scale in health geography. The study has also explored what is potentially protective for health in one of these resilient areas via an in-depth qualitative case study of a ward in the North East of England. This suggested that place attachment, the natural environment, and social capital may be mediating factors in this particular area in weakening the conventional area-level relationship between deprivation and health. The study acknowledges the limitations of the case study approach and argues that further qualitative research is needed to examine the generalizability – or not - of these indicative findings in areas with different demographic, social, cultural and historical contexts. Future

research should also examine whether these features (place attachment, social capital and natural environment) are present in non-resilient areas. This study adds to the emerging 'health resilience' literature by highlighting the importance of scale, identifying a wider range of resilient areas by using multiple health indicators, and by suggesting some potential protective factors in one specific case study area.

Ethical Approval

Ethical approval was obtained from Durham University's Department of Geography Research Ethics Committee.

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