Mapping the Characteristics of Residents Using Temporary Housing on Lincolnshire's East Coast and their Exposure to Risk Factors for Type 2 Diabetes

Report to the National Institute for Health Research Clinical Research Network East Midlands

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Executive Summary

INTRODUCTION

In the UK, approximately 17% of the population reside in coastal areas. Coastal communities are increasingly being identified as areas of growing risk for poor health and social outcomes. A recent report by the Chief Medical Officer highlights the unique health challenges faced by people who reside in coastal areas and Lincolnshire's coastal communities, particularly the towns of Mablethorpe and Skegness in the district of East Lindsey, are amongst the most deprived in the country.

An important subgroup of Lincolnshire's coastal communities are residents using 'temporary' housing (RUTH). Historically the coastal community has hosted a large number of caravans, chalets and other forms of temporary housing to accommodate large numbers of holiday makers. Over time the quantity and quality of this accommodation has changed and there has been an increase in the number of people choosing to use this housing option as a long-term residence. This has resulted in the emergence of what we might call long term RUTH.

Little is known about RUTH in the UK. Anecdotal evidence suggests that a significant proportion of long-term RUTH do not connect with local health and social care services (including registration with general medical practices) but have high health and care needs; they are older, present with multiple chronic health conditions and high levels of limiting long-term illness and disability. These characteristics increase their risk for developing type 2 diabetes or for poor control and management of existing diabetes. Undetected or uncontrolled type 2 diabetes generates significant cost pressure for health services and causes premature death, healthy life expectancy and long-term disability.

This project was funded by the National Institute for Health Research (NIHR) Clinical Research Network (CRN) East Midlands to conduct scoping work with Lincolnshire's East Coast RUTH community who are potentially at risk of type 2 diabetes but experience inequity of access to diabetes prevention and management services. The work supports engagement with RUTH through three connected work packages. The first work package, which is the focus of this report[1] involves mapping the numbers, demographics and geographical distribution of RUTH as well as their likely health needs related to diabetes prevention and management.

This first part of the research was **to quantify and document the extent of the RUTH population on the East Coast of Lincolnshire and their exposure to type 2 diabetes.**

To meet this aim we asked the following question(s):

Research Question 1: What is the geographical distribution of RUTH?

Research Question 2: What are the general characteristics and demographics of RUTH?

Research Question 3: What are the area-based indicators for type 2 diabetes risk where RUTH populations live?

[1] *The commencement of work package two will be dependent on government guidance and advice in relation to the global Covid-19 pandemic. Finally, work package three will contribute to the development of an NIHR research proposal to implement culturally appropriate diabetes interventions and to assess their potential for implementation elsewhere.*

METHODS

The data came from two main sources (1) The Office for National Statistics (ONS) and the (2) Consumer Data Research Centre (CDRC). Where the ONS data required were not publicly available a request was submitted to the ONS Census Commissioning Tables Team. All datasets provided were anonymised with no identifiable individual level information.

We used data from a range of areas across Lincolnshire County, North Lincolnshire, and North East Lincolnshire (Greater Lincs). This was to allow for comparison across different geographies (coastal and inland), as well as, with a view to increasing our total RUTH sample size. In addition to Lincolnshire, we report on data from King's Lynn and West Norfolk (West Norfolk District) where there is a substantial RUTH coastal population.

Our analysis and interpretation of the findings focuses on Lincolnshire's East Coast (Lincs Coastal Strip), specifically within the district of East Lindsey, although where appropriate, we have identified some of the differences and similarities that occur across the entire study area.

All statistical analyses were performed using R software (Ver 3.6.3).

The study was given a favourable ethical opinion on the 27th October 2020 by a Research Ethics Committee (REC) from the University of Lincoln (Ethics Reference 2020_3812).

RESULTS

Where is the geographical distribution of RUTH?

- East Lindsey is home to the highest proportion of RUTH across Lincolnshire County where they represent 1.3% of the population in that district.
- Half of RUTH reside in an urban area which is similar to the general population.
- RUTH tend to be highly concentrated in specific small geographic areas, notably, coastal areas close to Mablethorpe and Skegness although they are also present to a lesser extent in inland locations across Lincolnshire.
- Caravan parks are most prevalent in coastal areas of East Lindsey and a considerable number of new caravan park licences have been issued since 2011.

What are the general characteristics and demographics of RUTH?

- RUTH are much older than the rest of the population.
- The greater proportion of older RUTH could help explain the higher percentage of non-professionally active and higher proportion reporting poor health status or daily activities limited.
- Age differences with the general population varied depending on the area with a higher proportion of older RUTH in inland Lincolnshire.

- A significant proportion (33.6%) of the RUTH community were classed as economically active. However, they were twice as likely to experience unemployment compared to the rest of the population.
- Coastal areas were characteristic of the highest in-migration rates of RUTH.
- RUTH live in accommodation with a smaller number of rooms and bedrooms and are more likely not to have central heating in their home.

What are the area-based indicators for type 2 diabetes risk where RUTH populations live?

- Lincolnshire's East Coast is comprised of Lower Layer Super Output Areas (LSOAs)with high levels of deprivation of income, education/skills attainment, and employment.
- Communities located along Lincolnshire's East Coast have high levels of illness and disability relative to other communities at county and national level.
- The physical and social environment present a combination of risk and protective factors for type 2 diabetes.
- Access to health services is poor on Lincolnshire's East Coast although this is a similar trend across much of Greater Lincs.
- Collectively these findings suggest that there are elevated area-based risk indicators for type 2 diabetes in the Lincolnshire East Coast region.

CONCLUSION

This study addresses a research gap among RUTH populations by presenting findings from the first group-based analysis of RUTH using ONS 2011 census data. The findings from this report suggest that RUTH could be at higher risk for diabetes because of their characteristics (i.e., older population, poor reported health status and limited daily activities) and the place they live, mainly Lincolnshire's East Coast, which presents with elevated area-based risk indicators for diabetes.

Because of a lack of available data sources targeting specifically RUTH populations, our study gives a broad overview of type 2 diabetes risk among RUTH and may lack some precision. Further quantitative and qualitative data collection with RUTH is warranted to gain an in-depth understanding of their likely health related needs that can then be used to develop and implement culturally appropriate health interventions with coastal communities.

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1 INTRODUCTION

1.1 Coastal Communities

In the UK, approximately 17% of the population (~11 million citizens) reside in coastal areas (Zsamboky et al, 2011). Coastal communities are increasingly being identified as areas of growing risk for poor health and social outcomes (Bird, 2021; Depledge et al, 2017). A recent report by the Chief Medical Officer highlights the unique health challenges faced by people who reside in coastal areas (Department of Health and Social Care, 2021). In part, this is due to characteristics of coastal places that make them vulnerable to changes in socio-demographics and the broader economic and fiscal policy climate. However, not all coastal communities are the same. Some have experienced major shifts in economies and industries resulting in damaging social change. Others have been insulated by large core populations and well-established infrastructure or have been able to diversify and adapt (Depledge et al, 2017). Despite this observed variation between and within coastal communities most economic, health and prosperity indicators show a significant (and widening) gap between non-coastal and coastal communities as a whole.

Coastal communities, like rural communities tend to have an older population when compared to national figures (Bird, 2021; Department of Health and Social Care, 2021). Age differential migration in and out of these areas (i.e., older people arriving and young people leaving) sustains this trend and means that the population over 65 will grow more rapidly in coastal communities than in urban areas. Disadvantaged coastal communities also have higher levels of economically inactive adults or those with limiting long-term illness and disability. There is also some evidence that in-migration of disadvantaged or vulnerable groups into smaller coastal communities is occurring, contributing to challenges in these places (Beatty et al, 2011a).

Communities with ageing populations and significant groups of disadvantaged people should be supported with well-resourced health and social care systems and structures. Unfortunately, the characteristics of the places that most need good investment act as barriers to attracting health and social care professionals to disadvantaged communities and to creating and maintaining health promoting environments. It is unsurprising therefore that coastal communities are disproportionately represented among areas with the worst health outcomes and quality of life measures.

Lincolnshire's coastal communities particularly the towns of Mablethorpe and Skegness in the district of East Lindsey, are amongst the most deprived 10% of neighbourhoods in the country (Lincolnshire County Council, 2019). Furthermore, in the east of the county, life expectancy is lower than the England average and obesity prevalence is amongst the highest in the county as well as significantly above the national average (Lincolnshire County Council Public Health Intelligence Team, 2013). Prevalence of diabetes, cancer, coronary heart disease and stroke are all higher than the national average (Lincolnshire County Council Public Health Intelligence Team, 2013).

Despite these significant challenges facing disadvantaged coastal communities there are many positive things that should be considered assets and could be positively leveraged for local solutions (Gascon et al, 2017). What is required is a place-based approach to 1) identify and prioritise community needs and then 2) work in partnership with community members to identify community assets and navigate contextual barriers and limitations to develop solutions.

1.2 Residents Using Temporary Housing 'RUTH'

An important subgroup in of Lincolnshire's coastal communities are residents using 'temporary' housing (RUTH). Historically the community has hosted a large number of caravans, chalets and other forms of temporary housing to accommodate large numbers of holiday makers. Over time the quantity and quality of this accommodation has changed and there has been an increase in people choosing to use this housing option as a long-term residence. Together these trends have resulted in the emergence of what we might call long-term RUTH.

There is an ongoing tension between the requirements of the regulations governing residency and the desire by RUTH to remain onsite for most or all of the year. A caravan park's period of occupancy is determined by a local authority and varies greatly across the country. As a result, many RUTH may be motivated to avoid identifying as such for various reasons. In relation to the focus of this study there are two major issues that arise from this.

Firstly, RUTH may not connect and/or engage with local health services (Zennor and Allison, 2010). This means that ongoing support and monitoring of people with risk of developing illness, or who have existing long-term conditions is missing or at best episodic and inadequate. The limited formal evidence that exists combined with local 'intelligence' suggests that the population is largely older and has higher rates of illness and disability placing them at high risk of developing type 2 diabetes or living with unmanaged diabetes. This will result in reduced quality years of life and may increase the burden on communities and health systems. Acute or episodic presentation at General Practice (GP) services by individuals with multimorbidity and more advanced sequalae of unmanaged health conditions contributes further to the complexity of disease management. This reinforces the view that RUTH could be potentially sicker, poorer and less health-literate than other residents – this in the context of an already older and less well general population.

A second related issue identified by Beatty et al (2012) is that population data drives funding formulae for local services including primary care services. Unrecorded residents result in loss of income and this subsequently impacts on the ability of local services to respond to demands. In turn, RUTH who are not identified as permanent residents through official processes are often described in negative terms by people in the community and authorities. This gives rise to the perception that RUTH add an additional burden to already stretched social and healthcare services or create health and safety risks related to their place of residence (low cost and substandard housing). This further reduces the likelihood that effective prevention or disease management can occur.

Despite these significant issues little is known about RUTH in the United Kingdom. We were able to locate only a few publications that were specifically focussed on RUTH and several others that included some information that could contribute to a description. Internationally there is literature on caravan and mobile or 'manufactured' home residents in the United States and Australia. The cultural and regulatory context is somewhat different in these countries although some comparison is possible. In Australia, the focus for much of the literature is largely one of homelessness, housing stress and crisis housing with the Victorian Committee of Review on Long-Term Residency in Caravan Parks (1983) finding that long-term RUTH suffered from discrimination and unclear legal status.

Very little research directly focussed on British caravan park residents has been undertaken with just two published studies in 2010 and 2011. Both studies were cross sectional self-report surveys of residents in communities in England.

The first study by Zennor and Allison (2010) was conducted to assist in health service planning and sampled caravan residents in the East Riding region of Yorkshire who were registered with a GP. The

self-completion postal survey was similar to the Office for National Statistics (ONS) decennial census questionnaire and also collected demographic data, questions on self-rated health status, smoking, alcohol use and obesity. In addition, two targeted health areas (falls and chronic chest problems) were surveyed. The results indicated high rates of poor health and limiting long-term illness amongst long-stay caravan communities when compared to regional and national data.

The second study by Beatty et al (2011b) had a different focus and was commissioned by the East Lindsey District Council to quantify 'long-term' residents and assess their understanding of their flood risk and preparedness. Face-to-face semi-structured interviews were conducted across twelve park sites in the area. Although the focus was not on health some items were included relating to self-reported health status and wellbeing. Their respondents mostly reported their health as 'good' or 'fairly good' and 31% reported as having at least one person with a long-term illness or disability and some households had two or more people with these problems, although this was not surprising given the older age profile of these communities.

1.3 Purpose of the Research

This project was funded by the National Institute for Health Research (NIHR) Clinical Research Network (CRN) East Midlands to conduct scoping work with Lincolnshire's East Coast community who are at risk of type 2 diabetes but experience inequity of access to diabetes prevention and management services.

Diabetes is now one of the leading causes of death worldwide (Glovaci et al, 2019) and accounts for a large proportion of the UK health budget. It can lead to serious health problems, disability and reduced quality of life years if the condition is not managed well. The Global Burden of Disease study (GBD, 2017) shows that it makes a significant contribution to burden of disease in Lincolnshire. General practice data from 2017/18 indicates that 7.8% of the Lincolnshire adult population are on the diabetes register and with the highest prevalence (8.9%) in the Lincolnshire East region (PHE, 2018). It is estimated that a further 12.4% (75,506) of adults in Lincolnshire have non-diabetic hyperglycaemia (pre-diabetes) and are at risk of developing Type 2 diabetes as well as other cardiovascular conditions (Lincolnshire Research Observatory, 2019).

There is variation in diabetes distribution across the county, with the coastal areas of East Lindsey and South Holland (East Coast communities) experiencing higher rates than the rest of Lincolnshire. Notably, the town of Mablethorpe and the villages of Sutton-on-Sea, Chapel St Leonards and Ingoldmells, all coastal areas within East Lindsey district, have been identified as some of England's diabetes 'hotspots' (Baker, 2017). As with other long-term conditions, poverty, structural economic, demographic and lifestyle factors significantly increase risk for type 2 diabetes in these areas (Joint Strategic Needs Assessment for Lincolnshire, 2017).

The overarching aim of this work is to understand the characteristics of so called, 'marginalised communities' residing in temporary housing experience that may influence both experience of type 2 diabetes and their connection with local health services and support. The research supports engagement with RUTH through three connected work packages. The first work package, which is the focus of this report, involves mapping out the extent of RUTH and their likely health needs related to type 2 diabetes prevention and management. The commencement of work package two will be dependent on government guidance and advice in relation to the global Covid-19 pandemic. The team will work with the funder to determine when it is appropriate and safe to proceed with work package two which aims to explore the findings from work package one with RUTH through the active development of partnerships with local groups. Finally, work package three will contribute to the

development of an NIHR research proposal to implement culturally appropriate diabetes interventions and to assess their potential for implementation elsewhere.

1.4 Research Question(s)

The primary aim of work package one was **to quantify and document the extent of the RUTH population on the East Coast of Lincolnshire and their likely exposure to the risk and protective factors related to type 2 diabetes.**

Furthermore, in order to guide our work, work package one aimed to answer the following research question(s):

Research Question 1: Where is the geographical distribution of RUTH?

Research Question 2: What are the general characteristics and demographics of RUTH?

Research Question 3: What are the area-based indicators for type 2 diabetes risk where RUTH populations live?

2 METHODS

2.1 Study Setting

The primary focus of this study is Lincolnshire's East Coast (Lincs Coastal Strip), however we used data from a range of geographies across Lincolnshire County, North Lincolnshire, and North East Lincolnshire (Greater Lincs). This was to allow for comparison across different geographies (coastal and inland), within the same Local Authority area and also increase our total RUTH sample size. Furthermore, we report on data from King's Lynn and West Norfolk, a coastal area located in the south of Lincolnshire, where there is a substantial RUTH coastal population (West Norfolk district).

The Lincs Coastal Strip of the East Lindsey district is home to several seaside towns and villages such as Mablethorpe, Sutton-on-Sea, Chapel St. Leonards and Ingoldmells. To the south of the district is Skegness which is the largest town in East Lindsey.

Within East Lindsey there is a considerable concentration of caravan sites and park homes with 260 sites and approximately 37,000 caravans in the area[2]. There are two types of site licence, one for holiday parks and another for residential mobile home sites.

Our analysis and interpretation of the findings focuses on the Lincs Coastal Strip, although where appropriate, we will highlight some of the differences and similarities that occur across the entire study area.

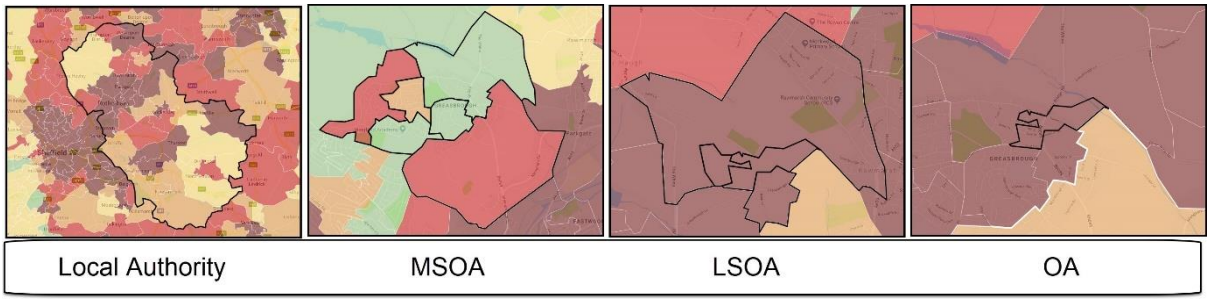
2.2 Data Sources and Formats

The data used for this report are drawn from two main sources (1) The Office for National Statistics (ONS) 2011 Census Data[3] and the (2) Consumer Data Research Centre (CDRC)[4]. Where the ONS data that the team required were not already publicly available, a request was submitted to the ONS Census Commissioning Tables Team. All datasets were anonymised with no identifiable individual level information.

To allow for mapping of the distribution of population level data, the UK is divided into standardised geographic areas of varying scales (see Figure 2.1). At a smaller scale, each postcode can be linked to an output area. Each area of a given geographic scale remains homogeneous in terms of the total number of individuals (see Table 2.1).

[2] *Email correspondence from East Lindsey District Council Environmental Health Team on 26 May 2021.*
[3] *Office for National Statistics (ONS) website. 2011 Census data catalogue. Accessed on 20 May 2021. Available at https://www.ons.gov.uk/census/2011census/2011censusdata/2011censusdatacatalogue*
[4] *The CDRC is the UK's leading consumer data source and part of the ESRC's Big Data Programme. Accessed on 4 October 2021. Available at https://data.cdrc.ac.uk*

Figure 2.1 Differences between Statistical Geographies[5]



Note: Each image is not to scale. These images show how Output Areas (OA) nestle within Lower Layer Super Output Areas (LSOA) and within Middle Layer Super Output Areas (MSOA).

Data at this scale are available from the ONS, however; Lower Layer Super Output Areas (LSOAs) and Middle Layer Super Output Areas (MSOAs) remain the two widely used scales as they offer a good compromise between accuracy and confidentiality (obtaining or providing data at a lower scale increases the risk of individuals being identified). For this reason, we chose to work with LSOAs and, when LSOAs were not available, MSOAs. This approach allowed the synthesis of other data sources, such as the CDRC data which is provided at LSOA and MSOA level.

Table 2.1 Lower and Upper Thresholds for Area Types in England and Wales[6]

	Lower threshold		Upper threshold	
Area type	**People**	**Households**	**People**	**Households**
Output Areas	100	40	625	250
Lower Layer Super Output Areas	1,000	400	3,000	1,200
Middle Layer Super Output Areas	5,000	2,000	15,000	6,000
Electoral wards/divisions	100	40	n/a	n/a

2.3 Statistical Analysis

All statistical analyses and mapping were performed using R software Ver 3.6.3 (https://www.r-project.org).
Since statistical analyses were different for each research question, we describe these analyses in further detail in each of their respective sections in the results.

2.4 Ethical Approval

The study was given a favourable ethical opinion on the 27th October 2020 by a Research Ethics Committee (REC) at the University of Lincoln (Ethics Reference 2020_3812).

[5] *OCSI: LSOAs, LEPs and lookups: A beginner's guide to statistical geographies. Accessed on 20 May 2021. Available at https://ocsi.uk/2019/03/18/lsoas-leps-and-lookups-a-beginners-guide-to-statistical-geographies*

[6] *2011 Census: Population and Household Estimates for Small Areas in England and Wales, March 2011. Accessed on 20 May 2021. Available at https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/2011censuspopulationandhouseholdestimatesforsmallareasinenglandandwales/2012-11-23#summary*

3 RESULTS

3.1 Where are RUTH geographically located?

Data and Methods

Addressing our first research question we identified the geographical location of the RUTH community in Lincolnshire, King's Lynn and West Norfolk. We used the most recently available ONS census data from 2011. Data were tabulated allowing us to compare the frequency of RUTH across different regions as well as the percentage of RUTH that make up the total population in those respective regions. Data were also mapped at LSOA level to highlight areas where RUTH were highly concentrated. Finally, we used data, provided from East Lindsey District Council, on caravan park licences and location to map where the caravan parks were located across the East Lindsey locality.

Results

The East Lindsey district is home to the largest group of RUTH within the region (n=1761) where they account for 1.3% of the total population (Table 3.1).

Table 3.1 Frequency and Proportions of RUTH by Region

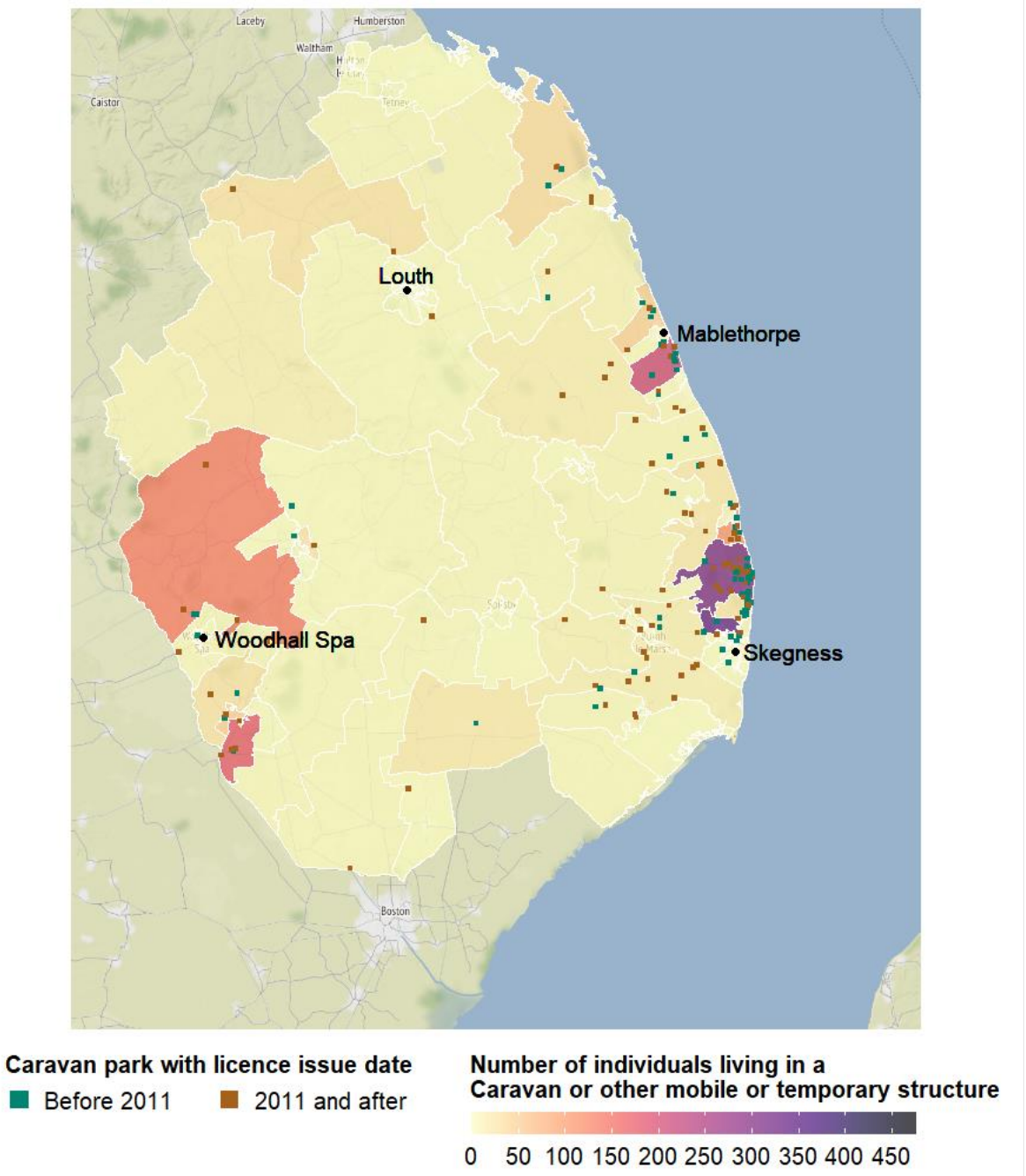
Region	RUTH *n = 6,323*	Total Population *n=1,167,658*	% of RUTH
East Lindsey	1761	133,400	1.3
North Lincolnshire	866	165,871	0.5
King's Lynn and West Norfolk	865	145,253	0.6
West Lindsey	815	87,850	0.9
North Kesteven	695	105,980	0.7
South Kesteven	585	132,493	0.4
South Holland	355	87,409	0.4
Boston	220	63,736	0.3
North East Lincolnshire	113	157,786	0.1
Lincoln	48	87,880	0.1

Looking at the Lincs Coastal Strip, RUTH tend to be highly concentrated in two areas, notably to the north of Skegness and the south of Mablethorpe (Figure 3.1). Inland areas with higher proportions of RUTH by LSOA are the Scunthorpe area in North Lincolnshire, as well as to the North-West of Lincoln in West Lindsey.

Limiting the focus to the East Lindsey district, Figure 3.2 presents the relative concentration of RUTH and the location of caravan park sites. RUTH tend to be more concentrated around the Mablethorpe area and to the north of Skegness, where a large number of caravan park sites are located. There is also a high concentration of RUTH inland to the west of the district (north and south of Woodhall Spa). Furthermore, a considerable number of new caravan park licences have been issued since 2011 in areas where RUTH are highly concentrated.

Figure 3.1 Number of RUTH by LSOA in Lincolnshire, King's Lynn and West Norfolk

Figure 3.2 Number of RUTH and Caravan Park Licences in East Lindsey



When compared to the general population more RUTH live in rural areas (Table 3.2). Overall, for RUTH, the split between urban and rural is similar with 49% residing in urban areas and 51% in rural areas

Table 3.2 Frequency and Proportions of RUTH in urban and rural areas

	RUTH *n = 6,323* *n* (%)	**General population** *n =1,167,658* *n* (%)
Urban city and town	2795 (44.2)	649495 (55.6)
Urban city and town in a sparse setting	275 (4.3)	12233 (1.0)
Total urban	***3070 (48.5)***	***661728 (56.6)***
Rural town and fringe	972 (15.4)	228202 (19.5)
Rural village and dispersed	2045 (32.3)	232963 (20.0)
Rural village and dispersed in a sparse setting	75 (1.2)	27374 (2.3)
Rural town and fringe in a sparse setting	161 (2.5)	17391 (1.5)
Total rural	***3253 (51.4)***	***505930 (43.3)***

Key Findings

- East Lindsey is home to the highest proportion of RUTH across Lincolnshire county where they represent 1.3% of the population.
- Half of RUTH reside in an urban area which is similar to the general population.
- RUTH tend to be highly concentrated in specific small geographic areas, notably, coastal areas close to Mablethorpe and Skegness although they are also present to a lesser extent in inland locations across Lincolnshire.
- Caravan parks are most prevalent in coastal areas of East Lindsey and a considerable number of new caravan park licences have been issued since 2011.

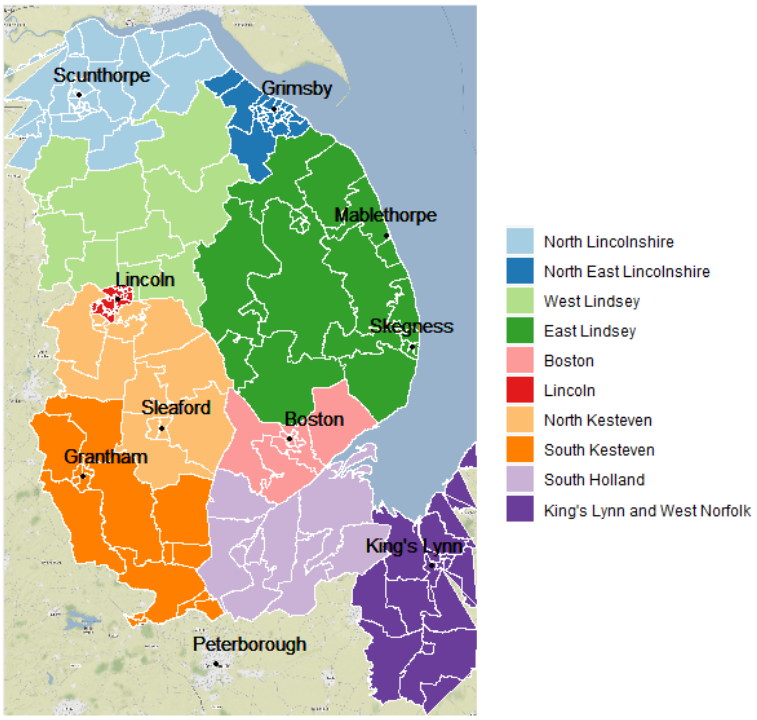
3.2 What are the general characteristics and demographics of RUTH?

Data and Methods

We have previously seen that RUTH tend to be highly concentrated in specific small geographic areas (e.g. coastal parts of East Lindsey) and are not equally distributed across Lincolnshire or our entire study area. We now aim to describe them in terms of characteristics and demographics. In other words, we aim to know who they are and how are they differ from the general population.

To answer that question, we used the ONS data at MSOA level instead of LSOA level as in the previous section. This was done chiefly because the ONS does not, to maintain confidentiality, provide demographic data of RUTH in a region that does not meet a certain threshold of individuals (i.e., at least 20 people). In this case, having the RUTH demographic data at LSOA level would have led to the exclusion of several LSOAs with less than 20 RUTH representing 21% of the total RUTH in our study area, while MSOA level would only exclude 7% of the total RUTH. Thus, we compared RUTH demographics with the general population globally and at MSOA level.

Figure 3.3 LSOA boundaries by local authority



Because our data are from a census, inferential statistics (e.g., p-values) for the comparison between the general population and RUTH were not computed as their use is underpinned by sampling uncertainty which is absent in the case of a census (Gorad, 2013). Moreover, the high number of people included in the overall population (>1 million) would lead to significant results even when the effect size is negligible (Khalizadeh and Tasci, 2017).

To investigate differences between RUTH and the rest of the population within a given area, we used dumbbell Plots and map the magnitude of these difference along.

Results

RUTH are older than the rest of the population, with high heterogeneity between regions.

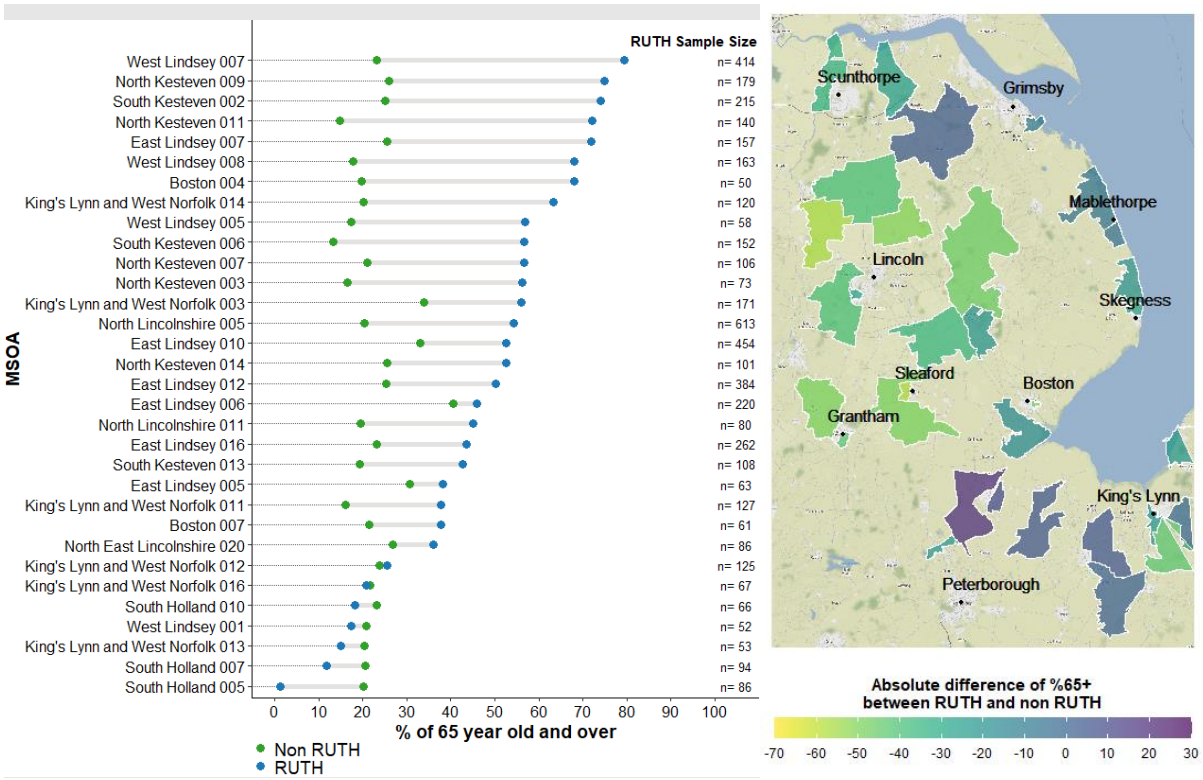
Just under half (49%) of RUTH were female (Table 3.3). Similar to the general population, nearly all RUTH reported being White and of British nationality. However, RUTH were much older than the rest of the population; 62.4% of RUTH were over 60 years old vs 26.9% in the general population. Young people (i.e., less than 30 years old) were particularly under-represented amongst RUTH (10.6% vs 34.0% in the rest of the population).

When we look at a inter and intra MSOA differences, we can see that the age distribution of RUTH between MSOAs is highly heterogeneous (Figure 3.4). For example, 79.5% of RUTH living in the west of East Lindsey (i.e., East Lindsey 007) are more than 60 years old compared to the west of South Holland (i.e., South Holland 005) where only 1.2% of RUTH were above that age. In addition, age differences between the general population and RUTH within MSOAs varied greatly with inland Lincolnshire having the higher proportion of over-65-years-old difference (i.e., RUTH much older than the rest of the general population), coastal Lincolnshire having similar proportion and South Holland the lowest proportion of over 65-years-old.

Table 3.3 RUTH and rest of the general population demographic description

	RUTH *Total n = 6,323*		**General Population** *Total n = 1,161,335*	
	n	%	*n*	%
Sex				
Males	3,249	51.4	567,815	48.9
Females	3,074	48.6	593,520	51.1
Age				
Age 0 to 14	290	4.6	192,795	16.6
Age 15 to 29	373	6.0	201,201	17.4
Age 30 to 49	757	11.9	301,343	26.0
Age 50 to 59	955	15.1	153,564	13.2
Age 60 to 69	2,003	31.6	154,179	13.3
Age 70 to 79	1,492	23.6	100,633	8.6
Age 80 or over	453	7.2	57,620	5
Ethnic Group				
White	6,272	99.2	1,130,235	97.3
Mixed/multiple ethnic groups	25	0.4	9,747	0.8
Asian/Asian British	16	0.3	15,375	1.3
Black/African/Caribbean/Black British	9	0.1	3,782	0.3
Other ethnic group	1	0.0	2,196	0.2
National Identity				
UK Identities	6,125	96.9	1,109,034	95.5
European: EU and Rest of Europe	177	2.8	41,051	3.6
Other	21	0.3	11,250	0.9
Religion				
Christian	4,719	74.6	776,917	66.9
No Religion	1,021	16.1	283,613	24.4
Other Religion	49	0.7	18,456	1.6
Religion not stated	534	8.4	82,349	7.1

Figure 3.4 Proportion of more than 65 year old RUTH and non-RUTH: Inter and Intra MSOA differences



Note 1: Only MSOAs with ≥50 RUTH were included in the analysis.

Note 2: Regarding the axis on the map, a yellow area indicates a higher proportion of RUTH 65+ compared to the rest of the population

Economically active RUTH work in different sectors than the rest of the population. RUTH are more likely to be unemployed.

The census collects data on employment, economic activity and occupation including employment status, hours worked and unpaid caregiving (Table 3.4). RUTH were more likely to report being economically inactive when compared to non-RUTH and this is not surprising given the older age profile of RUTH. However, when considering only those who were classified as economically active, unemployment was two times higher among RUTH (14.0%, 274/1,955) compared to the rest of the population (7.1%, 41,838/588,977). Unemployment was highest among RUTH in East Lindsey (Figure 3.5), three times higher than the unemployment in the general population (19.2% vs 7.2%, respectively), whilst it was similar in South Kesteven (7.6% vs 5.3%, RUTH and general population respectively).

RUTH were more likely to be employed in either elementary occupations, process, plant and machine operatives or skill trades compared to the general population. The main industry employing RUTH was distribution, hotels and restaurants compared to public administration, education, health for the rest of the population.

A higher proportion of RUTH reported working 49 or more hours compared to the rest of the population (20.3% vs 14.7%, respectively).

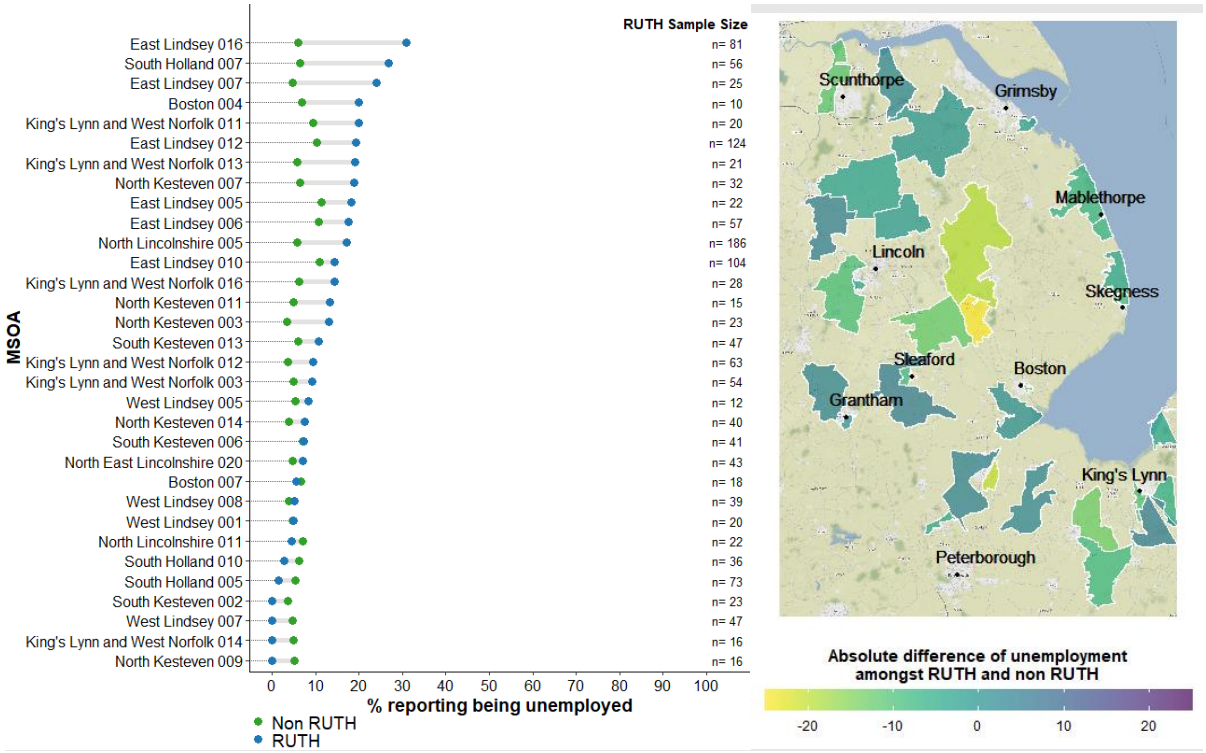
Table 3.4 Occupation and economic activities among RUTH and the rest of the general population

	RUTH		General Population	
	Total n = 6,323		*Total n = 1,161,335*	
	n	%	*n*	%
Provision of unpaid care a week				
Provides no unpaid care	5,464	86.4	1,031,695	88.8
1 to 19 hours	372	5.9	78,237	6.7
20 to 49 hours	115	1.8	16,804	1.4
50 or more hours	372	5.9	34,599	3
Economic Activity	*n=6,009*		*n=953,847*	
Economically active: In employment*	1,681	28	547,139	57.4
Economically active: Unemployed	274	4.6	41,838	4.4
Economically inactive	4,054	67.5	364,870	38.3
Employment Status: Ever worked	*n=6,009*		*n=953,847*	
Yes, has worked or currently working	5,667	94.3	898,651	94.2
No, has never worked	342	5.7	55,196	5.8
Economically Active: Hours worked p/week	*n=1,618*		*n=472,835*	
Part-time: 15 hours of less	177	10.9	46,615	9.9
Part-time: 16 to 30 hours	417	25.8	96,887	20.5
Full time: 31 to 48 hours	696	43.0	259,910	55.0
Full time: 49 or more hours	328	20.3	69,423	14.7
Economically Active: Occupations	*n=1,618*		*n=472,835*	
Managers, directors, senior officials	152	9.4	50,979	10.8
Professional occupations	82	5.1	59,750	12.6
Associate professional and technical	85	5.3	49,415	10.5
Administrative and secretarial	86	5.3	48,674	10.3
Skilled trades	270	16.7	65,575	13.9
Caring, leisure and other service	176	10.9	47,996	10.2
Sales and customer service	138	8.5	38,182	8.1
Process, plant and machine operatives	296	18.3	52,333	11.1
Elementary	333	20.6	59,931	12.7
Economically Active: Industry	*n=1,618*		*n=472,835*	
Agriculture, energy and water	129	8.0	21,537	4.6
Manufacturing	188	11.6	64,946	13.7
Construction	125	7.7	38,987	8.2
Distribution, hotels, restaurants	444	27.4	108,103	22.9
Transport and communication	150	9.3	32,950	7.0
Financial, Real Estate, Professional, Administrative	214	13.2	52,887	11.2
Public administration, education, health	294	18.2	132,808	28.1
Other	74	4.6	20,617	4.4
Economically Active: Method travel to work	*n=1,618*		*n=472,835*	
Mainly work at or from home	346	21.4	52,303	11.1
Train, underground, metro, light rail, tram	12	0.7	4,731	1.0

Bus; minibus, coach, taxi	56	3.5	14,213	3.0
Motorcycle, scooter or moped	13	0.8	3,726	0.8
Driving a car or van	923	57.0	305,476	64.6
Passenger in a car or van	76	4.7	27,735	5.9
Bicycle or on foot or other method of travel to work	192	11.9	64,651	13.7

*Note: *Economically active: in employment includes full-time students.*

Figure 3.5 Proportion of unemployed among economically active RUTH and non-RUTH: Inter and Intra MSOA differences



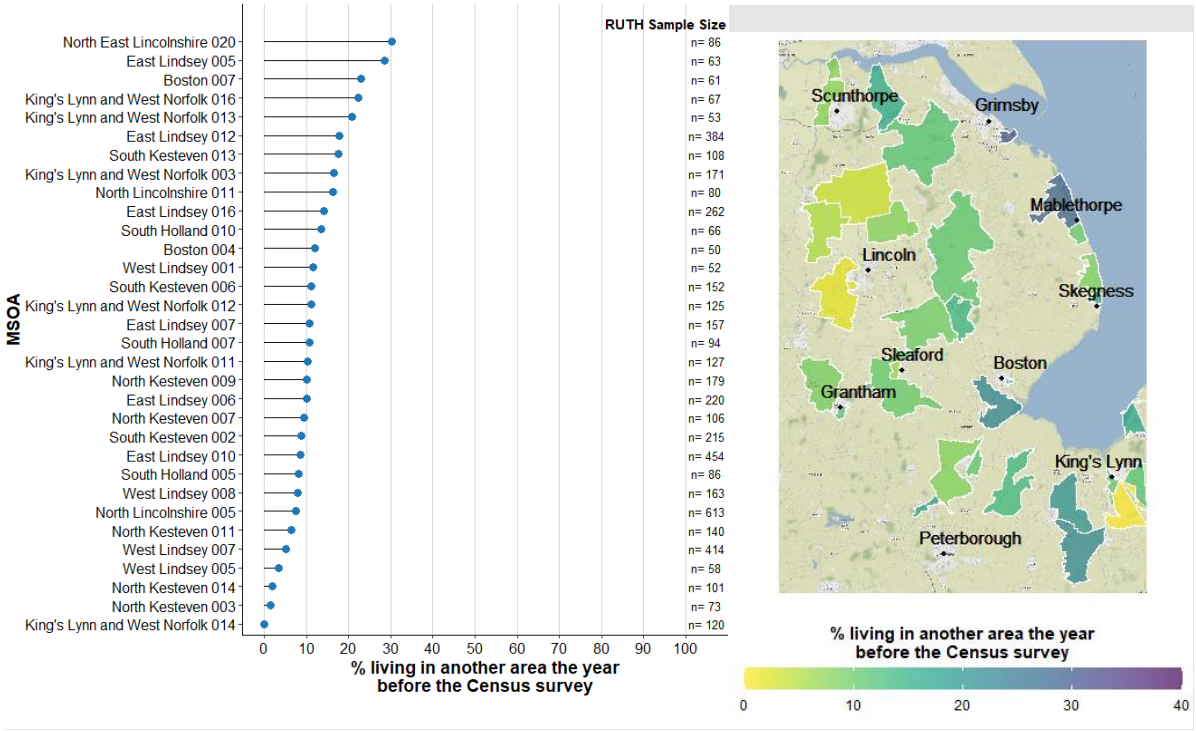
Note 1: Only MSOAs with ≥50 RUTH were included in the analysis.
Note 2: Regarding the axis on the map, a yellow area indicates a higher proportion of unemployed (economically active) RUTH compared to the non-RUTH population.

Coastal areas have a higher in-migration rate of RUTH

Overall, 10.9% of RUTH were living in a different address the year before the census data were collected which is similar to the rest of the population (11.5%); 40.8% of these in-migrations were from other addresses in Lincolnshire while 49.3% were from the rest of England and 9.9% from outside England or the UK.

Higher rates of in-migration were found in coastal areas (**Error! Reference source not found.**). In our case, 23.9% of RUTH from the North-East Lincolnshire region were not living there the year before the census, compared to 11.4% in the general population from the same district. One particular MSOAs within the North-East Lincolnshire region recorded more than 30% of RUTH who were living in another place prior to census (Figure 3.6). It is also important to note that a similar pattern of in-migration was found in other coastal regions within East Lindsey, notably, around Mablethorpe with nearly 30% of in-migration (**Error! Reference source not found.**).

Figure 3.6 Percentage of RUTH living in another area the year before the 2011 Census



Note 1: Only MSOAs with ≥50 RUTH were included in the analysis.

Note 2: Regarding the axis on the map, a darker area indicates a higher % of RUTH in-migration.

RUTH are more likely to report limited daily activities.

The census survey includes very few questions on health and wellbeing but does include items on subjective health status ('how is your health in general?) and degree of limitation to daily activity ('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?'). RUTH were much less likely to report very good or good health and much more likely to report bad or very bad health (Table 3.5). RUTH were more than twice as likely to report some or a lot of daily limitations to activity than were non-RUTH. These two results are more likely to be linked to the older age profile of RUTH compared to the rest of the population.

Table 3.5 Health status and disability among RUTH and general population

	RUTH *Total n =6,323*		**General Population** *Total n = 1,161,335*	
	n	%	*n*	%
Health Status				
Very good/Good health	3,636	57.5	923,315	79.5
Fair health	1,870	29.6	172,190	14.8
Bad/Very bad health	817	12.9	65,830	5.7
Daily Activities Limited				
Limited a lot	1,212	19.2	102,388	8.8
Limited a little	1,311	20.7	124,184	10.7
Not limited	3,800	60.1	934,763	80.5

RUTH live in small homes which are more likely not to have central heating.

Compared to the rest of the population, RUTH live in homes with a lower number of bedrooms. Respectively 17.3% and 69.7% lived in a home with 1 or 2 bedrooms compared to 4.0% and 20.8% in the general population. RUTH also reported owning a lower number of cars (Table 3.6). RUTH were more likely to report no central heating (8.2% vs 1.7% in the rest of the general population).

Unfortunately, we did not have any data on household composition (e.g., number of individuals living in the household). Considering the small number of bedrooms and car ownership, RUTH may be either living mainly alone or living in an overcrowded environment.

Table 3.6 Household characteristics among RUTH and general population

	RUTH *Total n = 6,323*		General Population *Total n = 1,161,335*	
	n	%	*n*	%
No. Cars or Vans in Household				
None	1,052	16.6	169,441	14.6
1 car/van	3,980	62.9	466,157	40.1
2 cars/vans	987	15.6	388,320	33.4
3 or more cars/vans	304	4.8	137,417	11.8
Central Heating				
None	520	8.2	19,271	1.7
Gas	4,408	69.7	835,032	71.9
Electric	308	4.9	66,759	5.7
Oil	356	5.6	152,263	13.1
Other	445	7.0	32,244	2.8
Two or more types	286	4.5	55,766	4.8
No. Bedrooms				
1 bedroom	1,095	17.3	46,774	4.0
2 bedrooms	4,419	69.9	241,905	20.8
3 bedrooms	675	10.7	577,075	49.7
4 or more bedrooms	134	2.1	295,581	25.5
No. Rooms				
1 room	141	2.2	1,553	0.1
2 rooms	255	4	9,644	0.8
3 rooms	1,088	17.2	44,175	3.8
4 rooms	2,847	45	147,871	12.7
5 rooms	1,291	20.4	288,019	24.8
6 or more	701	11.1	670,073	57.7
Home Ownership				
Owned or Shared Ownership	5,420	85.7	810,414	69.8
Social rented or private rented or living rent free	903	14.3	350,921	30.2

Key Findings

- RUTH are much older than the rest of the population.
- The greater proportion of elderly RUTH could help explain the higher percentage of non-professionally active and higher proportion reporting poor health status or daily activities limited.
- Age differences with the general population varied depending on the area with a higher proportion of older RUTH in inland Lincolnshire.
- A significant proportion (33.6%) of the RUTH community were classed as economically active. However, they were twice as likely to experience unemployment compared to the rest of the population.
- Coastal areas were characteristic of the highest in-migration rates of RUTH.
- RUTH live in accommodation with a smaller number of rooms and bedrooms and are more likely to not have central heating in their home.

3.3 What are the area-based indicators for diabetes risk where RUTH populations live?

Introduction

Characteristics of the places people live can increase risk of poor health, confer protection from ill-health or promote health. These factors are commonly referred to as social determinants of health (SDoH). SDoH are widely accepted as important contributors to disease and chronic conditions and understanding how they impact health is important to reducing inequities in access to health care, health outcomes and wellbeing (Marmot et al, 2020). Important SDoH associated with type 2 diabetes are socio-economic status (SES), neighbourhood and physical environment, the food environment, the social context, and health care (Hill-Briggs et al, 2020).

SES is a consistently strong predictor of long-term conditions including type 2 diabetes. In developed countries a social gradient in type 2 diabetes prevalence has been demonstrated and is persistent despite economic prosperity and/or increased investment in health services (Tatulashvili et al, 2020). SES is a multidimensional construct that is associated with the degree to which people and communities can access social and material resources including health care. The major components of SES are educational achievement, occupational status and income. All three correlate with each other but separately each have unique effects on health. Income and educational levels have been associated with age standardised prevalence of diagnosed and undiagnosed diabetes and impaired glucose regulation in England.

The role of physical environment as a determinant of diabetes risk is thought to relate to characteristics of place such as walkability and green space and environmental hazards such as noise and air pollution. A recent systematic review found reported associations with these factors but limited if any research establishing a clear causal pathway (Dendup et al, 2018). Housing stability and quality have been associated with poor glycaemic control and area-based studies consistently demonstrate poorer population level outcomes for high-poverty areas.

The social environment is well recognised as a critical determinant of health and has been conceptualised in terms of social capital, cohesion, and social support. Social cohesion, trust in local organisations, social networks and neighbourliness have been associated with good health (Gordeev and Egan 2015) in general. Studies from the US show an inverse relationship between adverse social environments and diabetes outcomes suggesting indirect pathways via stress and lack of social support. The author of a recent study in England using a diabetes risk index for MSOAs concluded that social fragmentation (an inverse measure of community cohesion) together with SES was a positive risk factor for diabetes risk (Congdon, 2020). Social support has been shown to influence diabetes control and outcomes with increased social support improving glycaemic control whilst low social support associated with poorer outcomes (Hill-Briggs et al, 2020).

Health care access for individuals and communities may vary based on socioeconomic status, geographical place, service funding models and sociocultural factors. Poor connection to high quality and affordable services may worsen existing chronic conditions or increase the risk of developing new disease.

Having determined the location and characteristics of RUTH we now consider available area-based data for SDoH associated with type 2 diabetes in the places where RUTH live.

Data and Methods

Table 3.7 presents a range of risk factors for diabetes as well as the public data sources that were used to obtain the data for our analysis. Data came from the ONS and the CDRC. Data relating to indicators of each of the SDoH for type 2 diabetes at LSOA level was available from the Indices of Deprivation (IoD) for England (McClennan et al, 2019). The Index of Multiple Deprivation (IMD) is the measure of relative deprivation used in England and is a composite measure comprising seven weighted domains from the IoD including income, education, employment, health, crime, housing and services and living environment.

Living environment measures deprivation in the living environment in two subdomains: indoors (lack of central heating and poor condition of housing) and outdoors (air quality and road traffic accidents with injury to cyclist and pedestrians). The physical environment can be inferred from the IoD components living environment and barriers to housing and services domains. Barriers to housing and services domain measures deprivation in relation to physical and financial accessibility to housing and to local services. It includes two subdomains (geographical barriers and wider barriers) with a range of indicators including distance to post office, schools, shops and doctors' surgeries, household crowding, homelessness and housing affordability. The health deprivation and disability domain includes measures of premature death and also measures of reduced quality of life and active participation due to poor mental or physical health. Indicators included in this domain are; years of potentail life lost, comparative illness and disability ratio, acute morbidity (based on rate of emergency hospital admissions) and a composite measure of mood and anxiety disorders.

The composite score (the IMD) gives an overall picture of the deprivation of small areas relative to the whole of England. To examine the area-based indicators for the SDoH for type 2 diabetes we selected domains of the IoD that included measures of socio-economic status (SES), neighbourhood and physical environment, the food environment, the social context, and health care.

Table 3.7 Risk factors for type 2 diabetes and data sources

Risk factor for diabetes	Data sources	Notes
Demographic area profile		
Age	ONS	
Sex	ONS	
Economic environment and education		
Education	Education decile from IMD index (ONS)	Measures the lack of attainment and skills in the local population
Level of employment	Employment decile from IMD index (ONS)	Measures the proportion of the working age population in an area involuntarily excluded from the labour market
Income	Income decile (ONS)	Measures the proportion of the population experiencing deprivation relating to low income
Social environment		
Crime	Crime decile from IMD index (ONS)	Measures the risk of personal and material victimisation at local level
Physical environment		
Barriers to housing and services	Barriers to housing and services decile from IMD index (ONS)	Measures the physical and financial accessibility of housing and local services
Living environment	Living environment decile from IMD index (ONS)	Measures the quality of both the 'indoor' and 'outdoor' local environment
Access to fast food outlets	Access to leisure centres decile (CDRC)	
Pubs	Access to pubs, bars and nightclubs decile (CDRC)	
Off-licences	Access to off licences decile (CDRC)	
Tobacconists	Access to tobacconists decile (CDRC)	
Access to leisure services	Access to leisure centres decile (CDRC)	
Healthcare environment		
Access to GPs	Access to GP practices decile (CDRC)	
Access to pharmacies	Access to pharmacy decile (CDRC)	
Access to dentists	Access to dentists decile (CDRC)	
Health area profile	Health decile from IMD index (ONS)	Measures the risk of premature death and the impairment of quality of life through poor physical or mental health

Sources: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/833959/IoD2019_Infographic.pdf

CDRC: Consumer Data Research Centre. Access to Healthy Assets & Hazards [accessed on 09/10/2021 at https://data.cdrc.ac.uk/dataset/access-healthy-assets-hazards-ahah]

Results

Demographic area profile

Age is an important risk factor for type 2 diabetes and our previous results have indicated that RUTH tend to be older than the general population. The coastal areas where RUTH live are also amongst the areas with the highest proportion of over 65 years old (Figure). Men have been considered to be at an increased risk for the development of type 2 diabetes and our earlier analysis showed a relatively even split when it came to the RUTH population with 51% male and 49% female which was not too dissimilar from the non-RUTH population (49% male and 51% female).

Economic environment and education

Socioeconomic status for area may be inferred from the three domains; income, education skills and training, and employment. The east coast strip LSOAs are included in the top 30% most deprived with relation to income, employment and educational attainment, and in some case the top 10% most deprived communities nationally (Lincolnshire County Council, 2019). It is important to note that the income domain does not direcly measure income, rather it is related to number of residents on selected government welfare benefits and so assumed to have low income. Employment deprivation measures the proportion of the working age population who are excluded from the workforce and include the unemployed as well as those unable to work due to sickness, disability or caring responsibilities. Education, skills and training deprivation measures lack of attainment in the population and has both adult and child subdomains.

When considering the Lincs Coastal Strip which is home to large numbers of RUTH it can be seen in Figure 3.7 that these communities are highly deprived areas in terms of employment, education and skills attainment and income. Similar pattern is observed for RUTH communities in the North Lincolnshire region.

Social environment

The social environment is an important SDoH for type 2 diabetes. The Crime domain of the IoD which includes indicators of violence, theft, criminal damage and burglary could be partial proxy measure for social trust and cohesion. The Lincs Coastal Strip area shows wide variation of deprivation in social environment with some areas showing high deprivation of social environment and others showing relatively low deprivation.

Figure 3.7 Education (A), Employment (B) and Income (C) deciles and number of RUTH individuals by LSOA

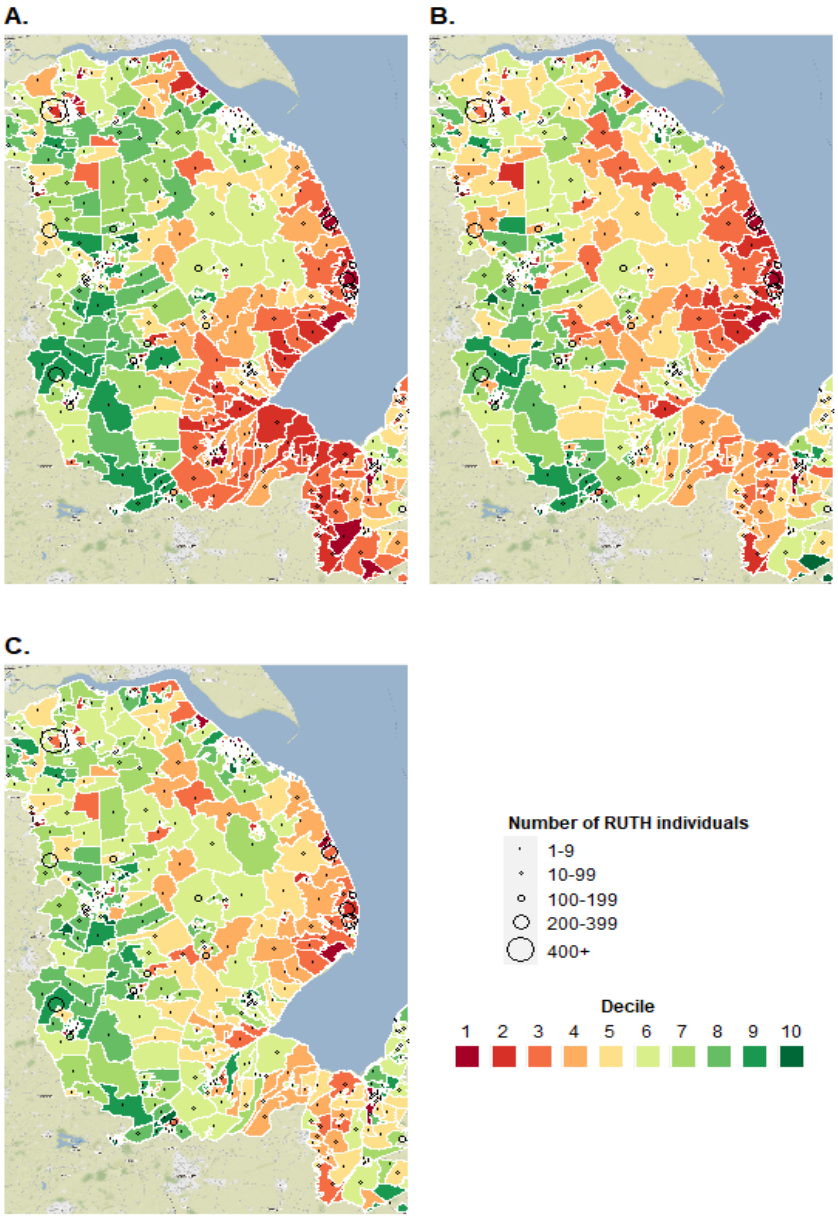
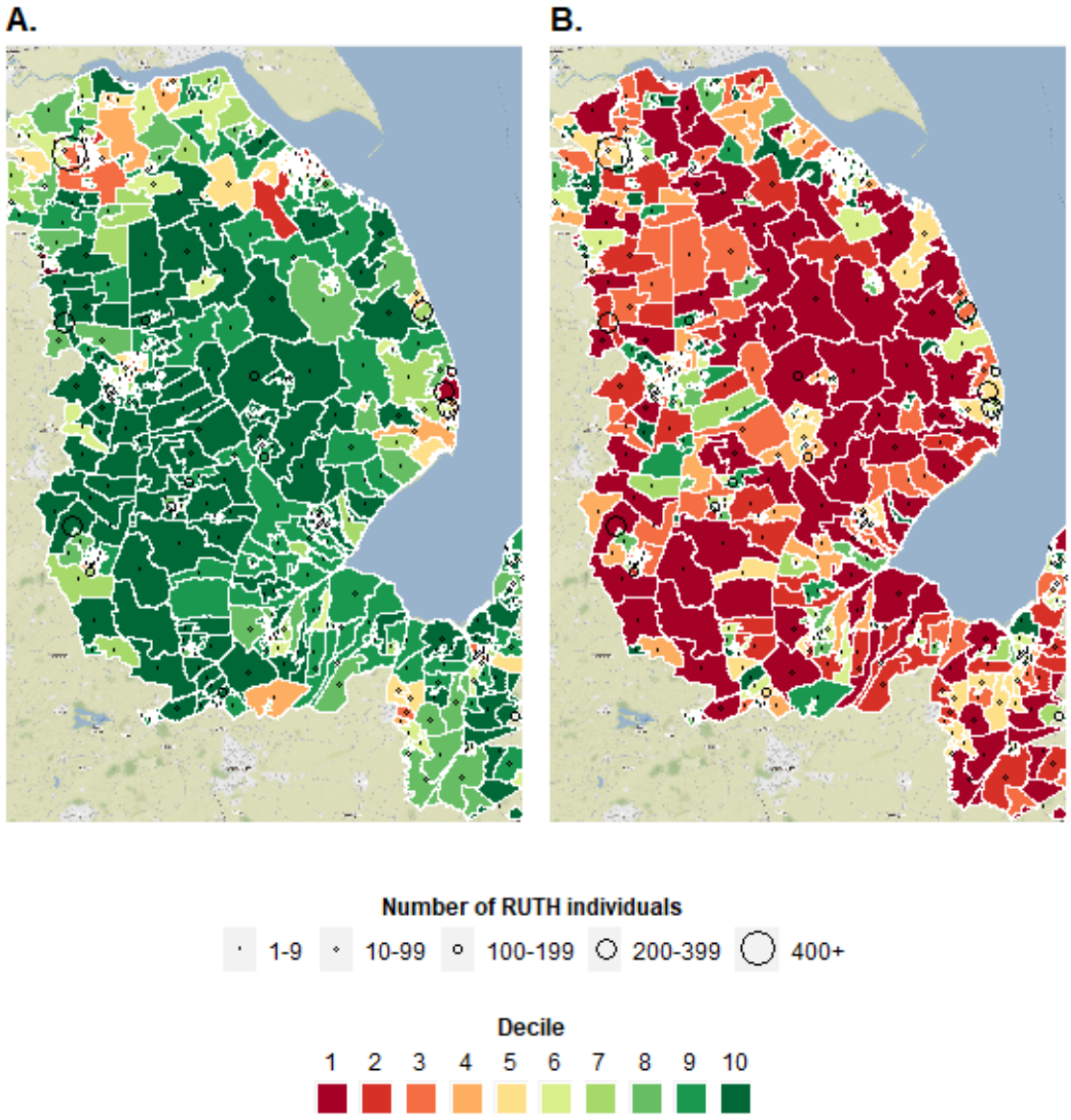


Figure 3.8 Crime (A) and Access to housing and services (B) deciles and number of RUTH individuals by LSOA



Physical environment

Overall, Lincolnshire compared to the rest of the country has high levels of deprivation where access to housing is concerned. For the Lincs Coastal Strip including those with RUTH there are mixed findings with some areas of high deprivation and some of middle of the range level of relative deprivation (Figure 3.8). Therefore, RUTH do not appear to be in the worst or best area when it comes to access to housing. Access to leisure centres is also somewhat mixed with some LSOAs on the Lincs Coastal Strip having good access and others with poor access (Figure 3.9).

Figure 3.9 Living Environment (A) and access to leisure centres (B) decile and number of RUTH individuals by LSOA

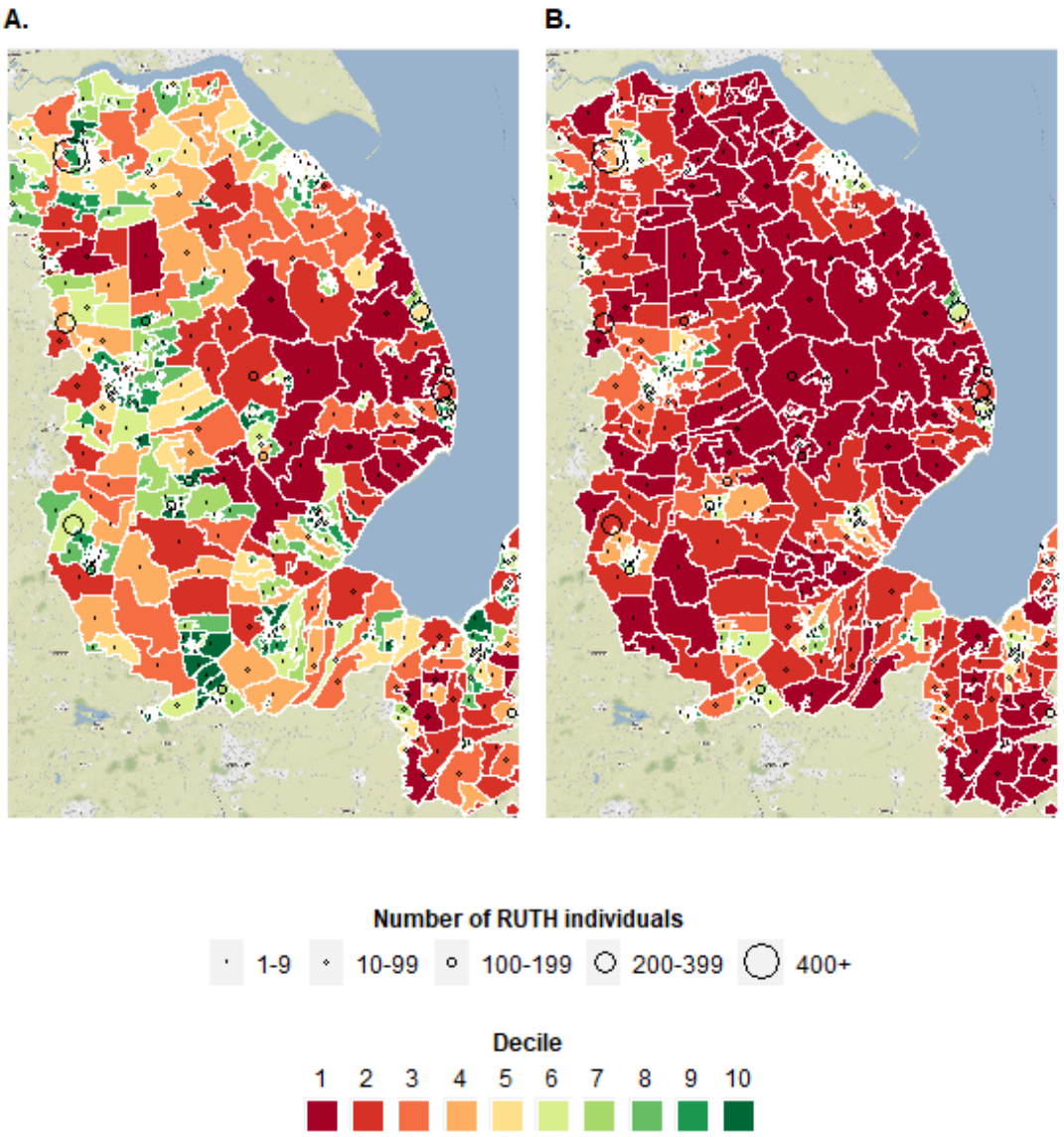
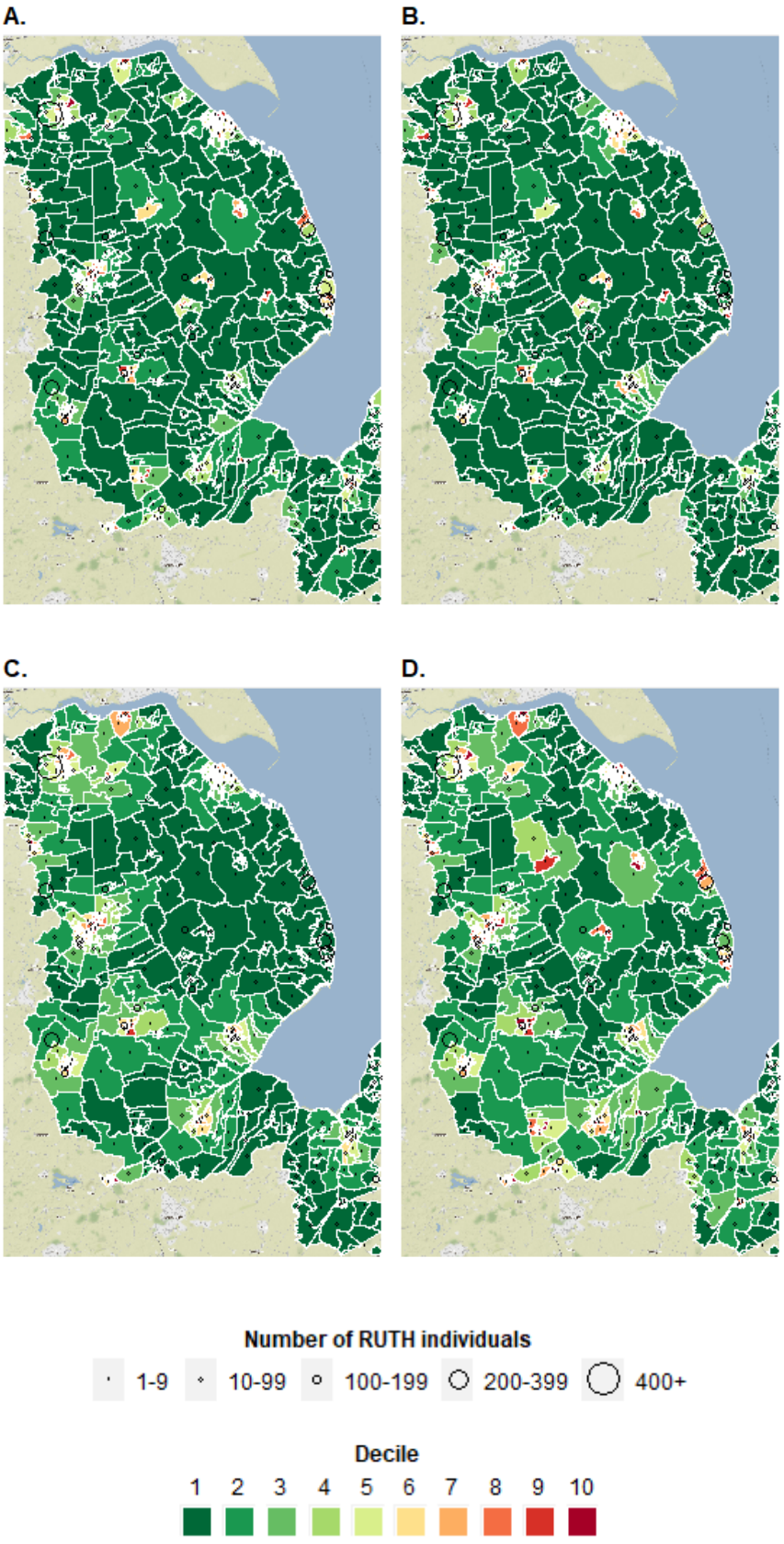


Figure 3.10 presents access to fast food outlets, access to pubs, bars and nightclubs, access to off-licences and access to tobacconists. With few exceptions, these venues seem to be highly concentrated around the larger urban centres. In contrast the areas where RUTH live do not seem to be particularly exposed to these venues.

Figure 3.10 Access to fast food outlets (A) access to pubs, bars and nightclubs (B) access to off-licences (C) and access to tobacconist (D).



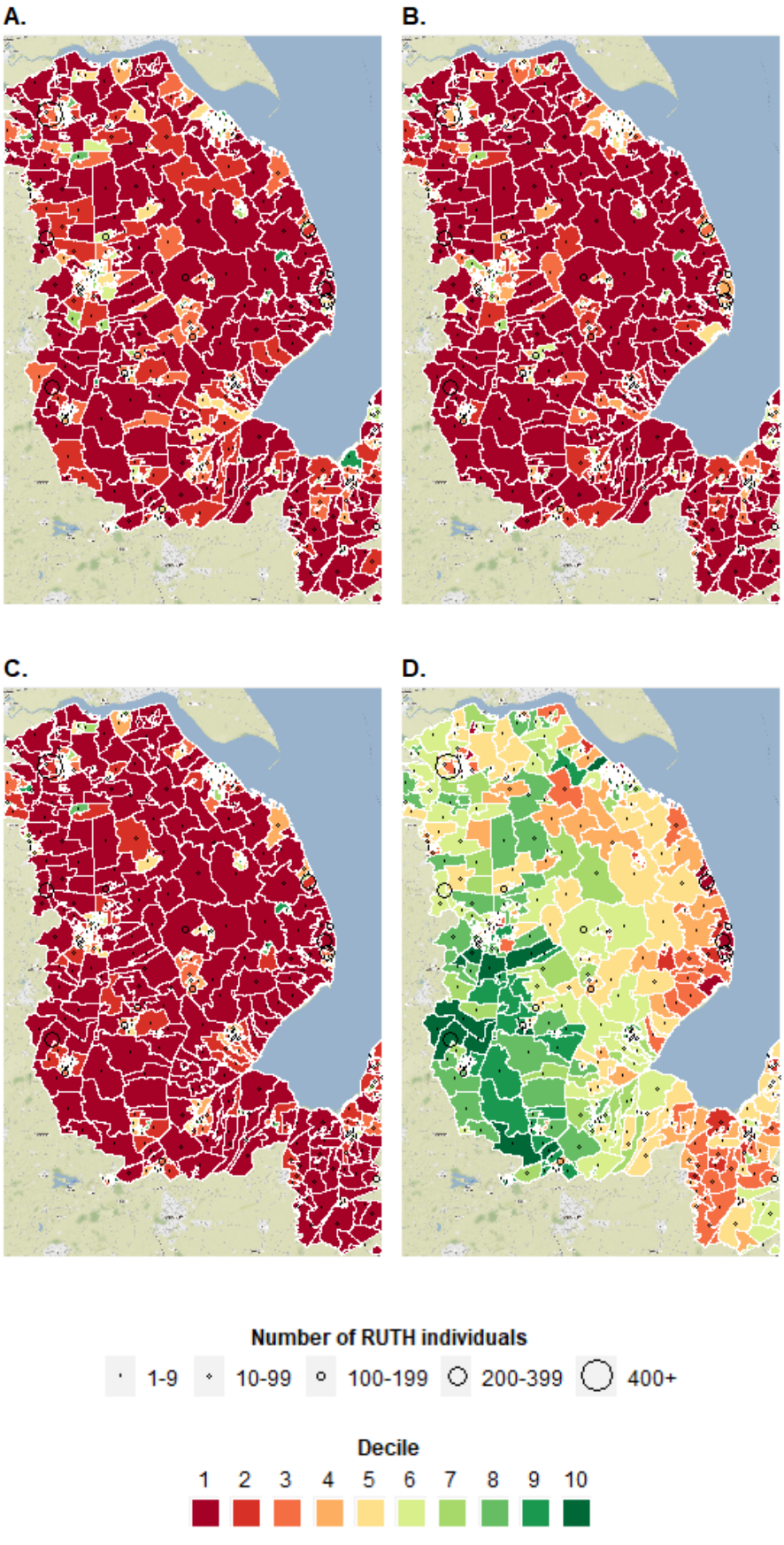
Healthcare environment

Figure 3.11 shows that the Lincs Coastal Strip is within the top 30% most deprived communities in the country. This figure shows that access to health services (GP, pharmacist, and a dentist) is particularly poor across Lincolnshire County (including Lincs Coastal Strip) with the exception of some urban inland areas such as Lincoln City. However, the Lincs Coastal Strip (where most RUTH reside) has the worst health deprivation in the county.

Key Findings

- The Lincs Coastal Strip is comprised LSOAs with high levels of deprivation of income, education/skills attainment, and employment.
- Communities located along the Lincs Coastal Strip have high levels of illness and disability relative to other communities at county and national level.
- The physical and social environment present a combination of risk and protective factors for type 2 diabetes.
- Access to health services is poor on the Lincs Coastal Strip although this is a similar trend across much of Greater Lincs.
- Collectively these findings suggest that there are elevated area-based risk indicators for type 2 diabetes in the Lincs Costal strip region.

Figure 3.11 Access to GP (A), Access to pharmacy (B), Access to dentist (C), and Health deprivation (D) deciles and number of RUTH individuals by LSOA.



4 DISCUSSION

4.1 Discussion

Our findings indicate that rather than being widely distributed across Lincolnshire, RUTH tend to reside in a number of specific LSOAs within the county. The East Lindsey District is home to a large proportion of the county's RUTH with areas of higher concentration in two coastal areas, Mablethorpe and Skegness. The findings show that a considerable number of park licences have been issued in East Lindsey since 2011 when the census data was collected. Data made available by the East Lindsey Council office for 2021 indicate that the number of both caravan parks and individual units has increased considerably in the last decade. The number of caravan licences issued in this time suggest significant growth in temporary housing stock although some of the new licences may reflect changes in planning permission applications and/or change of ownership. In addition, residential licences were updated and reissued in 2014 due to the introduction of the Mobile Homes Act 2013. Nonetheless there appears to be a strong trend for increasing numbers of caravan units and the potential for even greater long-term occupation. More recent census data was collected in March 2021. This data may have additional limitations in representing RUTH as the Covid-19 emergency restrictions in place at the time of data collection is likely to result in an even greater underrepresentation of the RUTH population. Given the limitation of census data there is a clear need for local community specific enumeration of this population to assist in health and social care service planning and resource allocation.

The data highlighted a number of key in-migration trends. In particular, on the Lincs Coastal Strip, Mablethorpe and Skegness had high proportions of RUTH who reported residing somewhere else the year before the 2011 census. To ascertain where these people might be coming from, we can look to the work of Beatty et al (2011b) who asked caravan dwellers in East Lindsey where their previous residence was for those whom the caravan/chalet was now their 'main home'. The responses indicated that Nottinghamshire (26%) South and West Yorkshire (19%) and East Lindsey (15%) were the most common areas in terms of where they were last living prior to moving on to the present site.

RUTH were more likely to report poor general health and limited daily activities. While this is expected considering the older age of most of the RUTH population, it highlights the higher potential health and care needs of communities with higher proportions of RUTH. More RUTH were living in homes with one or two bedrooms compared to the rest of the population who tend to live in homes with 3-4 bedrooms. The data did not allow an assessment of the RUTH household composition, but this finding could indicate that RUTH are more likely to either live alone or live-in overcrowded households. Both circumstances could increase risk for adverse mental health outcomes although further studies are needed to confirm this.

Interrogating the census data, we found that RUTH were less likely to report very good or good health and were more likely to report bad or very bad health. We also found that RUTH were more likely to report daily limitations than non-RUTH. These findings confirm those of Zennor and Allison (2010) who also found high rates of poor health and limiting long-term illness amongst long-stay caravan communities when compared to regional and national data. The work by Beatty et al (2011b) focussed specifically on Lincolnshire's East Coast found that although respondents reported their health as mostly 'good' or 'fairly good', thirty-one per cent reported as having at least one person with a long-term illness or disability and nine per cent of households had two or more people with these problems.

The older age profile might account for some of our findings that show that RUTH have poorer health and higher levels of disability. Nonetheless the higher needs of this group support the need for context

-specific and local supports for this group to address inequities and to reduce the burden on already strained services.
Another significant observation is that RUTH are concentrated in ageing areas with high levels of health deprivation and poor access to healthcare services. As mentioned above, RUTH were concentrated in two coastal communities, Mablethorpe and Skegness, both identified as amongst the most deprived 10% of neighbourhoods in England (Lincolnshire County Council, 2019). These areas also have a life expectancy lower than the English average and obesity prevalence that is amongst the highest in the country (Lincolnshire County Council Public Health Intelligence Team, 2013). Furthermore, these areas are amongst the most economically deprived in the UK. Both poor economic and health environment combined with the ageing and poor health reported by RUTH communities make them at high risk for poor type 2 diabetes outcomes.

The areas where people reside have both physical and social attributes that can impact on health. Our analysis has highlighted that the Lincs Coastal Strip is comprised of LSOAs with high levels of deprivation of income, deprivation of education/skills attainment, and deprivation of employment which have been identified as being associated with type 2 diabetes (Qi et al, 2019). Communities located along the Lincs Coastal Strip have high levels of illness and disability relative to other communities at both county and national level. The physical and social environment present a combination of risk and protective factors for type 2 diabetes. Collectively these findings suggest that there are elevated area-based risk indicators for type 2 diabetes in the Lincs Coastal Strip region.

4.2 Limitations

There were several limitations to our research acknowledge.

Unfortunately, we did not have access to individual level data which meant that we were not able to build RUTH population profiles. We were on the other hand able to see how they differ in comparison to the local population. The data that we requested from the ONS could not be obtained at an individual level which limited the extent of our analysis. This was however, in line with maintaining statistical disclosure and ensuring that individual anonymity was protected. To allow for data to be collected at an individual level future surveys and interviews should be targeted to and conducted with RUTH. This will need to be done in co-operation with the local community and park owners.

The ONS 2011 census data is now over ten years old. The two focussed studies that were available to us (Beatty et al, 2011b; Zennor and Allison, 2010) also collected data around this time. There is now a need for up-to-date data collection with RUTH, particularly in light of the Covid-19 pandemic, to understand their current experiences and health related needs as well as allowing an opportunity for some of the findings in this report to be validated and/or challenged. Data from the recently completed March 2021 census will offer some much-needed comparison with our findings as well as providing more up to date evidence on the characteristics of RUTH. However, it should be noted that this data will likely not be made available for another 2-3 years from the time of writing. The research team will maintain contact with the ONS and Census team at frequent intervals to ascertain when the data will be released

Whilst there were some similarities between the questions used in the census and the work of Beatty et al (2011b) and Zennor and Allison (2010) there were differences in how data were collected (self-complete postal questionnaire versus face-to-face surveys) and measured. Additionally, the census is not designed to be a comprehensive health survey and it asks few questions in relation to health which limited the extent of our analysis in relation to the health-related needs of RUTH. Although we were able to use publicly available data from the CDRC to understand the impact of the physical, social and

healthcare environment in areas where RUTH are highly concentrated. Future research should consider collecting data specifically on health and wellbeing with RUTH and coastal communities.

4.3 Recommendations

Considering the findings presented in this report we have formulated two recommendations in relation to the ongoing development of this research area.

4.3.1 Further data collection with RUTH

There is limited research with RUTH in the UK. Further quantitative and qualitative data collection with RUTH (and non-RUTH) is warranted to gain an in-depth understanding of their likely health related needs that can then be used to develop and implement culturally appropriate type 2 diabetes interventions with coastal communities. This should be targeted and localised at both an individual and group level. This would provide an up-to-date account of RUTH and allow us to understand any changes since 2011. Analysis of the recently conducted 2021 census would also be welcomed, however, at the time of writing these data are not yet available. The research team will maintain contact with the ONS to ascertain when these data will be accessible.

4.3.2 Designing research on the impact of residing in caravans/chalets on diabetes exposure and outcomes

The findings suggest that RUTH are likely to be at higher risk for type 2 diabetes. However, the data used for this report do not allow us to draw any firm conclusions around the actual level of type 2 diabetes risk amongst the RUTH population. Firstly, there needs to be confirmation of the prevalence of diabetes with RUTH. If this is the case, we then need to understand the mechanisms by which caravan or other temporary housing is associated with elevated risk or experience of type 2 diabetes.

4.4 Conclusion

There is a lack of research with RUTH in the UK and indeed internationally and this study is the first of its kind, in that it presents results from a group-based analysis of a large sample of RUTH using the ONS 2011 census data. Given recent calls from the Chief Medical Officer to tackle the health problems of coastal communities (Department of Health and Social Care, 2021) our findings should provide a timely addition to our understanding of coastal populations that have tended to be overlooked by policymakers in the past.

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