

N8 Research Partnership

**The impacts of demographic change in the
functional economies of the North of England**

Final Report, Strand 1:

**Modelling demographic change: projecting
future population, health, labour force
and households in Northern England**

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About the N8

The N8 is a group of the eight most research intensive universities in the North — Durham, Lancaster, Leeds, Liverpool, Manchester, Newcastle, Sheffield and York. All N8 universities are ranked in the top 200 of the World University Rankings. Combined, the N8 universities have 125 “top 10” subject rankings in the UK (RAE 2008).

The N8 partnership was created in 2007, establishing virtual research centres in Regenerative Medicine and Molecular Engineering. It was a novel way of creating a confluence of research assets and capabilities across the partnership, with sufficient scale and critical mass, to move on broader industrial and commercial opportunities.

The initial collaborations were focused on areas of scientific and technological research. This project marks the first venture for an N8 collaboration into the social sciences. The multi disciplinary research team which delivered this work combines economists, geographers, labour market, healthcare and housing experts from across the N8 Universities.

About the Northern Way

The Northern Way was a unique initiative, bringing together partners across the North of England from public, private and other sectors to work together to improve the economic performance of the North.

Created in 2004, the Northern Way conducted ground-breaking policy research in innovation, private investment and transport, and produced a wide-ranging economic evidence base on other issues facing the North ranging from the impact of long term global challenges on the North, through to strategies to address local deprivation.

As a result of the Government decision to close the Regional Development Agencies by March 2012, funding for The Northern Way ceased on 31st March 2011, at which point the initiative closed.

However, to ensure that the important research and intelligence produced by the Northern Way is not lost, the website remains available at www.thenorthernway.co.uk. The website enables public access to the various research reports and further information regarding the work of the initiative.

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Abstract

Northern England faces several important demographic changes over the next twenty five years: **substantial ageing** of the population, transition to **a more ethnically diverse** population against a backdrop of only a **moderate overall growth** with considerable variations between the most and least successful local areas. Within northern England there is substantial re-distribution within the regions through internal migration: from the big cities to the accessible rural areas. In this report we examine the past and future demographic changes in northern England and their implications for the health of the population, the size of the labour force and the number of households, drawing out the implications for public policy.

This examination of the future is based on use of **new projections** for England's local authority (LA) populations by ethnicity carried out at the University of Leeds¹. These projections forecast the populations from 2001 to 2051. The report extracts and analyses trends between 2011 and 2036, a 25 year horizon used in local planning. We converted projected variables from 2001 LA geography to 2009 LA geography and summarised result for Local Enterprise Partnerships (LEPs) which have replaced Regional Development Agencies as the enablers of growth in England.

We find that the population of northern England will experience **moderate growth** between 8 and 12% depending on projection, about the same rate as England as a whole though more slowly than other regions in England, particularly the Greater South East. This means that aggregate demand for goods and services in northern England will continue to grow in the next quarter century. In our analysis of ageing, we explored how much the age of retirement would need to rise to maintain the current old age support ratio. Our analyses suggested that **it will be necessary to increase pension entitlement age to 70 by 2036** rather than the 67 planned in the 2007 Pension Act.

Population ageing will have important impacts on the health status of the population of northern England. The rate of increase of the population with limiting long term illness and in not good health will be greater than the population as a whole because the age structure will shift towards the ages of poorer health. **Population ageing reflects improvement in survival and longevity but at the expense of more time spent in illness and more people ill.** The pressure on the National Health Service budget will intensify.

The flip side of the additional ageing in the next twenty five years is a decrease in the labour force as the baby boomers retire. **The labour force of northern England decreases if**

¹ See the project web pages at <http://www.geog.leeds.ac.uk/research/projects/migrants.html> and the ethnic population database at <http://ethpop.org>

labour force participation rates remain constant. Vigorous action needs to be taken to encourage employers to introduce flexible transitions to retirement that encourage and reward older workers who wish to continue in work and to signal to those who wish to exit that the gain in leisure must be compensated for by decreased income. Failure of more than a few employers to develop such older worker policies is a serious shortcoming: **government needs to provide a vigorous lead in developing employment opportunities for older workers**, using both carrot (extra points in tenders for contracts) and stick (reduced grants if no policy is in place). The objection that this might damage the prospects of younger entrants to the labour force can be countered by designing mentoring schemes that join together young and old labour together in shared projects.

Acknowledgements

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1 Introduction

1.1 The key demographic trends

Profound changes are in train in the communities of Northern England as a result of the local expression of two major demographic processes: population ageing and population migration (Boden and Rees 2010a). The population will age considerably in the next 25 years as the baby boom generations move into the older ages. Because of past and continuing immigration the ethnic composition of the UK population will also change profoundly (Wohland *et al.* 2010, Rees *et al.* 2011a, Rees *et al.* 2011b, Wohland *et al.* 2011). The White British group will have a smaller share of the UK and Northern England population and the Ethnic Minority population will have a larger share. A lot is known about these demographic processes but knowledge of just the age, sex and ethnic size and structure of Northern England's population is insufficient for preparing effective policy responses. It is necessary also to understand the social and economic character of the future population. Policy makers need to know about how the projected populations will be organized by households, as demand for housing and consumption are affected by household numbers and composition. We also need to understand how population change will affect the labour supply. Will the working age populations grow or shrink? What will be the effect of ageing of the working age population on the labour force? What potential is there for expanding the labour force by encouraging participation in the labour force at older ages? Extensions of working life, will, as Mayhew (2009) has demonstrated, be dependent on the future health status of the population. Disabled persons may not be able to work into old age. The health and social care services and the private insurance industry need to know how many people will face severe disability in very old age but the care needs of this subgroup may also affect the ability of their children (a main source of help) to remain in work. The implications of the demographic future for care needs and the supply of carers are discussed in the Strand 4 report (Buckner *et al.* 2011).

There is a wealth of research on these issues at national scale (Jagger *et al.* 2008, Robine *et al.* 2003) but relatively little at the scale of regions such as Northern England or at the scale of the functional economies such as the City regions. We need to develop knowledge of the following sets of statuses: **labour force status**, where we are seeing rises in workforce participation at older working ages, where jobs are available, because of later and meaner retirement provision; **good health status**, which is necessary for increased workforce participation and which changes radically with age; **dependency status**, where a minority of the older population may become unable to look after themselves fully and therefore need family or community care, which will be contingent on state support or private savings/insurance. We also need to understand how ageing might affect how the populations are organized into **households** and **families** of different kinds.

We will incorporate the best understanding of how to measure health statuses of different degrees and project health status (section 7). Strand 4 work reports on the likely increase in

particular illnesses and disabilities (e.g. Dementia) which lead to high dependency and the need for intensive care. Boden and Rees (2010a) surveyed the literature on ageing and labour force participation and connected it with Northern England. We extend the analysis of labour force participation to understand how participation varies across the local authorities of northern England (section 8). We implement a set of household and family type projections (section 9) which will be used in the Strand 4 analysis of caring arrangements and housing needs. These projected data are presented at scales which will support policy making within northern England for local authorities and for consortia of local authorities and business (Local Enterprise Partnerships), which correspond to the city regions and rural regions of northern England (see Appendix Tables).

This strand report does not review policy initiatives *per se*, but in section 10 we discuss the implications of the demographic changes for policy in different sectors.

1.2 Research questions, overall aim and objectives

We pose the following set of research questions in this Strand 1 report:

- (1) How will the **populations** of Northern England change over the next 25 years and what are the impacts of the changes?
- (2) How will the **age structures** of Northern England population change over the next 25 years and what are the impacts of the changes?
- (3) How will the **health status** of the population by age and sex change over the next 25 years, distinguishing carefully between different levels of health and dependency?
- (4) How will the **labour force status** of the population by age and gender change in Northern England over the next 25 years and how might this effect the economic dependency ratio?
- (5) How will the **numbers and types of households** and **families** change in Northern England change over the next 25 years and what are the impacts of the changes?

The **overall aim** is therefore to develop a projection of the future population of the northern England at local authority and city region scale that captures the linked statuses, building on an account of projected demographic changes.

To achieve the aim we implement the following tasks:

- (a) We extract from two projections the database of projected populations produced in a project funded by ESRC as part of the *Understanding Populations Trends and Processes Initiative* (UPTAP), using every fifth year from 2001 to 2036, five year age groups and

- broad ethnic groupings for Local Authorities (LAs) in northern England which will be grouped into LEPs (see section 4). The projection data are available on the ETHPOP database (<http://ethpop.org/>).
- (b) We analyse the ways in which population changes in terms of ageing and ethnic mix at LA and LEP scale.
 - (c) We extract data from the Standard Tables, Commissioned Tables and the Small Area Microdata (SAM) of the 2001 Census from which the prevalence rates of household representation, family type, labour force participation and health status can be computed.
 - (d) We develop methods for estimating ethnic specific prevalence rates where the data allow. This can be accomplished directly for the largest cities of northern England, but the smaller towns and rural districts usually have insufficient ethnic minority group numbers for the computation of reliable rates. We use northern England averages to reflect ethnic group differences in status prevalences.

1.3 Report outline

The report is organised as follows. After this introduction, section 2 reviews recent demographic changes in the United Kingdom, in northern England, drawing on Boden and Rees (2010a) and official statistics. Section 3 describes the methodology used to produce the ESRC-UPTAP projections, summarizing the account in Wohland *et al.* (2010). Section 4 describes the geographical zones we use in the analysis. Section 5 discusses the population changes projected in the two selected projections: the TRENDEF projection which is aligned to the 2008-based national population projection (NPP2008) and the UPTAPER projection which adopts a different model of international migration. Section 6 describes the methods used for adding additional characteristics to a population classified by location, age, sex and ethnicity. The method uses prevalence rates, is relatively simple and therefore feasible; more sophisticated methodologies are available (e.g. multistate or micro-simulation models) but require more detailed information and development time. Section 7 projects the health and illness status of the population using the prevalence rate method (or the Sullivan method after its inventor in the health field). Section 8 applies labour force participation rates to the projected population under fairly simple assumptions. Section 9 outlines our household projections which use communal establishment rates and household representative rates and our family type projections. A final section, 10, summarizes the findings and discusses the implications of these demographic and linked trends for policy in the LAs and LEPs of Northern England.

2 Review of Demographic Changes

This review is adapted and updated from the account provided in Boden and Rees (2011a). We describe demographic changes in the UK and in northern England.

2.1 Population ageing so far: a century of growing old, which will continue

2.1.1 Population ageing in the UK

The UK was one of the first countries to experience an ageing population (from 1911 onwards). By ageing we mean an increase over time in the share of the population that is old. The population aged 65+ increased by 366% between 1911 and 2008 whereas the all age population increased by only 45%. The old age share increased from 5.2% in 1911 to 16.1% in 2008. However, the pace of ageing varied across decades depending on the sizes of cohorts attaining their 65th birthdays which reflect the number of babies born 65 years earlier (ONS 2010a, 2011a). Between 1931 and 1951 the percentage of the population aged 65 and over grew from 7.4 to 11.0% but between 1951 and 1961 only to 11.9%. From 1991 to 2008 ageing ground almost to a halt, with the percentage of the population aged 65 and over moving from 15.9% to 16.1%, as the low birth cohorts of the inter-war period had their 65th birthdays in this period. What this history demonstrates is that although ageing is the consequence of the switch of demographic regime from high birth and death rates to low, the track ageing takes depends intimately on the population history of a country. To forecast future ageing we need to employ a projection model, the cohort-component model, which captures past history of the components and uses forecasts of future components rates.

2.1.2 The UK in a European Context

How does the UK compare with other developed countries in degree of ageing? Mathison (2010, p.18) compares the position of the UK with other countries, using Eurostat projections, thus: "the UK's 65 and over population is expected to rise from 16 per cent in 2009 to 23 per cent in 2035; however, by 2035 the UK will rank as one of the least aged countries in the EU." Rees *et al.* (2010) similarly forecast that the Old Age Dependency Ratio (population aged 65+/population aged 15-64) for the UK will increase least in the period 2005-2050 among 31 European countries.

2.1.3 Population ageing in northern England

Population ageing in northern England has followed the UK trajectory closely. The population aged 65 or over in England at mid-year 2009 was 16.3% of the total. In the North East and North West regions the population was slightly older at 17.1% and 16.6% aged 65+, while in Yorkshire and the Humber the figure was slightly younger 16.2% (ONS 2010b). Table 1 presents future populations for northern England Government Office Regions (GORs) projected by the Office for National Statistics from 2008 to 2033. Lower growth is projected for northern England in the North East and North West than in England as a whole. The slightly

higher growth in Yorkshire and the Humber must be regarded sceptically as the estimates of immigration to Yorkshire and the Humber have been criticised as being exaggerated by Boden and Rees (2010b). The degree of ageing in prospect in the 25 year period is considerable: the share of the population will rise to 23-24%, slightly above that of England as a whole. Part of this rise is a function of the transition to old age of baby boom cohorts born in the period 1945 to 1972 when the TFRs were high, mostly above replacement.

Table 1. Projected populations for northern England, 2008-2033, SNPP

Region	Age group	2008	2033	Time series 2038
North East	All ages	2,570.6	2,829.8	110
	65+	436.5	691.7	158
	%65+	17.0	24.4	144
North West	All ages	6874.1	7471.7	109
	65+	1127.2	1748.5	155
	%65+	16.4	23.4	143
Yorkshire and the Humber	All ages	5217.5	6296.0	121
	65+	839.6	1369.2	163
	%65+	16.1	21.7	135
Rest of England	All ages	36,802.4	44,117.7	120
	65+	5,885.0	9,887.5	168
	%65+	16.0	22.4	140
England	All ages	51464.6	60715.2	118
	65+	8288.3	13696.9	165
	%65+	16.1	22.6	140

Notes: SNPP = Subnational Population Projections, ONS (2010d). Population in 1000s.
Time series 2038 = $100 \times (\text{Population 2038} / \text{Population 2008})$.

2.2 Demographic momentum has kept and will keep natural increase positive

Since 1970 (except in 1977) the UK rate of natural increase (births minus deaths) has been positive, above 100 thousand per year in 1986-1996 and 2003-2008 and below 100 thousand in 1971-1985 and 1996-2002 (ONS 2009b, Table 1.6). However, since 1974 the synthetic indicator of fertility for the population, the total fertility rate (TFR, the children a woman would have if she experienced the current age-specific fertility rates over her reproductive life time), has been lower than the level required for long term replacement of the population (2.1 in 1974, 2.07 in 2001 — see Smallwood and Chamberlain 2004). How can natural increase and below-replacement fertility co-exist? Three factors are involved. First, large cohorts of baby boomers born 1945 to 1972 were available to boost births in the 1970s, 1980s and 1990s; second, the decrease in age-specific mortality kept deaths lower than they otherwise would have been; and third, new migrants added women to the fertile ages and so kept the demographic momentum going. The 2008-based National Population Projections

suggested that the second and third factors will keep natural increase positive until 2081 at least, despite adoption of a long run TFR assumption of 1.84, still well below replacement (ONS 2010b, Figure 12-2, p.50). In fact, between 2009 and 2026 natural increase is projected to exceed 200 thousand, well above the level of the four preceding decades. After 2026 natural increase will shrink back to levels around 100 thousand per year from 2041 to 2081.

2.3 Rising fertility in the past decade: now on a plateau and projected to be stable

2.3.1 Rising fertility in the 2000-2010 decade

A new trend of rising fertility has emerged in the last decade. In 2001 the England TFR was 1.63 while in 2009 it was 1.96, a rise of a third of a child or 20%. Northern England experienced fertility slightly above and below the England average of 1.9 in 2007: the TFR in the North West was 2.0, the North East TFR was 1.8 and the Yorkshire and the Humber TFR was 1.9 (ONS 2009a). What factors have led to the rise and how should this influence our future view of fertility? Jefferies (2008, 2009) puts forward two explanations: (1) women who previously postponed childbirth have been catching up in their thirties and (2) there has been a shift in the composition of mothers towards higher fertility groups. Tromans *et al.* (2009, p.41) conclude that “since 2004 increasing fertility rates among UK born women have made the largest contribution to the overall increase in births. ... The increasing size of the foreign born population ... resulted in the second largest contribution to overall increase in births since 2004.” The contribution of births to foreign born mothers is lower in northern England than in London and southern England except in Bradford, Oldham and Manchester (map in Tromans *et al.* 2009, p.38). In 2009-10 the decade long rise in fertility rates has come to an end (ONS 2011b, 2011c) with the England and Wales TFR of 1.97 in 2008, 1.96 in 2009 and 2.00 in 2010. The long-term fertility assumption for England in the 2008-based National Population Projections was 1.85 (ONS 2009b), reflecting some retreat from 2008-10 levels.

2.3.2 Assumptions for the future

The rise in fertility 2001-2010 has influenced the future assumptions for national projections. So in the 2000, 2002 and 2004 based projections the UK assumption of long run TFR was 1.74. In the 2006-based projections this was moved up to 1.84 and in the 2008-based projections to 1.85. A conservative view is taken that the rise in fertility since 2001 will not continue into the future. This reflects previous experience in the late 1970s and late 1980s when rises in the TFR fizzled out and takes into account the long-run decline in completed family size (though this is seen as bottoming out). The arguments for the long-term assumption in the 2006-based projections of a completed family size of 1.84 (which becomes the period TFR in the course of the projection) were set out in full in Jefferies (2008). These cohort-based arguments are maintained in the latest, 2008 based projections published in 2009 (ONS 2009b, 2009c, 2009d).

2.3.3 Fertility in northern England

Northern England should expect, on past evidence, to follow these future trends.

2.4 Mortality: continuing improvement internationally and in the UK

2.4.1 The recent pace of mortality decrease

A second factor contributing to population ageing is the decrease in mortality, particularly at older ages. This means that improving survival probabilities to old age and within old age will mean that more of successive cohorts will live to be old and very old. For example, in 1980-82 the chances of men surviving to age 65 were 74%, while in 2006-08 they were 85% (ONS 2009e). For women the corresponding chances were 84% to age 65 in 1980-82 and 90% in 2006-08. The probabilities of surviving from age 65 to age 80 were for men 39% in 1980-82 and 61% in 2006-08 and for women 59% in 1980-82 and 73% in 2006-08.

2.4.2 Future mortality

What about the future? In the long term some very optimistic projections of mortality exist. Using models of mortality decline equivalent to an increase of 0.2 years per year in life expectancy, Christensen *et al.* (2009, Table 1, p.1197) report the oldest age at which at least 50% of a birth cohort will still be alive for eight low mortality countries. For UK babies born in 2007, the oldest age is 103. A similar finding can be generated by assuming 2% decline per year in mortality rates (lower than recent experience) for 100 years. Much medical and bio-engineering research aims to provide the means for people to live longer and healthier lives.

The National Statistics projections are more conservative than the Christensen *et al.* (2009) forecasts. The 2008-based projections assume that there will be a decrease in current decline rates (above 2%) to a steady 1% from 2033. However, an exception is made for the cohorts born in the 1923-40 period aged 68-85 in 2008. These “golden” birth cohorts have experienced better mortality than earlier or later cohorts of up to 2.5% per annum decline. The ONS analysis therefore results in average annualised rates of mortality improvement of over 1.3 per cent for males and around 1.4 per cent for females over the longer 2008-2083 period.

In the past, ONS under-projection of mortality improvements has affected state, occupational and firm pension schemes. Insufficient contributions have been made by employer and employee to allow for the improvements. This has meant the downgrading of pension benefits and the passing of the risk to employees through conversion of defined benefit to defined contribution scheme. The consequences of over-prediction are less serious: excess savings can be used to provide capital for investment where returns are good (e.g. in the developing world).

Could the trend of improving survival be coming to an end? This is a topic that has exercised the National Population Projections (NPP) expert panel in its 2008 and 2009 meetings (ONS 2008a, ONS 2009k). The most important of the contrary factors is obesity. The Government

Office for Science (2007a, 2007b) used a forecasting model based on trends in Health Survey for England data and micro-simulation methods to project obesity levels. The obesity rate for both men and women in the UK was estimated to be 24% in 2004 and forecast to be 60% for men and 50% for women in 2050. Figures for northern England were close to the UK. However, Government Office for Science (2007b) evaluates the likely decreases in life expectancy, linked to rises in diabetes, hypertension, and coronary heart disease associated with obesity, to be small. By mid-century life expectancy will be reduced by between 0.2 and 0.4 of a year as a result of obesity. As one analysis of a US longitudinal cohort study put it (2010, Reuser 2010, p43), “smoking kills, obesity disables”.

2.4.3 Trends in northern England mortality

These trends in mortality and their influence on ageing apply to northern England. The GOR regions in northern England have higher mortality than the UK, with Standardized Mortality Ratios (UK=100) for the North East of 109, the North West of 110 and Yorkshire and the Humber of 104. Northern England trends in mortality follow the national norm very closely. Life expectancy for UK men improved from 74 years to 78 between 1991 and 2007. Life expectancies in the three northern England regions were lower (72.5 to 73.5) and rose in parallel, with no shrinkage of the gap. Life expectancies within each region vary significantly by local authority (Brown and Rees 2006). These inequalities are long standing but need to be monitored, so that public authorities can intervene should inequalities widen or life expectancies decrease.

2.5 Migration trends: internal gains and losses, international gains

Migration re-distributes the population between regions within a country through internal migration and adds/subtracts population into/out of the country and its regions through international migration. These two streams of migration can act either in the same direction or in opposite directions. We also note that the official sub-national estimates of international migration currently produced by the Office of National Statistics are uncertain (for an alternative view see Boden and Rees 2010b).

2.5.1 The pattern of migration flows within, into and out of the UK

Table 2 presents for 2008-9 (mid-year to mid-year) the internal, international and combined migration totals for northern England GORs and the Rest of the UK. The North East has a small internal migration loss while the North West and Yorkshire and the Humber have larger losses. The long standing North to South migration flow continues, reflecting the balance of economic development in favour of the Midlands, South and Celtic Fringe. All regions/countries in the UK gain from long term international migration, with net immigration to the northern England regions contributing. The flow to Yorkshire and the Humber stands out, being as big as to the other two regions combined. Boden and Rees (2010b) suggest that this is probably an artefact of the method used to allocate UK immigration totals to GORs using the Labour Force Survey (LFS). Use of more reliable administrative statistics (GP registrations, NINo registrations and HESA data on foreign

students) indicates that flows to Yorkshire and the Humber were lower than officially estimated and that flows to the West Midlands were under-estimated. With this correction applied and with low levels of net internal migration, the northern England regions experience small gains through international migration, though there may be compositional effects (e.g. in terms of ethnic mix).

Table 2. Migration flows into and out of northern England's regions, 2008-2009

Origin (from)	Destination (to)					Totals
	NE	NW	YH	RUK	ROW	
North East (NE)	42,440	6,950	10,900	28,640	7,000	95,930
North West (NW)	6,920	154,670	21,980	88,850	31,000	303,420
Yorkshire & Humber (YH)	10,470	20,960	82,550	76,850	22,000	212,830
Rest of UK (RUK)	25,480	81,960	69,630	1,930,640	338,000	2,445,710
Rest of World (ROW)	22,000	44,000	50,000	448,000	0	564,000
Totals	107,310	308,540	235,060	2,572,980	398,000	3,621,890
Net Internal	-3,620	-7,880	-5,770	17,270		0
Net International	15,000	13,000	28,000	110,000		166,000
Net Total	11,380	5,120	22,230	127,270		166,000

Source: ONS statistics from the Patient Register Data System, the NHS Central Register and the Long Term International Migration Statistics. Authors' compilation and approximate estimates.

Notes: The migration flows within regions refer only to migration between LAs, not within LAs.

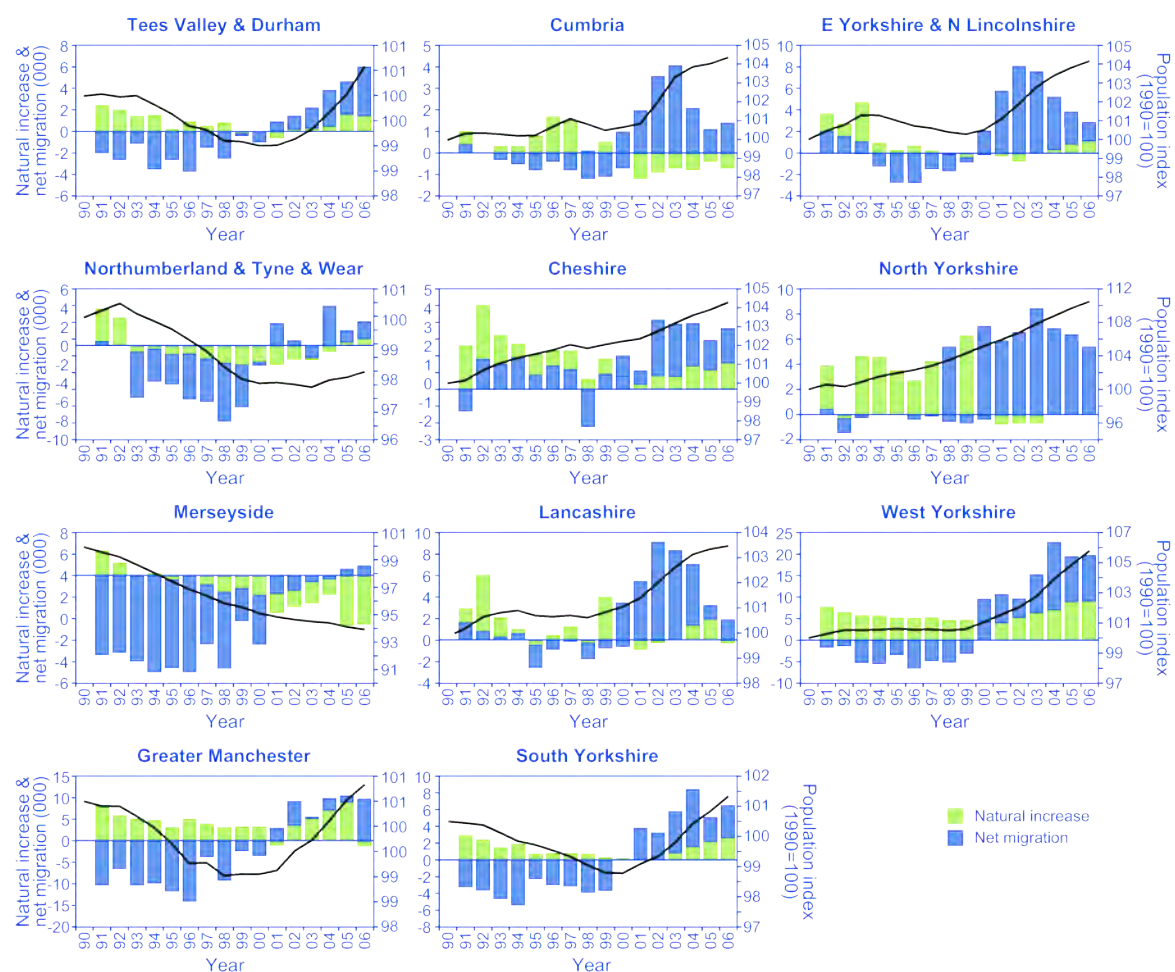
2.5.2 Natural increase and net migration within northern England

However, this picture of low migration exchanges alters when we step down the spatial ladder. Using migration and vital statistics assembled in the DEMIFER project (Rees *et al.* 2010), we can plot the trends in total net migration, natural increase and relative population change for a set of ten spatial units within northern England used by EUROSTAT known as NUTS2 regions (Figure 1). The graphs plot net (total) migration and natural increase in thousands for the period from 1991 to 2007 together with population indexed to a benchmark of 1990 (note that the natural increase and net migration bars are additive). Net migration dominates the graphs, indicating this is the most important contributor to population change at this scale. The graphs also show some rather different trends in the 2000s than in the 1990s.

Natural increase is relatively low but has a distinctive geography. It is high in the large metropolitan centres with high concentrations of ethnic minorities and foreign born women, such as Greater Manchester and West Yorkshire. It is also high in the suburban/metropolitan periphery region of Cheshire. It is negative in regions of older, retired populations such as Cumbria and North Yorkshire and in declining metropolitan regions such as Merseyside and Northumberland-Tyne and Wear. In mixed urban and rural regions such as Lancashire and East Yorkshire and Lincolnshire natural increase is close to zero. The pattern of natural increase is relatively stable across the two decades.

The net migration pattern shows greater differences between decades. In Tees Valley and Durham and in Northumberland and Tyne and Wear, significant losses through migration turn into significant gains. In Greater Manchester migration losses in the 1990s turn into small gains in the 2000s, while in Merseyside large losses in the 1990s become small losses in the 2000s. Cumbria and Lancashire show higher gains in the current decade, as do all the regions in Yorkshire and the Humber. What we see happening is a reflection of much higher net international migration in the 2000s than in the 1990s and a much wider dispersal of that international migration because the accession country migrants of the 2004-2007 period had a much wider spread of destinations (Bauere *et al.* 2007) than traditional migrants from South Asia and Africa, who are very concentrated in urban areas. Internal net migration is important in redistributing population between UK areas but is by definition balanced (total inflows = total outflows) and did not increase in absolute size.

Figure 1. Natural increase, net migration and population change 1990-2007, selected areas of northern England



Source: Author's computations using ONS data on vital statistics and migration for local authorities in England.
 Notes: Natural increase and net migration in 1000s for annual interval starting at mid-year indicated and population change as a time series. 1990 = 100.

2.5.3 Future migration trends

How will migration change in the future in northern England? This is a difficult question to answer because there is no definitive study of trends over the recent period in internal, inter-regional migration. In fact, reliable time series of migration for the whole UK at scales smaller than the country/GOR do not exist. Dennett and Rees (2010) have estimated a 1999-2007 series at NUTS2 scale (these are the 37 second level regions into which EUROSTAT divides the UK). There is also disagreement about the distribution of national immigration estimates to sub-national areas (the Yorkshire and the Humber problem identified above). There is a high degree of uncertainty about the international migration flows into and out of the UK because of the small size of the migrant samples within the International Passenger Survey and the Labour Force Survey.

The migration assumptions used in National Population Projections have been of a rather simple nature: a constant net immigration flow is assumed for future years beyond a short period of adjustment from the most recent past. In the 2006-based projections, the long-term assumption for net international migration was +190 thousand per year; in the latest 2008-based projections the level was dropped to +180 thousand. Commentators have criticized this figure as not reflecting the impact of the recent recession on the draw of the UK labour market for migrants but the NPP expert panel (ONS 2009g) “generally thought that the recession would have a small downward impact on both immigration and emigration in 2009 (compared to 2007), and that this impact would last no longer than five years”.

To signal the uncertainty associated with the projection of migration, a high variant projection assumed a net migration gain of +240 thousand while a low variant projection assumed +120 thousand (ONS 2009e, p.43), although sets of stochastic projections have been prepared (ONS 2009i) but not published.

What will this mean for northern England? It is likely there will be a short-term (3-5 year) dip in immigration and emigration numbers and probably also in net international migration. However, when the economy recovers it is likely that the demand for labour will be maintained by the ageing of the population, simultaneously shrinking the size of the working ages and increasing the demand for care workers for the elderly.

2.6 Past and future ethnic group populations: minority ethnic growth

2.6.1 A new perspective on ethnic group populations

So far we have talked about the population as one homogeneous group. But one of the important ways in which the population varies is in terms of ethnicity. Ethnicity is a complex combination of race, national origin, recent migration and culture, measured in the UK census and national surveys through a self-identification question. An ethnic question has been included in the 1991 and 2001 censuses so we have a good picture of the changing ethnic composition of the England and Wales population (see ONS 2005 for a wide-ranging summary).

A project at the University of Leeds (ESRC 2007-2010) has built projections of the ethnic group populations of local authorities in England with Wales, Scotland and Northern Ireland as single zones (Wohland *et al.* 2010, 2011; Rees *et al.* 2011a, 2011b). We discuss the methodology of two of the projections in more detail later in Section 3 of the report.

Table 3 summarises the results for two projections. The TRENDEF projection uses the assumptions for the UK of the 2008 National Population Projections (ONS 2009e) and enters immigration and emigration as time series of assumed flows. The UPTAPER projection adopts quite similar assumptions but models future migration by multiplying the origin populations by an assumed emigration rate (ER) which means emigration numbers rise as the population increases, leading to shrinking net international migration and slowing growth. There are arguments for and against both approaches: the truth probably lies in between. All projections are uncertain and these two scenarios remind us of this.

2.6.2 Ethnic population change in northern England

The UK population grows by 16% under the TRENDEF projection and by 10% under the UPTAPER (Table 3, middle panel). Population growth in northern England is only 10% and 5% respectively in the North West, 13% and 9% in the North East and 14% and 10% in Yorkshire and the Humber. Over 25 years 10% growth equates to an annual growth rate of 0.48%. Northern England's population grows more slowly than the rest of the UK but faster than most regions in Europe's periphery (Rees *et al.* 2010). There are much greater differences in the rates of growth of the different ethnic groups. The White population grows more slowly than the total population while the non-White groups grow much more. This is mainly because their much younger age structures mean higher fertility and lower mortality and because the international balance of migration is inward for these groups, whereas the White British group experiences net emigration. The non-White groups experience greater growth in northern England than in the UK as a whole, particularly in the North East.

The Mixed ethnic groups experience the greatest growth for two reasons: first, the groups in 2001 had by far the youngest age structures (truly pyramidal, see Wohland *et al.* 2010) and hence the greatest demographic potential and second, most babies born into the group have parents in other groups. The next highest growth is experienced by the Asian groups (mainly from South Asia), the Other groups (Chinese and a huge variety of smaller ethnicities), with the Black groups experiencing lower increases except in the North East.

The consequence of these differences in growth across ethnic groups is changes in the ethnic composition of the population. The White share of the population in northern England falls from 91/94% in 2011 to 87/88% in 2036, while the share of non-White minorities expands from 6/9 to 10/13% depending on projection (TRENDEF or UPTAPER). Growth in the ethnic minority population is slower in the UPTAPER projection because more ethnic minority members emigrate than in the TRENDEF projection. Return migration to origin countries is already significant for some groups (eastern Europeans, north Americans, Australians, West Indians) and may become more important for South Asian populations as first generation migrants retire.

Table 3. Projected ethnic group populations for northern England, 2011 and 2036

Broad Ethnic Group	2011				2036			
	NE	NW	YH	UK	NE	NW	YH	UK
Population in 1000s	TRENDEF Projection							
All people	2695.2	7067.6	5354.6	63531.3	3034.7	7776.8	6126.8	73623.4
White	2533.4	6519.2	4888.7	57087.4	2675.6	6860.2	5346.0	63044.5
Mixed	33.3	96.0	71.4	1028.6	78.8	186.9	138.3	1978.5
Asian	75.5	305.8	299.5	3132.8	171.4	480.6	493.6	5070.9
Black	27.9	80.6	52.6	1492.4	60.2	136.1	77.9	2162.5
Other	25.1	66.0	42.4	790.1	48.6	113.0	71.0	1366.9
	UPTAPER Projection							
All people	2688.5	7037.1	5333.1	63107.6	2923.6	7422.5	5874.0	69162.7
White	2531.4	6505.1	4878.8	56835.2	2626.0	6679.5	5216.8	60468.8
Mixed	32.8	94.4	70.3	1013.0	66.4	155.5	116.9	1661.3
Asian	74.0	299.7	295.2	3074.2	149.1	406.5	431.0	4341.7
Black	27.1	77.4	50.7	1455.9	49.5	107.6	63.5	1777.5
Other	23.2	60.5	38.2	729.4	32.6	73.3	45.8	913.5
Time series indexes	TRENDEF Projection							
All people	100	100	100	100	113	110	114	116
White	100	100	100	100	106	105	109	110
Mixed	100	100	100	100	237	195	194	192
Asian	100	100	100	100	227	157	165	162
Black	100	100	100	100	216	169	148	145
Other	100	100	100	100	194	171	168	173
	UPTAPER Projection							
All people	100	100	100	100	109	105	110	110
White	100	100	100	100	104	103	107	106
Mixed	100	100	100	100	203	165	166	164
Asian	100	100	100	100	202	136	146	141
Black	100	100	100	100	183	139	125	122
Other	100	100	100	100	141	121	120	125
Ethnic composition (%)	TRENDEF Projection							
All people	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
White	94.0	92.2	91.3	89.9	88.2	88.2	87.3	85.6
Mixed	1.2	1.4	1.3	1.6	2.6	2.4	2.3	2.7
Asian	2.8	4.3	5.6	4.9	5.6	6.2	8.1	6.9
Black	1.0	1.1	1.0	2.3	2.0	1.8	1.3	2.9
Other	0.9	0.9	0.8	1.2	1.6	1.5	1.2	1.9
	UPTAPER Projection							
All people	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
White	94.2	92.4	91.5	90.1	89.8	90.0	88.8	87.4
Mixed	1.2	1.3	1.3	1.6	2.3	2.1	2.0	2.4
Asian	2.8	4.3	5.5	4.9	5.1	5.5	7.3	6.3
Black	1.0	1.1	1.0	2.3	1.7	1.4	1.1	2.6
Other	0.9	0.9	0.7	1.2	1.1	1.0	0.8	1.3

Source: Projections from ESRC Award RES-163-25-0032, Wohland et al. (2010).

Notes: Government Office Region abbreviations. NE = North East, NW = North West, YH = Yorkshire and the Humber. UK = United Kingdom.

2.7 Trends in household numbers and composition: the end of decline in household size and its implications

2.7.1 A history of declining household sizes

The forty years to 2000 saw an increase in the number of UK households, driven by both the increase in the population and an increasing propensity to form and live in smaller households. This increasing propensity is reflected in a continuous fall in average household size, as shown in Table 4. This fall is accompanied by a shift in the distribution across households of different size. The percentage of large households (4 persons or more) falls from 34% in 1961 to 20% in 2001; the percentage in one person households rises from 14% to 29% in the same period. However, since 2001 the average household size has remained stable at 2.4 persons and the size distribution has hardly changed. In the Household Projections for England (CLG 2010) an increase of 27% in the number of households is projected from 2008 to 2033. The main driver (75%) will be an increase in the size of the population rather than a decrease in household size (25%). The number of households will increase as a result of ageing: more older people will mean smaller households, leading to an increase in households even if household representative rates for each age-sex group remain stable. This stability is a result of a tight housing market, the residential property boom (2001-2007) and subsequent bust (2008-2010), which means young people are delaying forming new households until they are older.

Table 4. Households by size, Great Britain, 1961-2009, percentage distribution

Household size	1961	1971	1981	1991	2001	2009
One person	14	18	22	27	29	29
Two people	30	32	32	34	35	35
Three people	23	19	17	16	16	16
Four people	18	17	18	16	14	14
Five people	9	8	7	5	5	4
Six or more people	7	6	4	2	2	2
All households (millions)	16.3	18.6	20.2	22.4	23.9	25.2
Average household size	3.1	2.9	2.7	2.5	2.4	2.4

Source: Table 2.1 in ONS (2010c). Notes: All households = 100%.

2.7.2 Household trends in northern England

The Communities and Local Government department has recently published household projections (CLG 2010) which build on the 2008-based ONS Subnational Population Projections (ONS 2010). Table 5 presents the projected household numbers for northern England. The number of households in the North East and North West regions grows by 18-19% over the 25 years. Again we consider the Yorkshire and the Humber figure at 31% to be in substantial error because of the mis-estimation of the allocation of UK immigration to the region (Boden and Rees 2010b).

Table 5. Household projections by region, England

Region	2008	2033	% change
North East	1,112	1,324	19
North West	2,935	3,473	18
Yorkshire and Humber	2,203	2,879	31
Rest of England	15,481	19,796	28
England	21,731	27,472	27

Source: CLG (2010), Table 4, p6. Note: Households in 1000s

2.8 Discussion

This review has placed northern England in the wider context of a century's population development. The region has experienced population growth but this has been slower than in the rest of England and slower than in the Greater South East², the powerhouse of the UK economy. However, in a European context the projected future growth in the next 25 years puts northern England in the upper part of the European regional league table. The population experience reflects, of course, the economic fortunes of the region. The 20th century saw the demise of northern England's basic industries: coal, steel, cotton and woollen textiles, engineering, ship building in which it had been a world-leader in the 19th century. It still has pockets of world leading expertise but it is no longer a world class economic leader. The secondary industry jobs have been replaced by jobs in services (retail, business, education) but many of these jobs are in the public sector. This makes the region vulnerable to economic shocks and subsequent policy adjustments. As a result the past century has been one of outward migration to the rest of the UK, particularly to the Greater South East. However, in periods of relative economic prosperity in the second half of the 20th century, northern England has attracted migrants from outside the UK. In the 1950s and 1960s the textile mills of Greater Manchester, North East Lancashire and West Yorkshire were short of labour to run night shifts and recruited from the Indian sub-continent. This migration has established important South Asian communities in the main districts of these parts of northern England. Continuing family migration from the 1970s has kept these South Asian communities growing and the ethnic composition of northern England has changed profoundly.

But the population trend which poses a greater challenge in the current half century is population ageing. Ageing is the inevitable consequence of a population completing the demographic transition, resulting from the lowering of fertility and the improvement in survival chances. In the next 25 years there will be more ageing than would occur as a result of the current demographic regime because the higher birth cohorts of the late 1940s,

² The Greater South East consists of the former Government Office Regions of London, the South East and the East of England.

1950s and 1960s will become old in the 2010s, 2020s and 2030s. The Observer (2011) called this challenge an “agequake”. The challenge is to adapt and change our systems of work and taxation to offer adequate and fair support in old age for successive generations. This adaptation has focused on changing the basic state pension, the pension arrangements of public sector workers and the allocation of funds in the National Health Service in response to need driven by ageing of the population. Most of the debate and the adaptations take place at national level rather than regional. However, the consequences of new arrangements will play out differently depending on local demography.

In this review we have looked at northern England at regional scale drawing mainly on official sources. However, this is inadequate for several reasons. First, Government Office Regions (GORs) ceased to exist as of 31 March 2011 and were replaced by looser federations of local enterprise and government called Local Enterprise Partnerships (LEPs). Second, the GORs and LEPs hide an important degree of local variation in the pace of ageing and changing composition of the population at LA scale. Third, we need also to understand how the labour force might change (affecting the ability of society to support the older population) and how healthy the ageing population will be (affecting the demand on health and care services). We could use the official sub-national population projections as a starting point. However, our review suggests several flaws in the available statistics. The projected populations for Yorkshire and the Humber are exaggerated. The official projections lack an ethnic component which affects labour force participation, health and care arrangements. Therefore instead we draw on recently completed projections of the populations of England’s local authorities which overcome these drawbacks. The next section of the paper summarises the features of these projections.

3 The Future Population: Methods and Assumptions

3.1 Background to the UPTAP projections

This report uses selected results of ESRC Research Award, RES-165-25-0032, *What happens when international migrants settle? Ethnic group population trends and projections for UK local areas*, October 2007 to March 2010. This project was part of an ESRC Programme called Understanding Population Trends and Processes (UPTAP), led by Professor John Stillwell (University of Leeds). We adopt the UPTAP acronym as the name of the projection model and also use it to refer to two projections in which we make our own set of assumptions about future fertility, mortality and migration. Full descriptions of the projections are given in Wohland *et al.* (2010) and Rees *et al.* (2011a) and particular aspects and applications are discussed in Rees *et al.* (2011b) and Wohland *et al.* (2011). Here we provide an outline of the main features.

The principal aim of the project was to produce projections of ethnic group populations for local areas in the UK. The ethnic make-up of the UK's population is changing significantly at present and groups outside the White British majority are increasing in size and share, not only in the areas of initial immigration but throughout the country. This growth is driven by all the demographic components: immigration balanced by emigration, differences among ethnic groups in fertility levels and varying mortality experiences. Important spatial re-distribution of the population is taking place through internal migration. The ethnic make-up of local areas is therefore evolving. The composition of the population is also changing through the birth of children of mixed ethnic origins. We estimated all of these components of change for 16 ethnic groups and 352 local authorities in England together with estimates for Wales, Scotland and Northern Ireland. The most reliable estimates can be made for 2001, when the last decennial census was held. However, we extend these estimates from 2001-2 to 2007-8 mid-year to mid-year intervals.

3.2 The model

Virtually all demographic projections used a cohort-component model. The population is divided into a set of age groups, the members of which belong to a particular birth cohort or set of birth cohorts. So persons aged 0 in the mid-year population of the UK in 2001 were born between 1 July 2000 and 30 June 2001. As long as the same time interval is used for the age group and period, then over the period the population in an age group moves from one age group to the next. In our model we use single years of age from age 0 to age 100 or over. This is an extension of current UK sub-national practice where the final age group is aged 90 or over. We needed to raise the threshold age for the final age group in order to allow for ever improving survival to very old ages. In the UK National Population Projection (NPP) model ages extend even further to 115 or over as the last age (though results for ages over 100 are not published).

The model uses two separate populations: men and women. They experience mortality and migration separately, being exposed to different probabilities of survival and of migration. Only women participate in the fertility model: births are projected by multiplying the populations of women in the fertile age range from 15 to 45 or over by forecast age specific fertility rates. Babies are assigned a sex by multiplying births by a sex proportion. This is a standard female dominant fertility model.

The model handles 16 ethnic groups as separate populations disaggregated by age and sex. People remain in the ethnic group that they self-identified with in the 2001 Census. The ethnic groups therefore change separately, in parallel, with one exception. For infants newly born to mothers in an ethnic group, we apply a probability, derived from the 2001 Census, that they will have been assigned a particular ethnicity. Most new-borns are assigned their mother's ethnicity, but in mixed unions they may be assigned the husband's or partner's ethnicity or assigned a mixed ethnicity. Ethnic groups may gain or lose through this process. For example, a majority of infants born to White Irish mothers are assigned a White British

ethnicity. A substantial minority of babies born to Black Caribbean mothers are assigned a Mixed White and Black Caribbean ethnicity.

Sub-national projection models track the future populations of a large number of regions, which exchange populations through migration. There are several ways in which these migrations and the associated regional populations can be handled.

The simplest method is the single region projection model in which each regional population is handled in isolation; migration to/from this single zone can be represented as net migration flows (the balance of inflows minus outflows), as gross inflows and outflows or as gross inflow and outflow rates or as a combination of inflows and outflow rates. It is usual to distinguish internal migration (within a country) from international migration (into and out of a country). The Wales sub-national projection model, for example, is a single region type that uses software known as POPGROUP (POPGROUP 2011).

The problem with single region models is that in reality migration into a region is a product of the population of connected regions and the propensity to migrate between them. Therefore the cohort-component model was expanded into a multiregional projection model in which a matrix of inter-regional migration rates or probabilities is used to project the flows between regions. The England sub-national projection model uses a modified multi-regional model in which the required inter-regional migration rates by age are modelled using migration schedule functions.

However, our model had to handle a much larger number of sub-populations than most prior models. We aimed to produce projections for 355 regions (352 local authorities in England plus Wales, Scotland and Northern Ireland as separate zones) and 16 ethnic groups, making a total of 5,280 sub-populations. A multiregional cohort-component model with single year of age populations requires a huge array of component rates and probabilities, which have sparse and unreliable data for each cell. We therefore adopted a compromise between the single regional and multiregional models called the **bi-regional model**. The population of each region is modelled in a two region system consisting of the region itself and the rest of the country. Out-migrants from each region are modelled as a product of the out-migration rate multiplied by the regional population while the in-migration to each region is the product of the out-migration rate from the rest of the country and the rest of the country population. The definitions of the rest of the country change with each region. To maintain consistency in each time interval, the ratio of number of out-migrants to the number of preliminary in-migrants is calculated. This ratio is then used as a correction factor to scale the *preliminary in-migrants* so their total number is equal to the total number of *out-migrants* out of all areas for each ethnic group. Thus, the *final* number of *in-migrants* into an area is computed.

To complete the projection model we need to model *international migration* between the sub-populations within our country and the rest of the world. Here each population becomes

a single region to which are added immigrants and from which are subtracted emigrants. In the UK National Population Projection model each of these migration streams is handled as a set of flow counts set by exogeneous judgement but reduced to a net international term. In the UPTAP models we use either judgemental assumptions about both inflows and outflows or assume that immigrants should derive from assumptions about inflows and that emigrants should derive from assumptions about emigration rates, with projected emigrants being a product of the assumed rates and the regional populations at risk.

3.3 The data inputs

Because we were projecting the populations of ethnic groups, a good deal of work was necessary to estimate ethnic specific fertility, mortality, international migration flows and rates and internal migration probabilities. Full details are provided in Wohland *et al.* (2010) and Rees *et al.* (2011b). Experiments with simpler inputs (Wohland *et al.* 2011) demonstrated that ethnic differences in the rates and flows made relatively little difference to the aggregate UK population but such estimates were clearly essential if one wished to project local ethnic group populations.

3.4 The assumptions and projections

To carry out a projection requires assumptions about how the component drivers will vary in the future. Table 6 sets out the assumptions for the five scenario projections we carried out, while Figure 2 shows their trajectories for the UK population, with the projected UK population from the 2008-based NPP as a comparator. For the projections, we made assumptions about how component rates, probabilities and flows will develop in the next forty years and fed these into a projection model. The two benchmark projections, BENCHER and BENCHEF, explore what would have happened if the component rates, probabilities and flows of 2001-2 had continued. Their trajectories show population decline setting in the 2020s in the first scenario and in the 2030s in the second. Together they demonstrate how much the population component drivers have changed in a mere 7 or 8 years. This emphasizes how uncertain any of population projection is since assumptions are heavily influenced by information from a few recent years. The next projection is called TRENDEF and is designed to be aligned at the UK level, as far as possible, to the assumptions used in the 2008-based National Population Projections and to the model that uses net international migration flows. Figure 2 shows that these projections are close to the 2008-based NPP though slightly higher. Wohland *et al.* (2010) interpret the small difference as an aggregation effect: if you project 5,280 sub-populations (as in our model) compared with 4 sub-populations (the home countries in the national model), then the projected population will be slightly higher because population drifts towards regions with higher growth regimes. The final two projections, UPTAPEF and UTAPER, both use assumptions for components beyond 2008 are adjusted from those adopted in the 2008-based National Population Projections; this reflects the team's views on how component rates, flows and probabilities are likely to

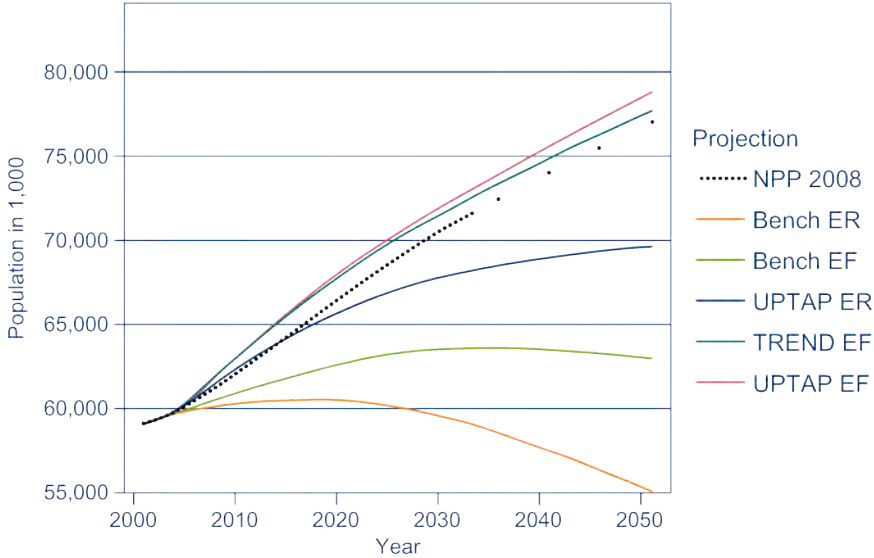
change in the future. The UPTAPEF scenario adopts a gross international flows model designed to simulate the net migration mechanism in the NPP model but with different levels. The result is a slightly higher projected population. The UPTAPER scenario changes the way emigration is projected to a model of rates multiplied by populations at risk. The projected population is considerably lower because emigration flows rise in tandem with the populations at risk and hence the net international surplus shrinks. This represents an alternative way to achieve a shrinking net international migration balance to that proposed by the Coalition Government, which seeks to severely restrict certain categories of immigration (e.g. international students), which make a vital contribution to the UK economy.

Table 6. The five main ethnic population projections

Projections	Assumptions	Emigration model
BENCHER	2001-2 dynamics held constant	Rates × PAR
BENCHEF	2001-2 dynamics held constant	Flows
TRENDEF	ONS trends in NPP & SNPP 2008 based	Flows
UPTAPEF	Adjusted ONS trends	Flows
UPTAPER	Adjusted ONS trends	Rates × PAR

*Note: The bolded projections are the ones used in this report. PAR = population at risk.
Source: Wohland et al. (2010)*

Figure 2. The five scenario projections for the UK with the NPP2008 projection for comparison



Source: Wohland et al. 2010, Figure 11.1.

Table 7 sets out the content of the projected population database for northern England used in this report.

Table 7. Population classifications in the projected population database

Variable	Comments
Geography: 2009 Local authorities	The 92 2001 LAs in northern England are aggregated to the 72 2009 LAs. See the Geography section.
Ages: five years groups 0-4 to 95-99, 100+ plus 10-15, 16-19	We group single years of age into five year ages to reduce the volume of data handled but include slight variations in the teenage years, to take account of the current compulsory schooling ages.
Sexes: males, females, persons	Essential because educational status, labour force participation and health status are different for the two sexes
Ethnic groups: 16groups, 2001 Census	LAs vary greatly in ethnic composition and this affects derived population statuses.

3.5 The projection database for northern England

For this report we confine attention to just two of the scenarios which are highlighted in Table 6. The TRENDEF scenario follows the official trends (2001-2008) and assumptions (2008-2031-2051) in the components of change from the National Population Projections and Sub-national Population Projections. This is a “comfort blanket” projection for users who want to stick closely to the official view. Note that we use our own estimates based on administrative data for the sub-national allocation of immigration to correct for the over-allocation to Yorkshire and the Humber (and under-allocation to the West Midlands) in the official estimates and projections base on sample data for an intermediate geography. UPTAPER employs our own assumptions for the components and also uses emigration rates multiplied by origin area populations to project emigration. We use an emigration rates model that better reflects the potential for return migration by previous immigrants and migration up the international ladder by all British residents.

Table 8 shows an example of the output of a projection. The outputs of the ESRC projections are for local authorities in England as constituted at the time of the 2001 Census. We require, in this project, data for local authorities as constituted from 1 April 2009. These are the local authorities that applied to the Department of Communities and Local Government to form Local Enterprise Partnerships. Fortunately, the re-organization has only involved merging of some smaller LAs and no complex swaps of territory. In our study area of northern England, there are 92 LAs as defined in 2001 and 77 LAs as defined in 2009. We extract from the TRENDEF and UPTAPER output files the population results for years 2001, 2006, 2011, 2016, 2021, 2026, 2031 and 2036 and then aggregate to 5 year ages and 2009 Local Authorities. In the next section of the report we discuss the geographies of northern England in more detail.

Table 8. Extract from the ethnic projections database for 2001

GOR	LA #	LA code	LA Name	ETH	M0	M1	M2	M3	M4
2	33	00BL	Bolton	1	1310.3	1347.7	1372	1434.6	1472.1
2	34	00BM	Bury	1	900	939.4	927.5	1008.8	1024.2
2	35	00BN	Manchester	1	1763	1766.8	1721.7	1732.8	1847.7
2	36	00BP	Oldham	1	1027.5	1070.5	1123.3	1140.9	1197.7
2	37	00BQ	Rochdale	1	999.7	1033.3	1082.6	1137.3	1165.5
2	38	00BR	Salford	1	1138	1135.9	1178.2	1235.6	1347.3
2	39	00BS	Stockport	1	1397.7	1428.4	1478	1581.7	1667.2
2	40	00BT	Tameside	1	1025.1	1109.8	1166.6	1176.2	1228.4

Notes: GOR = Government Office Region, 2 = Northwest; LA = Local authorities; ETH = Ethnic group, 1 = White British; M0 = Males, aged 0, M1 = Males aged 1, M2 = Males aged 2, and so on

4 Geographies for Northern England: Recent Change

The project is focussed on demographic change in “functional economies”. Functional Economic Areas are city regions consisting of one or more central business cores and surrounding places which interact with the core through daily commuting, shopping and administration. The current Coalition government has adopted the functional economic area as the basis of its growth strategy for England, following the abolition of the Regional Development Agencies (from 1 April 2011). In their place the Coalition Government (HM Government 2010, p.5) wishes to:

- “shift power to local communities and business, enabling places to tailor their approach to local circumstances;
- promote efficient and dynamic markets, in particular in the supply of land, and provide real and significant incentives for places that go for growth; and
- support investment in places and people to tackle the barriers to growth”.

They invited local governments and business organizations to put forward collaborations called Local Enterprise Partnerships (LEPs), which seek to meet these goals for their areas. No direct funding will be provided to LEPs but they will be able to bid to the Regional Growth Fund and to other government programmes for funding to “realise every place’s potential”.

Communities and Local Government in 2007-9 commissioned studies of the functional economic organization of England (ODPM 2006, CLG 2010). However, the new government has sought bottom up proposals from local authorities and businesses instead. A first set of bids for Local Enterprise Partnerships (LEPs) from consortia of local authorities in collaboration with businesses was approved in the White Paper of 28 October 2010 (HM Government 2010) and a second set was approved in early 2011.

The LEP proposals pose a dilemma for reporting on demographic, social and economic developments in northern England. Many of the LEPs overlap: that is, several local authorities

are members of more than one LEP proposal. Table 9 lists the 2009 Local Authority membership of the approved Local Enterprise Partnerships in northern England. The boundaries of the local authorities at the time of the 2001 Census, Local Authorities as constituted from 1 April 2009 and the official LEPs map as of 28 October 2010 are set out in Figure 3. Tables 10a and 10b provide a key to the LA numbers in Figures 3a and 3b.

Table 9. Local Enterprise Partnerships based on 2009 LAs in northern England

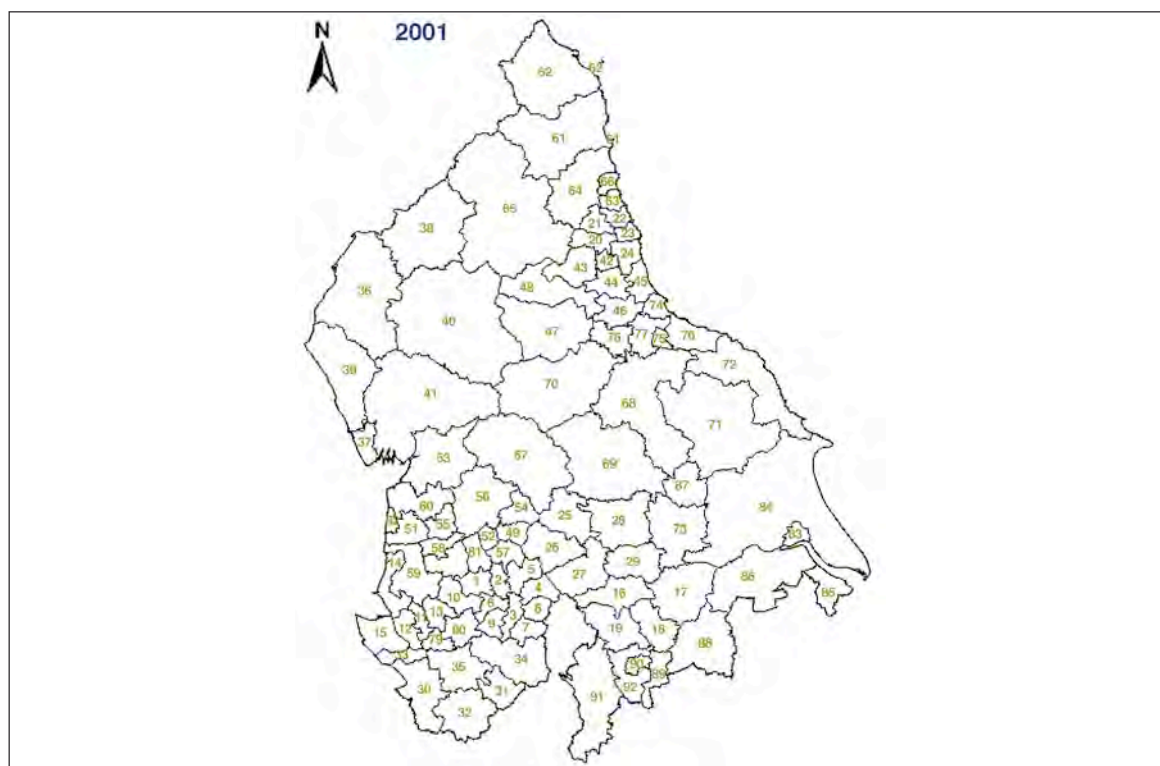
#	LEP Name (bold = approved LEP) ¹	LA Members (<i>italics</i> = core city) (<i>bold italics</i> = overlapping LAs) ²
LEP01	Greater Manchester	<i>Manchester</i> , Bolton, Bury, Oldham, Rochdale, Salford, Stockport, Tameside, Trafford, Wigan
LEP02	Liverpool City Region	<i>Liverpool</i> , Halton, Knowsley, St. Helens, Sefton, Wirral
LEP03	Leeds City Region	Leeds, <i>Barnsley</i> , Bradford, Calderdale, Craven, Harrogate, Kirklees, Wakefield, <i>Selby, York</i>
LEP04	Sheffield City Region	Sheffield, <i>Barnsley, Bassetlaw, Bolsover, Chesterfield, Derbyshire Dales</i> , Doncaster, <i>North East Derbyshire</i> , Rotherham,
LEP05	Cheshire and Warrington	<i>Cheshire West and Chester</i> , Cheshire East, Warrington
LEP06	Tees Valley	<i>Middlesbrough</i> , Darlington, Hartlepool, Redcar and Cleveland, Stockton-on-Tees
LEP07	Cumbria	<i>Carlisle</i> , Allerdale, Barrow-in-Furness, Eden, Copeland, South Lakeland
LEP08	Hull City Region	<i>Kingston upon Hull</i> , East Riding of Yorkshire, North Lincolnshire, North East Lincolnshire
LEP09	North Yorkshire	<i>York</i> , Hambleton, Richmondshire, Ryedale, Scarborough, Selby
LEP10	North East	Newcastle upon Tyne, County Durham, Gateshead, North Tyneside, Northumberland, South Tyneside, Sunderland
LEP11	Lancashire	Preston, Blackburn with Darwen, Blackpool, Burnley, Chorley, Fylde, Hyndburn, Lancaster, Pendle, Ribble Valley, Rossendale, South Ribble, West Lancashire, Wyre
LEP03a	<i>Leeds City Region</i>	<i>Leeds</i> , Bradford, Calderdale, Craven, Harrogate, Kirklees, Wakefield
LEP04a	<i>Sheffield City Region</i>	<i>Sheffield</i> , <i>Barnsley</i> , Doncaster, Rotherham,

Notes

- 1 The bold LEP Names indicate Local Enterprise Partnerships approved by Communities and Local Government in the White Paper of 28 October 2010. The LEP names not in bold are suggested groupings of the LAs into LEPs which were approved in early 2011. The names in italics are versions of the LEPs with no overlapping LA members.
- 2 Some LAs joined more than one LEP proposal. These are listed in bold italics.
- 3 Care must be taken in aggregating populations or other variables for the LEPs because of the dual memberships. The sum of LEPs 1 through LEP11 will overcount the population of northern England. The sum of LEPs 1 to 2 and 5 to 11 plus LEP03a and LEP04a will produce a sum for the population of northern England equivalent to the three former Government Office Regions (NE, NW, YH).

We adopt the following procedure to analyse the results of our population projections. First, the results for 2001 LAs are aggregated where necessary to 2009 LAs. Appendix Table A1 links 2001 LA to the 2009 LA it belongs to. Most LAs continue without change. Shire county districts in Northumberland and in Durham were merged in Northumberland (unitary authority) and County Durham (unitary authority). The districts of Cheshire were merged in two unitary authorities: Cheshire West and Chester, and Cheshire East. These changes are highlighted in Table A1. Then the 2009 LAs are re-ordered and duplicated where necessary by Local Enterprise Partnerships and LEP totals computed. Because adding all LEP populations would over count the population of northern England we also report populations for two alternative groupings: the Leeds City Region without overlaps into neighbouring LEPs and the Sheffield City Region without overlaps into neighbouring LEPs. Using these alternative definitions with the other LEP totals yields the total populations for northern England consistent with the three previous Government Office Regions.

Figure 3a. Zone boundaries in northern England Local Authorities in the 2001 Census

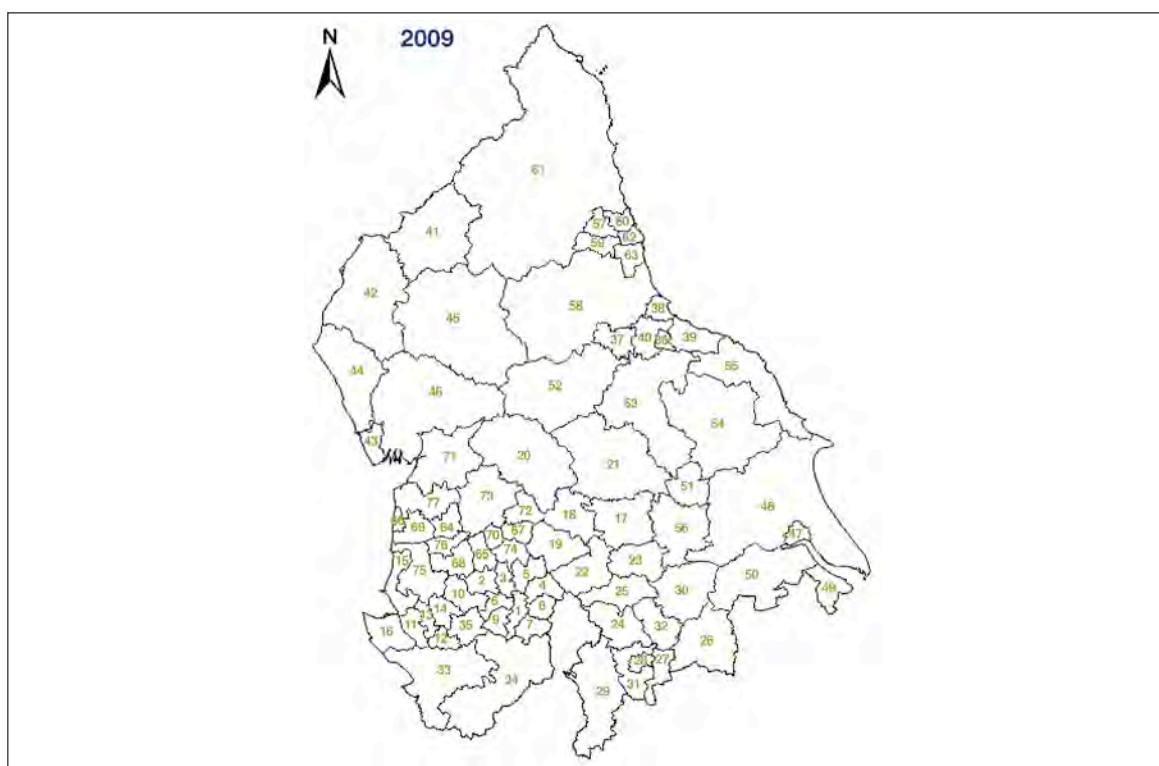


Notes: LA = Local Authority, LEP = Local Enterprise Partnerships.

Table 10a: Key to Figure 3a — 2001 Local Authorities

Number (2001)	Census Code	Name	Number (2001)	Census Code	Name	Number (2001)	Census Code	Name
1	00BL	Bolton	32	13UD	Crewe and Nantwich	63	35UD	Blyth Valley
2	00BM	Bury	33	13UE	Ellesmere Port & Neston	64	35UE	Castle Morpeth
3	00BN	Manchester	34	13UG	Macclesfield	65	35UF	Tynedale
4	00BP	Oldham	35	13UH	Vale Royal	66	35UG	Wansbeck
5	00BQ	Rochdale	36	16UB	Allerdale	67	36UB	Craven
6	00BR	Salford	37	16UC	Barrow-in-Furness	68	36UC	Hambleton
7	00BS	Stockport	38	16UD	Carlisle	69	36UD	Harrogate
8	00BT	Tameside	39	16UE	Copeland	70	36UE	Richmondshire
9	00BU	Trafford	40	16UF	Eden	71	36UF	Ryedale
10	00BW	Wigan	41	16UG	South Lakeland	72	36UG	Scarborough
11	00BX	Knowsley	42	20UB	Chester-le-Street	73	36UH	Selby
12	00BY	Liverpool	43	20UD	Derwentside	74	00EB	Hartlepool
13	00BZ	St. Helens	44	20UE	Durham	75	00EC	Middlesbrough
14	00CA	Sefton	45	20UF	Easington	76	00EE	Redcar and Cleveland
15	00CB	Wirral	46	20UG	Sedgfield	77	00EF	Stockton-on-Tees
16	00CC	Barnsley	47	20UH	Teesdale	78	00EH	Darlington
17	00CE	Doncaster	48	20UJ	Wear Valley	79	00ET	Halton
18	00CF	Rotherham	49	30UD	Burnley	80	00EU	Warrington
19	00CG	Sheffield	50	30UE	Chorley	81	00EX	Blackburn with Darwen
20	00CH	Gateshead	51	30UF	Fylde	82	00EY	Blackpool
21	00CJ	Newcastle upon Tyne	52	30UG	Hyndburn	83	00FA	Kingston upon Hull, City of
22	00CK	North Tyneside	53	30UH	Lancaster	84	00FB	East Riding of Yorkshire
23	00CL	South Tyneside	54	30UJ	Pendle	85	00FC	North East Lincolnshire
24	00CM	Sunderland	55	30UK	Preston	86	00FD	North Lincolnshire
25	00CX	Bradford	56	30UL	Ribble Valley	87	00FF	York
26	00CY	Calderdale	57	30UM	Rossendale	88	37UC	Bassetlaw
27	00CZ	Kirklees	58	30UN	South Ribble	89	17UC	Bolsover
28	00DA	Leeds	59	30UP	West Lancashire	90	17UD	Chesterfield
29	00DB	Wakefield	60	30UQ	Wyre	91	17UF	Derbyshire Dales
30	13UB	Chester	61	35UB	Alnwick	92	17UJ	North East Derbyshire
31	13UC	Congleton	62	35UC	Berwick-upon-Tweed			

Figure 3b. Zone boundaries in northern England Local Authorities at 1 April 2009



Notes: LA = Local Authority, LEP = Local Enterprise Partnerships.
See Table 9 for the links between 2009 LAs and 2011 LEPs.

Table 10b: Key to Figure 3a — 2009 Local Authorities

Number (2009)	LEP #	LA Code (2009)	Name	Number (2009)	LEP #	LA Code (2009)	Name	Number (2009)	LEP #	LA Code (2009)	Name
1	LEP01	00BN	Manchester	28	LEP04, NNDD	17UD	Chesterfield	52	LEP09	36UE	Richmondshire
2	LEP01	00BL	Bolton	29	LEP04, NNDD	17UF	Derbyshire Dales	53	LEP09	36UC	Hambleton
3	LEP01	00BM	Bury	30	LEP04, NNDD	00CE	Doncaster	54	LEP09	36UF	Ryedale
4	LEP01	00BP	Oldham	31	LEP04, NNDD	17UJ	North East Derbyshire	55	LEP09	36UG	Scarborough
5	LEP01	00BQ	Rochdale	32	LEP04, NNDD	00CF	Rotherham	56	LEP09, LEP03	36UH	Selby
6	LEP01	00BR	Salford	33	LEP05	00EW	Cheshire West and Chester	57	LEP10	00CJ	Newcastle upon Tyne
7	LEP01	00BS	Stockport	34	LEP05	00EQ	Cheshire East	58	LEP10	00EJ	County Durham
8	LEP01	00BT	Tameside	35	LEP05	00EU	Warrington	59	LEP10	00CH	Gateshead
9	LEP01	00BU	Trafford	36	LEP06	00EC	Middlesbrough	60	LEP10	00CK	North Tyneside
10	LEP01	00BW	Wigan	37	LEP06	00EH	Darlington	61	LEP10	00EM	Northumberland
11	LEP02	00BY	Liverpool	38	LEP06	00EB	Hartlepool	62	LEP10	00CL	South Tyneside
12	LEP02	00ET	Halton	39	LEP06	00EE	Redcar and Cleveland	63	LEP10	00CM	Sunderland
13	LEP02	00BX	Knowsley	40	LEP06	00EF	Stockton-on-Tees	64	LEP11	30UK	Preston
14	LEP02	00BZ	St. Helens	41	LEP07	16UD	Carlisle	65	LEP11	00EX	Blackburn with Darwen
15	LEP02	00CA	Sefton	42	LEP07	16UB	Allerdale	66	LEP11	00EY	Blackpool
16	LEP02	00CB	Wirral	43	LEP07	16UC	Barrow-in-Furness	67	LEP11	30UD	Burnley
17	LEP03	00DA	Leeds	44	LEP07	16UE	Copeland	68	LEP11	30UE	Chorley
18	LEP03	00CX	Bradford	45	LEP07	16UF	Eden	69	LEP11	30UF	Fylde
19	LEP03	00CY	Calderdale	46	LEP07	16UG	South Lakeland	70	LEP11	30UG	Hyndburn
20	LEP03	36UB	Craven	47	LEP08	00FA	Kingston upon Hull, City of	71	LEP11	30UH	Lancaster
21	LEP03	36UD	Harrrogate	48	LEP08	00FB	East Riding of Yorkshire	72	LEP11	30UJ	Pendle
22	LEP03	00CZ	Kirklees	49	LEP08	00FC	North East Lincolnshire	73	LEP11	30UL	Ribble Valley
23	LEP03	00DB	Wakefield	50	LEP08	00FD	North Lincolnshire	74	LEP11	30UM	Rossendale
24	LEP04	00CG	Sheffield	51	LEP09, LEP03	00FF	York	75	LEP11	30UP	West Lancashire
25	LEP04, LEP03	00CC	Barnsley					76	LEP11	30UN	South Ribble
26	LEP04, NNDD	37UC	Bassetlaw					77	LEP11	30UQ	Wyre
27	LEP04, NNDD	17UC	Bolsover								

5 The Future Population: Results

Our population projections generate very large amounts of data, only some of which are presented here. We adopted the following strategy. The full tables giving figures for all local authorities in northern England, grouped by Local Enterprise Partnership using the scheme set out in Table 8, are provided in the Appendix. Table A2 sets out the population totals for each local authority in 2011 and 2036 together with a time series index showing how much growth has occurred. The time series index reported for 2036 has a 2011 base (which therefore equals 100 for 2011). Also provided in Table A2 are the LEP totals as sums of their member LAs but readers should be aware that there are LAs in Yorkshire which belong to more than one LEP. The Appendix also contains detailed tables for projected LA old age dependency ratios (Table A3), people with limiting long term illness (Table A4), people with not good health (Table A5), labour force members (Table A6) and households (Table A7). We explain in section 6 how these projections are derived from the LA-age-sex-ethnic group projections.

5.1 Total population change

Table 11 presents the population change projected between 2011 and 2036 in the LEP regions of northern England together with the comparable figures for England as a whole and the rest of England. Northern England's projected growth is 4.8% less than that of England under the TRENDEF projection but only 1.7% under the lower growth UPTAPER projection. Population growth across northern England at LEP level is 5.6%, ranging between Liverpool (only 1.0% growth) and North Yorkshire (16.6% growth). Corresponding figures for the UPTAPER projection are -0.2% and 10.6%.

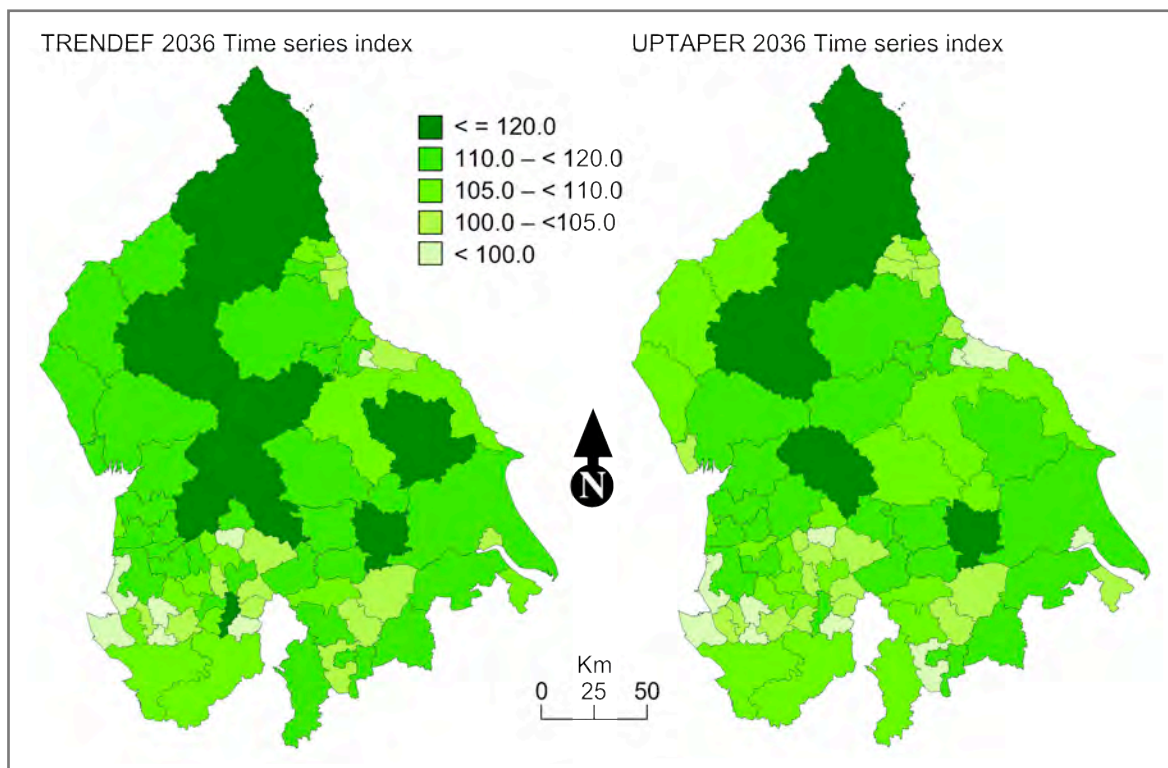
Table 11. Population change for LEPs, 2011-2036

Code	Name	TRENDEF Populations		Time Series	UPTAPER Populations		Time Series
		2011	2036	2036	2011	2036	2036
LEP1	Greater Manchester	2,611	2,861	109.5	2,585	2,714	105.0
LEP2	Liverpool City Region	1,493	1,508	101.0	1,487	1,484	99.8
LEP3	Leeds City Region	3,001	3,464	115.4	2,977	3,320	111.5
LEP4	Sheffield City Region	1,809	1,980	109.4	1,798	1,926	107.1
LEP5	Cheshire and Warrington	904	977	108.1	899	950	105.7
LEP6	Tees Valley	676	721	106.7	672	703	104.6
LEP7	Cumbria	532	606	113.9	526	574	109.1
LEP8	Hull City Region	935	1,011	108.2	930	998	107.3
LEP9	North Yorkshire	596	695	116.6	589	651	110.6
LEP10	North East	2,025	2,311	114.2	2,005	2,197	109.6
LEP11	Lancashire	1,522	1,706	112.1	1,508	1,636	108.5
LEP3a	Leeds City Region	2,489	2,888	116.0	2,468	2,763	111.9
LEP4a	Sheffield City Region	1,328	1,439	108.3	1,320	1,404	106.4
Totals	Northern England	13,617	15,215	111.7	13,502	14,590	108.1
	Rest of England	38,123	45,060	118.2	37,811	41,815	110.6
	England	53,240	61,999	116.5	52,870	58,036	109.8

Note: Populations are in 1000s. The time series starts at 2011 = 100.

The larger variation at local authority scale is shown in Figure 4 and detailed in Appendix Table A2. A majority of LAs in the Liverpool City Region face population decline. It is only the higher growth in Liverpool City itself that keeps population change in the LEP positive under the TRENDEF projection. Other LAs with decline in prospect are Stockport in Greater Manchester, Burnley in Lancashire LEP and Middlesbrough in Tees Valley LEP. The highest growth LAs are rural and small town LAs outside of the big cities: the populations of Northumberland, Eden, Richmondshire, Craven and York are projected to increase by more than 20% under both projections together with Ribble Valley, Ryedale, Bradford and Manchester under the TRENDEF projections. The main driver of the population growth is internal migration from the larger northern cities into these rural areas. However, Bradford and Manchester do not fall in this class of settlement. Here the driver is the extra growth generated by a large and youthful BAME population, mainly South Asian in Bradford. Other rural or small town LAs fall in the next growth class, 10% up to 20% along with the metropolitan districts of West Yorkshire.

Figure 4. Population change in northern England LAs, 2011-2036, TRENDEF and UPTAPER projections



Notes: Time Series Index 2001=100

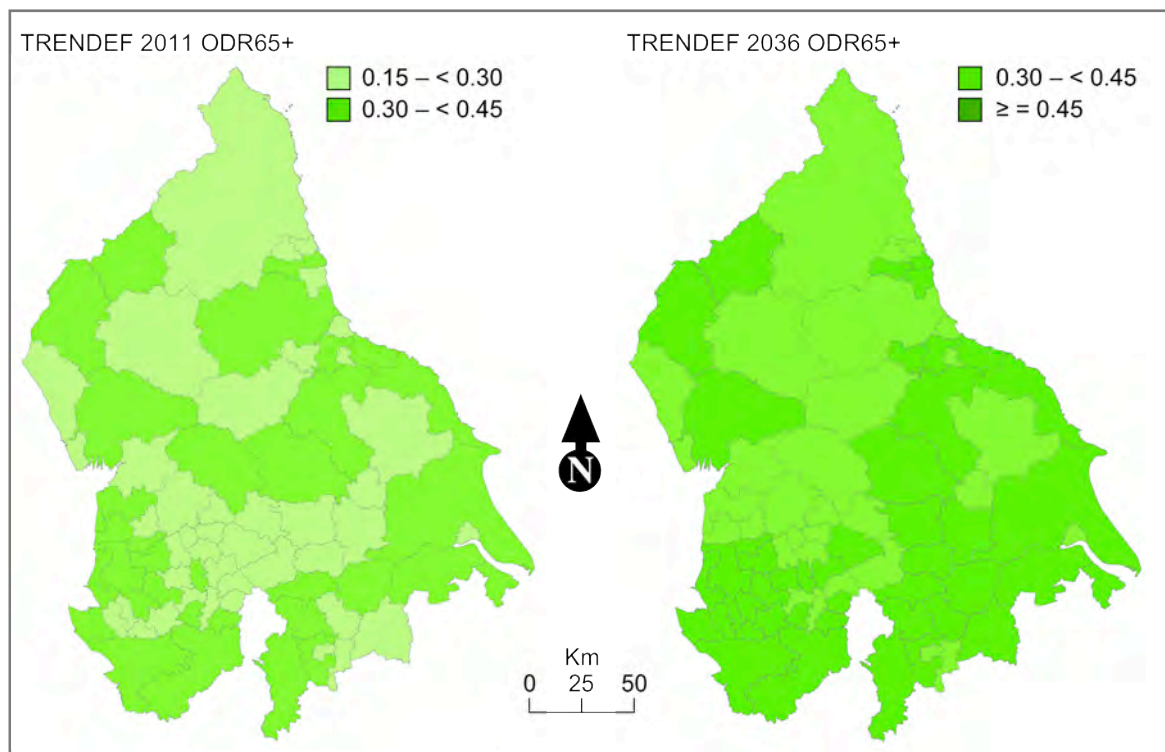
What are the policy implications of the levels and spatial distribution of population growth? Set in a city region context this growth is moderate and sustainable. It reassures suppliers of private goods and services that there will continue to be a growing market. However, as we observed in section 2, there are profound differences in the rates of growth of the different ages, to which we now turn.

5.2 Ageing of the population and its consequences

Ageing of the population is measured using the Old Age Dependency Ratio (ODR) which we define as the old age population divided by the working age population. This only approximates the economic relationship between those who are old and not working and those who are not old and working (the Old Age Economic Dependency Ratio). The OEDR is influenced by the participation rate at different ages in the labour force. The conventional ODR uses ages 65+ for the numerator of the ratio and 16-64 for the denominator. The conventional ODRs for northern England LAs and LEAs are set out in Appendix Table A3. The ODR for northern England increases from 0.29-0.30 in 2011 to 0.46-0.48 in 2036. The first figure refers to the TRENDEF projection and the second to the UPTAPER projection. Note that the difference between our two projections is here very small, as international migration, which is modelled differently in the two projections, has little direct impact on the elderly population in the short run.

Figure 5 shows what happens at LA scale between 2011 and 2036 to the ODR65+. All LAs experience a rise in the ODR65+ over the period. There is a 57% increase in the ratio in the 25 years. While the pattern of high and low ODRs will be broadly the same in 2036 as in 2011, there are subtle changes consequent on current differences in age structure and in internal migration flows by age.

Figure 5. Old age dependency ratios for ages 65+ in northern England LAs, 2011-2036, TRENDEF projections



Notes. ODR = (Population aged 65+/Population aged 16-64)

Public and private policy makers are responding to these profound changes in the old age to younger age ratios. Arrangements for the Basic State Pension are changing. Women's retirement age is currently moving from 60 to 65 in stages between 2010 and 2020 (The Economist 2011). The Pensions Act of 2007 (DWP 2007) enacted changes to the age of eligibility of the basic state pensionable: this was to rise to 66 between 2024 and 2026), to 67 between 2034 and 2036 and to 68 between 2044 and 2046 and leaves open the possibility of further rises in the second half of the century. Current legislation before Parliament seeks to speed up this timetable (DWP 2011, The Economist 2011). For women the pensionable age threshold will rise to 65 in 2018 and for men and women it will rise to 66 in 2020 and perhaps to age 67 in 2026 (Boffey 2011).

The Pensions Commission (2005), whose recommendations were embodied in the Pensions Act 2007, accepted the principle that workers are entitled to a fixed period of retirement dependent on their ability (individually or collectively to finance the income required). The idea has been discussed for some time in the social science literature. Sanderson and Scherbov (2005) provide a review of its origins. Sanderson and Scherbov (2010) provide an analysis for European countries of the way that dependency ratios change when you raise the old age threshold in line with increasing remaining life expectancy. In their analysis they assume people can only have 15 years of retirement beyond a threshold age. In the UK 2005-7 life table men had a life expectancy at age 65 of 17.3 years and women 20.2 years, having increased from 16.0 and 19.1 years from 2000-2.

Public sector pension reform has been proposed in the Hutton Report (HM Treasury 2011) which will see retirement ages raised from 60 in public sector jobs to 65 (where this is not the case currently) and thereafter follow the rises in basic pension age for the basic state pension. The report also proposes a switch from final salary to average lifetime salary for computing pension entitlement and increases in employee and employer contributions (The Economist 2011). So far in the public sector the intention is to retain defined benefit schemes. In the private sector most such schemes have been closed to new entrants who have been switched to defined contribution schemes where the risk is transferred to the individual from the organisation. These reforms are driven by the future demography spelt out for northern England in Appendix Table A3 and Figure 5. The policy changes are determined at national scale though the consequences will be worked through differentially at local scale within northern England.

Behind these policy changes is the notion that society can cope with ageing if people can be encouraged to work for longer to build up their private savings and provide more taxes to pay for the previous generation's public pensions. We can examine the demography of ageing to get a rough idea of how much working age should be extended. So we have computed ODRs in which the old age threshold is moved from age 65 to age 70 and to age 75. The results are set out in Appendix Table A3. The ODR70+ is the ratio of the population aged 70+ to the population aged 16-69. The ODR75+ is the ratio of the population aged 75+ to the population

aged 16-74. Extending working ages in this way depends on people's health status (discussed later in the report) and on acceptance of the reform. One proposal to help in acceptance that is being examined is to give people the choice of a longer retirement with a smaller pension or a shorter retirement and a larger pension, with a trade-off that is fiscally neutral. To understand what happens to the relationship between the retirement age population and the working age population as we shift the boundary, it is useful to use the reciprocal of the ODR. This is the Old Age Support Ratio or OSR, which is the number of people in the working ages per person in the older ages. Table 12 presents OSRs for northern England LEPs from our two projections. The ratios are slightly smaller in the UPTAPER projections because the net inflow into the working ages from outside the UK is smaller.

Table 12. Population support ratios under different definitions of the old age dependency ratio, northern England, 2011 and 2036

Code	LEP Name	TRENDEF						UPTAPER					
		OSR 65		OSR 70		OSR 75		OSR 65		OSR 70		OSR 75	
		2011	2036	2011	2036	2011	2036	2011	2036	2011	2036	2011	2036
LEP1	Greater Manchester	3.1	1.7	5.5	3.2	8.5	4.9	3.6	2.2	5.4	3.1	8.4	4.7
LEP2	Liverpool City Region	3.8	2.4	4.5	2.6	7.0	3.9	3.1	1.8	4.5	2.5	6.9	3.8
LEP3	Leeds City Region	3.2	1.7	5.4	3.2	8.4	4.9	3.6	2.2	6.2	3.6	8.2	4.7
LEP4	Sheffield City Region	2.9	1.9	4.9	3.0	7.6	4.6	3.3	2.0	4.4	2.6	7.6	4.4
LEP5	Cheshire and Warrington	3.3	2.0	4.9	2.9	7.6	4.4	3.2	2.0	4.8	2.8	7.6	4.2
LEP6	Tees Valley	3.8	2.8	4.9	2.8	7.4	4.2	3.4	2.0	4.6	2.6	7.4	4.0
LEP7	Cumbria	3.2	2.1	4.6	3.1	7.3	4.6	3.0	2.1	4.5	2.9	7.2	4.3
LEP8	Hull City Region	3.7	2.3	4.9	2.9	7.5	4.5	3.2	2.0	4.8	2.9	7.4	4.4
LEP9	North Yorkshire	2.9	2.3	5.0	3.3	7.9	5.1	3.3	2.2	4.9	3.1	7.8	4.7
LEP10	North East	3.3	2.2	4.9	3.1	7.6	4.7	3.3	2.1	4.2	2.5	7.5	4.4
LEP11	Lancashire	4.3	3.0	5.3	3.3	8.3	5.1	3.5	2.2	5.2	3.2	8.2	4.9
LEP3a	Leeds City Region	3.1	1.7	5.4	3.2	8.3	4.9	3.6	2.2	6.3	3.7	8.2	4.7
LEP4a	Sheffield City Region	2.8	2.3	4.9	3.0	7.7	4.5	3.3	2.0	4.1	2.4	7.6	4.4
Totals	Northern England	3.4	2.2	5.1	3.1	7.8	4.7	3.4	2.1	5.0	2.9	7.7	4.4

Notes: OSR65 = Population aged 16-64/Population aged 65+

In northern England as a whole, the OSR65 declines from 3.4 persons of working age in 2011 to 2.2 in 2036, 35% decrease. This is what is propelling the changes in Basic State Pension ages and the switch from defined benefit to defined contribution pensions. If the pension arrangements stayed as they are now, either taxation for pension transfers would have to increase by 35% or benefits would need to decrease by 35%. If we change the age threshold to 70, then the OSR70 in 2036 is 3.1 (TRENDEF) or 2.9 (UPTAPER) in northern England. Compared with OSR65 in 2011, this is only a 9% decrease. Note that because the projections build in decreasing mortality, there is not a further hit from improving longevity. The

pensionable age increase by 2036 is only to 67 years in the Pensions Act (2007), so there is still likely to be deficit problem for the Basic State Pension and other schemes. If we raise the pensionable age even further, to 75 (something that would probably be strongly resisted), then the OSR75 in 2036 will be 4.7 or 4.4, which is 38% or 29% higher than the OSR65 in 2011. It would not be necessary to raise the pensionable age threshold that far. However, these figures suggest that the planned changes will not be fast enough. The pending plan before Parliament is for 66 in 2020, 67 in 2036 and 68 in 2046. This analysis suggests the sequence should be 66 in 2020, 68 in 2036, 70 in 2046 and 72 in 2056, although to confirm this revision would require more detailed actuarial calculations than we have carried out. The Pensions Minister in the Coalition Government has indicated that a speed up in the rise of pensionable age will be proposed (Boffey 2011).

Table 12 provides statistics for the LEP regions within northern England. The trends in all LEPs parallel those in northern England as a whole but there will be a considerable variation in experience both between LEPs and across the different OSR measures. With OSR values consistently above the northern England average will be the Lancashire LEP. This region maintains a consistently younger age structure than northern England as a whole though the gap is not great. The concentration of more youthful Asian or Asian British minorities in the North East Lancashire towns is probably the factor at play here. Other LEPs with more favourable age structures than northern England as a whole are Greater Manchester and Leeds City Regions for the age 70 and age 75 thresholds. LEP regions with consistently older age structures than the average are Cheshire and Warrington and Sheffield City Region. The other LEPs vary above and below the northern England average, depending on measure and year. Despite these variations, northern England LAs are all in the same boat rushing towards the ageing waterfall of the 2030s. Between 2011 and 2036 their demographic structures deteriorate in terms of sustainability of current old age support systems.

The LEP statistics hide greater variation at local authority scale. Appendix Table A3 lists the ODR ratios for local authorities organized by LEP region. The ratios are mapped in Figure 6 (the TRENDEF results) and in Figure 7 (the UPTAPER results). The maps are organized in three pairs: the left hand map refers to 2011 and the right hand map to 2036. The top pair of maps plots the ODR65 ratio, the middle pair the ODR70 ratio and the bottom pair the ODR75 ratio. A shading scheme of four classes applies to all maps so we can compare the ratio levels over time and between age thresholds. The ratio class intervals are (1) low, less than 0.15, (2) low middle, 0.15 up to 0.30, (3) high middle, 0.30 up to 0.45 and (4) high, 0.45 and above. In 2011 LAs are assigned to the middle two classes for ODR65; in 2036 all LAs in the low middle class have moved up to the high middle class and LAs in the high middle class have moved onwards to the high class.

Figure 6. Old age dependency ratios, 2011 and 2036, for northern England local authorities, TRENDEF projection

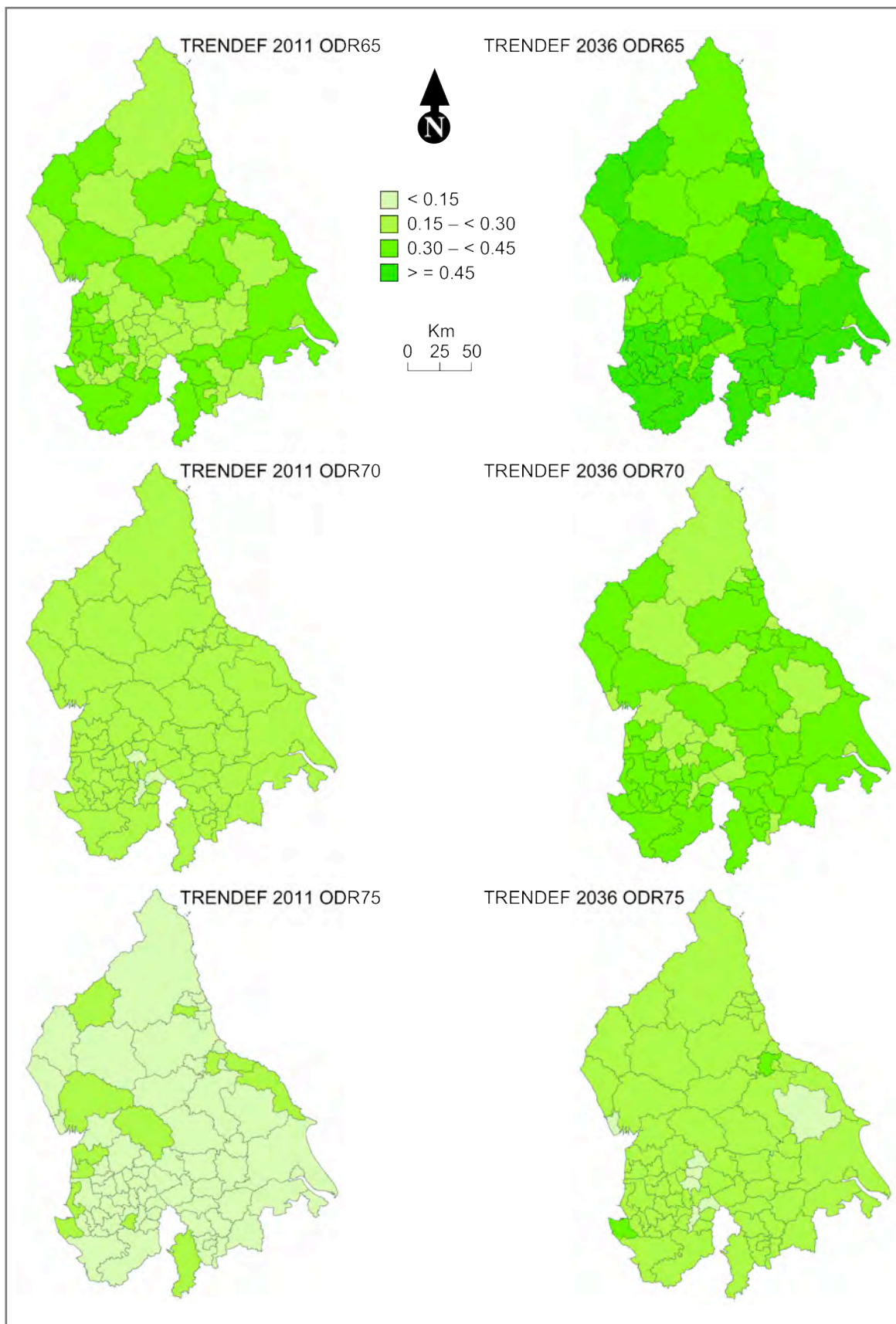
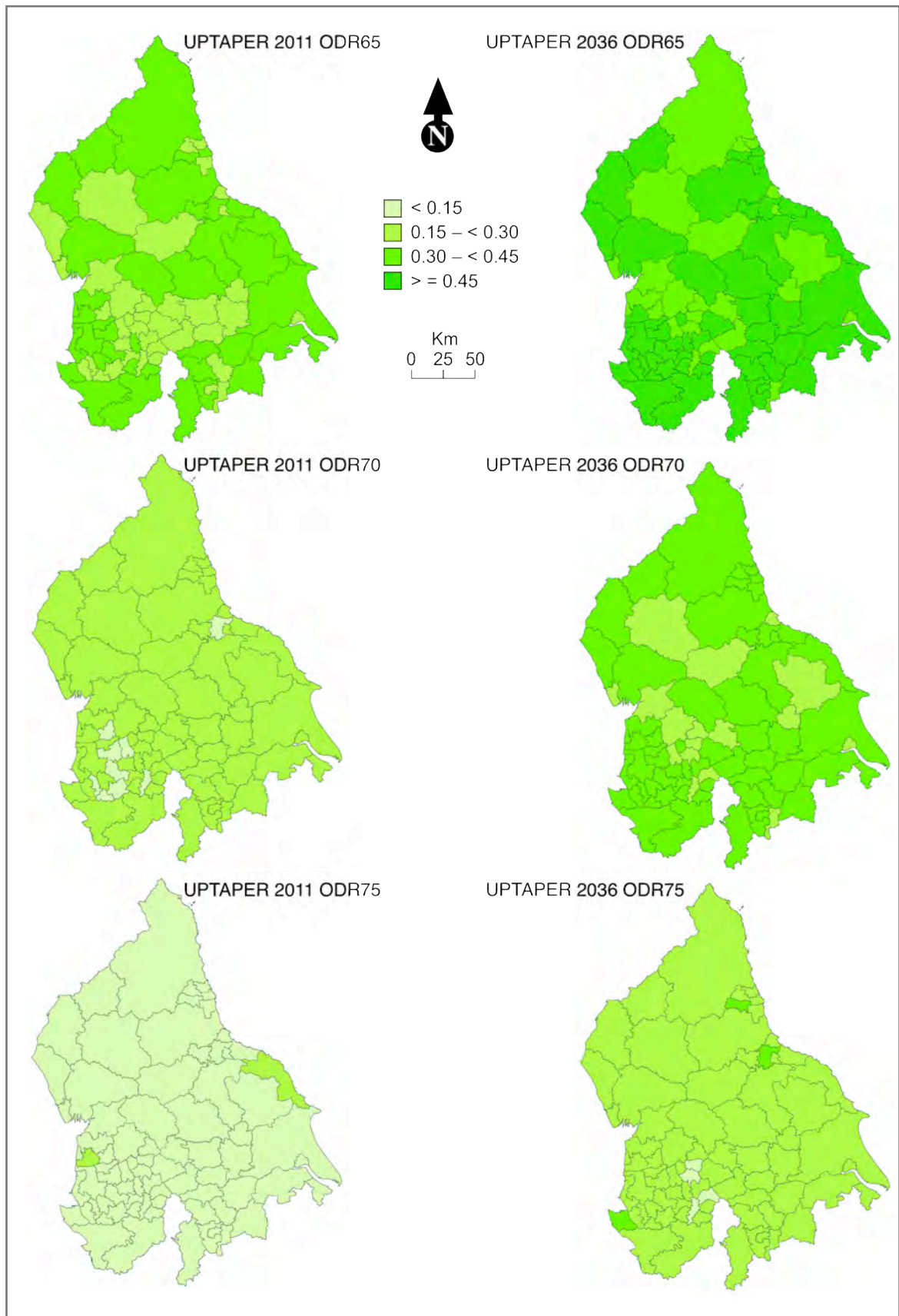


Figure 7. Old age dependency ratios, 2011 and 2036, for northern England local authorities, UPTAPER projection



The same upward class shifts occur for the ODR70 and ODR75 maps. The ODR70 map in 2036 has a very similar level and pattern to the ODR65 map in 2011. Figure 7 tells the same story, more or less, at a slightly higher level of ODRs.

The lesson here is this: to maintain old age ratios at their current levels, it is necessary to move the old age threshold to 70 by 2036. This assumes that it will be possible to find sources of income (e.g. jobs) for the 65-69 year olds who would have been retired and that they will be healthy enough for work. We now turn to the implications of population ageing for these two topics: population health and the size of the labour force, after first explaining how the projections of these additional statuses are achieved.

6 Methods for Projecting Additional Population Attributes

6.1 General method for projecting age-sex dependent statuses

We use the results of a recently completed projection model (the UPTAP model for projecting ethnic populations by local authority in England) by adding three statuses using prevalence rates by age, sex (and ethnicity if available). Because of the short duration of the project we will use prevalence methods rather than multistate methods, in order to deliver plausible results to the required timetable. Populations are modelled at local authority scale within northern England and then aggregated to the Local Enterprise Partnerships and to northern England as a whole. Comparisons with England and the rest of England have been added where possible but not as systematically as with the population and ageing analysis, where we could use the results of projections that covered all of the UK.

To explain the general method we use the notation set out in Table 13.

We use three data sources for the projections: our ESRC UPTAP projections, selected 2001 Census Standard Tables and the 2001 Census Small Area Microdata. We investigated survey data sets such as the General Household Survey and Labour Force for trends in the various statuses but their use would need more analysis than funds and time available in this project allowed.

The general model we adopted was to measure status prevalence rates using the 2001 Census and to apply them to the projected population for local authorities in northern England. The prevalence rates were held constant between 2001 and 2036. We could have tried to project each status using time series for recent censuses (1991, 2001) together with survey data for 2001 to 2008 or 2009, but this has been left to another project. So, what these additional status projections do is to assess the impact of population change and ageing in particular on future reported health, on future labour force participation and future

household numbers, assuming no change from the prevalence rates in 2001. So, they are suitable for assessing the impact of population change and ageing in these domains but should not be regarded as best practice forecasts.

Table 13. A notation for the model used to generate additional status projections

Variable or index	Description
P	Population (mid-year population in year)
R	Prevalence rates conditional on LA, age, gender and ethnicity
i	Index (subscript) for local authorities (92 LAs as of 2001 Census)
j	Index (subscript) for local authorities (77 LAs as of 1st April 2009)
z	Index (subscript) for Local Enterprise Partnership region (defined 2010-2011)
a	Index (subscript) for age groups (21 classes: 5 years ages 0-4, ... , 95-99, 100+)
g	Index (subscript) for sex/gender (2 classes: males, females)
e	Index (subscript) for ethnic group (16 groups used in the 2001 Census)
f	Index (subscript) for broad ethnic group (5 groups used in the 2001 Census)
k	Index (subscript) for additional population status k
l	Index (subscript) for limiting long term illness (2 classes: Ill, Not Ill)
n	Index (subscript) for not good health (2 classes: Not Good Health, Good Health)
h	Index (subscript) for household representative status (2 classes: household representative, not household representative)
y	Index for mid-year time point (values: 2001, 2011 and 2036)
c	Index for 2001 Census time point, 29 April 2001

The number of people in Local Authority i in status k at mid-year y is modelled as:

$$P(i,k,y) = \sum_{a,g,e} P(i,a,g,e,y) \times R(k|i,a,g,e,c) \quad (1)$$

where:

$P(i,k,y)$ = projected population of local authority i with status k at mid-year y

$P(i,a,g,e,y)$ = projected population for local authority i, age a, gender g, ethnic group e at mid-year y.

$R(k|i,a,g,e,c)$ = prevalence rate for additional status k for local authority i, age a, gender g, ethnicity e at time point c (the Census on 29 April 2001).

The prevalence rate is a conditional probability of status k given attributes i, a, g, e in the 2001 Census. Note that equation (1) involves generating the age, gender and ethnic specific populations with additional status k.

These projected populations are then converted to local authority definitions in 2009 using the look up information in Appendix Table A1 and aggregated to Local Enterprise

Partnerships using the information in Table 9. Formally, these aggregations are achieved as follows:

$$P(j,k,y) = \sum_{i \in j} P(i,k,y) \quad (2)$$

$$P(z,k,y) = \sum_{j \in z} P(j,k,y) \quad (3)$$

where $i \in j$ means local authority i (2001 definition) belongs to local authority (set) j (2009 definition) and $j \in z$ means local authority j (2009 definition) belongs to Local Enterprise Partnership z (2010-11 definition). These small pieces of algebra describe the aggregation routines employed in the software (SPSS, Excel) employed for the computations.

6.2 Methods for estimating age-sex-ethnic specific prevalence rates

We estimate the prevalence rates by age, sex and ethnicity for limiting long term illness, not good health, labour force status, communal establishment status and household representative status for local authorities in northern England using 2001 Census data. Sometimes this can be done directly using cross-tabulations from the 2001 Census Standard Tables for local authorities. Quite often, however, the tables are too sparse to yield reliable prevalence rates at local authority, age, sex and ethnicity detail. The main problem is that in the majority of LAs in northern England outside the large urban areas, the numbers in some ethnic groups are too small to yield reliable prevalence rates. Another problem is that there was no Standard Table that linked the additional status, age, sex and ethnicity though there may have been cross-tabulations of subsets of these variables.

6.2.1 The method employing Small Area Microdata

To solve this problem we used the 2001 Census Small Area Microdata or SAM (CCSR 2006, ONS 2008), which is a 5% sample of individual data from the 2001 Census. The SAM is coded by Local Authority but cross-tabulations are again too sparse to be reliable. We aggregated all 2001 Census LAs in northern England (GOR definitions), grouped age and ethnicity variables and used the following model to estimate the prevalence rates in the detail required:

$$R(k|i,a,g,e,c) = R(k|i,a,g,c) \times [R(k|+,A,g,E,c)/R(k|+,A,g,+,c)] \quad (4)$$

where

$R(k|i,a,g,c)$ = prevalence rate for status k given local authority i , age group a , gender g at time c (i.e. from the 2001 Census Standard Tables)

$R(k|+,A,g,E,c)$ = prevalence rate for status k given all LAs in northern England, broad age group A , gender g , broad ethnic group E from the 2001 Census Small Area Microdata

$R(k|+,A,g,+,c)$ = prevalence rate for status k given all LAs in northern England, broad age group A , gender g , for all ethnic groups from the 2001 Census Small Area Microdata.

The last term on the right hand side of equation (4) provides a ratio of the ethnic specific prevalence to the all group prevalence for northern England, which we assume can be applied across all LAs.

This method was used to develop the prevalence rates for the household projections, the family type projections and the labour force projections.

6.2.2 The method employing Standardised Ratios

For the two health statuses, Limiting Long Term Illness and Not Good Health, we used a different method, based on Standardized Ratios. Standardized Ratios can be used when we have information of the total number of persons ill or in not good health in an area (see Rees and Wohland 2008 for an application). We computed prevalence rates of age specific limiting long term illness by sex for each LA in 2001 using the Census Table ST16. We call these $R(i,a,g)$, aggregating the information in the table to age groups 0-4, ..., 85-89, 90+. We computed Standardised Illness Ratios and age-sex specific illness rates for England. Let us call these $SIR(E,e,g)$, where E stands for England, e stands for ethnic group and g for gender.

$$SIR(E,e,g) = 100 \times [I(E,e,g) / \sum_a R(E,+,a,g) P(E,e,a,g)] \quad (5)$$

where $I(E,e,g)$ is the number with limiting long term illness in England by ethnic group e and gender g , $R(E,+,a,g)$ is the England prevalence rate for all ethnic groups by age and gender and $P(E,e,a,g)$ is the England population by ethnicity, age and gender. We compute local authority ethnic specific illness rates by age and sex thus:

$$R(i,e,a,g) = [SIR(E,e,g) / SIR(E,+,g)] \times R(i,a,g) \quad (6)$$

where $SIR(E,+,g)$ is the Standardised Illness Ratio for all ethnic groups for England for sex g and $R(i,a,g)$ is the illness prevalence rate for local authority i , age a and gender g for all ethnicities.

We used the same methods to compute prevalence rates for persons Not in Good Health.

7 Health Status

The 2001 Census provides two measures of the health status of the population: there is a question on limiting long term illness (possible answers are yes or no) and another on general health (possible answers are good, fairly good and not good) over the past 12 months. Such survey questions elicit the respondent's opinion on their health and are self reported. However, there is substantial evidence that self-reported health is a good predictor of subsequent illness and mortality. The evidence is reviewed in Rees and Wohland (2008) and Rees *et al.* (2009). Health expectancies for local authorities are estimated by ONS using abridged life tables and two health measures, limiting long term illness for Disability Free Life Expectancies (DFLE) and self-rated health for Healthy Life Expectancy (HLE). DFLE are input by the Department of Health into the formula for about 15% of the general allocation of NHS funds to PCTs. Our projections of the numbers of people with limiting long term illness will therefore be of considerable interest to health planners in northern England. We examined trends in a parallel measure, limiting long standing illness (LLSI), reported in the General Household Survey for 2001 and 2007 (Table 14). There is some evidence of reductions in reported LLSI rates but most of the age-sex group differences are not significant. We decided that it was reasonable to assume a continuation of LLTI rates from the 2001 Census to 2036. An alternative methodology is used by Sanderson and Scherbov (2010) to project disability rates by age and sex for a set of European countries. This method assumes a fixed relationship between disability rates and mortality rates and uses the relationship to project disability rates based on mortality rates projections. The method, though innovative and attractive, was not validated for European populations.

The full projections for persons with limiting long term illness are set out in Appendix Table A4. Table 15 summarizes these results for Local Enterprise Partnerships in northern England. In northern England the numbers of people reporting limiting long term illness will increase between 2011 and 2036 by 25% under the TRENDEF projection and by 22% under the UPTAPER projection. This compares with a population increase of 12% and 8% under the two projections. Because limiting long term illness rates rise strongly with increasing age, population ageing translates into an increase of about double for persons with limiting long term illness. The highest increases of 30% or more will be experienced in the Leeds City Region, Lancashire and Cumbria while the lowest increases of less than 20% are likely in Liverpool and Tees Valley, where population growth is low. Increases at the Local Authority scale have a wider range, as might be expected, with Barrow in Furness projected to see increases in its LLTI population of 69% (TRENDEF) and 55% (UPTAPER), while Stockton on Tees is anticipated to have an increase of just under 9% (TRENDEF) and 5% (UPTAPER). The variation of the increases across local authorities is a complex function of both the population ageing process and the strong association of LLTI with deprivation levels. Further analysis would be needed to establish the respective contributions.

Table 14. Limiting Long Standing Illness rates for Great Britain, 2001 and 2007, General Household Survey

GHS	Great Britain	Percentages		Upper CL	Lower CL	Upper CL	Lower CL	Sig of diff
		2001	2007	2001	2001	2007	2007	
Sex, ages	Sample	2001	2007	2001	2001	2007	2007	2001 vs 2007
Males								
0-4	600	5	2	6.7	3.3	3.1	0.9	sig
5-15	1,600	9	6	10.4	7.6	7.2	4.8	sig
16-44	2,960	10	11	11.1	8.9	12.1	9.9	not sig
45-64	2,550	28	25	29.7	26.3	26.7	23.3	not sig
65-74	1,030	36	37	38.9	33.1	39.9	34.1	not sig
75 and over	720	47	47	50.6	43.4	50.6	43.4	no diff
Total	9,480	18	18	18.8	17.2	18.8	17.2	no diff
Females								
0-4	620	4	3	5.5	2.5	4.3	1.7	not sig
5-15	1,500	8	5	9.4	6.6	6.1	3.9	sig
16-44	3,560	12	12	13.1	10.9	13.1	10.9	no diff
45-64	2,860	26	25	27.6	24.4	26.6	23.4	not sig
65-74	1,090	37	36	39.9	34.1	38.8	33.2	not sig
75 and over	900	45	48	48.3	41.7	51.3	44.7	not sig
Total	10,530	19	19	19.7	18.3	19.7	18.3	no dif

Notes: CL = 95% confidence limits. Study population is for Great Britain. Sig = significant at 95% confidence. Source: ONS, General Household Survey, Table 7.2. CLs: Authors' computation.

Table 15. Projected population with limiting long-term illness, 2011 and 2036

Code	Name	TRENDEF population with LLTI		Time Series	UPTAPER populations with LLTI		Time Series
		2011	2036	2036	2011	2036	2036
LEP1	Greater Manchester	582	744	127.9	577	703	121.8
LEP2	Liverpool City Region	386	457	118.3	385	447	116.1
LEP3	Leeds City Region	624	839	134.3	622	808	130.0
LEP4	Sheffield City Region	458	581	126.8	456	562	123.3
LEP5	Cheshire and Warrington	120	155	129.5	120	151	126.1
LEP6	Tees Valley	139	166	119.5	139	162	116.7
LEP7	Cumbria	92	121	131.2	92	117	126.9
LEP8	Hull City Region	68	87	128.3	67	84	123.9
LEP9	North Yorkshire	201	258	128.7	200	253	126.4
LEP10	North East	579	720	124.5	576	696	120.9
LEP11	Lancashire	271	358	132.2	269	338	125.7
LEP3a	Leeds City Region	513	700	136.3	511	672	131.6
LEP4a	Sheffield City Region	316	396	125.0	315	385	122.1
Totals	Northern England	3268	4163	125.0	3251	4007	122.1

Note: Populations are in 1000s. The time series starts at 2011 = 100.

The same analysis was carried out with the self reported health in the last 12 months indicator. We chose here to focus on the worst category “not good health”, while other observers have combined this with “fair health”. Fewer people report “not good health”: the numbers in 2036 are projected to be only 43% of those with limiting long term illness (both projections). Table 16 sets out the projected population reporting “not good health” for LEPs. The local authority numbers are reported in Appendix Table A5. Although the numbers are much lower than in Table 14, the time series indicators are closely aligned.

The National Health Service has been feeling the pressure of these increases for several decades now. These projections show that they will not abate and will continue to average about 1% a year. The drive will be to increase the efficiency with which patients with limiting long term illness or not good health are treated and to drive down the age specific rates through early health interventions such as health checks and associated advice on life style for the elderly or smoking cessation clinic visits for all smokers. Success in such health interventions will postpone the time at which high cost health treatment is needed, which is concentrated in the one or two years before death. Although person health costs may not be reduced, health costs per person-year of life will be reduced. In this analysis of the health status implications of population change and ageing for northern England we have, of course, only scratched the surface of the analysis required. In the Strand 4 Report (Buckner *et al.* 2011) the analysis is taken further through a projection of the likely numbers with dementia, heart disease and other chronic conditions.

Table 16. Projected population with not good health, 2011 and 2036

Code	Name	TRENDEF population with Not Good Health		Time Series	UPTAPER Populations with Not Good Health		Time Series
		2011	2036	2036	2011	2036	2036
LEP1	Greater Manchester	266	340	127.8	263	316	120.1
LEP2	Liverpool City Region	170	198	116.3	169	192	113.4
LEP3	Leeds City Region	280	376	134.0	279	358	128.6
LEP4	Sheffield City Region	203	257	126.6	201	246	122.3
LEP5	Cheshire and Warrington	48	62	128.7	48	59	124.3
LEP6	Tees Valley	59	70	118.6	59	67	115.1
LEP7	Cumbria	37	49	131.4	37	47	126.0
LEP8	Hull City Region	28	36	127.5	28	34	122.0
LEP9	North Yorkshire	78	99	126.6	77	96	123.6
LEP10	North East	252	312	123.8	250	299	119.3
LEP11	Lancashire	117	154	132.0	116	144	124.0
LEP3a	Leeds City Region	232	316	136.2	231	301	130.3
LEP4a	Sheffield City Region	143	178	124.7	142	172	121.1
Totals	Northern England	1396	1787	124.7	1388	1710	121.1

Note: Populations are in 1000s. The time series starts at 2011 = 100.

8 Labour Force Status

The transition of baby boom cohorts into the retirement ages means that the working age population will decrease because more recent birth cohorts are smaller. The labour force is a product of the numbers in different working age groups and the labour force participation rates at those ages. As with health status we have maintained the local authority labour force participation rates constant at their 2001 levels, though there is evidence from recent labour force surveys that participation rates of people in their sixties is rising. Appendix Table A6 sets out our projections for local authorities in northern England, while Table 17 collects together the Local Enterprise Partnership labour force projections. In northern England the labour force is projected to decrease despite continuing net international immigration, as a result of the cohort ageing processes. In 2036 the Labour Force will be 96% (TRENDEF) or 93% (UPTAPER) of its 2011 size. Under the UPTAPER projection more labour will have emigrated to more prosperous economies or immigrants will have returned home or moved on to third countries. The result will be that all LEP regions will see a shrinking labour force even in the more prosperous areas, such as the Leeds City Region and North Yorkshire. Under the TRENDEF projection, in which the UK continues to attract a steady net inward flow of international migrants, six of the eleven LEP regions see their labour forces shrink, while the growth in the other five is only 1 to 6%. The shrinkage is greatest in the Liverpool City Region and in Tees Valley, which have the least dynamic economies in northern England. Only a few LAs are projected to see increases in their labour forces by 20% or more (Ryedale in North Yorkshire and Craven in the periphery of the Leeds City Region).

Table 17. Projected labour force, 2011 and 2036

Code	Name	TRENDEF working age population		Time Series	UPTAPER Working age population		Time Series
		2011	2036	2036	2011	2036	2036
LEP1	Greater Manchester	1,170	1,120	95.7	1,153	1,052	91.2
LEP2	Liverpool City Region	635	559	88.2	630	545	86.5
LEP3	Leeds City Region	1,363	1,391	102.1	1,345	1,313	97.6
LEP4	Sheffield City Region	823	801	97.3	814	768	94.3
LEP5	Cheshire and Warrington	415	398	96.1	411	381	92.9
LEP6	Tees Valley	320	299	93.4	316	287	90.7
LEP7	Cumbria	243	250	102.8	239	233	97.3
LEP8	Hull City Region	473	458	96.9	468	446	95.2
LEP9	North Yorkshire	282	298	105.9	277	274	98.9
LEP10	North East	922	939	101.8	909	877	96.5
LEP11	Lancashire	712	719	101.0	702	681	96.9
LEP3a	<i>Leeds City Region</i>	1,130	1,157	102.5	1,114	1,090	97.9
LEP4a	<i>Sheffield City Region</i>	591	567	95.9	584	546	93.4
Totals	Northern England	6,891	6,764	95.9	6,804	6,411	93.4

Note: Populations are in 1000s. The time series starts at 2011 = 100.

9 Household Projections

We computed household projections from the population projections. The household representative rates were computed from the 2001 Census at LA level along with the Communal Establishment rates. We introduced some ethnic specific information. A critical assumption is that these rates remain constant over the projection period. As a result the projected increases in the number of households for LEP regions (Table 18) and local authorities (Appendix Table A7) are close to the increases in the population reported in Table 11 for the population. This result departs from experience over recent decades which saw a faster increase in households than in population as households became smaller in size because of young people forming their households at younger ages, because of more single people living alone and because more people are surviving into older ages to become widows or widowers living alone. However, in the past decade these trends have petered out. It became more difficult for young people to enter the housing market when house prices were rising up to 2007 and more difficult from 2008 to enter because of credit restrictions and falling real incomes. The steady decline in household size since 1961 has ceased. Since 2001 household size has remained constant at 2.4 persons per household (ONS 2010c, Table 2.1). As we assumed that household representative rates and communal establishment rates remain constant at their 2001 values in our projections, the growth in households is low. The recent projections of the Department of Communities and Local Government report growth in households between 2008 and 2033 of 19% in the North East, 18% in the North West and 31% in Yorkshire and the Humber (CLG, 2010, Table 4). While the 31% figure for Yorkshire and the Humber is not credible (the highest of any region in England), the overall forecasts are higher than the ones we have produced.

Table 18. Projected households, 2011 and 2036

Code	Name	TRENDEF households		Time Series	UPTAPER households		Time Series
		2011	2036	2036	2011	2036	2036
LEP1	Greater Manchester	1,125	1,279	113.7	1,110	1,190	107.2
LEP2	Liverpool City Region	654	696	106.5	650	673	103.6
LEP3	Leeds City Region	1,266	1,516	119.8	1,252	1,430	114.2
LEP4	Sheffield City Region	774	876	113.3	767	837	109.2
LEP5	Cheshire and Warrington	388	434	111.6	386	415	107.6
LEP6	Tees Valley	269	302	112.3	266	289	108.5
LEP7	Cumbria	233	270	115.5	231	252	109.3
LEP8	Hull City Region	369	412	111.6	367	400	109.0
LEP9	North Yorkshire	247	295	119.1	244	272	111.5
LEP10	North East	871	1,022	117.4	860	956	111.1
LEP11	Lancashire	620	718	115.9	613	678	110.7
LEP3a	Leeds City Region	1,052	1,266	120.4	1,040	1,192	114.6
LEP4a	Sheffield City Region	569	642	112.7	564	615	109.0
Totals	Northern England	6,816	7,819	114.7	6,746	7,393	109.6
GOR Totals	Northern England	6,397	7,334	114.7	6,331	6,933	109.5

Note: Households are in 1000s. The time series starts at 2011 = 100.

10 Discussion of Policy Implications and Conclusions

Here we summarize the findings of the report and draw out policy implications.

In our **review of demographic changes** (section 2), we identified ageing as a process that had been occurring in the UK and northern England for over a century. Our society has adapted and mitigated the degree of ageing experienced to date, so we could be optimistic that we can do so in the future. Previous systems of social support for people in old age did not take proper account of demographic changes with the result that the Pay as You Go State Pension was only sustainable because its benefits compared with other schemes across Europe were so poor. Recent policy developments and legislation suggest that policy makers are now fully informed about how demographic developments will affect social security in old age. Reforms in progress, although subject to resistance by the “haves” or “insiders”, will enable us to cope.

Our discussion of official national (NPP) and subnational (SNPP) population projections suggested that there was scope to improve our forecasts. A case can be made that net inflows from abroad will be lower than officially projected because emigration may rise in line with population growth and this will lead to a lower future population. This might also be the case if the target of the current government to reduce net immigration to tens of thousands is achieved. Northern England will be affected by these national changes but in a more subdued way. Long established net internal migration losses to the rest of England are likely to continue as will the decentralization of population from metropolitan centres to the accessible countryside. In one respect we felt the official SNPP to be **seriously flawed**: it allocates a share of UK immigration to Yorkshire and the Humber which is unreasonably high when compared with administrative proxies for immigration. Both the NPP and SNPP fail to take into account the effect on population change of the changing ethnic composition of the population consequent on several decades of net immigration in the younger adult ages. For these reasons **we used our own, recently completed ethnic group projections for England LAs** plus the other home countries to analyse northern England’s demographic prospects at local authority spatial scale.

To make these projections relevant for national and local governments, we had to ensure **delivery of the results for new geographies** in two steps. First, the population data for LAs as defined at the time of the 2001 Census had to be converted to LAs as currently defined, following the re-organization of 2009. This involved a few straightforward aggregations. More difficult was to relate local authorities to the new Local Enterprise Partnerships which overlap because local authorities have been allowed to bid in more than one consortium. After debate between project members and the project advisory board a solution was achieved that allows for LAs to be aggregated to more than one LEP but which also makes clear the overlap when summary statistics are needed for bigger areas such as northern England. The BIS and CLG departments should be able to learn from this experience when presenting statistics in future about LEP regions and larger areas.

Under both of our own projections and the official sub-national projections, the population of northern England will experience **moderate growth** (8-12%), about the same rate as England as a whole though more slowly than more prosperous regions in England, particularly the Greater South East. This means that aggregate demand for goods and services in northern England will continue to grow in the next quarter century. The region will not experience the declines projected for the eastern Länder of Germany, for example, which have equivalent populations and equivalent industrial and commercial infrastructure in need of renewal.

That growth includes two structural trends which will influence economy and society in the region. Firstly, there will be a **continuing ethnic transformation** in which Black and Minority Ethnic groups grow strongly and increase their share of the total population, particularly in Pennine textile towns both in Lancashire and West Yorkshire. The Asian and Asian British and the Mixed populations of these cities and towns will be more youthful than the northern England average and their share will grow from 6.5 % of the population in 2011 to 8.7-9.6% of the population in 2036. This will help fill the emerging gaps in the labour force, as long as these minority groups are able to obtain the skills and education needed for a 21st century economy.

Our analysis of population ageing in northern England showed what a huge impact there will be on the old age dependency and support ratios. As governments and private companies have recognised, present arrangements for retirement and pension receipts are not sustainable. We explored how much the age of retirement would need to rise to maintain the current old age support ratio. Our analyses suggested that **it will be necessary to increase pension entitlement age to 70 by 2036** rather than the 67 planned in the 2007 Pension Act. This timetable set out in that Act will be changed in the current 2011 Pensions Bill so that the threshold age will be 66 in 2020, with further changes planned.

Population ageing will have important impacts on the health status of the population of northern England. The rate of increase of the population with limiting long term illness and in not good health will be greater than the population as a whole because the age structure will shift towards the ages at which people have limiting long term illness and not good health. **Population ageing reflects improvement in survival and longevity but at the expense of more time spent in illness and more people ill, unless illness onset can be delayed by improved health behaviours (less smoking, moderate drinking, better diets, more exercise).** The pressure on the National Health Service budget will intensify.

The flip side of the additional ageing in the next twenty five years is a decrease in the labour force as the baby boomers retire. The labour force of northern England decreases if labour force participation rates remain constant. Vigorous action needs to be taken to encourage employers to introduce flexible transitions to retirement that encourage and reward older workers who wish to continue in work and to signal to those who wish to exit that the gain in leisure must be compensated for by decreased income. Failure of more than a few employers

to develop proper older worker policies is a serious shortcoming: **government needs to provide a vigorous lead in developing employment opportunities for older workers**, using both carrot (extra points in tenders for contracts) and stick (reduced grants if no policy is in place). The objection that this might damage the prospects of younger entrants to the labour force can be countered by designing mentoring schemes that join together young and old labour together (as has happened in the production of this report).

We analyzed what population change might mean for household change but found our results differing so much from official forecasts that further work will be needed to understand the reasons for the differences.

The report has provided detailed statistics on all these themes at LEP and LA scales. There is important geographical variation in population change and ageing across northern England, which is discussed in the report and for which the appendices supply detailed information. We have put together the statistics presented here and in Strand 4 into a local authority spreadsheet with each access to **profiles of key indicators** for both LEPs and LAs, which will be available via the N8 Research Partnership web pages.

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Appendix: Detailed Tables for Local Authorities (LAs) in Northern England

Table A1. Look up table for 2001 LAs to 2009 LAs

Old serial number	Census 2001 Code	Name	Code for New LAs (after 1.4.09)	Name for new LAs (after 1.4.09)
1	00BL	Bolton	00BL	Bolton
2	00BM	Bury	00BM	Bury
3	00BN	Manchester	00BN	Manchester
4	00BP	Oldham	00BP	Oldham
5	00BQ	Rochdale	00BQ	Rochdale
6	00BR	Salford	00BR	Salford
7	00BS	Stockport	00BS	Stockport
8	00BT	Tameside	00BT	Tameside
9	00BU	Trafford	00BU	Trafford
10	00BW	Wigan	00BW	Wigan
11	00BX	Knowsley	00BX	Knowsley
12	00BY	Liverpool	00BY	Liverpool
13	00BZ	St. Helens	00BZ	St. Helens
14	00CA	Sefton	00CA	Sefton
15	00CB	Wirral	00CB	Wirral
16	00CC	Barnsley	00CC	Barnsley
17	00CE	Doncaster	00CE	Doncaster
18	00CF	Rotherham	00CF	Rotherham
19	00CG	Sheffield	00CG	Sheffield
20	00CH	Gateshead	00CH	Gateshead
21	00CJ	Newcastle upon Tyne	00CJ	Newcastle upon Tyne
22	00CK	North Tyneside	00CK	North Tyneside
23	00CL	South Tyneside	00CL	South Tyneside
24	00CM	Sunderland	00CM	Sunderland
25	00CX	Bradford	00CX	Bradford
26	00CY	Calderdale	00CY	Calderdale
27	00CZ	Kirklees	00CZ	Kirklees
28	00DA	Leeds	00DA	Leeds
29	00DB	Wakefield	00DB	Wakefield
30	13UB	Chester	00EW	Cheshire West and Chester
31	13UC	Congleton	00EQ	Cheshire East
32	13UD	Crewe and Nantwich	00EQ	Cheshire East
33	13UE	Ellesmere Port & Neston	00EW	Cheshire West and Chester
34	13UG	Macclesfield	00EQ	Cheshire East
35	13UH	Vale Royal	00EW	Cheshire West and Chester
36	16UB	Allerdale	16UB	Allerdale
37	16UC	Barrow-in-Furness	16UC	Barrow-in-Furness
38	16UD	Carlisle	16UD	Carlisle
39	16UE	Copeland	16UE	Copeland
40	16UF	Eden	16UF	Eden
41	16UG	South Lakeland	16UG	South Lakeland
42	20UB	Chester-le-Street	00EJ	County Durham
43	20UD	Derwentside	00EJ	County Durham
44	20UE	Durham	00EJ	County Durham
45	20UF	Easington	00EJ	County Durham
46	20UG	Sedgefield	00EJ	County Durham

Table A1. Look up table (continued)

Old serial number	Census 2001 Code	Name	Code for New LAs (after 1.4.09)	Name for new LAs (after 1.4.09)
47	20UH	Teesdale	00EJ	County Durham
48	20UJ	Wear Valley	00EJ	County Durham
49	30UD	Burnley	30UD	Burnley
50	30UE	Chorley	30UE	Chorley
51	30UF	Fylde	30UF	Fylde
52	30UG	Hyndburn	30UG	Hyndburn
53	30UH	Lancaster	30UH	Lancaster
54	30UJ	Pendle	30UJ	Pendle
55	30UK	Preston	30UK	Preston
56	30UL	Ribble Valley	30UL	Ribble Valley
57	30UM	Rossendale	30UM	Rossendale
58	30UN	South Ribble	30UN	South Ribble
59	30UP	West Lancashire	30UP	West Lancashire
60	30UQ	Wyre	30UQ	Wyre
61	35UB	Alnwick	00EM	Northumberland
62	35UC	Berwick-upon-Tweed	00EM	Northumberland
63	35UD	Blyth Valley	00EM	Northumberland
64	35UE	Castle Morpeth	00EM	Northumberland
65	35UF	Tynedale	00EM	Northumberland
66	35UG	Wansbeck	00EM	Northumberland
67	36UB	Craven	36UB	Craven
68	36UC	Hambleton	36UC	Hambleton
69	36UD	Harrogate	36UD	Harrogate
70	36UE	Richmondshire	36UE	Richmondshire
71	36UF	Ryedale	36UF	Ryedale
72	36UG	Scarborough	36UG	Scarborough
73	36UH	Selby	36UH	Selby
74	00EB	Hartlepool	00EB	Hartlepool
75	00EC	Middlesbrough	00EC	Middlesbrough
76	00EE	Redcar and Cleveland	00EE	Redcar and Cleveland
77	00EF	Stockton-on-Tees	00EF	Stockton-on-Tees
78	00EH	Darlington	00EH	Darlington
79	00ET	Halton	00ET	Halton
80	00EU	Warrington	00EU	Warrington
81	00EX	Blackburn with Darwen	00EX	Blackburn with Darwen
82	00EY	Blackpool	00EY	Blackpool
83	00FA	Kingston upon Hull, City of	00FA	Kingston upon Hull, City of
84	00FB	East Riding of Yorkshire	00FB	East Riding of Yorkshire
85	00FC	North East Lincolnshire	00FC	North East Lincolnshire
86	00FD	North Lincolnshire	00FD	North Lincolnshire
87	00FF	York	00FF	York
88	37UC	Bassetlaw	37UC	Bassetlaw
89	17UC	Bolsover	17UC	Bolsover
90	17UD	Chesterfield	17UD	Chesterfield
91	17UJ	North East Derbyshire	17UJ	North East Derbyshire

Notes: Yellow highlight indicates where there has been changed.

LA = Local Authority, 2001 = 29/4/2001, 2009 = 1/4/2009

Table A2. Population projections for LAs in northern England, 2011-2036

LA2009 Code	LA Name	TRENDEF Population		Time Series	UPTAPER Population		Time Series
		2011	2036	2036	2011	2036	2036
LEP01	Greater Manchester						
00BN	Manchester	459085	570155	124.2	445184	493840	110.9
00BL	Bolton	276261	302524	109.5	274104	292415	106.7
00BM	Bury	182920	190227	104.0	181932	183663	101.0
00BP	Oldham	218493	229264	104.9	217041	218991	100.9
00BQ	Rochdale	219421	246966	112.6	217779	236494	108.6
00BR	Salford	228525	254195	111.2	225203	241694	107.3
00BS	Stockport	275029	270886	98.5	274805	265413	96.6
00BT	Tameside	216835	226046	104.2	215914	222490	103.0
00BU	Trafford	214533	233028	108.6	212621	219035	103.0
00BW	Wigan	320302	337236	105.3	319954	339773	106.2
	Total	2611405	2860525	109.5	2584536	2713808	105.0
LEP02	Liverpool City Region						
00BY	Liverpool	450743	480603	106.6	445695	460418	103.3
00ET	Halton	117114	114372	97.7	116816	112596	96.4
00BX	Knowsley	156028	162657	104.2	154790	157959	102.0
00BZ	St. Helens	179902	179339	99.7	179922	179667	99.9
00CA	Sefton	278700	270416	97.0	278444	270462	97.1
00CB	Wirral	310442	301023	97.0	310990	302803	97.4
	Total	1492928	1508410	101.0	1486655	1483905	99.8
LEP03	Leeds City Region						
00DA	Leeds	784519	920229	117.3	776980	878261	113.0
00CX	Bradford	516370	627753	121.6	510126	584184	114.5
00CY	Calderdale	194898	201870	103.6	193980	196988	101.6
36UB	Craven	66398	90258	135.9	65406	82695	126.4
36UD	Harrogate	166232	188463	113.4	164479	179986	109.4
00CZ	Kirklees	419810	479966	114.3	417600	464304	111.2
00DB	Wakefield	340757	379180	111.3	339856	376279	110.7
00CC	Barnsley	230102	247807	107.7	229225	244261	106.6
36UH	Selby	90475	117902	130.3	89366	109066	122.0
00FF	York	191893	211039	110.0	190222	203780	107.1
	Total	3001455	3464468	115.4	2977240	3319803	111.5
LEP04	Sheffield City Region						
00CG	Sheffield	547093	620010	113.3	541314	591446	109.3
00CC	Barnsley	230102	247807	107.7	229225	244261	106.6
37UC	Bassetlaw	120047	139379	116.1	119272	135497	113.6
17UC	Bolsover	81108	95891	118.2	80521	91901	114.1
17UD	Chesterfield	107088	121880	113.8	106068	116904	110.2
17UF	Derbyshire Dales	76085	85692	112.6	75320	81455	108.1
00CE	Doncaster	298057	310089	104.0	297116	308593	103.9
17UJ	North East Derbyshire	97195	98410	101.2	96704	95710	99.0
00CF	Rotherham	252585	260629	103.2	252080	260134	103.2
	Total	1809361	1979785	109.4	1797618	1925900	107.1

Table A2. Population projections (continued)

LA2009 Code	LA Name	TRENDEF Population		Time Series	UPTAPER Population		Time Series
		2011	2036	2036	2011	2036	2036
LEP05	Cheshire and Warrington						
00EW	Chester and Cheshire West	334942	363284	108.5	333288	352828	105.9
00EQ	Cheshire East	371703	406923	109.5	369260	394558	106.9
00EU	Warrington	196948	206577	104.9	196257	202253	103.1
	Total	903593	976784	108.1	898805	949640	105.7
LEP06	Tees Valley						
00EC	Middlesbrough	136604	132946	97.3	135486	130207	96.1
00EH	Darlington	105839	121106	114.4	105315	118038	112.1
00EB	Hartlepool	93368	101199	108.4	92667	97035	104.7
00EE	Redcar and Cleveland	140651	142593	101.4	139603	136920	98.1
00EF	Stockton-on-Tees	199632	223346	111.9	199171	221164	111.0
	Total	676093	721188	106.7	672242	703364	104.6
LEP07	Cumbria						
16UD	Carlisle	110384	124337	112.6	109317	119461	109.3
16UB	Allerdale	100227	111213	111.0	99329	106038	106.8
16UC	Barrow-in-Furness	74587	82604	110.7	73148	74872	102.4
16UE	Copeland	74400	84623	113.7	73592	78938	107.3
16UF	Eden	60188	77219	128.3	59582	72342	121.4
16UG	South Lakeland	112152	125664	112.0	111481	122837	110.2
	Total	531937	605659	113.9	526449	574488	109.1
LEP08	Hull City Region						
00FA	Kingston upon Hull	251948	255571	101.4	249352	249169	99.9
00FB	East Riding of Yorkshire	349478	391815	112.1	349222	391924	112.2
00FC	North East Lincolnshire	164869	173131	105.0	164320	171515	104.4
00FD	North Lincolnshire	168445	190903	113.3	167102	185399	110.9
	Total	934740	1011421	108.2	929996	998007	107.3
LEP09	North Yorkshire						
00FF	York	191893	211039	110.0	190222	203780	107.1
36UE	Richmondshire	53984	66499	123.2	53514	62341	116.5
36UC	Hambleton	87789	95800	109.1	87423	92178	105.4
36UF	Ryedale	59368	80255	135.2	57454	66424	115.6
36UG	Scarborough	112650	123718	109.8	111322	117694	105.7
36UH	Selby	90475	117902	130.3	89366	109066	122.0
	Total	596159	695214	116.6	589301	651482	110.6
LEP10	North East						
00CJ	Newcastle upon Tyne	270495	290679	107.5	266092	275976	103.7
00EJ	Durham	546392	652676	119.5	543117	625370	115.1
00CH	Gateshead	203566	228010	112.0	200284	208979	104.3
00CK	North Tyneside	199545	213975	107.2	199236	212670	106.7
00EM	Northumberland	359254	470421	130.9	353762	426401	120.5
00CL	South Tyneside	155953	162422	104.1	154222	157606	102.2
00CM	Sunderland	289315	293201	101.3	288115	289861	100.6
	Total	2024521	2311385	114.2	2004827	2196862	109.6

Table A2. Population projections (continued)

LA2009 Code	LA Name	TRENDEF Population		Time Series	UPTAPER Population		Time Series
		2011	2036	2036	2011	2036	2036
LEP11	Lancashire						
30UK	Preston	143063	169394	118.4	141093	158940	112.6
00EX	Blackburn with Darwen	145244	164142	113.0	144307	155387	107.7
00EY	Blackpool	148467	158909	107.0	147838	156560	105.9
30UD	Burnley	86057	84579	98.3	85211	80610	94.6
30UE	Chorley	111556	126426	113.3	111022	123984	111.7
30UF	Fylde	82748	96406	116.5	82241	93437	113.6
30UG	Hyndburn	84965	92302	108.6	83947	86698	103.3
30UH	Lancaster	145765	164531	112.9	143890	158707	110.3
30UJ	Pendle	96541	110853	114.8	95539	104355	109.2
30UL	Ribble Valley	61194	73469	120.1	59849	66697	111.4
30UM	Rossendale	68365	74525	109.0	67597	69675	103.1
30UP	West Lancashire	118925	133809	112.5	118258	130796	110.6
30UN	South Ribble	111697	125101	112.0	111162	121098	108.9
30UQ	Wyre	117065	132012	112.8	116077	128717	110.9
	Total	1521651	1706457	112.1	1508031	1635662	108.5
LEP03a	Leeds City Region						
00DA	Leeds	784519	920229	117.3	776980	878261	113.0
00CX	Bradford	516370	627753	121.6	510126	584184	114.5
00CY	Calderdale	194898	201870	103.6	193980	196988	101.6
36UB	Craven	66398	90258	135.9	65406	82695	126.4
36UD	Harrogate	166232	188463	113.4	164479	179986	109.4
00CZ	Kirklees	419810	479966	114.3	417600	464304	111.2
00DB	Wakefield	340757	379180	111.3	339856	376279	110.7
	Total	2488985	2887720	116.0	2468427	2762697	111.9
LEP04a	Sheffield City Region						
00CG	Sheffield	547093	620010	113.3	541314	591446	109.3
00CC	Barnsley	230102	247807	107.7	229225	244261	106.6
00CE	Doncaster	298057	310089	104.0	297116	308593	103.9
00CF	Rotherham	252585	260629	103.2	252080	260134	103.2
	Total	1327837	1438534	108.3	1319735	1404434	106.4
Totals	Regions						
LEP total	Northern England	16103844	17841296	110.8	15975701	17152921	107.4
GOR total	Northern England	15109850	16723298	110.7	14989004	16074348	107.2

Notes: LEP= Local Enterprise Partnership. Alternative LEPs = LEPs minus overlaps. Time series: 2011 = 100.
LA = Local Authority

Table A3. Old age dependency ratios for LAs in northern England, 2011-2036

LA2009	LA Name	TRENDEF Projections						UPTAPER Projections					
		ODR 65		ODR 70		ODR 75		ODR 65		ODR 70		ODR 75	
		2011	2036	2011	2036	2011	2036	2011	2036	2011	2036	2011	2036
LEP01	Greater Manchester												
00BN	Manchester	0.199	0.317	0.137	0.212	0.089	0.133	0.207	0.337	0.137	0.231	0.086	0.148
00BL	Bolton	0.282	0.466	0.186	0.332	0.122	0.226	0.286	0.481	0.160	0.343	0.100	0.234
00BM	Bury	0.301	0.506	0.197	0.358	0.122	0.230	0.304	0.528	0.154	0.373	0.095	0.239
00BP	Oldham	0.232	0.337	0.142	0.221	0.082	0.131	0.235	0.345	0.153	0.228	0.096	0.136
00BQ	Rochdale	0.276	0.488	0.190	0.347	0.126	0.233	0.280	0.506	0.153	0.361	0.092	0.242
00BR	Salford	0.271	0.441	0.184	0.308	0.116	0.200	0.277	0.462	0.169	0.326	0.106	0.212
00BS	Stockport	0.327	0.535	0.222	0.377	0.143	0.246	0.328	0.549	0.176	0.387	0.107	0.253
00BT	Tameside	0.268	0.453	0.174	0.309	0.107	0.193	0.270	0.462	0.159	0.316	0.099	0.197
00BU	Trafford	0.325	0.516	0.229	0.376	0.154	0.255	0.330	0.549	0.172	0.401	0.107	0.271
00BW	Wigan	0.315	0.562	0.206	0.398	0.131	0.266	0.316	0.562	0.144	0.399	0.088	0.267
	Total	0.328	0.599	0.183	0.311	0.117	0.203	0.278	0.465	0.186	0.327	0.119	0.214
LEP02	Liverpool City Region												
00BY	Liverpool	0.273	0.452	0.192	0.320	0.124	0.210	0.277	0.467	0.155	0.332	0.091	0.220
00ET	Halton	0.294	0.588	0.196	0.423	0.124	0.282	0.296	0.600	0.138	0.432	0.081	0.288
00BX	Knowsley	0.283	0.507	0.206	0.362	0.141	0.246	0.287	0.522	0.149	0.374	0.080	0.254
00BZ	St. Helens	0.328	0.599	0.215	0.421	0.133	0.277	0.328	0.600	0.158	0.422	0.094	0.278
00CA	Sefton	0.371	0.606	0.255	0.434	0.161	0.281	0.373	0.612	0.205	0.438	0.123	0.283
00CB	Wirral	0.373	0.610	0.257	0.451	0.172	0.311	0.374	0.615	0.199	0.454	0.121	0.313
	Total	0.266	0.416	0.221	0.389	0.144	0.259	0.323	0.553	0.223	0.397	0.145	0.265
LEP03	Leeds City Region												
00DA	Leeds	0.284	0.469	0.199	0.335	0.134	0.227	0.289	0.488	0.160	0.351	0.100	0.238
00CX	Bradford	0.235	0.357	0.160	0.246	0.102	0.159	0.240	0.376	0.156	0.263	0.096	0.170
00CY	Calderdale	0.273	0.455	0.180	0.317	0.118	0.206	0.276	0.469	0.171	0.328	0.108	0.213
36UB	Craven	0.358	0.435	0.248	0.321	0.169	0.224	0.367	0.479	0.226	0.354	0.141	0.247
36UD	Harrogate	0.303	0.461	0.204	0.330	0.134	0.222	0.308	0.488	0.189	0.349	0.119	0.235
00CZ	Kirklees	0.261	0.425	0.174	0.299	0.110	0.195	0.264	0.438	0.157	0.309	0.098	0.201
00DB	Wakefield	0.289	0.495	0.189	0.344	0.117	0.219	0.291	0.503	0.160	0.349	0.098	0.223
00CC	Barnsley	0.302	0.491	0.193	0.336	0.115	0.209	0.305	0.503	0.169	0.345	0.103	0.214
36UH	Selby	0.291	0.490	0.190	0.356	0.122	0.241	0.296	0.534	0.152	0.389	0.094	0.263
00FF	York	0.271	0.424	0.178	0.285	0.111	0.175	0.275	0.439	0.176	0.297	0.110	0.182
	Total	0.314	0.600	0.186	0.311	0.120	0.204	0.280	0.461	0.162	0.280	0.121	0.213
LEP04	Sheffield City Region												
00CG	Sheffield	0.302	0.475	0.209	0.339	0.138	0.229	0.307	0.493	0.173	0.354	0.110	0.240
00CC	Barnsley	0.302	0.491	0.193	0.336	0.115	0.209	0.305	0.503	0.169	0.345	0.103	0.214
37UC	Bassetlaw	0.299	0.462	0.197	0.327	0.124	0.212	0.303	0.481	0.168	0.341	0.101	0.221
17UC	Bolsover	0.266	0.354	0.176	0.237	0.123	0.152	0.270	0.369	0.185	0.249	0.112	0.160
17UD	Chesterfield	0.292	0.433	0.196	0.302	0.127	0.193	0.297	0.454	0.194	0.317	0.120	0.203
17UF	Derbyshire Dales	0.394	0.570	0.260	0.424	0.176	0.299	0.401	0.610	0.187	0.301	0.146	0.246
00CE	Doncaster	0.312	0.500	0.215	0.359	0.145	0.242	0.314	0.506	0.172	0.364	0.102	0.246
17UJ	North East Derbyshire	0.339	0.502	0.209	0.348	0.125	0.218	0.342	0.521	0.187	0.361	0.113	0.226
00CF	Rotherham	0.280	0.456	0.182	0.313	0.109	0.196	0.282	0.461	0.162	0.317	0.099	0.199
	Total	0.346	0.524	0.203	0.334	0.131	0.219	0.307	0.488	0.229	0.382	0.132	0.227

Table A3. Old age dependency ratios (continued)

LA2009	LA Name	TRENDEF Projections						UPTAPER Projections					
		ODR 65		ODR 70		ODR 75		ODR 65		ODR 70		ODR 75	
		2011	2036	2011	2036	2011	2036	2011	2036	2011	2036	2011	2036
LEP05	Cheshire and Warrington												
00EW	Chester and Cheshire West	0.303	0.466	0.205	0.333	0.135	0.224	0.306	0.485	0.172	0.347	0.103	0.233
00EQ	Cheshire East	0.337	0.512	0.224	0.371	0.145	0.250	0.342	0.536	0.178	0.388	0.109	0.261
00EU	Warrington	0.272	0.467	0.169	0.316	0.098	0.191	0.274	0.480	0.145	0.325	0.088	0.197
	Total	0.306	0.504	0.205	0.345	0.131	0.228	0.313	0.505	0.207	0.359	0.132	0.237
LEP06	Tees Valley												
00EC	Middlesbrough	0.247	0.440	0.171	0.304	0.112	0.193	0.251	0.449	0.152	0.312	0.089	0.198
00EH	Darlington	0.297	0.495	0.205	0.357	0.136	0.243	0.300	0.513	0.184	0.370	0.114	0.253
00EB	Hartlepool	0.243	0.369	0.163	0.250	0.099	0.151	0.247	0.387	0.164	0.262	0.096	0.159
00EE	Redcar and Cleveland	0.340	0.483	0.239	0.353	0.156	0.240	0.345	0.510	0.176	0.374	0.106	0.254
00EF	Stockton-on-Tees	0.314	0.600	0.221	0.445	0.150	0.311	0.316	0.611	0.146	0.454	0.085	0.317
	Total	0.266	0.354	0.204	0.356	0.134	0.240	0.296	0.511	0.219	0.387	0.136	0.248
LEP07	Cumbria												
16UD	Carlisle	0.330	0.501	0.228	0.364	0.151	0.249	0.336	0.526	0.188	0.383	0.114	0.262
16UB	Allerdale	0.347	0.491	0.235	0.355	0.148	0.240	0.352	0.522	0.192	0.377	0.115	0.255
16UC	Barrow-in-Furness	0.266	0.357	0.177	0.243	0.108	0.150	0.274	0.395	0.180	0.270	0.113	0.167
16UE	Copeland	0.289	0.431	0.198	0.313	0.128	0.216	0.294	0.467	0.167	0.340	0.098	0.234
16UF	Eden	0.291	0.400	0.190	0.278	0.116	0.177	0.296	0.426	0.194	0.297	0.115	0.190
16UG	South Lakeland	0.371	0.505	0.243	0.360	0.151	0.237	0.376	0.522	0.230	0.372	0.141	0.244
	Total	0.309	0.484	0.217	0.326	0.137	0.217	0.328	0.486	0.220	0.347	0.139	0.231
LEP08	Hull City Region												
00FA	Kingston upon Hull	0.250	0.428	0.170	0.291	0.109	0.179	0.254	0.438	0.158	0.299	0.097	0.185
00FB	East Riding of Yorkshire	0.342	0.517	0.224	0.369	0.143	0.244	0.344	0.523	0.193	0.374	0.116	0.247
00FC	North East Lincolnshire	0.300	0.480	0.206	0.340	0.139	0.229	0.303	0.488	0.179	0.346	0.110	0.233
00FD	North Lincolnshire	0.332	0.492	0.224	0.357	0.143	0.241	0.337	0.512	0.177	0.372	0.107	0.252
	Total	0.271	0.444	0.206	0.341	0.133	0.224	0.310	0.493	0.208	0.349	0.134	0.229
LEP09	North Yorkshire												
00FF	York	0.271	0.424	0.178	0.285	0.111	0.175	0.275	0.439	0.176	0.297	0.110	0.182
36UE	Richmondshire	0.262	0.384	0.174	0.268	0.111	0.175	0.266	0.410	0.156	0.287	0.095	0.187
36UC	Hambleton	0.333	0.479	0.217	0.341	0.134	0.222	0.337	0.502	0.182	0.358	0.109	0.233
36UF	Ryedale	0.291	0.303	0.192	0.212	0.129	0.142	0.305	0.372	0.222	0.261	0.134	0.175
36UG	Scarborough	0.365	0.457	0.243	0.326	0.157	0.218	0.372	0.486	0.241	0.348	0.150	0.233
36UH	Selby	0.291	0.490	0.190	0.356	0.122	0.241	0.296	0.534	0.152	0.389	0.094	0.263
	Total	0.349	0.430	0.199	0.301	0.126	0.196	0.307	0.461	0.202	0.324	0.128	0.211

Table A3. Old age dependency ratios (continued)

LA2009	LA Name	TRENDEF Projections						UPTAPER Projections					
		ODR 65		ODR 70		ODR 75		ODR 65		ODR 70		ODR 75	
		2011	2036	2011	2036	2011	2036	2011	2036	2011	2036	2011	2036
LEP10	North East												
00CJ	Newcastle upon Tyne	0.266	0.416	0.188	0.293	0.128	0.193	0.273	0.431	0.167	0.306	0.103	0.203
00EJ	Durham	0.303	0.445	0.204	0.317	0.129	0.209	0.307	0.468	0.169	0.334	0.101	0.220
00CH	Gateshead	0.354	0.564	0.252	0.413	0.173	0.286	0.364	0.629	0.178	0.462	0.104	0.319
00CK	North Tyneside	0.292	0.440	0.206	0.313	0.140	0.207	0.294	0.447	0.191	0.318	0.115	0.211
00EM	Northumberland	0.296	0.395	0.201	0.286	0.132	0.197	0.303	0.437	0.182	0.319	0.110	0.219
00CL	South Tyneside	0.301	0.505	0.204	0.358	0.124	0.226	0.306	0.523	0.193	0.372	0.115	0.235
00CM	Sunderland	0.279	0.495	0.186	0.338	0.112	0.208	0.281	0.503	0.155	0.344	0.089	0.213
	Total	0.303	0.461	0.204	0.322	0.132	0.213	0.302	0.478	0.236	0.400	0.134	0.226
LEP11	Lancashire												
30UK	Preston	0.255	0.406	0.182	0.290	0.122	0.197	0.260	0.429	0.150	0.308	0.092	0.209
00EX	Blackburn with Darwen	0.229	0.352	0.157	0.247	0.102	0.163	0.231	0.363	0.144	0.256	0.089	0.169
00EY	Blackpool	0.319	0.433	0.212	0.297	0.132	0.189	0.322	0.444	0.216	0.305	0.134	0.194
30UD	Burnley	0.235	0.332	0.152	0.219	0.097	0.133	0.239	0.348	0.167	0.231	0.105	0.140
30UE	Chorley	0.304	0.531	0.205	0.387	0.136	0.267	0.307	0.548	0.141	0.399	0.089	0.275
30UF	Fylde	0.338	0.447	0.231	0.314	0.158	0.209	0.343	0.465	0.261	0.327	0.159	0.218
30UG	Hyndburn	0.271	0.444	0.175	0.305	0.102	0.190	0.276	0.468	0.167	0.323	0.104	0.202
30UH	Lancaster	0.279	0.407	0.185	0.282	0.117	0.179	0.285	0.423	0.191	0.294	0.120	0.187
30UJ	Pendle	0.237	0.360	0.152	0.244	0.091	0.150	0.241	0.376	0.170	0.256	0.106	0.157
30UL	Ribble Valley	0.281	0.380	0.177	0.261	0.100	0.158	0.290	0.420	0.179	0.289	0.111	0.175
30UM	Rossendale	0.215	0.357	0.127	0.230	0.076	0.135	0.219	0.377	0.153	0.245	0.094	0.144
30UP	West Lancashire	0.309	0.542	0.210	0.387	0.131	0.262	0.326	0.552	0.156	0.400	0.094	0.271
30UN	South Ribble	0.323	0.534	0.202	0.388	0.127	0.260	0.312	0.565	0.161	0.405	0.097	0.271
30UQ	Wyre	0.349	0.430	0.245	0.303	0.166	0.205	0.355	0.445	0.248	0.314	0.148	0.212
	Total	0.232	0.337	0.189	0.299	0.120	0.195	0.287	0.446	0.192	0.313	0.122	0.205
LEP03a	Leeds City Region												
00DA	Leeds	0.284	0.469	0.199	0.335	0.134	0.227	0.289	0.488	0.160	0.351	0.100	0.238
00CX	Bradford	0.235	0.357	0.160	0.246	0.102	0.159	0.240	0.376	0.156	0.263	0.096	0.170
00CY	Calderdale	0.273	0.455	0.180	0.317	0.118	0.206	0.276	0.469	0.171	0.328	0.108	0.213
36UB	Craven	0.358	0.435	0.248	0.321	0.169	0.224	0.367	0.479	0.226	0.354	0.141	0.247
36UD	Harrogate	0.303	0.461	0.204	0.330	0.134	0.222	0.308	0.488	0.189	0.349	0.119	0.235
00CZ	Kirklees	0.261	0.425	0.174	0.299	0.110	0.195	0.264	0.438	0.157	0.309	0.098	0.201
00DB	Wakefield	0.289	0.495	0.189	0.344	0.117	0.219	0.291	0.503	0.160	0.349	0.098	0.223
	Total	0.328	0.599	0.186	0.309	0.121	0.204	0.277	0.456	0.158	0.270	0.122	0.214
LEP04a	Sheffield City Region												
00CG	Sheffield	0.302	0.475	0.209	0.339	0.138	0.229	0.307	0.493	0.173	0.354	0.110	0.240
00CC	Barnsley	0.302	0.491	0.193	0.336	0.115	0.209	0.305	0.503	0.169	0.345	0.103	0.214
00CE	Doncaster	0.312	0.500	0.215	0.359	0.145	0.242	0.314	0.506	0.172	0.364	0.102	0.246
00CF	Rotherham	0.280	0.456	0.182	0.313	0.109	0.196	0.282	0.461	0.162	0.317	0.099	0.199
	Total	0.358	0.435	0.202	0.338	0.130	0.222	0.303	0.491	0.245	0.414	0.131	0.229
Totals													
LEP total	Northern England	0.293	0.461	0.198	0.325	0.127	0.214	0.297	0.480	0.200	0.340	0.129	0.224
GOR total	Northern England	0.292	0.460	0.198	0.326	0.127	0.215	0.296	0.480	0.201	0.341	0.129	0.225

Notes: ODR65 = (Population aged 65+/Population aged 16-64), ODR70 = (Population aged 70+/Population aged 16-69), ODR75 = (Population aged 75+/Population aged 16-74)

Table A4. Limiting long term illness projections for LAs in northern England, 2011 and 2036

LA2009	LA Name	TRENDEF Count		Time Series	UPTAPER Count		Time Series
		2011	2036	2036	2011	2036	2036
LEP01	Greater Manchester						
00BN	Manchester	107295	153498	143	104853	132158	126
00BL	Bolton	60936	78570	128	60603	75836	125
00BM	Bury	38182	46447	121	38049	45026	118
00BP	Oldham	45940	53607	116	45580	49880	109
00BQ	Rochdale	50798	68365	134.6	50449	64858	128
00BR	Salford	53647	68594	127.9	53165	65363	122
00BS	Stockport	54018	62572	115.8	53960	61455	113
00BT	Tameside	47838	57126	119.4	47669	55781	117
00BU	Trafford	42835	54229	126.6	42617	51651	121
00BW	Wigan	80427	101323	126.0	80339	100837	125
	Total	581921	744335	127.9	577288	702850	121
LEP02	Liverpool City Region						
00BY	Liverpool	119846	146263	122.0	118864	139748	117
00ET	Halton	33957	44841	132.1	33884	43873	129
00BX	Knowsley	42553	51600	121.3	42279	49874	118
00BZ	St. Helens	47673	56559	118.6	47651	56270	118
00CA	Sefton	66377	73771	111.1	66304	73370	110
00CB	Wirral	76018	84011	110.5	76040	83905	110
	Total	386426	457046	118.3	385024	447043	116
LEP03	Leeds City Region						
00DA	Leeds	156152	224497	143.8	155283	214893	138
00CX	Bradford	101859	145272	142.6	100955	134886	133
00CY	Calderdale	38149	46232	121.2	38050	45135	118
36UB	Craven	30084	38375	127.6	30029	37695	125
36UD	Harrogate	23533	28108	119.4	23480	27718	118
00CZ	Kirklees	81110	110456	136.2	80783	106638	132
00DB	Wakefield	82265	106675	129.7	82095	105094	128
00CC	Barnsley	61337	74037	120.7	61199	72636	118
36UH	Selby	31282	40825	130.5	31177	39872	127
00FF	York	18551	24280	130.9	18471	23485	127
	Total	624326	838761	134.3	621527	808057	130
LEP04	Sheffield City Region						
00CG	Sheffield	121787.7	163572.7	134	120957.3	156106.5	129.1
00CC	Barnsley	61337.0	74037.0	120.7	61199.2	72636.3	118.7
37UC	Bassetlaw	42578.8	53428.1	125.5	42385.8	51688.8	121.9
17UC	Bolsover	21620.7	27322.7	126.4	21443.0	25697.3	119.8
17UD	Chesterfield	33079.6	42504.2	128.5	32856.3	41093.6	125.1
17UF	Derbyshire Dales	15318.7	20646.2	134.8	15202.6	19487.0	128.2
00CE	Doncaster	73842.6	87633.9	118.7	73676.1	86550.3	117.5
17UJ	North East Derbyshire	29075.8	41347.9	142.2	28833.7	39137.6	135.7
00CF	Rotherham	59453.9	70396.3	118.4	59352.2	69530.6	117.1
	Total	458094.8	580889.1	126.8	455906.2	561928.1	123.3

Table A4. Limiting long term illness (continued)

LA2009	LA Name	TRENDEF Count		Time Series	UPTAPER Count		Time Series
		2011	2036	2036	2011	2036	2036
LEP05	Cheshire and Warrington						
00EW	Chester and Cheshire West	54522.2	71230.6	130.6	54377.0	69194.2	127.2
00EQ	Cheshire East	43845.1	57607.7	131.4	43722.7	55978.7	128.0
00EU	Warrington	21539.6	26473.3	122.9	21459.6	25535.5	119.0
	Total	119906.9	155311.6	129.5	119559.4	150708.4	126.1
LEP06	Tees Valley						
00EC	Middlesbrough	24297.8	29933.6	123.2	24226.6	28957.7	119.5
00EH	Darlington	34016.3	37423.6	110.0	33965.3	36791.2	108.3
00EB	Hartlepool	32931.1	38020.8	115.5	32877.1	37245.7	113.3
00EE	Redcar and Cleveland	31490.9	43030.0	136.6	31350.3	41897.1	133.6
00EF	Stockton-on-Tees	16522.1	17994.6	108.9	16469.7	17248.9	104.7
	Total	139258.2	166402.5	119.5	138889.0	162140.7	116.7
LEP07	Cumbria						
16UD	Carlisle	13408.2	18140.2	135.3	13369.3	17525.7	131.1
16UB	Allerdale	19744.6	25945.9	131.4	19692.4	25157.4	127.8
16UC	Barrow-in-Furness	7911.3	13350.5	168.8	7841.9	12163.4	155.1
16UE	Copeland	17259.9	18173.6	105.3	17147.1	17255.1	100.6
16UF	Eden	19168.4	26685.3	139.2	19127.1	26245.8	137.2
16UG	South Lakeland	14904.0	18925.0	127.0	14864.6	18468.9	124.2
	Total	92396.4	121220.5	131.2	92042.4	116816.3	126.9
LEP08	Hull City Region						
00FA	Kingston upon Hull	17115.9	21694.1	126.7	17033.2	20529.7	120.5
00FB	East Riding of Yorkshire	10519.5	15144.0	144.0	10470.9	14401.1	137.5
00FC	North East Lincolnshire	24576.8	30185.2	122.8	24514.8	29633.8	120.9
00FD	North Lincolnshire	15487.1	19815.6	127.9	15419.6	18996.1	123.2
	Total	67699.4	86838.9	128.3	67438.5	83560.6	123.9
LEP09	North Yorkshire						
00FF	York	18551	24280	130	18471	23485	127
36UE	Richmondshire	39368	48501	123	39123	47159	120
36UC	Hambleton	20751	28743	138	20621	27178	131
36UF	Ryedale	58092	76350	131	58061	75998	130
36UG	Scarborough	32590	39570	121	32516	39057	120
36UH	Selby	31282	40825	130	31177	39872	127
	Total	200636	258271	128	199971	252750	126

Table A4. Limiting long term illness (continued)

LA2009	LA Name	TRENDEF Count		Time Series	UPTAPER Count		Time Series
		2011	2036	2036	2011	2036	2036
LEP10	North East						
00CJ	Newcastle upon Tyne	62920	76933	122	62213	72817	117
00EJ	Durham	142297	183045	128	141641	175756	124
00CH	Gateshead	53876	68770	127	53448	64454	120
00CK	North Tyneside	44791	53262	118	44736	52621	117
00EM	Northumberland	160936	203231	126	160398	198506	123
00CL	South Tyneside	38380	45769	119	38085	44133	115
00CM	Sunderland	75608	89365	118	75365	87712	116
	Total	578811	720377	124	575887	696003	120
LEP11	Lancashire						
30UK	Preston	36911	47118	127	36738	45392	123
00EX	Blackburn with Darwen	16995	20027	117	16807	18299	108
00EY	Blackpool	28111	35421	126	27957	34149	122
30UD	Burnley	21719	28392	130	21617	27240	126
30UE	Chorley	11421	14451	126	11359	13544	119
30UF	Fylde	12742	18741	147	12707	17916	141
30UG	Hyndburn	17488	26764	153	17203	23157	134
30UH	Lancaster	14780	21508	145	14682	20184	137
30UJ	Pendle	21118	25096	118	21082	24292	115
30UL	Ribble Valley	8634	12451	144	8603	11865	137
30UM	Rossendale	13324	18184	136	13132	15825	120
30UP	West Lancashire	18953	29363	154	18826	27679	147
30UN	South Ribble	23883	28014	117	23774	26995	113
30UQ	Wyre	24921	32693	131	24847	31894	128
	Total	271004	358227	132	269339	338437	125
LEP03a	Leeds City Region						
00DA	Leeds	156152	224497	143	155283	214893	138
00CX	Bradford	101859	145272	142	100955	134886	133
00CY	Calderdale	38149	46232	121	38050	45135	118
36UB	Craven	30084	38375	127	30029	37695	125
36UD	Harrogate	23533	28108	119	23480	27718	118
00CZ	Kirklees	81110	110456	136	80783	106638	132
00DB	Wakefield	82265	106675	129	82095	105094	128
	Total	513156	699618	136	510679	672063	131
LEP04a	Sheffield City Region						
00CG	Sheffield	121787	163572	134	120957	156106	129
00CC	Barnsley	61337	74037	120	61199	72636	118
00CE	Doncaster	73842	87633	118	73676	86550	117
00CF	Rotherham	59453	70396	118	59352	69530	117
	Total	316421	395639	125	315184	384823	122
Totals	Regions						
LEP total	Northern England	3531094	4497803	127	3513444	4330051	123
GOR total	Northern England	3205400	4089864	128	3188761	3930527	123

Table A5. Not good health projections for LAs in northern England, 2011 and 2036

LA2009	LA Name	TRENDEF Count		Time Series	UPTAPER Count		Time Series
		2011	2036	2036	2011	2036	2036
LEP01	Greater Manchester						
00BN	Manchester	54273	77927	143	52839	65842	124
00BL	Bolton	27274	34863	127	27098	33404	123
00BM	Bury	16625	20077	120	16552	19282	116
00BP	Oldham	21694	25748	118	21474	23527	109
00BQ	Rochdale	23338	31369	134	23134	29335	126
00BR	Salford	24612	31073	126	24345	29284	120
00BS	Stockport	22719	25767	113	22683	25126	110
00BT	Tameside	21899	25621	117	21805	24841	113
00BU	Trafford	18017	22605	125	17902	21303	119
00BW	Wigan	35298	44467	126	35251	44126	125
	Total	265752	339520	127	263086	316077	120
LEP02	Liverpool City Region						
00BY	Liverpool	55669	67037	120	55139	63449	115
00ET	Halton	15002	19374	129	14965	18819	125
00BX	Knowsley	19406	23152	119	19261	22176	115
00BZ	St. Helens	21143	24755	117	21132	24573	116
00CA	Sefton	27565	29966	108	27526	29689	107
00CB	Wirral	31258	33493	107	31265	33323	106
	Total	170045	197779	116	169290	192031	113
LEP03	Leeds City Region						
00DA	Leeds	71154	101323	142	70653	96078	136
00CX	Bradford	49010	71324	145	48461	65290	134
00CY	Calderdale	17002	20284	119	16942	19651	116
36UB	Craven	11892	14831	124	11862	14479	122
36UD	Harrogate	8881	10434	117	8855	10230	115
00CZ	Kirklees	37049	50119	135	36855	47961	130
00DB	Wakefield	37157	47771	128	37060	46825	126
00CC	Barnsley	28188	33837	120	28116	33029	117
36UH	Selby	12461	16098	129	12408	15617	125
00FF	York	7359	9515	129	7316	9111	124
	Total	280158	375540	134	278532	358276	128
LEP04	Sheffield City Region						
00CG	Sheffield	55970	75257	134	55513	71222	128
00CC	Barnsley	28188	33837	120	28116	33029	117
37UC	Bassetlaw	17333	21578	124	17240	20708	120
17UC	Bolsover	9620	12270	127	9528	11408	119
17UD	Chesterfield	14372	18503	128	14258	17748	124
17UF	Derbyshire Dales	5978	8094	135	5920	7560	127
00CE	Doncaster	32107	37807	117	32020	37175	116
17UJ	North East Derbyshire	12519	18024	144	12394	16891	136
00CF	Rotherham	26507	31141	117	26446	30581	115
	Total	202598	256515	126	201438	246326	122

Table A5. Not good health projections (continued)

LA2009	LA Name	TRENDEF Count		Time Series	UPTAPER Count		Time Series
		2011	2036	2036	2011	2036	2036
LEP05	Cheshire and Warrington						
00EW	Chester and Cheshire West	21705	28048	129	21635	27030	124
00EQ	Cheshire East	17269	22540	130	17204	21722	126
00EU	Warrington	8938	11088	124	8899	10607	119
	Total	47913	61677	128	47738	59360	124
LEP06	Tees Valley						
00EC	Middlesbrough	10579	13052	123	10542	12512	118
00EH	Darlington	13833	14973	108	13808	14629	106
00EB	Hartlepool	13720	15698	114	13693	15283	111
00EE	Redcar and Cleveland	13440	18141	135	13369	17521	131
00EF	Stockton-on-Tees	7154	7810	109	7126	7416	104
	Total	58728	69675	118	58540	67363	115
LEP07	Cumbria						
16UD	Carlisle	5470	7346	134	5449	7034	129
16UB	Allerdale	8100	10662	131	8075	10271	127
16UC	Barrow-in-Furness	3501	6179	176	3467	5564	160
16UE	Copeland	7326	7755	105	7268	7269	100
16UF	Eden	7413	10196	137	7394	9984	135
16UG	South Lakeland	5578	6980	125	5559	6763	121
	Total	37390	49122	131	37213	46888	126
LEP08	Hull City Region						
00FA	Kingston upon Hull	7764	9758	125	7719	9113	118
00FB	East Riding of Yorkshire	4190	6049	144	4167	5690	136
00FC	North East Lincolnshire	9969	12109	121	9938	11815	118
00FD	North Lincolnshire	6433	8229	127	6399	7806	122
	Total	28358	36146	127	28225	34426	122
LEP09	North Yorkshire						
00FF	York	7359	9515	129	7316	9111	124
36UE	Richmondshire	14400	17313	120	14288	16699	116
36UC	Hambleton	8323	11597	139	8253	10851	131
36UF	Ryedale	22230	28483	128	22214	28257	127
36UG	Scarborough	13043	15519	119	13003	15226	117
36UH	Selby	12461	16098	129	12408	15617	125
	Total	77818	98526	126	77484	95763	123
LEP10	North East						
00CJ	Newcastle upon Tyne	29046	35313	121	28642	33018	115
00EJ	Durham	63315	81751	129	62974	77926	123
00CH	Gateshead	24238	30861	127	24010	28535	118
00CK	North Tyneside	19223	22526	117	19190	22136	115
00EM	Northumberland	65501	81806	124	65230	79370	121
00CL	South Tyneside	17012	20167	118	16850	19255	114
00CM	Sunderland	33596	39431	117	33469	38503	115
	Total	251936	311857	123	250369	298745	119

Table A5. Not good health projections (continued)

LA2009	LA Name	TRENDEF Count		Time Series	UPTAPER Count		Time Series
		2011	2036	2036	2011	2036	2036
LEP11	Lancashire						
30UK	Preston	16328	20350	124	16236	19390	119
00EX	Blackburn with Darwen	7770	9242	118	7666	8284	108
00EY	Blackpool	12622	15737	124	12542	15040	119
30UD	Burnley	9778	12868	131	9724	12238	125
30UE	Chorley	4809	6153	128	4777	5691	119
30UF	Fylde	5184	7674	148	5164	7263	140
30UG	Hyndburn	7936	12301	155	7784	10378	133
30UH	Lancaster	6008	8815	146	5956	8153	136
30UJ	Pendle	9379	11234	119	9359	10793	115
30UL	Ribble Valley	3296	4766	144	3281	4491	136
30UM	Rossendale	5744	8036	139	5643	6803	120
30UP	West Lancashire	7838	12225	156	7778	11393	146
30UN	South Ribble	9729	11329	116	9672	10810	111
30UQ	Wyre	10204	13193	129	10166	12773	125
	Total	116630	153930	132	115752	143505	124
LEP03a	Leeds City Region						
00DA	Leeds	71154	101323	142	70653	96078	136
00CX	Bradford	49010	71324	145	48461	65290	134
00CY	Calderdale	17002	20284	119	16942	19651	116
36UB	Craven	11892	14831	124	11862	14479	122
36UD	Harrogate	8881	10434	117	8855	10230	115
00CZ	Kirklees	37049	50119	135	36855	47961	130
00DB	Wakefield	37157	47771	128	37060	46825	126
	Total	232148	316089	136	230690	300517	130
LEP04a	Sheffield City Region						
00CG	Sheffield	55970	75257	134	55513	71222	128
00CC	Barnsley	28188	33837	120	28116	33029	117
00CE	Doncaster	32107	37807	117	32020	37175	116
00CF	Rotherham	26507	31141	117	26446	30581	115
	Total	142774	178043	124	142096	172008	121

Table A6. Labour force projections for LAs in northern England, 2011 and 2036

LA2009	LA Name	TRENDEF Count		Time Series	UPTAPER Count		Time Series
		2011	2036	2036	2011	2036	2036
LEP01	Greater Manchester						
00BN	Manchester	181377	203603	112	174258	172630	99
00BL	Bolton	124601	120154	96	123031	114940	93
00BM	Bury	85885	77720	90	85129	73972	86
00BP	Oldham	95714	87561	91	94789	84025	88
00BQ	Rochdale	94366	89531	94	93259	85091	91
00BR	Salford	102646	101464	98	100503	94646	94
00BS	Stockport	133842	115190	86	133405	111634	83
00BT	Tameside	102847	94462	91	102069	92073	90
00BU	Trafford	101583	96681	95	100202	88983	88
00BW	Wigan	147134	133773	90	146417	133547	91
	Total	1169999	1120143	95	1153065	1051544	91
LEP02	Liverpool City Region						
00BY	Liverpool	180937	172199	95	177942	162695	91
00ET	Halton	51986	42084	81	51716	41178	79
00BX	Knowsley	64632	58301	90	63928	56277	88
00BZ	St. Helens	78507	66990	85	78375	66888	85
00CA	Sefton	125237	106283	84	124703	105205	84
00CB	Wirral	133281	113547	85	133156	112802	84
	Total	634581	559407	88	629822	545047	86
LEP03	Leeds City Region						
00DA	Leeds	369969	383695	103	364439	360036	98
00CX	Bradford	213687	227356	106	209703	208034	99
00CY	Calderdale	93040	85185	91	92269	82090	89
36UB	Craven	28491	35952	126	27912	32056	114
36UD	Harrogate	75651	77907	103	74350	72513	97
00CZ	Kirklees	191000	193263	101	189121	184865	97
00DB	Wakefield	157659	153880	97	156576	150857	96
00CC	Barnsley	99923	95286	95	99130	92782	93
36UH	Selby	42801	47827	111	42068	43214	102
00FF	York	90906	90761	99	89675	86229	96
	Total	1363132	1391115	102	1345250	1312682	97
LEP04	Sheffield City Region						
00CG	Sheffield	243484	244067	100	239566	228987	95
00CC	Barnsley	99923	95286	95	99130	92782	93
37UC	Bassetlaw	58597	60766	103	57950	58080	100
17UC	Bolsover	38951	42116	108	38494	39751	103
17UD	Chesterfield	52334	53431	102	51650	50529	97
17UF	Derbyshire Dales	34556	34570	100	34037	32136	94
00CE	Doncaster	131735	121728	92	130742	119720	91
17UJ	North East Derbyshire	47367	43083	91	46982	41301	87
00CF	Rotherham	115769	105603	91	115059	104275	90
	Total	822719	800653	97	813614	767564	94

Table A6. Labour force projections (continued)

LA2009	LA Name	TRENDEF Count		Time Series	UPTAPER Count		Time Series
		2011	2036	2036	2011	2036	2036
LEP05	Cheshire and Warrington						
00EW	Chester and Cheshire West	148377	144185	97	147006	137915	93
00EQ	Cheshire East	161928	157942	97	160132	150539	94
00EU	Warrington	104212	96327	92	103511	93002	89
	Total	414518	398455	96	410649	381456	92
LEP06	Tees Valley						
00EC	Middlesbrough	68106	57665	84	67253	56032	83
00EH	Darlington	51846	52307	100	51378	50223	97
00EB	Hartlepool	45945	45520	99	45417	42973	94
00EE	Redcar and Cleveland	63674	58536	91	62887	55154	87
00EF	Stockton-on-Tees	90068	84581	93	89553	82712	92
	Total	319641	298611	93	316490	287095	90
LEP07	Cumbria						
16UD	Carlisle	50438	50627	100	49681	47810	96
16UB	Allerdale	47141	46897	99	46483	43877	94
16UC	Barrow-in-Furness	31887	32280	101	31067	28541	91
16UE	Copeland	32736	33077	101	32272	30364	94
16UF	Eden	29542	34472	116	29107	31772	109
16UG	South Lakeland	51092	52254	102	50564	50438	99
	Total	242838	249609	102	239176	232804	97
LEP08	Hull City Region						
00FA	Kingston upon Hull	134202	121307	90	132211	116823	88
00FB	East Riding of Yorkshire	177340	178804	100	176580	176503	100
00FC	North East Lincolnshire	78562	73860	94	78000	72349	92
00FD	North Lincolnshire	82634	83964	101	81530	80167	98
	Total	472740	457936	96	468322	445843	95
LEP09	North Yorkshire						
00FF	York	90906	90761	99	89675	86229	96
36UE	Richmondshire	27367	30171	110	26999	27796	103
36UC	Hambleton	38375	37386	97	38083	35472	93
36UF	Ryedale	27876	35936	128	26721	28580	107
36UG	Scarborough	54357	56163	103	53400	52483	98
36UH	Selby	42801	47827	111	42068	43214	102
	Total	281684	298245	105	276950	273777	98
LEP10	North East						
00CJ	Newcastle upon Tyne	114814	110548	96	112212	103391	92
00EJ	Durham	262919	278180	105	260257	262982	101
00CH	Gateshead	87062	85434	98	84929	75164	88
00CK	North Tyneside	94337	92207	97	93821	90405	96
00EM	Northumberland	165079	195872	118	161571	172994	107
00CL	South Tyneside	69025	62921	91	67923	60419	89
00CM	Sunderland	129018	113960	88	127968	111361	87
	Total	922257	939126	101	908684	876719	96

Table A6. Labour force projections (continued)

LA2009	LA Name	TRENDEF Count		Time Series	UPTAPER Count		Time Series
		2011	2036	2036	2011	2036	2036
LEP11	Lancashire						
30UK	Preston	69193	72367	104	67843	67038	98
00EX	Blackburn with Darwen	70387	70222	99	69581	66393	95
00EY	Blackpool	76071	75217	98	75444	73160	97
30UD	Burnley	38729	34813	89	38172	32802	85
30UE	Chorley	57749	56519	97	57273	54757	95
30UF	Fylde	41258	44332	107	40809	42259	103
30UG	Hyndburn	36528	34728	95	35924	32339	90
30UH	Lancaster	70672	73587	104	69308	69915	100
30UJ	Pendle	46529	48101	103	45832	44848	97
30UL	Ribble Valley	28831	31855	110	27973	28233	100
30UM	Rossendale	31918	31330	98	31432	28985	92
30UP	West Lancashire	45972	45733	99	45484	44115	97
30UN	South Ribble	46309	44732	96	45951	42452	92
30UQ	Wyre	51918	55483	106	51200	53498	104
	Total	712070	719026	101	702231	680800	96
Alternative LEPs							
LEP03a	Leeds City Region						
00DA	Leeds	369969	383695	103	364439	360036	98
00CX	Bradford	213687	227356	106	209703	208034	99
00CY	Calderdale	93040	85185	91	92269	82090	89
36UB	Craven	28491	35952	126	27912	32056	114
36UD	Harrogate	75651	77907	103	74350	72513	97
00CZ	Kirklees	191000	193263	101	189121	184865	97
00DB	Wakefield	157659	153880	97	156576	150857	96
	Total	1129501	1157241	102	1114375	1090455	97
LEP04a	Sheffield City Region						
00CG	Sheffield	243484	244067	100	239566	228987	95
00CC	Barnsley	99923	95286	95	99130	92782	93
00CE	Doncaster	131735	121728	92	130742	119720	91
00CF	Rotherham	115769	105603	91	115059	104275	90
	Total	590912	566685	95	584499	545765	93

Table A7. Household projections for LAs in northern England, 2011 and 2036

LA2009	LA Name	TRENDEF Households		Time Series	UPTAPER Households		Time Series
		2011	2036	2036	2011	2036	2036
LEP01	Greater Manchester						
00BN	Manchester	203017	264503	130	195589	220915	112
00BL	Bolton	116026	131348	113	114801	125261	109
00BM	Bury	77535	83102	107	77027	79246	102
00BP	Oldham	88371	92315	104	87504	86665	99
00BQ	Rochdale	91548	106021	115	90609	100185	110
00BR	Salford	101543	1178111	116	99748	109675	110
00BS	Stockport	120226	122667	102	119985	118642	98
00BT	Tameside	92542	100179	108	91944	96811	105
00BU	Trafford	94203	105008	111	93253	97503	104
00BW	Wigan	140112	156327	111	139627	154696	110
	Total	1125124	1279282	113	1110088	1189599	107
LEP02	Liverpool City Region						
00BY	Liverpool	202630	229724	113	199722	215700	108
00ET	Halton	35969	40875	113	58127	67864	116
00BX	Knowsley	65803	73043	111	65119	69802	107
00BZ	St. Helens	79198	83832	105	79100	83023	105
00CA	Sefton	119168	120705	101	118880	118997	100
00CB	Wirral	136572	136422	99	136567	134836	98
	Total	639339	684602	107	6575154	690223	105
LEP03	Leeds City Region						
00DA	Leeds	347376	430461	123	343020	404163	117
00CX	Bradford	197309	244676	124	194015	222979	114
00CY	Calderdale	82896	89422	107	82326	85906	104
36UB	Craven	39284	45710	116	77333	81890	105
36UD	Harrogate	28116	37818	134	61628	64957	105
00CZ	Kirklees	174915	206217	117	173453	196737	113
00DB	Wakefield	146600	170535	116	145827	166451	114
00CC	Barnsley	98554	109995	111	97965	106484	108
36UH	Selby	73435	85461	116	67222	74257	110
00FF	York	61995	66989	108	45609	51115	112
	Total	1250481	1487284	118	1288399	1454937	112
LEP04	Sheffield City Region						
00CG	Sheffield	240633	284415	118	237383	266686	112
00CC	Barnsley	98554	109994	111	97964	106483	108
37UC	Bassetlaw	76672	85462	111	78160	86568	110
17UC	Bolsover	88926	93902	105	34457	36851	106
17UD	Chesterfield	143786	166345	115	64431	73188	113
17UF	Derbyshire Dales	70956	79987	112	34567	38533	111
00CE	Doncaster	124980	135187	108	124290	132325	106
17UJ	North East Derbyshire	67823	77742	114	54973	63596	115
00CF	Rotherham	105064	111919	106	104567	109631	104
	Total	1017397	1144957	112	830797	913865	110

Table A7. Household projections (continued)

LA2009	LA Name	TRENDEF Households		Time Series	UPTAPER Households		Time Series
		2011	2036	2036	2011	2036	2036
LEP05	Cheshire and Warrington						
00EW	Chester and Cheshire West	146359	164538	112	112747	125698	111
00EQ	Cheshire East	164459	183962	111	105737	116706	110
00EU	Warrington	54964	56216	102	43268	46175	106
	Total	365783	404717	110	261754	288580	110
LEP06	Tees Valley						
00EC	Middlesbrough	25052	33187	132	43607	47288	108
00EH	Darlington	50149	59619	118	66557	64829	97
00EB	Hartlepool	20587	26147	127	54693	57527	105
00EE	Redcar and Cleveland	47389	52515	110	53047	63799	120
00EF	Stockton-on-Tees	36829	48988	133	32572	32155	98
	Total	180008	220458	122	250477	265599	106
LEP07	Cumbria						
16UD	Carlisle	49156	56933	115	28118	31867	113
16UB	Allerdale	43710	49159	112	39940	45398	113
16UC	Barrow-in-Furness	30939	35004	113	13299	19271	144
16UE	Copeland	34228	39544	115	33127	31394	94
16UF	Eden	24267	31787	131	45981	52898	115
16UG	South Lakeland	51127	57224	111	33743	38206	113
	Total	233430	269654	115	194210	219036	112
LEP08	Hull City Region						
00FA	Kingston upon Hull	41606	49701	119	33838	36464	107
00FB	East Riding of Yorkshire	50577	52495	103	23994	29284	122
00FC	North East Lincolnshire	77667	85003	109	50745	55342	109
00FD	North Lincolnshire	49303	56429	114	32913	37379	113
	Total	219154	243630	111	141491	158471	112
LEP09	North Yorkshire						
00FF	York	61995	66988	108	45609	51114	112
36UE	Richmondshire	30675	44074	143	89646	92724	103
36UC	Hambleton	22562	26605	117	48821	53075	108
36UF	Ryedale	28969	39019	134	141537	159045	112
36UG	Scarborough	38398	42418	110	68280	73540	107
36UH	Selby	73434	85460	116	67222	74256	110
	Total	256035	304567	119	461116	503757	109
LEP10	North East						
00CJ	Newcastle upon Tyne	119719	133697	111	117373	124449	106
00EJ	Durham	257968	300554	116	230597	264920	114
00CH	Gateshead	91177	106662	117	89557	95991	107
00CK	North Tyneside	87653	96587	110	87290	94172	107
00EM	Northumberland	207157	250591	121	316775	340167	107
00CL	South Tyneside	68727	74968	109	67892	71888	105
00CM	Sunderland	125271	134490	107	124441	130751	105
	Total	957674	1097553	114	1033927	1122340	108

Table A7. Household projections (continued)

LA2009	LA Name	TRENDEF Households		Time Series	UPTAPER Households		Time Series
		2011	2036	2036	2011	2036	2036
LEP11	Lancashire						
30UK	Preston	34007	40108	117	72504	80099	110
00EX	Blackburn with Darwen	62511	65151	104	30257	30917	102
00EY	Blackpool	73520	89605	121	48550	53824	110
30UD	Burnley	41539	48733	117	38884	43037	110
30UE	Chorley	40214	47788	118	22242	23843	107
30UF	Fylde	13517	21704	160	27921	35348	126
30UG	Hyndburn	28316	33712	119	29587	35249	119
30UH	Lancaster	33553	33682	100	28541	35398	124
30UJ	Pendle	46257	54662	118	38183	40225	105
30UL	Ribble Valley	34985	39845	113	20369	24062	118
30UM	Rossendale	65485	77285	118	24291	27277	112
30UP	West Lancashire	55879	68720	123	36356	44867	123
30UN	South Ribble	34989	41537	118	46793	49135	105
30UQ	Wyre	25945	31928	123	49753	56960	114
	Total	590723	694468	117	514236	580246	112
Alternative LEPs							
LEP03a	Leeds City Region						
00DA	Leeds	347375	430461	123	343020	404163	117
00CX	Bradford	197308	244675	124	194014	222978	114
00CY	Calderdale	82896	89422	107	82326	85906	104
36UB	Craven	39284	45710	116	77332	81889	105
36UD	Harrogate	28116	37818	134	61628	64957	105
00CZ	Kirklees	174915	206216	117	173453	196737	113
00DB	Wakefield	146600	170535	116	145827	166450	114
	Total	1016496	1224839	120	1077602	1223082	113
LEP04a	Sheffield City Region						
00CG	Sheffield	240633	284415	118	237383	266686	112
00CC	Barnsley	98554	109994	111	97964	106483	108
00CE	Doncaster	124980	135187	108	124290	132325	106
00CF	Rotherham	105064	111919	106	104567	109631	104
	Total	569232	641517	112	564207	615127	109

Notes: LEP= Local Enterprise Partnership. Alternative LEPs = LEPs minus overlaps. Time series: 2011 = 100.



N8 is a partnership of the eight most research-intensive universities in the North of England: Durham, Lancaster, Leeds, Liverpool, Manchester, Newcastle, Sheffield and York.

