steer davies gleave

User Insight into Pan Northern Travel

Final Report
July 2018

Transport for the North

Our ref: 23271901

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Summary

Gaining insight into the travel behaviour and motivations of individuals – and the decisions that people make about where they live and work and how and where they travel – is a starting point to better understanding future travel patterns within the North.

Transport for the North (TfN) is currently developing the case for a series of major investment programmes, including Northern Powerhouse Rail (NPR) and the Strategic Development Corridors (SDCs), which have the potential to facilitate and stimulate new travel patterns, as individuals adapt their behaviour to take advantage of new opportunities. Different groups of people will react differently to these opportunities, dependent on their skills, employment and life stage, amongst other things. Defining a set of user segments and understanding the behaviours and motivations of these groups will therefore help TfN to develop the most compelling cases for intervention.

This report therefore develops the evidence base regarding how different groups of people within the North of England currently travel, based on extensive data analysis and literature review, which has informed the development of a series of distinct user segments of different population groups within the North.

Northern Travel Patterns

National Travel Survey (NTS) data provides extensive insight into the travel patterns of people within the North, how these differ to those elsewhere in the country, and differences in travel behaviour by socio-demographic group. Broadly:

- individuals within the North exhibit similar behaviour to those in the rest of England excluding London, in terms of total trips and distance travelled;
- car is the dominant mode within the North, similar to the rest of England excluding London;
- rail patronage has more than doubled over the past twenty years, with the increase being greater in the North than the rest of Great Britain. Rail now accounts for 1.1% of trips and 6.7% of distance travelled in the North

Additionally, there are strong relationships between key socio-demographic indicators and travel behaviour. Trips and distance travelled increase with age (until age 50), and the presence of children in the household is associated with an uplift in trip making. Those in higher occupational groups, those with graduate-level skills and those in higher-level income bands travel greater distances than average – especially by rail – and have a greater propensity to make long-distance trips. An individual in North within the lowest income quintile travels 216 miles by rail on average – less than a quarter of the average distance travelled by an individual in the highest income quintile (933 miles).

Trends in Trip Patterns

While trip rates – the number of journeys made per person per year – have fallen since the mid-1990s, the total time spent travelling has been broadly constant over the past 35 years; Metz (2010) argues that individuals have traded increased incomes for the ability to travel faster and further than before, accounting for the long-term increases in total distance travelled per person.

Notably, car mileage per person has fallen in recent years, a phenomenon referred to as 'peak car' by Goodwin (2012). Both per-person car trips and distance travelled by car fell by 13% between 2002 and 2016 (DfT, 2017), argued to be a result of several factors:

- the advent and increasing popularity of telecommunications and the Internet
- changing demographics, such as delayed parenthood or full-time employment
- societal 'end of the love affair' with the car
- declining traffic speeds and worsening congestion, and/or modal shift to rail
- increased cost of car travel (especially insurance) for young people

There is continued debate regarding the root causes of these trends, and whether they can be expected to continue in future. Underlying factors include:

- a long-term decline in commuting trips as a result of changing working habits and an increase in 'trip-chaining' (DfT, 2017)
- declines in per person car mileage, especially amongst young men, likely linked to 'delayed adulthood' and the high cost of insurance (Chatterjee et al., 2018)
- a decline in company car mileage, probably a result of changes in vehicle taxation (Le Vine et al, 2010).

Conversely, rail trips have grown strongly, with rail patronage more than doubling over the past 20 years, with the greatest increases being outside of the core London commuting market (Le Vine et al (2010)).

User Segmentation

User segmentation forms a powerful tool to better understand the behaviours and motivations of *specific* groups of people, in order to inform transport policy and target transport interventions and policy more effectively. Informed by our data analysis and literature review, we developed a Northern user segmentation based on the ONS's Output Area Classification, complemented by data regarding travel behaviour from the National Travel Survey and the 2011 Census.

Nine segments were developed, as outlined below:

Segment	% of the North's population	Key demographics	Key property/geography characteristics	Key travel characteristics
Rural Residents	8%	Older, married, better educated. Working in primary industries.	Rural, less dense, detached houses	High car ownership and car commuting
Small Town Suburbs	13%	Older and without children.	Outside metropolitan areas. Detached/semis majority owner occupied.	Travel more, travel further, less public transport. Greater car ownership & travel further by car. Significantly less bus.
Urbanites	15%	Employed full-time in middle occupational roles. Families with children & couples with no children.	Smaller towns and outer fringes of larger cities. Semis and terraces, majority owner occupied.	Travel more, travel more by rail, less bus. Own car and greater propensity to commute by rail

Hard Pressed Living 1	13%	Families with children. High percentage with no qualifications. Working in manufacturing.	Smaller towns and cities outside metro areas. Terraces houses and semis - around half rented.	Travel less, shorter journeys, considerably less by rail but much higher bus. Greater car ownership.
Constrained City Dwellers	9%	High percentage singles, divorced or widowed. High percentage with no qualifications, unemployed and long-term sick.	Densely populated, large towns and cities. High percentage social rented & flats.	Fewest trips, shortest distance, much more bus, much lower rail. More than 50% no car. High walking/bus commute
Inner City Cosmopolitans	3%	~50% students. Young, well educated, single.	Dense inner cities, private rented flats.	Significantly above average rail. Low car usage and ownership - almost 50% no car.
Multiculturals	11%	High percentage families with children. Younger with more children in households.	Larger towns and cities. Around half rented.	Travel less, shorter journeys. Much higher bus. Almost 50% no car.
Metro Suburbs	13%	Older, employed in high occupations. More likely to be employed full-time and aged 45-59.	Outer suburban areas of metropolitan areas. Majority owner occupied. Semis/detached.	Travel more & further by car and rail. Much lower bus. Car ownership higher. More likely to have 1-2 cars in household and travel to work by car.
Hard Pressed Living 2	15%	Families with children. Lower occupations in public admin & education. Relatively high percentage no qualifications.	Inner suburbs and small towns within metropolitan areas. Approximately half owner-occupied, living in terraces or semis.	Travel less and shorter distances. Slightly higher rail and much higher bus. ~30% no car. Commute more likely by bus & rail

Future Research

Our user segments have been created using Census data (specifically the Output Area Classification/OAC) and the National Travel Survey, both of which provide a solid foundation in terms of socio-demographics and travel behaviour. There are two broad questions to consider when thinking about future research:

1. How will the travel behaviour of people within each segment change over time, both in respect to changes in transport supply and the provision of transport services, and in response to exogenous changes?
2. How will the size of each segment change over time, again with respect to exogenous and transport stimuli?

Travel Behaviour

As the TfN User Segments are based upon the OAC geodemographic classification system it is possible to add further data, based on additional primary research, in order to add extra layers of segment profiling. This could be useful for exploring issues such as:

- how different segments are responding to emerging technologies and transport options such as automated vehicles, and how quickly each segment embraces change;
- the relative priority people in different segments place on factors such as saving money, Improving health and wellbeing or saving time;
- the relationship between the User Segments and Northern Powerhouse Independent Economic Review (NPIER) capabilities.

This could involve either a quantitative or qualitative approach, the former involving online or telephone surveys to better understand the relative potential of different groups to embrace new transport options such as car clubs, and the latter the use of focus groups to better understand wider societal changes such as potential responses to autonomous vehicles.

Segment Size and Distribution

Each of the segments is expected to grow and evolve in the future, changing in response to endogenous factors (such as lifecycle factors as people get older, co-habit or have children), exogenous factors (such as economic growth) and transport stimuli. Of particular interest could be the response of the segments to a 'Transformational' growth scenario (as outlined in the NPIER), or in response to new transport infrastructure currently being developed by TfN.

Our approach has involved a simple illustrative estimate of how the population of the user segments could change in response to one factor – the future Northern economy, and a change in the occupational split of the workforce. Future work could develop a population model for the North that can respond to a wide range of endogenous, exogenous and transport variables.

1 Introduction

Background

1.1 In June 2016, Transport for the North (TfN) published the Northern Powerhouse Independent Economic Review (NPIER), which established:

- a detailed understanding of the causes of the North's 'productivity gap' compared to the rest of the UK;
- the North's economic and sectoral strengths, and areas of competitive advantage; and
- the future prospects and opportunities for growth in the North.

1.2 Overall, the NPIER demonstrated the potential for the Northern economy to become more productive, with £97bn in additional GVA and 850,000 additional jobs by 2050, compared to a 'business as usual' approach, subject to investment in skills, innovation and transport connectivity.

1.3 Such a 'transformed' future for the North would be expected to lead to far-reaching changes in transport demand and travel patterns. In January 2018, TfN began consultation on its draft Strategic Transport Plan (STP), which identifies a set of broadly-defined transport initiatives with the goal of supporting and facilitating the transformational growth ambitions outlined in the NPIER.

1.4 TfN is currently developing a series of major investment programmes, as outlined within the STP, including:

- Northern Powerhouse Rail (NPR): a major strategic rail programme to transform connectivity and capacity of journeys between the key economic centres of the North;
- Strategic Development Corridors (SDCs): a multi-modal transport investment programme to support transformational growth by better connecting prime economic capability assets and important economic centres; and
- Integrated and Smart Travel (IST): a roll-out of a range of technologies to enhance the traveller experience and reduce the generalised cost of travel within the North.

User Insight

1.5 Integral to developing the most compelling case for these programmes is gaining insight into individual travel behaviour and motivations – the decisions that people make about where they live and work, how and where they travel, and the economic opportunities open to them. Building this insight into the assessment of current travel patterns and forecasting of future travel trends will support TfN in understanding the travel demands of different groups within

the North – and better understand which socio-demographic groups and business sectors will benefit from TfN investments.

1.6 Building the most compelling economic case for TfN planned interventions will therefore rely on analysis that recognises the potential for significant changes in transport connectivity to transform the economic geography of the North. Transformational transport infrastructure – such as Northern Powerhouse Rail – will facilitate and stimulate new travel patterns, as individuals adapt their behaviour to take advantage of enhanced connectivity to access new employment opportunities, for example.

1.7 Improved trans-Pennine connectivity, for example, could be expected to result in skilled workers travelling further distances outside of their city region to take advantage of employment opportunities. Firms would hence benefit from access to larger and more specialist labour markets, supporting productivity growth, together with increased economic agglomeration.

1.8 However, different groups of people will react differently to these opportunities, dependent on their skills, employment and life stage. People's trip making patterns and motivations are diverse, vary throughout their lives and depend on a range of socio-economic factors, as well as their location and the transport choices available to them. Data indicates that those in with a higher occupational status and on higher incomes typically travel further, especially to work, whilst car ownership tends to increase with both income and age. Such groups could be expected, for example, to benefit most from the improved employment accessibility delivered by NPR.

1.9 Whilst at an individual level such patterns may be clear, when aggregated complex travel patterns can emerge, which at first glance are not always obvious or easy to understand. Different markets for travel – such as local commuting into a town centre or longer-distance rail commuting – are likely to experience very different growth trends over the coming years, related to both the behaviours of the groups of people who make those trips, together with the extent to which the population of these groups is changing within the North, as well as the changing nature of the transport options available to them. Better understanding these factors is therefore key to understanding potential future travel patterns within the North.

Study Aims and Approach

1.10 This study therefore aims to develop the evidence into the travel behaviour of different groups of people within the North, with a specific focus on the travel behaviour of different socio-demographic groups in the North. It consists of four broad stages:

- undertaking a **literature review** and bespoke **data analysis** exercise to maximise the existing evidence base regarding the travel behaviour of individuals within the North, including:
  - how do people of different socio-demographic backgrounds, industries and occupational classifications currently travel across the North?
  - what are the recent trends in travel behaviour, and how could travel behaviours be expected to change in the future for certain groups? (such as decreasing car ownership amongst young people)
  - What are the links between improved transport connectivity and travel behaviour, focusing on how changes in travel behaviour amongst certain groups (e.g. increased

trans-Pennine commuting) could generate larger labour market catchments and economic agglomeration;
    - gaining an understanding of existing user segmentation methods (such as those developed for TfGM and TfL) and their strengths and weaknesses.
- developing a comprehensive **user segmentation** which concisely captures the travel behaviours of different groups of people within the North and their socio-demographic characteristics through a set of bespoke **pen-portraits**;
- undertaking further data analysis to explore the travel behaviour of these groups, including their commuting patterns, how these relate to travel patterns within the Northern Powerhouse Independent Economic review (NPIER) capabilities, and potential growth and evolution of these capabilities in a 'transformational' NPIER scenario;
- developing a set of recommendations for **further research**, with a particular focus on the motivations of individual within the user segments to change their travel behaviour, especially in response to new infrastructure.

Structure of this Document

1.11 This report is hence structured as follows:

- **Chapter 2** sets out the core findings from our analysis of existing travel patterns within the UK and the North, and the relationships between an individual's socio-demographic characteristics (such as their income or life stage) and their travel behaviour;
- **Chapter 3** describes our literature review exploring the existing evidence base regarding trends in travel behaviour within the UK and existing approaches to user segmentation, and the linkages between transport and economic growth;
- **Chapter 4** discusses the wider linkages between transport, the economy and travel behaviour, with a focus on the NPIER capabilities;
- **Chapter 5** describes the methodology used to develop a segmentation of the North's population, presents a summary persona (or pen-portrait) for each segment, together with future detail on the employment within each user segment; and
- **Chapter 6** concludes the study, and provides thoughts for future research.

2 Data Analysis

Introduction

2.1 This chapter summaries bespoke analysis of Department for Transport (DfT) Transport Statistics, Census, Office of Road and Rail (ORR) and National Travel Survey (NTS) data. It identifies **current travel patterns** within the North, London and the UK, focusing on understanding the **differences and similarities** in travel patterns across all modes between **different socio-demographic** groups within the North. It includes two sections:

- 'Headline Trends' identifies the broad trip patterns within Great Britain and the North (subject to regional data availability) in terms of total trips, trip distances, trip purposes, commuting trips and rail trips, based on a variety of data sources;
- 'Northern Trip Making Patterns' identifies key socio-demographic drivers in differences in travel behaviour within the North, such as income and life stage, based on bespoke analysis of NTS data.

2.2 This analysis guided the resultant literature review, and ultimately informed the user segmentation approach outlined in Chapter 5.

Note on the National Travel Survey

Our analysis has primarily been undertaken using NTS data, an annual household survey designed to monitor long-term trends in personal travel and inform transport policy. It is the primary source of data on personal travel patterns within England, derived from face-to-face interviews and travel diaries of 16,000 individuals in England only (Wales, Scotland and Northern Ireland are not included in the survey), of which approximately 7,000 of the respondents are located within the North of England. Commissioned by the DfT since the early 1970s, it provides a continuous record of trends in travel behaviour such as total trips, journey distances and times, modes used and journey purposes, all linked to socio-demographic characteristics such as income, occupation, household structure or age, together with a geographic disaggregation.

Our analysis (except where stated) has been undertaken for a three-year period from 2014 to 2016 using R, ensuring that the sample size for each aspect of our analysis is sufficient (at least > 150) to identify patterns and trends robustly. The sample size refers to the total number of individuals surveyed within each stated demographic within a specific geography (e.g. single parent families within the North) upon which the analysis of travel behaviour is based.

'Trips' in the NTS refer to a one-way journey with a single main purpose; 'trip chaining', whereby several trips with multiple purposes are 'joined' together are considered as multiple trips and not as a single trip. For example, a person taking their child to school whilst travelling to work makes two trips: the first an 'educational escort' trip (from home to school) and the second an 'other work' trip (from school to work). Commuting trips in the NTS are defined as those starting at home and finishing at work or vice versa; a trip from a school to a workplace, for example, is *not* classified in the NTS as a commuting trip.

Our analysis has also been undertaken using the weighting process recommended by the DfT (and used in developing all official NTS derived statistics). This applies a household, trip and/or individual weighting to ensure that when trips are aggregated for specific groups of households or individuals, they fully reflect the behaviours of the overall group. For example, individuals have a tendency to underestimate short walk trips (e.g. a half-mile walk to a local shop) in their travel diary so short walk trips are weighted upwards in any analysis undertaken. A different household weighting is applied to ensure that the proportion of households within a given income bracket (for example) in any analysis reflects that of the wider UK population.

To complement the NTS analysis, additional analysis has also been undertaken of published DfT Transport Statistics Great Britain (TSGB)[1], together with ORR data and Census Travel-to-Work data. These provide a reliable overview of travel patterns and current trends, included to identify 'headline' trends, but do not provide disaggregation of travel behaviour by socio-demographic status and only a limited disaggregation by geography. Only the NTS provides a detailed breakdown of travel behaviour by socio-demographic status, and in any case it forms the basis for much of TSGB.

Headline Trends

Total Distance Travelled

2.3 DfT's Transport Statistics Great Britain (TSGB) indicate that 801 billion passenger kilometres were travelled within Great Britain in 2016, the largest volume ever recorded, and an increase of 11% from 719 billion in 1996.

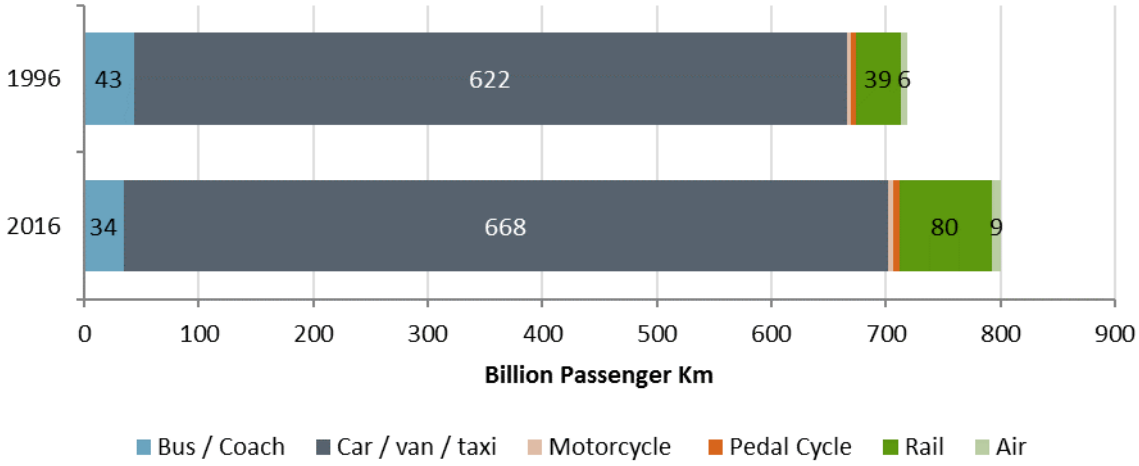
2.4 Figure 2.1 breaks down passenger kilometres by mode for 2016 and 1996. Travel by motorised private modes (car/van/taxi/motorcycle) accounts for a substantial majority of total distance travelled in both 1996 and 2016. Whilst the total distance travelled by private motorised modes has increased by 7% during the period, the percentage of total distance by private motorised modes has fallen from 87% to 83% over the 20-year period.

2.5 Between 1996 and 2016 the distance travelled by rail has increased substantially, more than doubling from 39 to 80 billion kilometres. Rail's share of the distance travelled has increased

[1] TSGB forms the main publication of statistical trends in the UK transport sector, and is classified by the ONS as National Statistics. It provides a robust assessment of current travel trends within Great Britain as a whole, with a limited breakdown by region, and is drawn from a range of sources including the NTS, ONS and ORR.

from 5% to 10% of passenger kilometres. However, it should be stressed that since rail trips are typically longer in distance than other modes, they only account for 2% of all trips in 2016.

Figure 2.1: Passenger Kilometres by Mode, Transport Statistics Great Britain



Data Source: Transport Statistics Great Britain

Nationally, total distance travelled has increased over the past twenty years.

Total mileage by private modes (largely car) has increased, but accounts for a smaller proportion of total mileage. Mileage by rail has more than doubled since 1996.

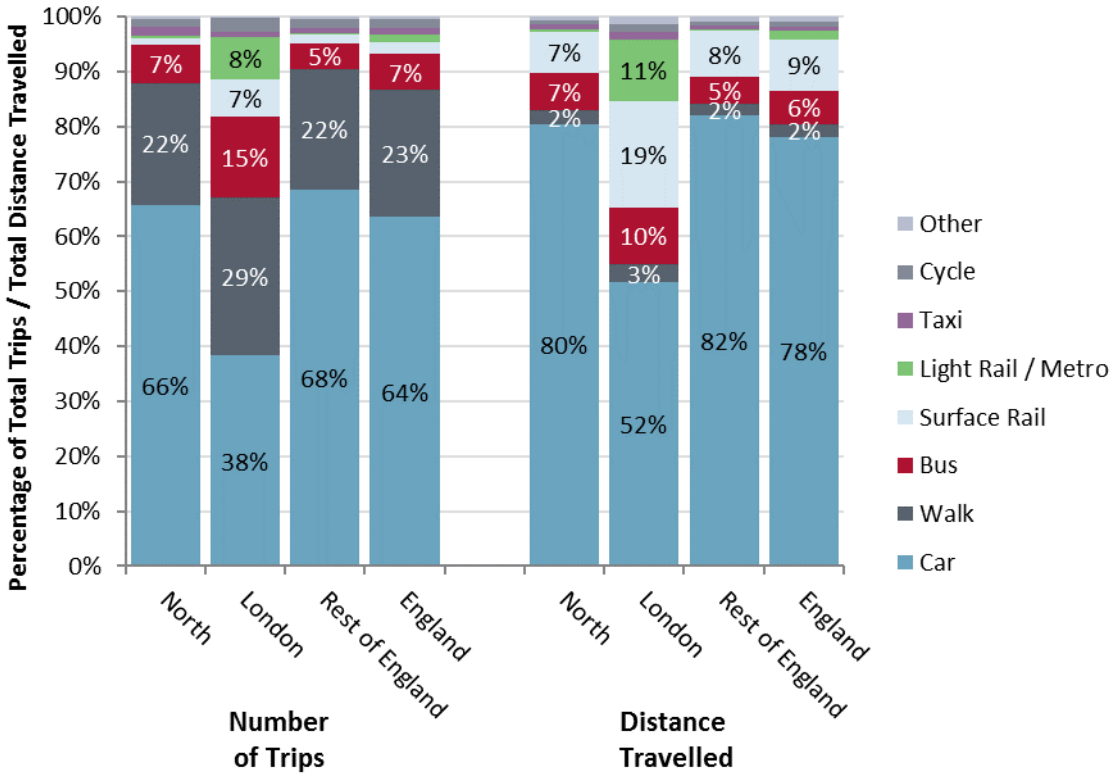
Total Trips

2.6 National Travel Survey (NTS) data indicates that nationally and on average, over the 2014 – 2016 period, each person in England makes 931 trips and travels 6,553 miles per year. Within the North, the average person makes 946 trips and travels 6,305 miles per year. Both of these figures are slightly lower than the rest of England (962 trips and 7,207 miles), but considerably greater than within London (795 trips and 4,668 miles).

2.7 Figure 2.2 shows the modal share of trips, in terms of both total trips (left) and total distance travelled (right). Data is shown for the North[2], London, England and the Rest of England (i.e. excluding the North and London). Consistent with the TSGB figures, private car is the dominant mode, accounting for 66% of all trips and 80% of distance travelled within North. This is comparable to the rest of the country and greater than within London. Rail accounts for 1.1% of all trips in the North – less than the rest of England average of 1.7% and the London average of 6.7% - yet rail accounts for 7.4% of total distance, reflecting the tendency for rail trips to be on average longer in distance than trip by other modes.

[2] In this context, the North is defined is the North East, North West and Yorkshire and Humber, with these regions defined as per all other Government statistics.

Figure 2.2: Modal share of total trips, National Travel Survey, 2014-16



Data Source: National Travel Survey, 2014-16

Car is the dominant mode of travel within the North, similar to the rest of England outside London. Although rail only accounts for a small proportion of trips in the North, these trips are significantly longer than average.

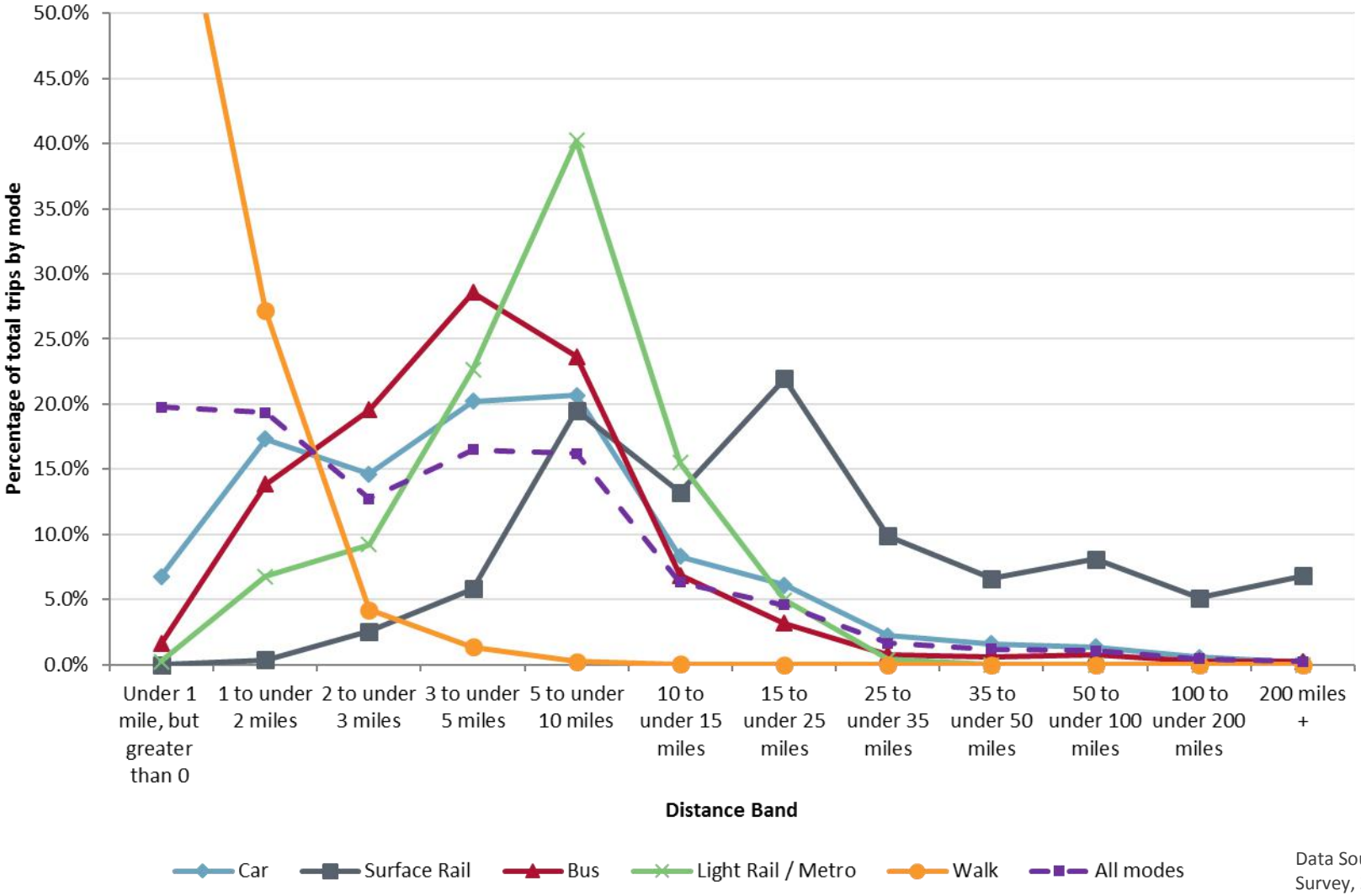
Bus travel, walking and cycling within the North is broadly similar to the England average, although use of light rail/metro is significant less than the England average.

Usage of rail, light rail/metro (which includes London Underground, as well as DLR) and bus is significantly greater in London than both the North and the rest of England.

2.8 Figure 2.3 shows the percentage of trips by each mode *in the North* within given distance bands. Longer-distance trips, reflecting TfN's role in developing the case for pan-Northern strategic transport improvements, form an area of key interest for this study.

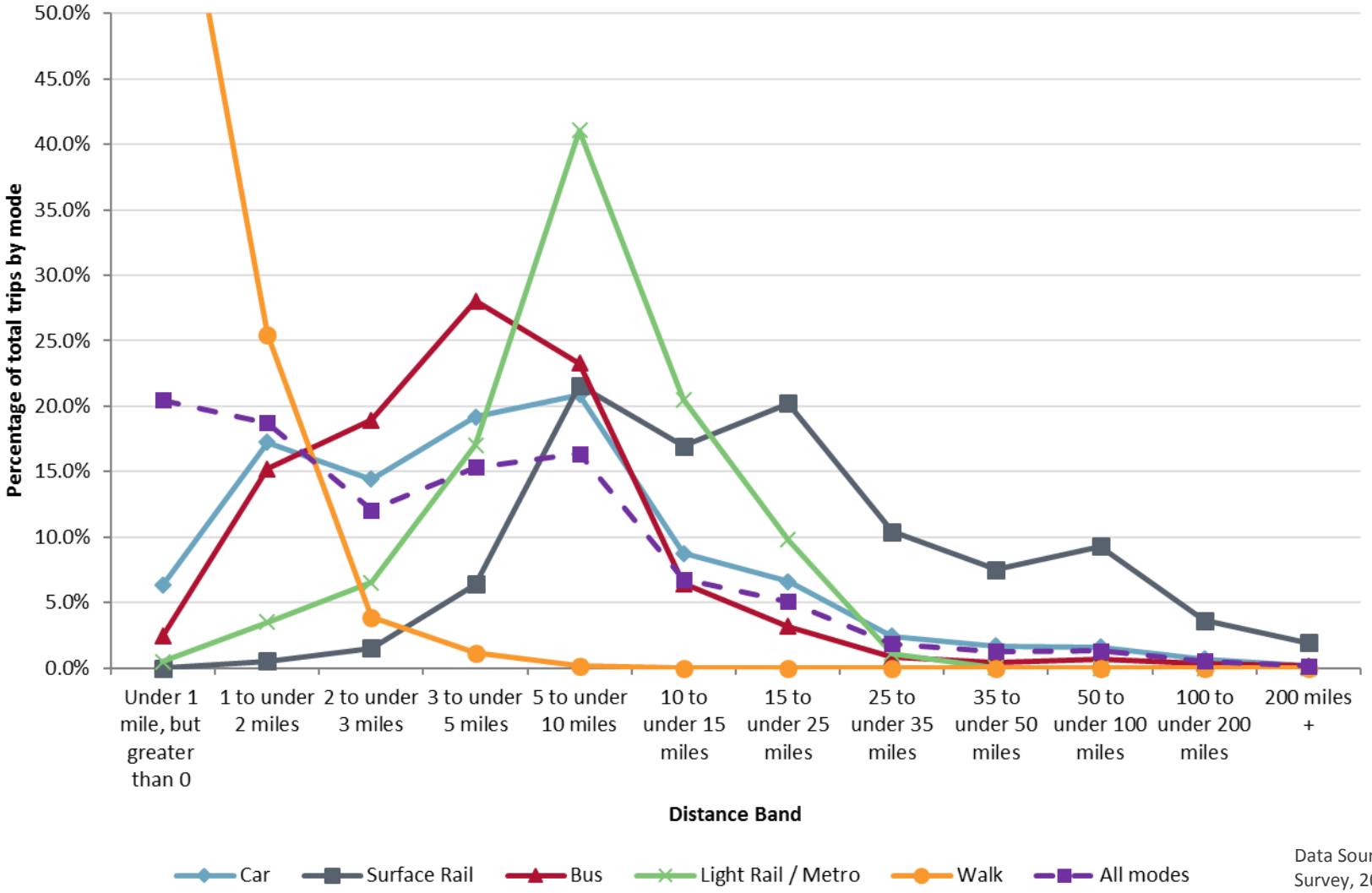
2.9 Walk trips are (unsurprisingly) short in distance, with 94% less than two miles. Both bus and car trips are typically middle-distance in length, with 86% and 73% between one and ten miles respectively. Rail trips are longer, with 72% are greater than ten miles in distance, compared to just 20% of car trips. Figure 2.4 shows the percentage of trips by each mode *in England* by distance; comparing the two graphs indicates the typical distance of trips by mode is similar within both England and the North.

Figure 2.3: Total Trips by Distance Band in the *North*, National Travel Survey, 2014-16



Data Source: National Travel Survey, 2014-16

Figure 2.4: Total Trips by Distance Band in *England*, National Travel Survey, 2014-16



Data Source: National Travel Survey, 2014-16

2.10 Figure 2.5 shows the modal split of journeys of different distance bands within both England and the North. Walk trips, unsurprisingly, account for a large (75%+) share of trips less than one mile in length within both England and the North. For all trips greater than one mile in length, private car dominates, and accounts for more than 50% of trips.

2.11 Bus usage is greatest for trips between two and ten miles in length, where it accounts for between 9% and 12% of trips within both England and the North. Rail usage is greatest for the longest trips in the North: the mode share of rail increases from 1% of trips in the North between 5 and 10 miles to 13% of trips of 100 – 200 miles and 34% of trips greater than 200 miles in length.

2.12 Notably, there are significant differences in the rail mode share within different distance bands between the North and England. While rail usage in the North accounts for 1.1% of trips compared to 1.7% for the rest of England and 2.2% within England overall, rail usage within the North is especially underrepresented within shorter-distance trips. Rail accounts for 2% of trips in the North between 10 and 15 miles (compared to 6% in England), 5% of trips between 15 and 25 miles (compared to 9%) and 7% of trips between 25 and 35 miles (compared to 12%).

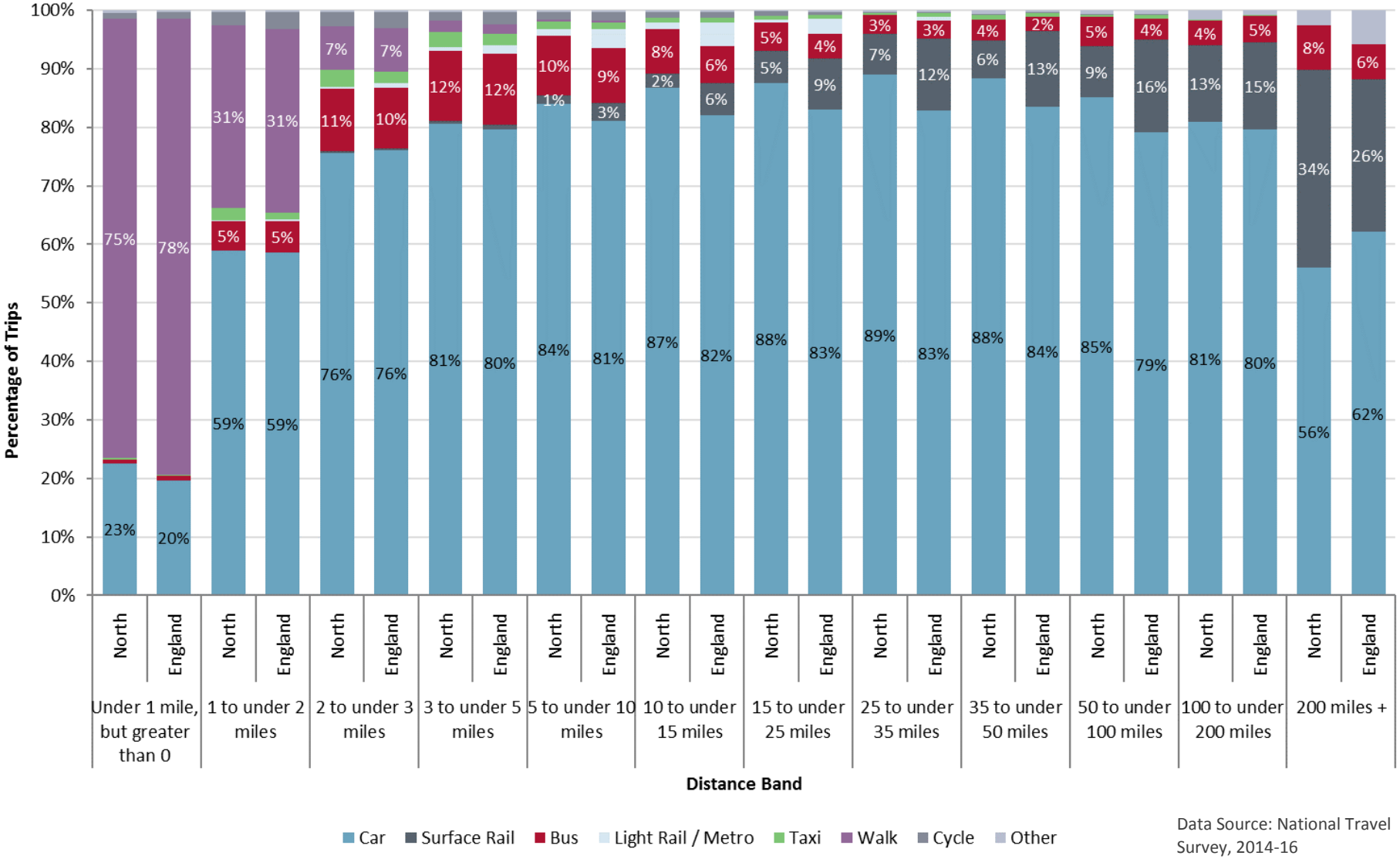
2.13 Longer-distance commuting flows, including some within city regions, are typically within these distance bands (Manchester to Liverpool, for example, is approximately 34 miles), and hence rail commuting accounts for a smaller proportion of commuting journeys than elsewhere in England. Although rail has a greater mode share across longer-distance journeys – indeed rail mode share for 200+ mile journeys is greater the England average – these journeys account for a far smaller proportion of the travel market.

Car is the dominant mode across all distance bands, with the exception of trips less than one mile in length. These trips are typically middle-distance in length, with 73% of car trips in the North between one and ten miles in length.

Rail trips are typically longer-distance compared to other modes - 55% of rail trips greater than 10 miles in length. Rail's mode share increases with trip distance..

Walk trips (unsurprisingly) are short in distance, with 94% less than two miles, and bus mode share is greatest for trips between two and ten miles in length.

Figure 2.5: Percentage of Trips by Distance Band in the North and England, National Travel Survey, 2014-16

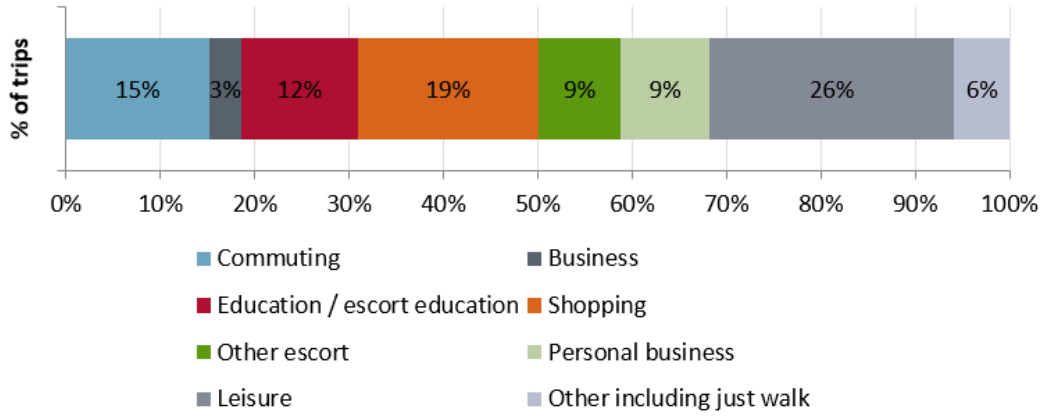


Data Source: National Travel Survey, 2014-16

Trip Purpose

2.14 Figure 2.6 shows the breakdown of all trips in England by purpose, as sourced from Transport Statistics Great Britain, itself based on DfT analysis of NTS data. Trips are split across a range of purposes, with commuting, leisure and shopping trips collectively accounting for 60% of all trips.

Figure 2.6: Trips by Journey Purpose, Transport Statistics Great Britain, 2016



Data Source: Transport Statistics Great Britain / National Travel Survey

2.15 Modal share of trips varies by journey purpose. After education and associated 'escort' trips (largely those to and from school over short distances), commuting and shopping trips have the lowest mode share by private car, at both 64%. Rail mode share is greatest for commuting and business trips, with a mode share of 7% and 6% respectively, compared to 2% for all trips. These trends are common to both England and the North.

Commuting from home to work accounts for 15% of all trips, and business trips a further 3%.

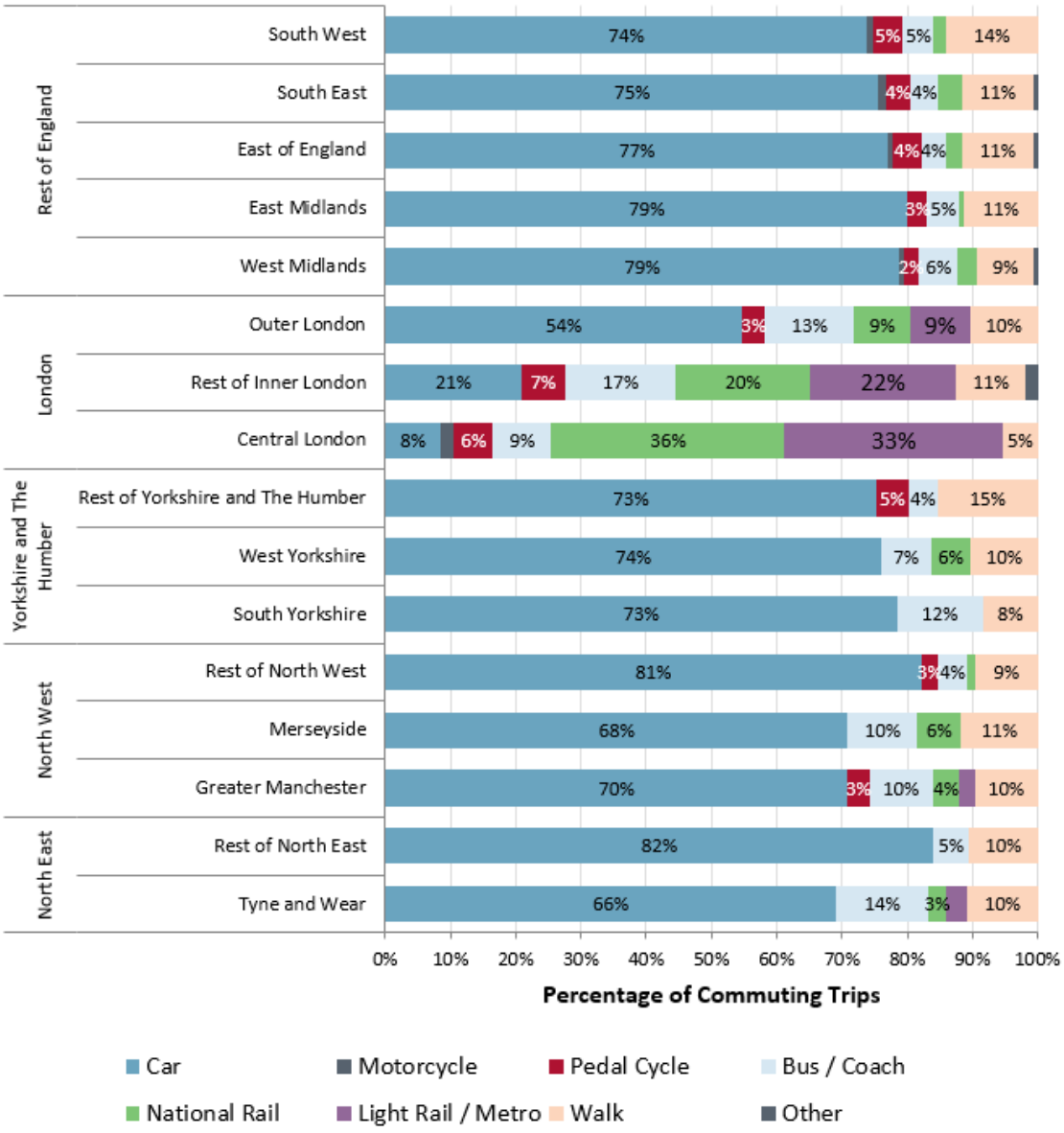
Whilst only a minority of trips, these journeys facilitate economic activity and because they tend to be concentrated both temporally and spatially experience the adverse impacts of limited network capacity and associated overcrowding and congestion.

Commuting Trips

2.16 Commuting trips represent 15% of all trips made within Great Britain. Figure 2.7 sets out the method of travel to work by the location of the workplace in question, as sourced from Transport Statistics Great Britain and based on Labour Force Survey data.

2.17 Outside of London, car is the dominant commuting mode, accounting for between 70% and 82% of journeys to work in the geographic areas analysed, but with metropolitan areas typically at the lower end of the range. Within metropolitan areas in the North, mode share for surface rail and light rail/metro combined is 6 to 7%, somewhat less than the 44% observed within London (69% within Central London). Walking and bus travel each account for between 10% and 15% of commuting trips, dependent on the area in question.

Figure 2.7: Usual Method of Travel to Work by region of workplace, Transport Statistics Great Britain, Oct – Dec 2016



Data Source: Transport Statistics Great Britain / Labour Force Survey

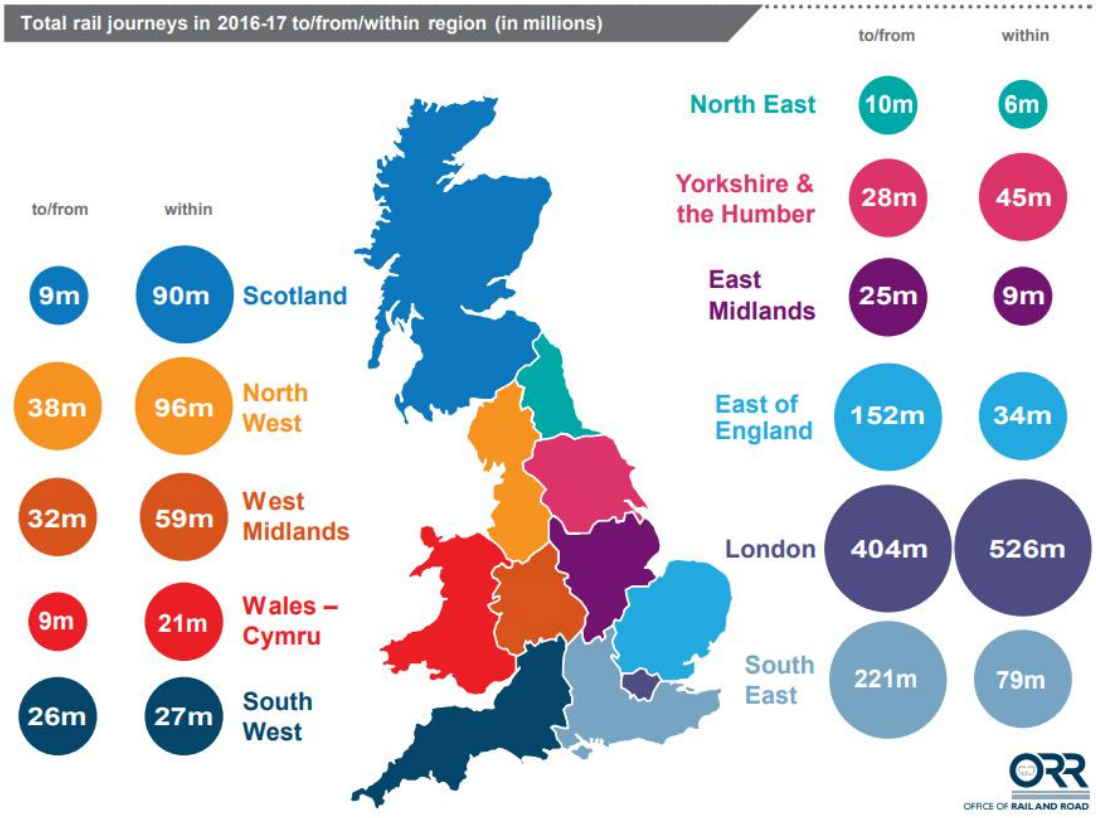
Car is the dominant commuting mode everywhere within Great Britain outside of London.

Rail mode share for commuting trips within Northern metropolitan areas is comparable to the national average, although it is less within the rest of the North.

Rail Patronage

2.18 As set out above, rail accounts for 1.1% of total trips within the North and 7.4% of total distance travelled – figures less than the rest of England, and substantially less than London. Figure 2.8 – sourced directly from the Office for Rail and Road – highlights the variation in the use of rail within Great Britain: 147 million rail trips are made annually *within* the North, compared to 526 million *within* London, despite the 15 million population of the North being nearly twice the 8 million of London. Rail usage is less on a per person basis than within London, and to a lesser extent the rest of Great Britain.

Figure 2.8: Total Rail Journeys in 2016-17, Office for Rail and Road



Source: Office of Rail and Road, based on Origin-Destination Matrix data (derived from ticket sales)

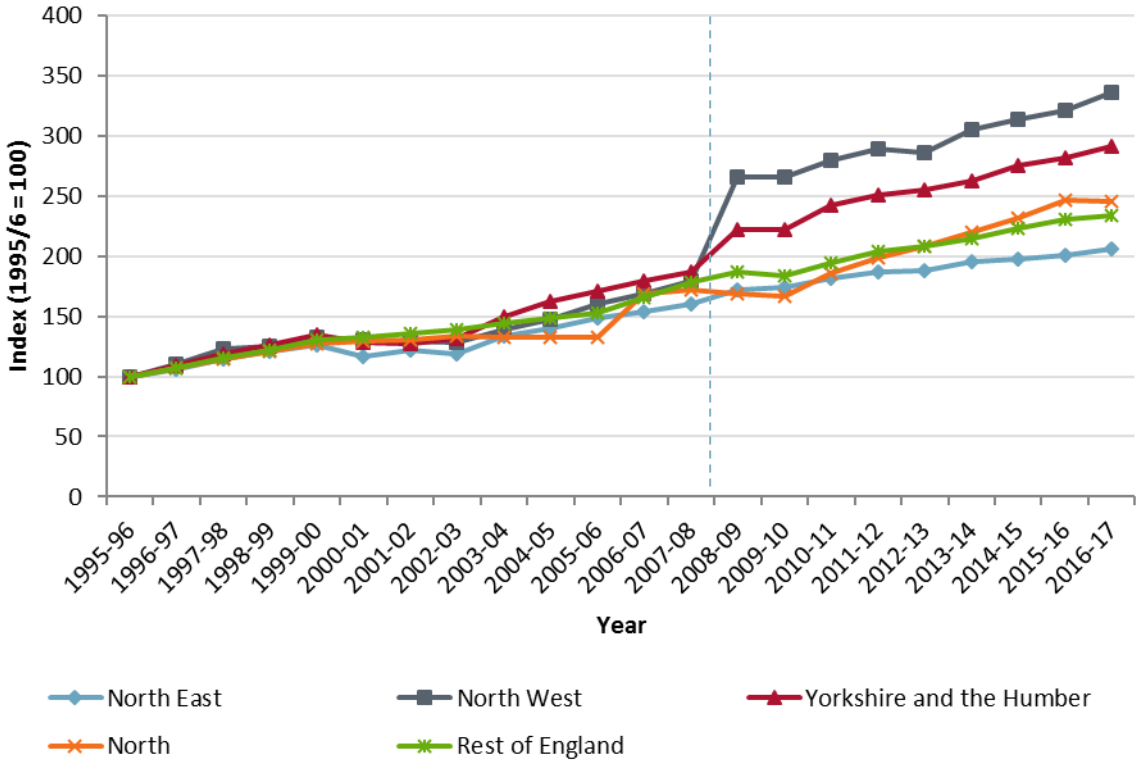
2.19 Figure 2.9 shows the growth in rail journeys over the past twenty years. Within Great Britain, rail patronage has more than doubled over this period, from 589 million trips in 1995/96 to 1.470 billion in 2016/17[3], and growth has been greater within the North[4]. It should be noted that the slower rate of growth within the North East (especially within the mid/late-2000s) is

[3] Note that this figure is not the total of the numbers in Figure 2.8, since in the Figure journeys to/from regions are 'counted' twice (once at the origin region and once at the destination)

[4] A proportion of this increase is accounted for by a methodological change pertaining to journeys within Passenger Transport Executive areas ('PTE-areas') in 2008/9. The rate of growth of rail trips in the North before and after the change is similar to the rate of growth in the rest of England.

partly a result of the extension of the Tyne-and-Wear Metro, which abstracted passenger flows from conventional to light rail.

Figure 2.9: Regional Rail Journeys, 1995/6 to 2016-17



Data Source: Office for Rail and Road, based on Origin-Destination Matrix data (derived from ticket sales)

2.20 Recent 2016/17 figures have seen rail growth in the North accelerating ahead of the rest of the country. Total passenger journeys within Great Britain fell by 0.4% between 2015/16 and 2016/17, largely driven by a reduction of 2.1% and 5.3% in rail journeys solely within London and the South East respectively. In contrast, passenger journeys to/from and within the North increased by 4.1% over the same period.

At the national scale, there has been a recent plateauing of national growth in rail journeys – with reductions in London and the South East, but continued increases in the North.

Over the last 20 years and as with the rest of the country, rail patronage has grown strongly in the North.

However, despite strong growth in rail usage in the North, people in the North make fewer rail trips than those elsewhere in England, especially within London.

Northern Trip Making Patterns

Age, Household Structure and Life Stage

2.21 An individual's travel behaviour varies throughout a person's life. Key events such as having children or entering full-time employment are associated with distinctive changes in travel patterns, such as the need to make additional educational 'escort' trips and commuting trips respectively.

2.22 Figure 2.10 and 2.11 present the total number of trips per year per person by age distribution and household structure. There are clear differences in travel behaviour in different age cohorts, with individuals within the North making more trips as their age increases until middle-age (40-49 years), before the total number of trips made falls towards retirement (age 60+). Such an effect is similar to that observed within the Rest of England and London.

2.23 Similar patterns can be observed in total distance travelled per year, and total time spent travelling, with an individual in the North aged 17-20 travelling, on average, 5,197 miles per year compared to an individual aged 40-49 travelling 8,434 miles per year. This is likely a result of greater household income, the presence of children in the family, a greater propensity to be in full-time employment and in a higher occupational status.

2.24 Having children is associated with increased trip-making on a *per person* basis, likely due to the requirement for additional education trips and associated 'escort' trips for parents taking children to/from school or nursery or other activities[5]. Figure 2.11 shows how the presence of children in the household is associated with increased trip-making, with a typical family of 2 adults and 1 or more children making the highest number of trips *per individual*. There is a correlation with the age effect here - families with children in the household are most likely to concentrated within the middle-age brackets (30-39 and 40-49 years).

2.25 However, the relationship between total distance travelled and children in the household is more muted, suggesting that additional trips (likely education) are short in distance. Other factors – such as income – are more relevant in understanding total distance patterns.

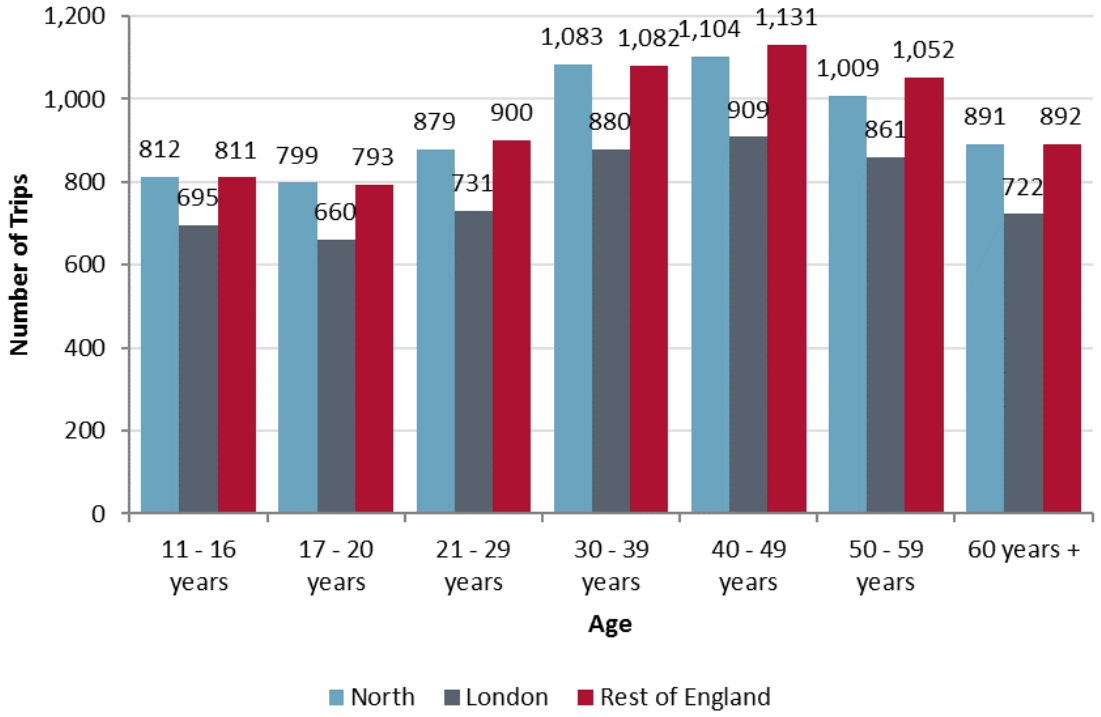
Total trips and total distance travelled increase with age up until retirement.

Households with children make a large number of additional trips, although only a small increase in total distance travelled compared with an average household.

These effects are observed across the North, London and the rest of England – indicating that they are common to all areas.

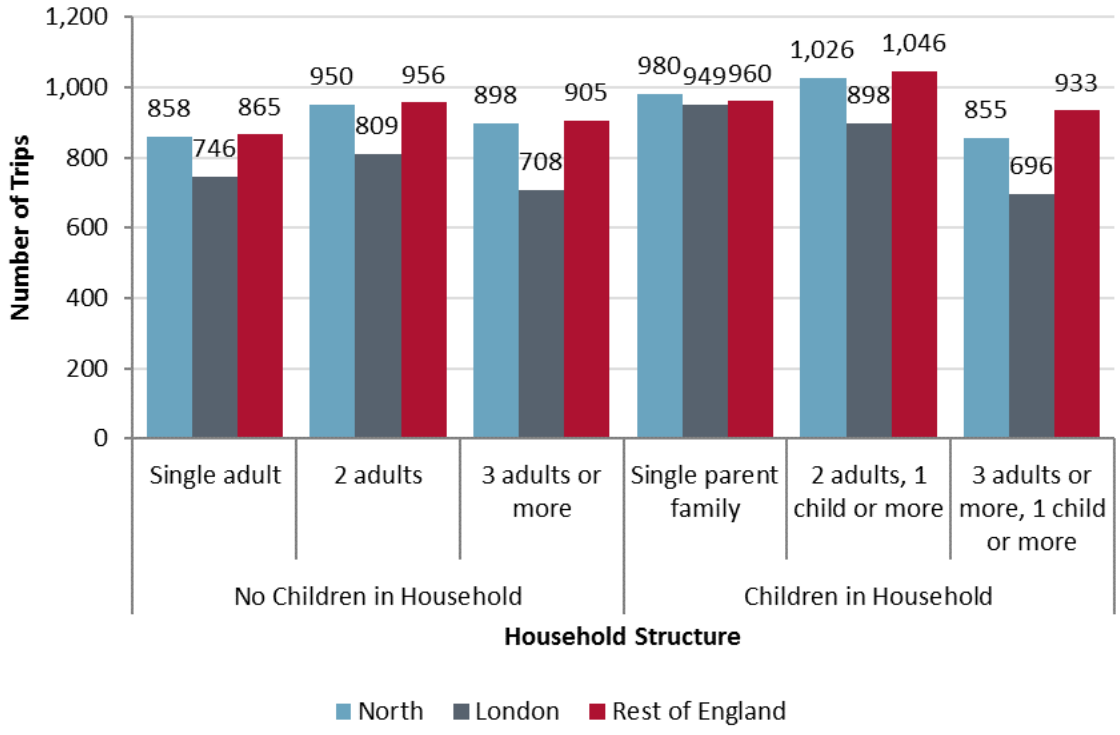
[5] Educational 'escort' trips refer to where the primary purpose of the trip is to 'escort' another person to a place of education (e.g. a parent taking their child to school). Within the NTS, this would be represented as two trips – an 'escort' trip for the parent, and an 'educational' trip for the child. Trips per person in a household in this context refer to the total number of trips made by an average person in that household – including those made by both the child and the adult parent/guardian.

Figure 2.10: Total Trips by Age Bracket per person per year, National Travel Survey, 2014-16



Data Source: National Travel Survey, 2014-16

Figure 2.11: Total Trips by Household Structure per person per year, National Travel Survey, 2014-16



Data Source: National Travel Survey, 2014-16

National Statistics Socio-Economic Classification (NS-SEC)

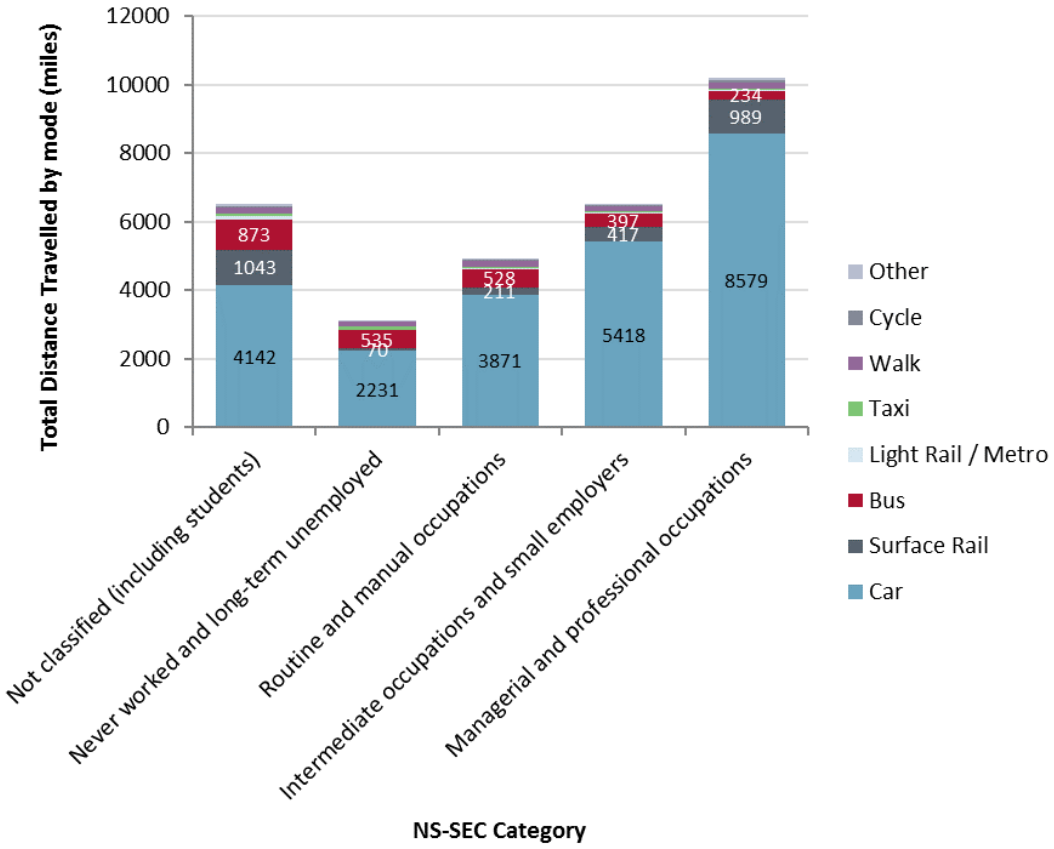
2.26 NS-SEC[6] is a measure of occupational status based on an individual's employment, in particular the degree of skill involved in their role and the extent to which they are responsible for managing or directing others. Of the North's population, 28% are employed within "Managerial, administrative and professional occupations" – this compares to 36% in London and 32% in the rest of England. In the North 21% are in "intermediate occupations", 36% in "routine and manual occupations" and 6% "never worked and long-term unemployed". The remainder are not classified.

2.27 Figure 2.12 demonstrates the strong relationship between higher occupational status and increased distance travelled. In mileage terms, those in managerial and professional occupations travel on average more than double those in routine and manual occupations. Whilst the majority of this difference is accounted for by greater car mileage, the difference in rail mileage by occupation is also notable, with those in managerial and professional occupations travelling approximately 990 miles per year by rail, compared to just 70 for those in routine and manual occupations.

2.28 In the chart, the "not classified" group largely refers to full-time students – retired people are classed against their previous occupation. The "not classified" group has a broadly average annual mileage, but disproportionately travel by rail, with a greater rail mileage per year than any other group. Children are not included in these figures.

[6] More details can be found here: *https://www.ons.gov.uk/methodology/classificationsandstandards/otherclassifications/thenationalstatisticssocioeconomicclassificationnssecrebasedonsoc2010*

Figure 2.12: Total Distance Travelled by NS-SEC Category by mode per person per year in the North

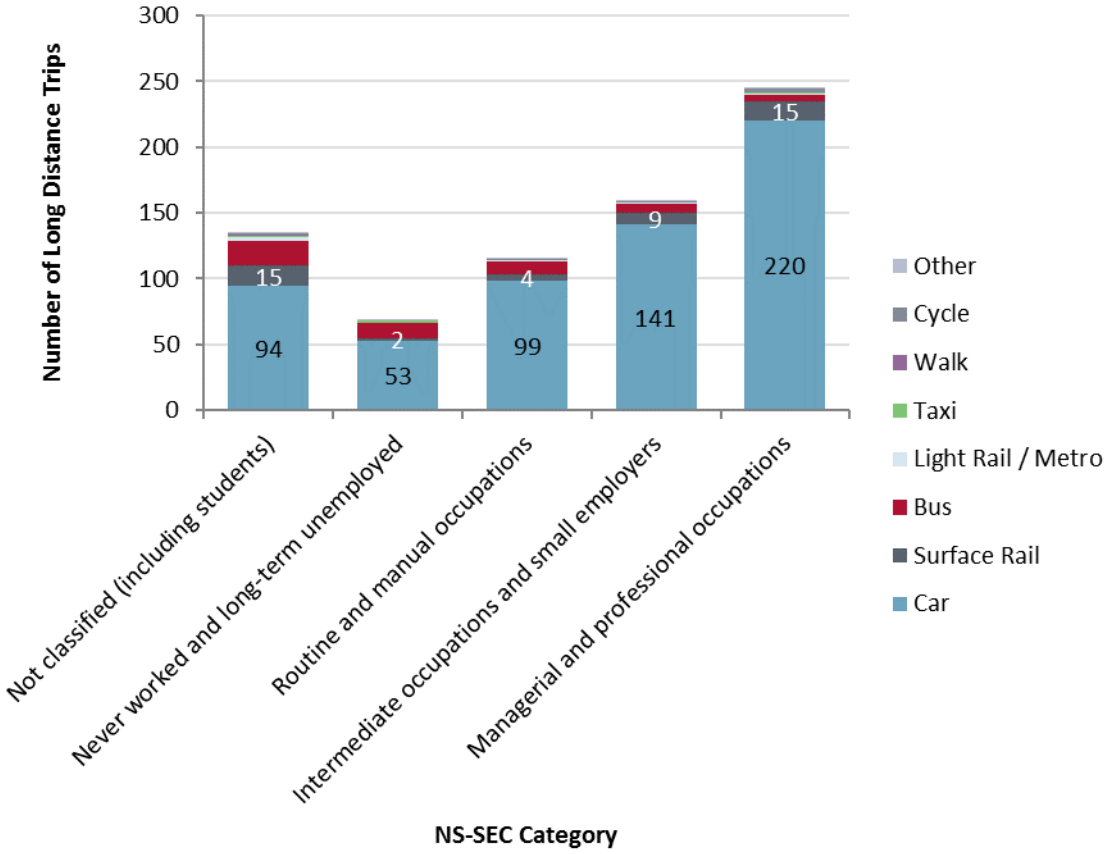


Data Source: National Travel Survey, 2014-16

2.29 Figure 2.13 demonstrates a similar relationship between higher occupational status and the propensity to make longer-distance trips, defined as those over 10 miles in length.

2.30 Except for those not classified (largely students), having a higher occupational status is strongly linked to a greater propensity to make longer-distance trips, of which the dominant modes are car and rail. Those in managerial and professional occupations, for example, make more than four times as many long-distance car journeys and seven times as many long-distance rail trips than those in routine and manual occupations.

Figure 2.13: Number of Long Distance Trips by NS-SEC Category by mode per person per year in the North



Data Source: National Travel Survey, 2014-16

Occupational status appears to be a key explainer of travel behaviour within the North.

Individuals with a higher occupational status typically travel significantly further and make significantly more long-distance trips than those in other occupations, especially by rail.

Income Quintile

2.31 Similar relationships can be observed with increased income, reflecting how those in a higher occupational status typically have greater incomes (and *vice versa*). Figure 2.14 and 2.15 overleaf outline how the total number of trips and total distance travelled vary with increased income.

2.32 Increased income broadly results in an increased *number* of trips, up until the highest quintile. The number of trips made by bus declines as income increases. Total *distance* travelled, however, increases much more strongly with increased income, such that those within the top 20% income band travel more than 2½ times those in the bottom 20% band. In a similar way to the relation with NS-SEC, while much of this is accounted for by increased car mileage, the differences in rail mileage is especially prominent, with an increase from 216 miles to 933 miles per person between the lowest and highest income bands.

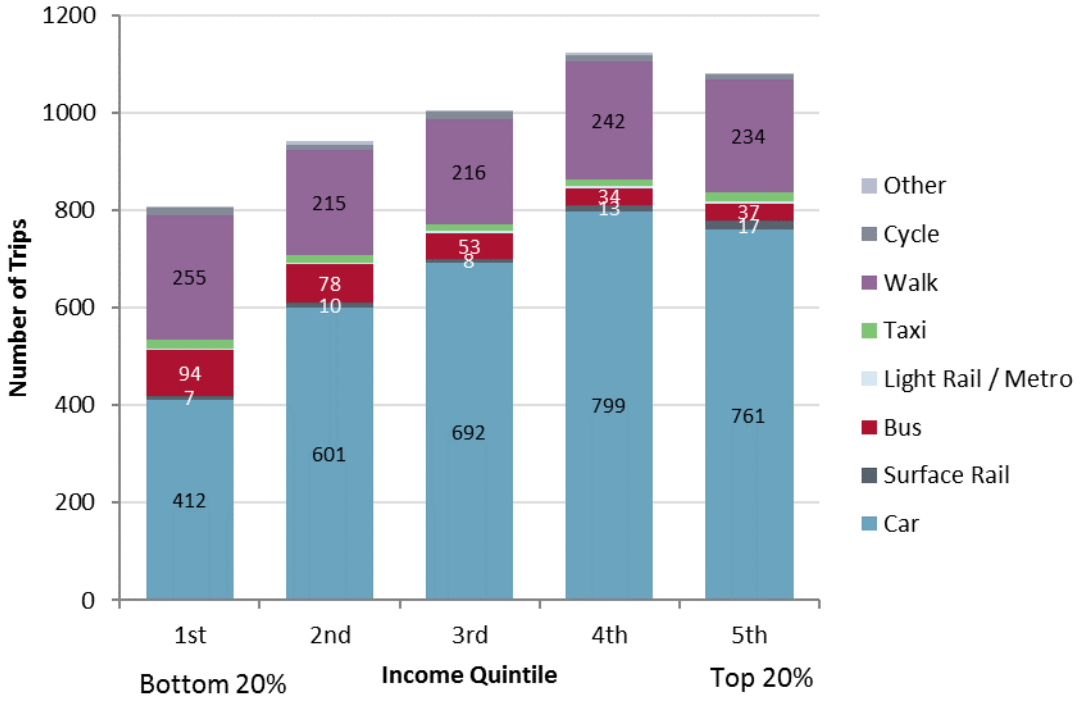
2.33 Rail mileage increases from 6% of all mileage of those on the lowest income quintile to 9% of those on the highest quintile, while car mileage increases from 70% to 84%. However, as highlighted in Figure 2.14, it should be stressed that the overall number of trips being made by rail remains low in absolute terms, at an average of 17 per person per year for the highest income quintile, accounting for 1.6% of all trips by that quintile. Bus mileage decreases rapidly with increased income, accounting for 16% of mileage of those on the lowest income quintile but just 2% of those on the highest quintile.

People on higher incomes typically travel further than those on lower incomes, especially by rail.

People within the top 20% income band within the North travel 250% greater distance annually than those within the bottom 20% income band, including 210% more by car and 330% more than by rail. Conversely, bus travel declines significantly with increased income.

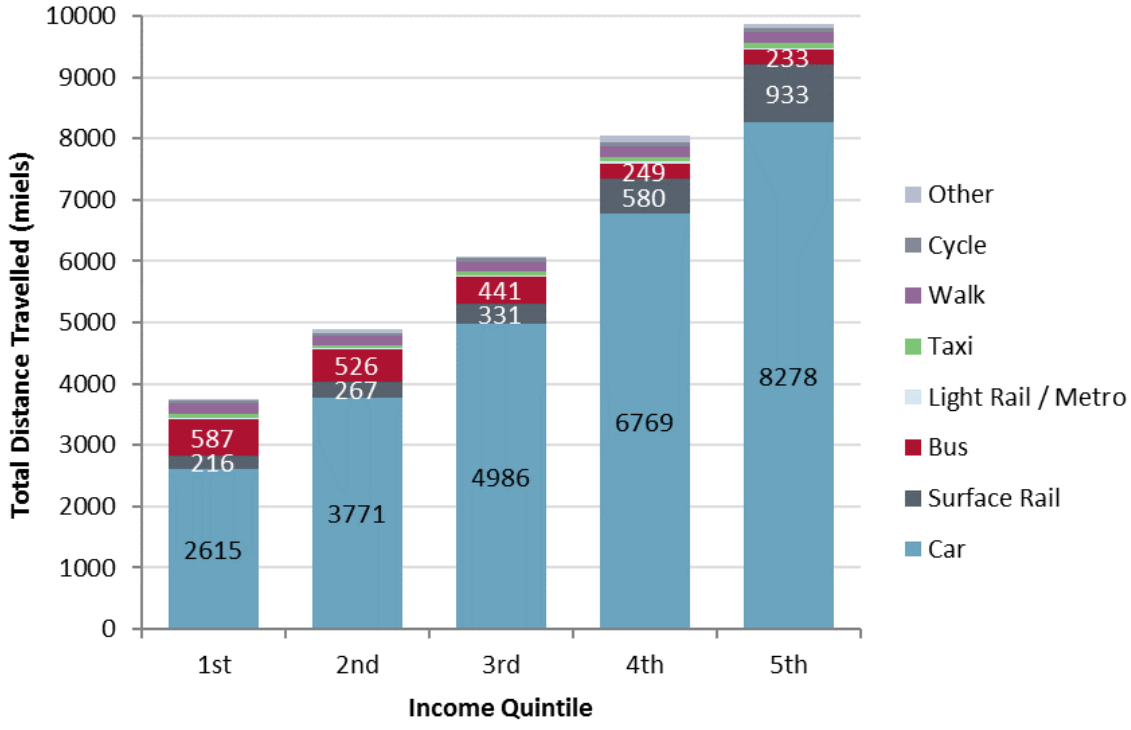
Most of this is accounted for by longer trip distances, rather than making additional trips.

Figure 2.14: Number of Trips by income quintile by mode per person per year in the North



Data Source: National Travel Survey, 2014-16

Figure 2.15: Total Distance Travelled by income quintile by mode per person per year in the North



Data Source: National Travel Survey, 2014-16

Qualifications and Working Status

2.34 Table 2.1 below reflects these trends, highlighting how degree-level qualifications and full-time employment – both highly correlated with higher incomes – are associated with increased mileage and trip-making, especially by rail.

2.35 Part-time workers make more trips than those working full-time, although these trips are shorter in distance than those made by full-time workers. Greater distance travelled by bus is strongly associated with being unemployed or economically inactive (e.g. retired).

Table 2.1: Total Trips and Distance Travelled by Graduate and Working Status across the North

	Total Number of Trips	Total Distance Travelled (miles) (all modes)	% distance by car	% distance by surface rail	% distance by bus	% distance by walk / cycle	% distance by other modes
Northern average	944	6,294	80%	7%	7%	3%	2%
Qualifications[7]							
Degree level or above	1,135	10,458	82%	11%	2%	2%	2%
Other type of qualification	982	6,406	81%	6%	7%	3%	2%
Working Status							
Unemployed	853	3,687	71%	5%	15%	8%	2%
Economically inactive	951	4,323	76%	6%	10%	5%	3%
Part Time	1,155	6,644	82%	7%	6%	3%	2%
Full Time	1,030	8,972	84%	9%	3%	2%	2%

Data Source: National Travel Survey, 2014-16

People with graduate-level qualifications typically travel more often and further, especially by rail.

Those within full-time employment typically travel further than those in part-time work or out of employment, although those working part-time make a greater total number of trips.

Graduate-level skills, full-time employment and higher incomes are all closely correlated, and individuals within these groups make more trips and travel further than those in other socio-economic groups.

[7] Note that this is the only breakdown of skills levels provided in the National Travel Survey data available for the purposes of this study

Output Area Classification

2.36 The Output Area Classification (OAC) refers to a geodemographic classification developed by the Office for National Statistics (ONS) to categorise local communities at an Output Area (OA) level – approximately 125 households – to better understand their socio-demographic characteristics, such as typical occupation, housing type and tenure, household structure and ethnicity. It offers a helpful way of considering the travel behaviours of different types of communities, incorporating a number of Census variables including age breakdown, ethnicity and country of birth, housing type and tenure, occupation and qualifications, car usage and employment.

2.37 Each of the eight OAC 'groups' which form the core classification by which areas are characterised are summarised below using the ONS's own terminology[8]. The population of each group within the North, London and the Rest of England is presented in Table 2.1.

- **Rural Residents** – households within rural, less-densely populated communities, typically living in detached properties, working in primary industries (e.g. agriculture) with high levels of car ownership and car commuting to work;
- **Cosmopolitans** – households within densely populated urban areas, more likely to be privately renting flats, with a high proportion of young, single adults and those without children, together with full-time students;
- **Ethnicity Central** – ethnically diverse households typically living in flats within dense inner-city areas (predominately in London), which tend to be young, more likely to have children, and use public transport to access work with low car ownership;
- **Multicultural Metropolitans** – ethnically diverse households typically living in rented terraced housing within large urban conurbations, with above-average number of young families, typically working in transport and administration;
- **Urbanites** – households typically located in privately rented flats or terraces within urban areas (especially within Southern England), and most likely to work in information and communication, finance, public administration or education-related sectors;
- **Suburbanites** – households located on the suburban outskirts of towns and cities, typically living in owner-occupied detached and semi-housing, with high qualifications, low levels of unemployment, and high levels of car ownership;
- **Constrained City Dwellers** – households, typically older than average and less ethnically diverse, with higher levels of unemployment, low qualifications, long-term illness, and living in socially-rented flats in larger urban areas;
- **Hard Pressed Living** – households typically living in semi-detached or terraced properties on the outskirts of larger urban areas or small towns within northern England and South Wales, which have often suffered industrial decline. Households typically have lower qualifications, higher unemployment and less non-White ethnic representation than the national average.

2.38 There is variation in the *number* of trips made by an individual between each OAC group – constrained city dwellers make the fewest trips annually (at 780), suburbanites the most (at

[8] Full details and 'pen-portraits' of the OAC 'groups' can be found here *https://www.ons.gov.uk/file?uri=/methodology/geography/geographicalproducts/areaclassifications/2011areaclassifications/penportraitsandradialplots/penportraits.pdf*

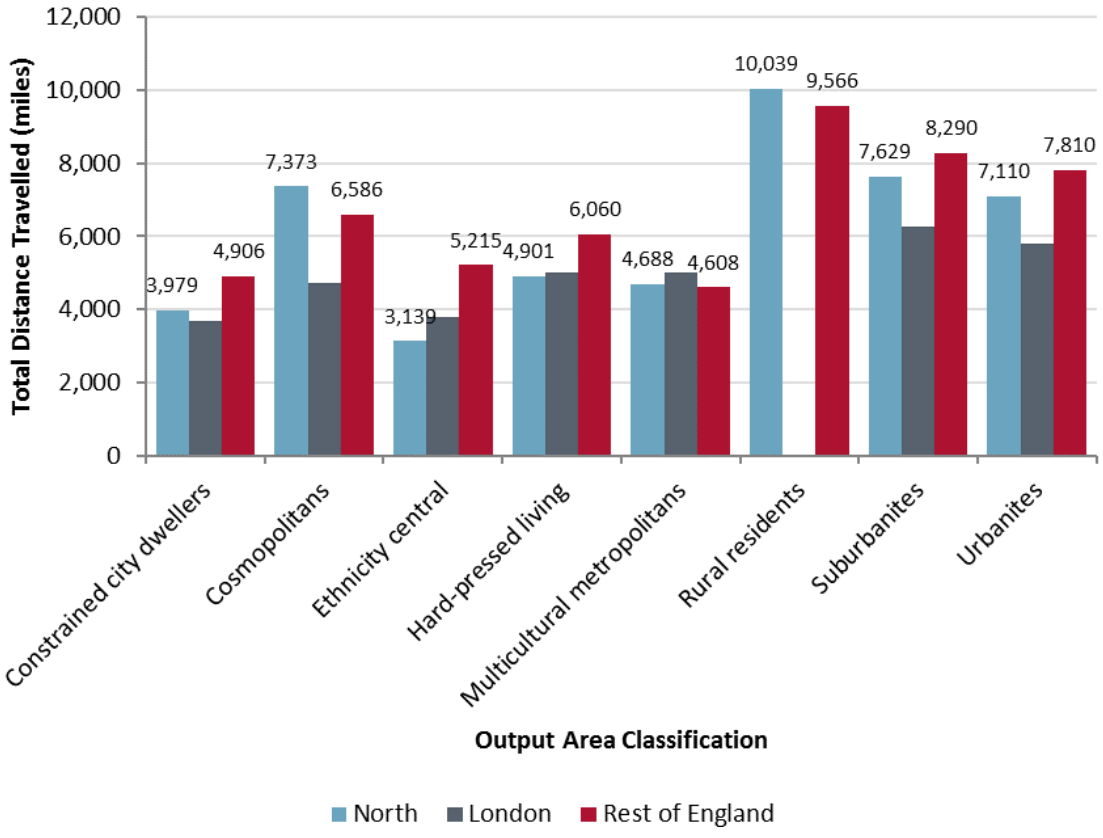
1,060), a difference of 36%. However, the greatest variation is within total distance travelled, which varies by more than 200% between the group travelling the least distance (Ethnicity Central, at 3,139 miles per year) and the most distance (Rural Residents, at 10,039 miles per year).

2.39 Individuals will always be required to make a certain number of trips irrespective of socio-demographic status – working individuals, for example, will make regular commuting trips regardless of income, likely explaining the more limited variation in the total number of trips made by different socio-demographic groups. However, the greater variation in distance travelled is likely a result of how different groups have a different propensity to travel further distances to access work, shopping or leisure.

People within different OAC groups make different numbers of trips. There is a large variation in the total distance travelled per person by different groups.

2.40 Figure 2.16 shows the total distance travelled by OAC group within the North, London and the rest of England. Groups typically located within inner cities, together with those that are less economically prosperous, on average travel less per year than those in rural and suburban areas. Cosmopolitans reflect the opposite of this trend, however, travelling longer distances than other groups despite typically living close to major city centres. Northern cosmopolitans travel further than those in London and elsewhere in England. Broadly, however, the distance travelled by people in the eight classifications closely reflects the national pattern.

Figure 2.16: Total Distance Travelled by Output Area Classification per person per year in the North



2.41 Figure 2.17 also shows the distance travelled per year within the North by each OAC group, broken down by mode. The height of the bars indicates the total distance travelled (by mode), and the width is proportionate to the total population of the OAC group within the North. For example, an average person within the 'hard-pressed living' group travels 3,844 miles annually by car, and the width of the 'hard-pressed living' bar indicates that this group accounts for 27% of the North's population. While rural residents travel the greatest distance per person, as they only represent 8% of the North's population, they travel less in aggregate than other groups and this is reflected in the narrow width of the 'Rural Residents' bar.

2.42 Clearly, the average person in some OAC groups travel greater distances than the average person on other OAC groups, and there are clear patterns regarding their use of different modes. Whilst car is the predominant mode amongst all groups, the reliance on private car and the use of rail varies markedly.

2.43 In particular, cosmopolitans travel extensively by rail, with an individual within this OAC group travelling on average 1,427 miles by rail each year, more than double any other group. While cosmopolitans make up just 3% of the North's population, they account for 9% of all rail trips. Conversely, mileage by rural residents, and to a lesser extent suburbanites and urbanites, has the greatest share by car, with a mode share by distance greater than 80%. Bus usage varies markedly, with less economically prosperous groups within urban areas travelling most by bus.

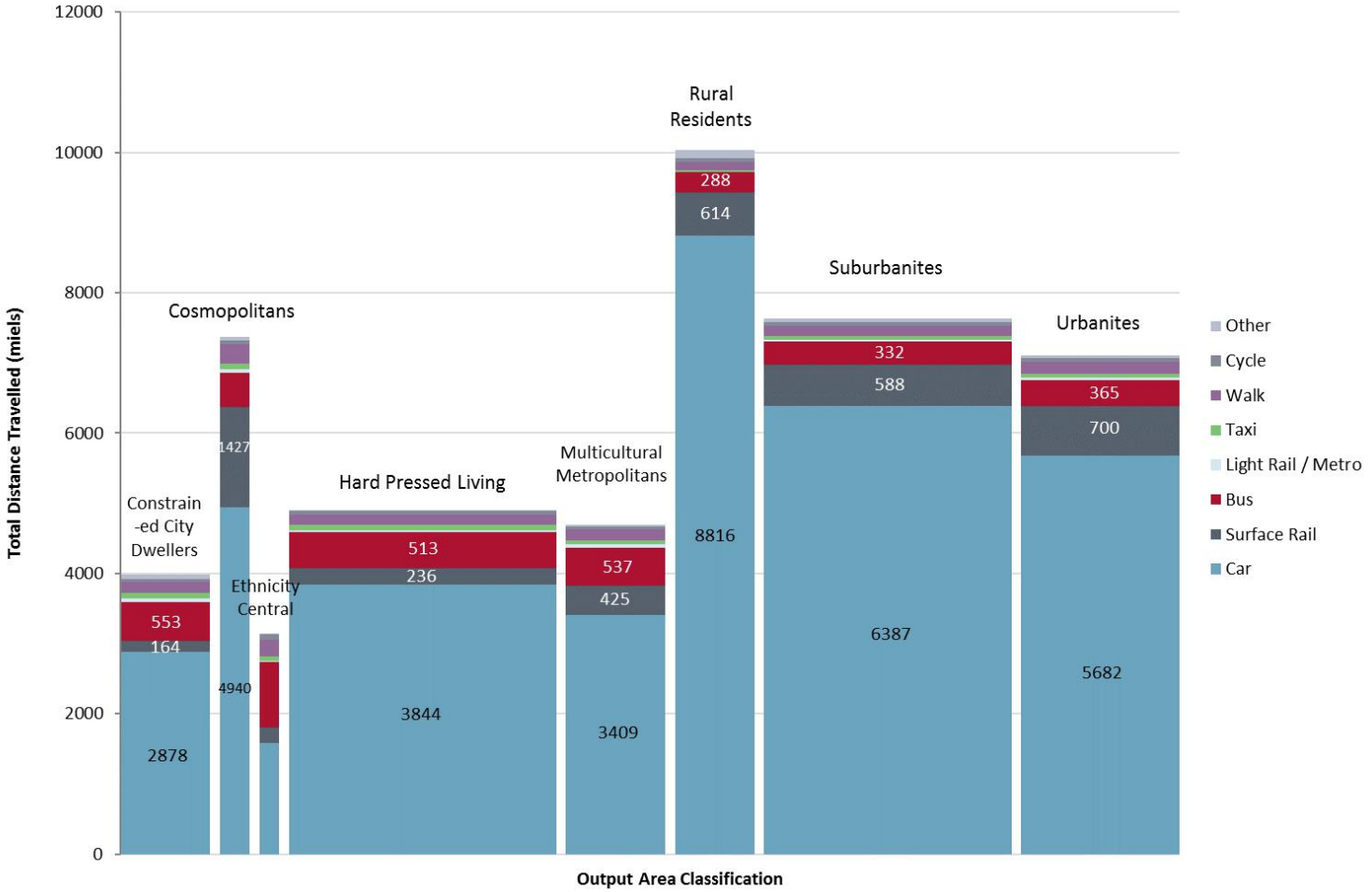
2.44 Several factors underpin these trends. Geography is clearly a determinant of distance travelled. On average, rural residents need to travel further to access employment and basic services. Cosmopolitans, suburbanites and urbanites – all groups with comparable total mileage – are typically associated with employment in a higher occupational status and have higher qualification levels, which as we have shown earlier are associated with increased aggregate mileage and longer commutes to work. Conversely, constrained city dwellers, hard-pressed living and multicultural metropolitans – groups typically with higher unemployment, lower occupational statuses and lower qualifications – typically travel less in distance terms.

Different groups have a different propensity to travel by different modes: cosmopolitans are disproportionately likely to travel by rail, rural residents by car, and hard-pressed living and ethnicity central by bus.

Much of this variation can be accounted for by the different socio-demographic makeup and geography of these groups. For example, cosmopolitans typically live in city centres, are younger and less likely to have a driving license, explaining their use of rail; while rural residents need to travel further to access employment and basic services.

Figure 2.17: Total Distance Travelled by Output Area Classification, by mode, per person per year

Width and area of bars is proportionate to the total population of each group within the North

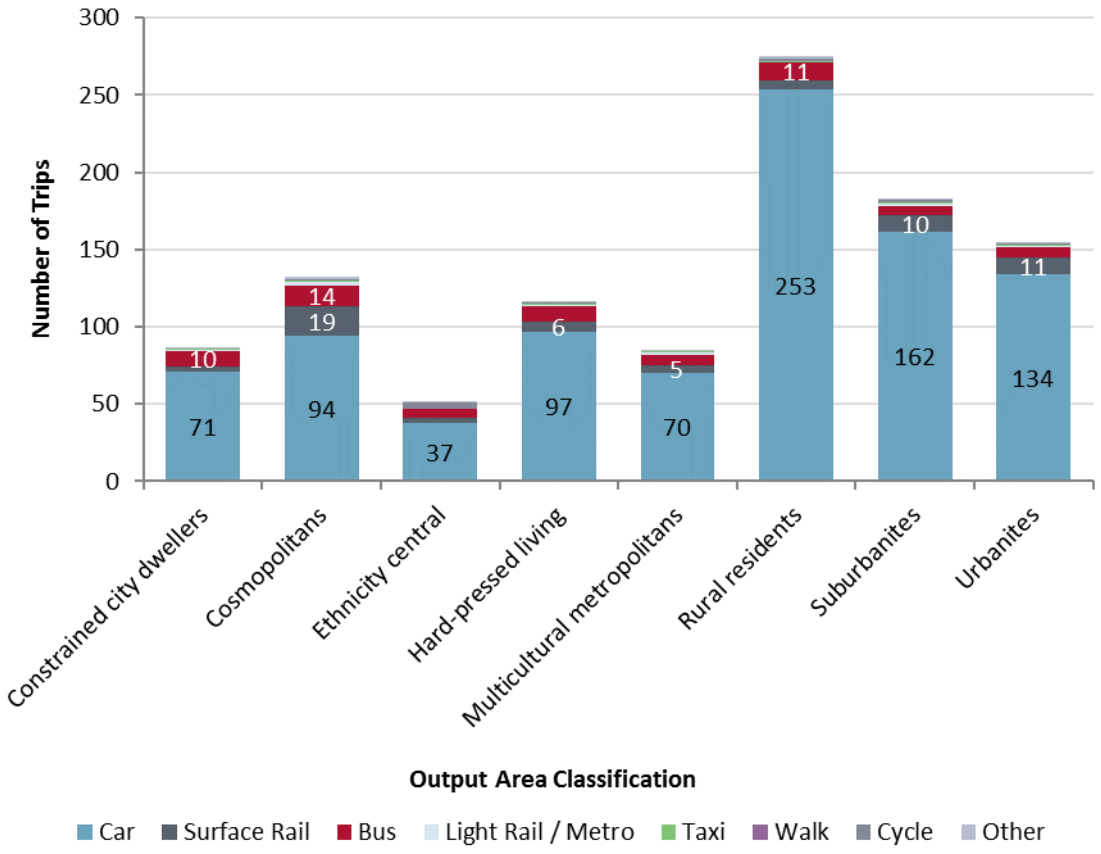


Data Source: National Travel Survey, 2014-16

2.45 Figure 2.18 demonstrates the propensity to make long-distance trips (defined as greater than 10 miles in length) by each OAC group. Similar to the relationship with distance travelled, some OAC groups are more likely to make long-distance trips, and by different modes.

2.46 Rural residents, reflecting their location, make approximately 88% more longer-distance trips than the Northern average of 146 long-distance trips per year. This is primary accounted for by additional car trips, with the average rural resident making 253 long-distance car trips per year, compared to the Northern average of 127. Cosmopolitans make 132 long-distance trips per year, less than the Northern average, but have a greater propensity to travel by rail, making 19 trips compared to the Northern average of 8.

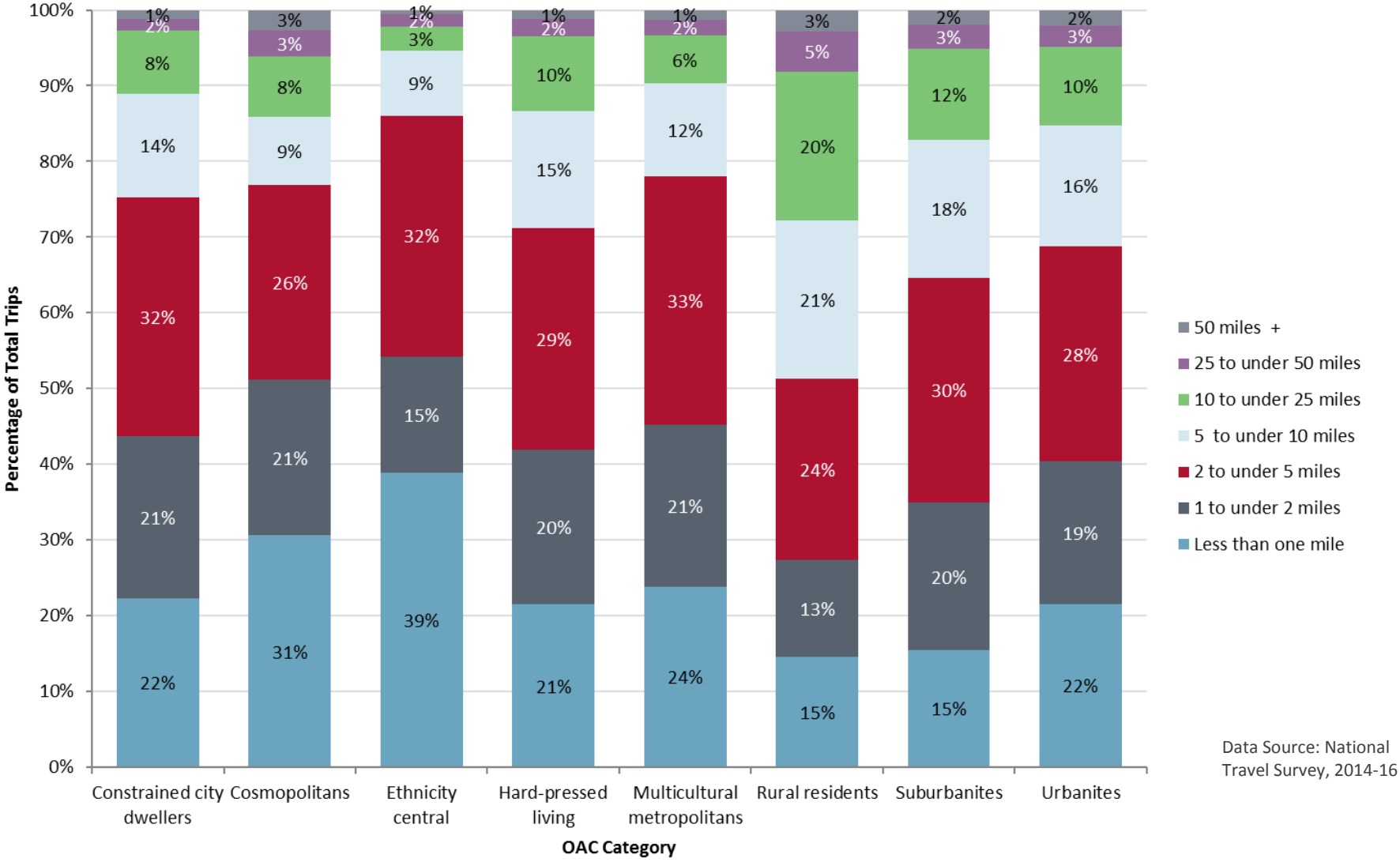
Figure 2.18: Number of Long Distance Trips by Output Area Classification, by mode, per person per year



Data Source: National Travel Survey, 2014-16

2.47 Figure 2.19 shows the proportion of trips at different distance bands for each OAC group. It highlights how, for example, rural residents unsurprisingly make fewer short (> 5 mile) trips and more longer (> 25 mile) trips; cosmopolitans and ethnicity central, conversely, make greater numbers of short trips than other groups.

Figure 2.19: Percentage of trips by distance band by Output Area Classification, per person per year



Data Source: National Travel Survey, 2014-16

2.48 Table 2.2 summarises these trends.

Table 2.2: Total Trips and Total Distance Travelled by OAC group per person per year

OAC Group	Number of Trips	Number of Long Distance Trips	Total Distance Travelled (miles) (all modes)	% distance by car	% distance by surface rail	% distance by bus	% of North popula-tion	% of London popula-tion	% of Rest of England popula-tion
Constrained city dwellers	780	87	3,979	72%	4%	14%	9%	1%	6%
Cosmo-politans	940	132	7,373	67%	19%	7%	3%	12%	4%
Ethnicity central	932	51	3,139	51%	7%	29%	1%	36%	1%
Hard-pressed living	866	116	4,901	78%	5%	10%	27%	1%	17%
Multicultural metropolitans	871	85	4,688	73%	9%	11%	10%	36%	12%
Rural residents	992	275	10,039	88%	6%	3%	8%	0%	15%
Suburbanites	1,060	183	7,629	84%	8%	4%	25%	5%	23%
Urbanites	1,017	155	7,110	80%	10%	5%	16%	9%	23%

Data Source: National Travel Survey, 2014-16

Conclusions

2.49 This chapter has explored how travel behaviour varies for different socio-demographic groups within the North, and how contrasts these with London and the Rest of England. Overall:

- People in the North make marginally fewer trips and travel less than the rest of England, but more than those in London;
- Car is the dominant mode within the North, accounting for 66% of trips and 80% of distance travelled. This is comparable to the Rest of England but greater than London (38% and 52% respectively);
- Rail accounts for 1.1% of all trips in the North – less than the rest of England average of 1.7% and the London average of 6.7%. Rail accounts for 7.4% of total distance travelled in the North, less than the rest of England average of 8.5% and the London average of 19.5%;
- Rail patronage has grown strongly over the past twenty years, more than doubling over the period both in Great Britain as a whole and within the North.

2.50 Northern travel behaviour broadly reflects what is seen in the rest of England, with London as a clear outlier compared to the national picture. In several respects, this should be expected – the North includes an extensive geography with many communities from dense inner-city districts to rural villages, in keeping with the rest of England excluding London, and hence would be expected to exhibit broadly similar travel behaviour. London, in contrast, is singularly

a metropolitan area and is of a scale unmatched anywhere else in the country and it has a public transport network to match.

2.51 Our analysis of the variation in travel behaviour by socio-demographic status identified a series of factors as being key explainers of different behaviour:

- **age**, with both total number of trips and total distance travelled increasing with age up until retirement;
- **household structure**, with children in the household associated with a clear uplift in total trips per person, likely a result of the need to make additional educational 'escort' trips, but a smaller increase in total distance travelled;
- **occupation**, with those with a higher level occupational status travelling further distances than those within other occupations;
- **graduate and employment status,** with those with a degree and in full-time work travelling further distances than those without a degree, working part-time or not in employment;
- **income**, with those within higher income bands travelling further distances than those within lower bands;
- **geography,** with residents in the most rural OAC groups travelling further than those within urban areas, with those in inner cities travelling the least distance.

2.52 These patterns are observed across England, and are not unique to the North. These indicators are also highly correlated: those in middle-age are most likely to have children in the household, those with degrees are most likely to be in full-time work on a higher income band, and so forth. The Output Area Classification provides a useful lens for understanding the travel behaviour of *specific groups of people* within *specific places*, rather than simply how travel behaviour varies against the indicators above.

3 Literature Review

Introduction

3.1 This chapter builds on the data analysis presented in Chapter 2, and focuses on what the literature tells us about:

- recent trends in travel behaviour, and how travel behaviour could be expected to change in future for certain groups;
- existing user segmentation methods and their strengths and weaknesses.

3.2 Informed by academic research, typically for looking at Great Britain as a whole, this chapter focuses on identifying wider, longer-term trends that are not explored in Chapter 2, such as the declines in per-capita car mileage and increases in rail patronage, and their causes. It also explores the academic literature underpinning the link between transport investment and the economy, and ultimately informs the development of the pen-portraits outlined in Chapter 4.

Headline Trends

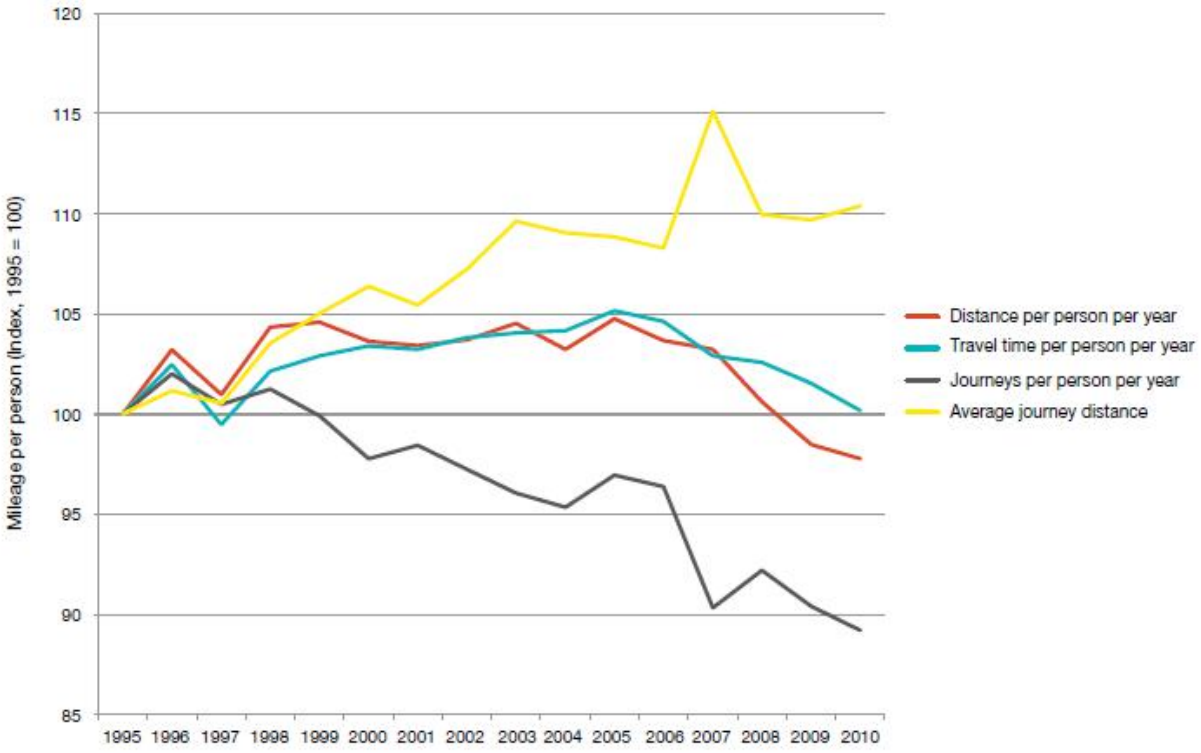
General Patterns – Trip Frequencies, Distances and Journey Times

3.3 Analysis of historical National Travel Survey (NTS) data in Great Britain (Le Vine *et al*., 2012) has highlighted how, over recent decades, the number of trips made by individuals has decreased, even prior to the late-2000s recession.

3.4 **Total journeys per person** (trip rates) have fallen steadily since 1998, and in 2010 were more than 10% lower than in the mid-1990s, as shown in Figure 3.1. National Travel Survey data[9] indicates that trip rates continued to fall post-2010, from 961 annual trips in 2010 to 914 in 2015.

[9] Department for Transport, NTS Table NTS0403

Figure 3.1: Overall trends in travel behaviour per person, Great Britain, 1995–2010



Source: Le Vine *et al*. (2012)

3.5 **Total distance travelled per person** increased from its 1995 level until the mid-2000s after which it declined, and by 2010 was less than that experienced in 1995. Whilst individuals were making fewer trips per year, this was countervailed by an increase in the average length of each trip. This reflects a longer-term trend, with the average trip increasing from under 5 miles in length in 1970, to 6.5 miles by the late-1990s, and 7 miles by 2010 (Le Vine *et al.*, 2012). Total travel time per person increased by 5% between the mid-1990s and 2005 before declining back to its 1995 value by 2010.

3.6 Metz (2010) echoes this, pointing to how data from successive National Travel Surveys over a longer 35-year period points towards personal travel behaviour being broadly stable, with little change in average journey times, journey frequency or journey purpose. He argues the only factor which has changed significantly is distance travelled, which has increased as individuals' take advantage of growing incomes to travel faster and further to access to a greater choice of destinations all within a (broadly) constant travel time budget (Metz, 2010). Since 2010, while average trip distance has remained more-or-less constant, the decline in journeys per year means that the distance travelled per year has also declined (Le Vine *et al.*, 2012).

3.7 Recent published National Travel Survey data[10] indicates that distance travelled per person continued to decline, from 6,689 miles in 2010 to 6,648 miles in 2014, compared to a high of

[10] NTS Table NTS0101

7,202 miles in 2003. Although distance travelled subsequently increased to 6,649 miles in 2015, it declined again to 6,499 miles in 2016.

Trip rates (the number of journeys made per person per year) have fallen since the mid-1990s.

Total distance travelled per person per year has been broadly stable until the mid-2000s (due to increases in the average length of trips), but has declined since then.

Metz (2010) points to how the total time spend travelling has been broadly constant over the past 35 years, as individuals have traded increased incomes for the ability to travel faster and further than before.

3.8 Atkins *et al*. (2017) highlight how these *declines in trip rates have been observed across most trip purposes* between 1998 and 2010, including commuting, shopping, visiting friends and family and personal business, although trip rates for holidays and day trips have increased. There has been no observable change in educational trip rates. They cite DfT research that changes in walking and 'short' trips account for much of the decline in trip rates, arguing that:

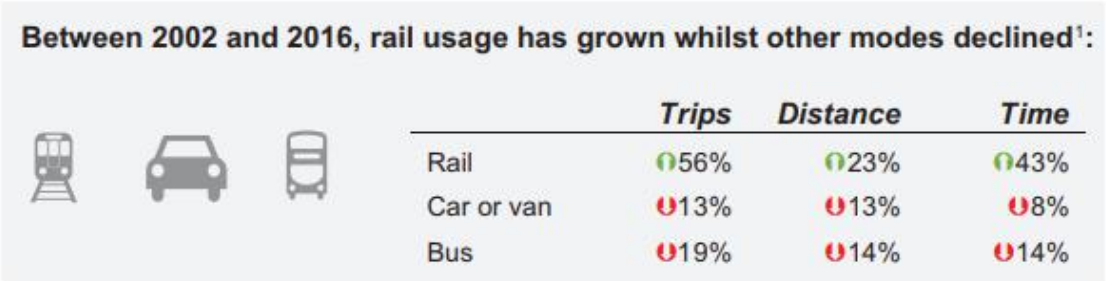
- For commuting trips per person, only those less than 5 miles have declined in number, whilst there has been no change in commuting trips longer than this;
- For shopping trips per person, declines have been most consistent in short trips of less than a mile or less;
- for trips visiting friends and family, all distance bands show a similar decreasing trend, although there has been a shift towards longer (> 5 mile) trips.

3.9 Together, this reflects the trend highlighted by Metz, for individuals to make longer trips within constant travel time budgets.

Changes in Trip Making Behaviour by Mode

3.10 Coincident with shifts in trip patterns have been a changing distribution of travel by mode. Within England as a whole, rail usage per person has grown, while car and bus usage has fallen. Such trends are summarised in Figure 3.2, sourced from DfT (2017).

Figure 3.2: Changes in travel behaviour by mode, 2002-2016



Source: Department for Transport, 2017

Trends in Road Usage

3.11 Traffic is measured in vehicle-miles, a combination of the number of trips made and the distance travelled per trip. Le Vine *et al*. (2012) highlight that, since the late 1990s, growth in highway traffic has slowed compared with earlier decades. This is especially so for car traffic post-2002. As car mileage on a per capita basis has plateaued, much of the growth in national car traffic since the early 2000s can be attributed to increases in population.

3.12 Table 3.1, cited by Goodwin (2012) from DfT (2010), clearly illustrates the long-term decline in the growth in traffic since the 1950s.

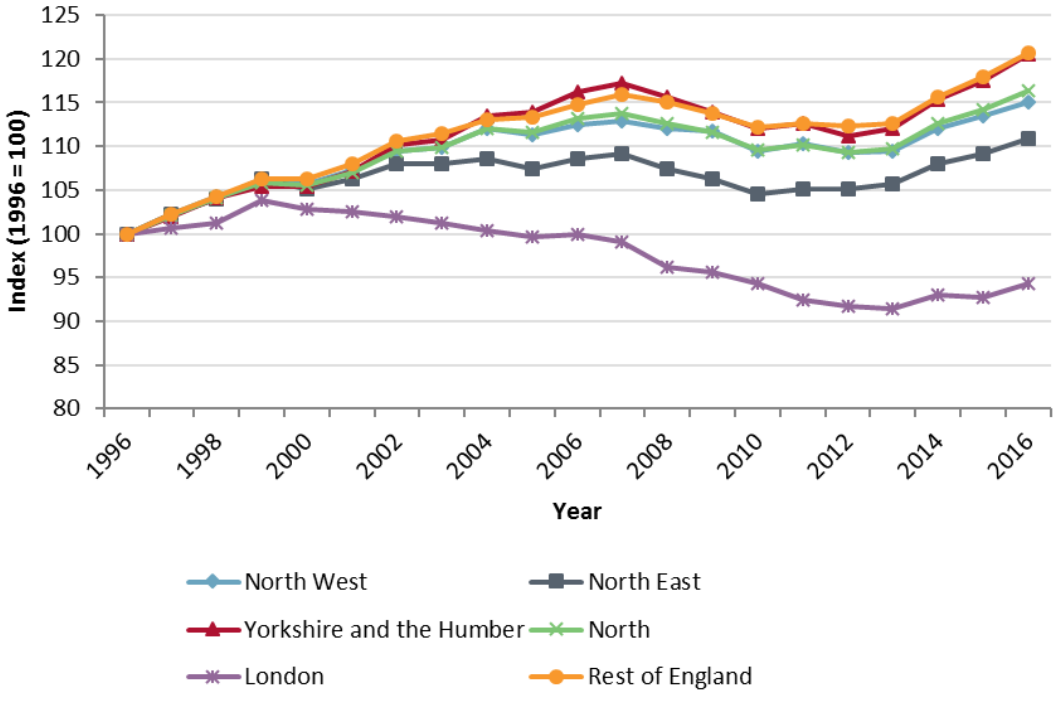
Table 3.1: Average Traffic Growth, 1950s – 2007

Decade	Traffic Average Annual Growth
1950s	8.4%
1960s	6.3%
1970s	2.9%
1980s	4.7%
1990s	1.4%
2000 – 2007	1.2%

Source: Department for Transport (2010)

3.13 Data from the Department for Transport's Road Traffic Survey sets out the trend in traffic growth since the 1990s at a regional level. Figure 3.3 shows the change in vehicle miles from 1996 until 2016 within the North, London and the rest of England.

Figure 3.3: Change in Highway Vehicle Miles, 1996 – 2016



Source: Department for Transport National Road Traffic Survey, Table TRA0206

3.14 Whilst net traffic growth has continued, there has been a noticeable decline in traffic during the late-2000s recession, although traffic growth has rebounded since 2013. Growth within the North has generally been less than the rest of England average (with the exception of Yorkshire and the Humber), although has been greater than London, which has experienced a fall in traffic since the late 1990s despite high levels of population growth.

3.15 Goodwin (2012) refers to a 'peak car' effect, a term used to describe a sustained period of stable *per person* car mileage. This has been observed in a number of developed nations with high car use, including Germany and the USA. Some commentators argue that this period of stable per person car mileage is a forerunner to a period of sustained decline. Several complementary and competing hypotheses have been proposed to account for this, including:

- the advent and increasing popularity of telecommunications and the Internet
- changing demographics, such as delayed parenthood or full-time employment
- societal 'end of the love affair' with the car
- declining traffic speeds and worsening congestion, and/or modal shift to rail
- increased cost of car travel (especially insurance) for young people

3.16 Indeed, there is a lack of consensus surrounding whether such effects will continue into the future, and the topic remains of considerable academic interest. Metz (2012), for example, argues that the present stabilisation in car traffic per person will form a long-standing trend, and that future traffic growth will be lower than forecast and come predominately from population growth. Conversely, all five core DfT traffic forecast scenarios (DfT, 2015) assume that either the trip rate will tend towards the historical average (rather than declining further), or that individuals' propensity to travel will continue to increase in line with incomes/GDP (even if the rate of increase falls as incomes increase further).

> Car mileage per person has plateaued, referred to as 'peak car'. There are competing explanations for this, and it is unclear if it will continue in the long term.

Trends in Rail Usage

3.17 Growth in rail patronage within the UK has been well-documented, both from NTS data and that from ticket sales data from the Office for Rail and Road. Passenger journeys have more than doubled over the past twenty years, from 800 million in 1996/7 to 1.7 billion in 2016/17 (ORR, 2018).

3.18 Le Vine *et al*. (2012), based on NTS research, highlights how growth in rail patronage between 1995/7 and 2005/7 can be almost exclusively explained by an expanding market base, with growth generated by greater proportions of the population travelling by train, rather than existing rail users making more or longer rail trips. They demonstrate that the proportion of NTS respondents reporting at least one rail trip within their travel diary increased from 6% in 1995/7 to 9% in 2005/7.

3.19 Furthermore, Le Vine *et al*. (2012) highlight how:

- the fastest growth in rail trips has been for non-commuting business purposes (increasing by 170% from 1995/7 to 2005/7);

- the greatest rail growth rates have been **outside** of the traditional rail markets of commuting trips and those to/from London. Notably, the proportion of rail trips to/from or within London fell from 63% in 1995/7 to 57% in 2005/7.

Rail growth has more than doubled over the past twenty years. The fastest rate of growth has been for trips outside London.

Explaining Individuals' Changes in Travel Patterns

3.20 Several factors have been argued to account for these changes. Recent literature has primarily focused on:

- changes in commuting trips;
- reductions in per capita car mileage (the 'peak car' effect), including:
  - changing attitudes of young people to car usage
  - falls in company car ownership
  - modal shift between road and rail, partly as a result of the above.

Commuting Trips

3.21 Of all trip-making purposes, commuting trips have experienced some of the largest reductions, in both per-person and absolute terms, with the number of commuting trips in England falling from 8.5 billion to 7.9 billion between 1995/7 and 2013/14, despite an increase in the England population of 12% (DfT, 2017). Several factors contribute towards this change:

- Both full and part-time **workers are working fewer hours each week**, yet spending more time working on each individual day that they do work. Since individuals are therefore working longer but fewer days, this is associated with a reduction in annual commuting trips;
- There has been a **growth in 'trip-chaining'**, whereby workers combine trips of different purposes, such as dropping-off children on the way to work. This results in a decline in both total trips and commuting trips (since these are defined as directly between a worker's home and workplace);
- There has been **growth in the number of workers who do not have a 'fixed' workplace** (such as an office they travel to daily) but instead travel to multiple workplaces (an example would be an on-call tradesman). Such trips are not considered 'commuting' within the NTS;
- **Workers are more likely to work-at-home**, both occasionally and on a usual basis;
- **Part-time and self-employment** has increased over recent decades, both of which are associated with fewer commuting trips.

3.22 However, whilst individuals are on average making fewer commuting trips, the average distance and duration of each commuting trip is increasing, especially amongst part-time workers (DfT, 2017). Distances and trends differ markedly across age and gender lines – workers over 30 (especially women) are the most important driver of increased commuting distances, while commuting distances are falling for men under 30. This is consistent with the trend amongst young men towards more part-time working, falling incomes and decreasing car use (Le Vine and Polak, 2014).

Individuals are making fewer commuting trips per year, but these trips are becoming longer in both distance and duration. Commuting is, in effect, being consolidated into fewer, but longer-distance, journeys.

Reductions in Per Capita Car Mileage

3.23 Gaining a better understanding the causes of changes in car mileage per person has been a focus within the recent literature. Commissioned by the DfT and using NTS analysis, Le Vine *et al*. (2012) sought to understand the patterns of behaviour which underline the levelling-off of car traffic since the mid-1990s, together with the continued growth in rail passenger mileage. They point towards how, whilst aggregated traffic trends across Britain do show a 'peak car' effect with no increase in average car mileage per person (even during periods of economic growth), this effect is limited to **specific areas and specific groups of people**.

3.24 They argue that there has no 'universal' peak car effect, and demonstrate that some groups have experienced significantly different changes in travel patterns (both road and rail). Overall:

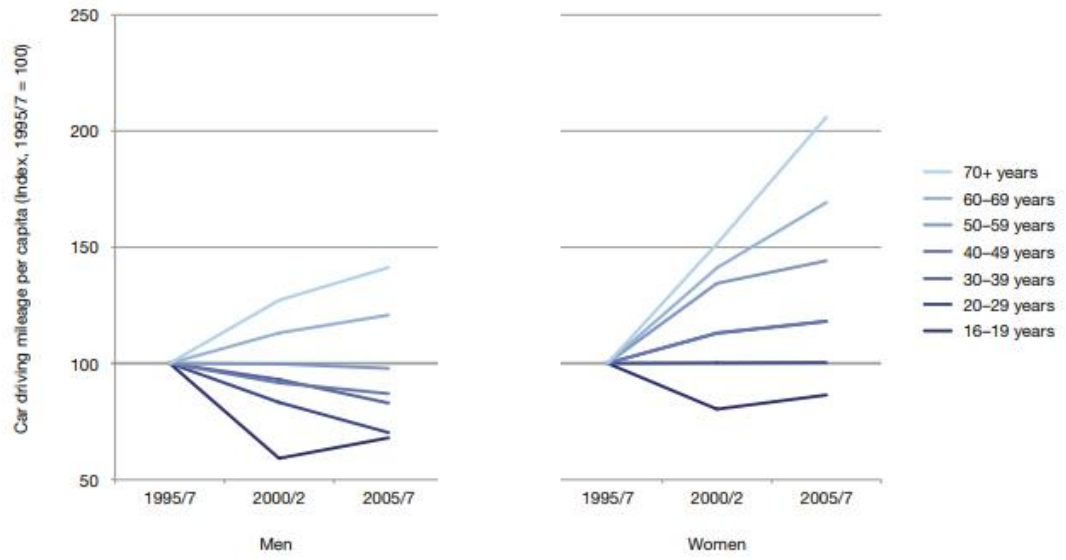
- Men have experienced the largest falls in car mileage, especially young men in their 20s, and women's driving mileage has continued to increase, except those in their teens;
- Most of the reduction in car mileage by men (except those in their 20s) can be explained through a sharp reduction in company car mileage, which appears to be as a result of changes in vehicle taxation (especially for those provided with free fuel);
- There is a continued growth in non-company car (private) mileage for those outside London aged 30 or over – a group that represents 70% of the UK population for which there has been no 'peak car' effect.

3.25 The following sections explores how changes in car and rail use can be understood, and for which socio-demographic groups changes have been most pronounced.

Age and Gender

3.26 Figure 3.4, taken from Le Vine *et al*. (2012), highlights how driver mileage is related to an individuals' age and gender. Younger groups (especially men) have experienced a reduction in mileage, whilst for older groups (especially women), mileage has continued to increase. Whilst the difference in mileage between men and women has reduced, men still drive approximately twice as far as women.

Figure 3.4: Relative changes in car driver mileage over time, by age and gender



Source: Le Vine *et al*. (2012)

3.27 Young men – referring to those in their 20s – have experienced the most significant shift in travel behaviour. Le Vine *et al*. (2012) highlight how total mileage (across all modes) by young men fell by 18% between 1995/7 and 2005/7, almost all of which is accounted for by a drop of 2,000 miles (or 30%) in their average car-driving mileage. Whilst rail usage amongst this group increased by about 50%, this only equates to an increase of 250 miles a year, substantially outweighed by the fall in car mileage. Mileage by young women has remained broadly stable over this period, with the result that there is now no significant difference between the car mileage of young men and women.

> 'Peak car' effects are not universal, with an individual's change in car mileage varying with their age and gender. Some cohorts have experienced a decline, while other an increase.

3.28 Chatterjee *et al*. (2018), on behalf of the DfT, explored how changes in the socio-economic conditions, attitudes and lifestyles of young people (in their study, those aged 17-29) have affected their travel behaviour. They identified a sustained trend for each cohort of young people since the early 1990s to own and use cars less than previous cohorts, with their growth in car usage with age also occurring at a lower rate. This was argued to be a result of both:

- **non-transport** factors, where 'delayed adulthood' results in the typical life events that coincide with learning to drive and buying a car occurring later in life;
- **transport** factors, such as the increased costs of driving (especially insurance) and attitudinal changes resulting in less car usage within the cohort.

3.29 Chatterjee *et al*. (2018) argue that the majority of the changes in travel behaviour arise from the concept of 'delayed adulthood'. They argue that key life stages are happening later in life. These include ending university/full time education, getting a full-time job, or the birth of a

child. On top of this, there is increased participation in higher education, greater prevalence of lower paid, less secure employment and a decline in disposable income, together with lifestyle changes, such as a decline in home ownership and a tendency to marry or have children later in life. The net result, they argue, is that young people are learning to drive and/or increasing their car use at a later stage in life compared to previous generations.

3.30 Changes in transport conditions, however, were also argued to play an important role. Chatterjee *et al*. cite evidence that higher costs of motoring, especially insurance, have discouraged young people from learning to drive. Many young people, they argue, have 'accepted' not driving, although it is unclear the extent to which this is a result of a generational shift in attitudes (such as the 'end of the love affair' with the car), increased use of technology (e.g. smartphones and the Internet) in everyday life, or other changes that simply mean that driving is no longer considered 'essential' at this stage in life.

3.31 No research has conclusively determined the relative importance of these factors, although it should be noted that Le Vine *et al*. (2012) say that half the reduction in aggregate car mileage by men in their 20s is a result of *fewer young men driving* and the remaining half caused by a *reduction in mileage amongst those who do drive*.

3.32 Chatterjee *et al*. (2012) also stress the potential for longer-term cohort effects. They suggest that whilst car usage will increase over time for what is currently the young generations (although perhaps only after they enter stable, full-time employment), since many young people have grown accustomed to a less car-dependent lifestyle, they will retain significant differences in travel behaviour throughout their lives. They go on to suggest that there is therefore a need for more flexible approaches to modelling future demand, which account for different scenarios of how the travel behaviour of different cohorts changes in the future. Stokes (2012) also highlights such age-cohort effects, stressing that while people with car-intensive lifestyles continue them later in life (such as the 'Baby Boomer' generation), younger people continue to drive less, even as they age.

Young people – especially young men – are driving less than previous generations.

Much of this effect appears to be a result of 'delayed adulthood' – such as young people entering full-time employment or marriage later in life – but the role of high driving costs or attitudinal factors are also important.

There is evidence for 'age-cohort' effects, as young people growing up without access to cars continue a less car-dependent lifestyle later in life.

Changes in Company Car Usage

3.33 Since the mid-1990s, company car use UK has dropped, from 29 cars per 1,000 people in 1995/7 to 23 cars per 1,000 people in 2005/7. Declines were greatest amongst those with a higher occupational status – with a decline of nearly 60% in company car ownership amongst those employed in 'professional' occupations. Mileage by company cars fell 40% between 1995/7 and 2005/7, accounting for **almost all of the levelling off of average car mileage since the 1990s** (Le Vine *et al*., 2012). As personal car usage increased steadily until 2007 (the start of the recession), reductions in company car usage therefore account for much of the observed 'peak car' effect.

3.34 Le Vine *et al*. (2012) point towards a link between this reduction and the changes in the taxation of company cars and fuel. Prior to the late-1990s, company cars users enjoyed tax advantages, such as provision for employers to provide unlimited 'free' fuel to their employees subject only to a fixed tax liability which did not vary with the volume of fuel used. Such tax incentives have been withdrawn over time and this would appear to be linked to the reduction in company car mileage over the period.

3.35 Le Vine *et al*. (2012) also identify possible evidence to suggest a substitution by men of business mileage from road to rail. Whilst they identify that business mileage has fallen, they cite that for every four-mile reduction in business company car travel, there has been an increase of approximately one mile in business rail travel.

Reductions in company car ownership account for the majority of the observed decline in car mileage per person.

Business company car mileage has declined significantly, but business rail mileage has increased.

Economic Differences

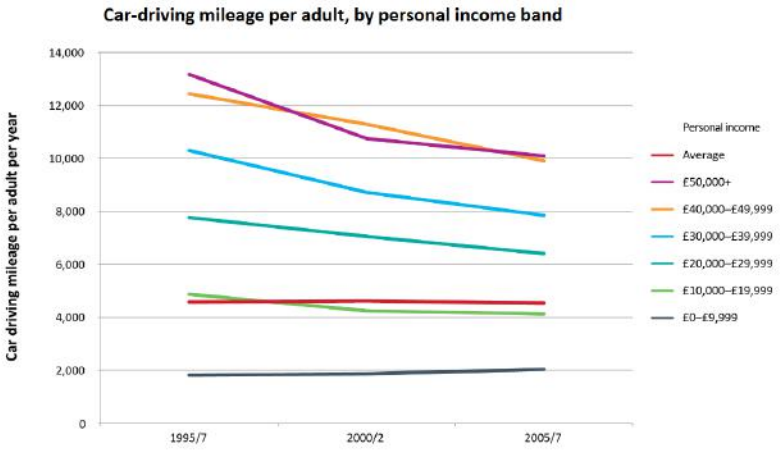
3.36 Figure 3.5 highlights how the relationships between car mileage and rail mileage per person by income band have changed over time. Whilst car mileage clearly increases in line with income (as outlined in Chapter 2), car mileage has declined over all income groups except the lowest, and the rate of decline is fastest for higher-income groups (Le Vine *et al*., 2012). Income now appears to be a less of a determinant of car mileage than in the past. While higher-income people typically travel more by rail, the increase in rail mileage over the period can be observed across all income groups.

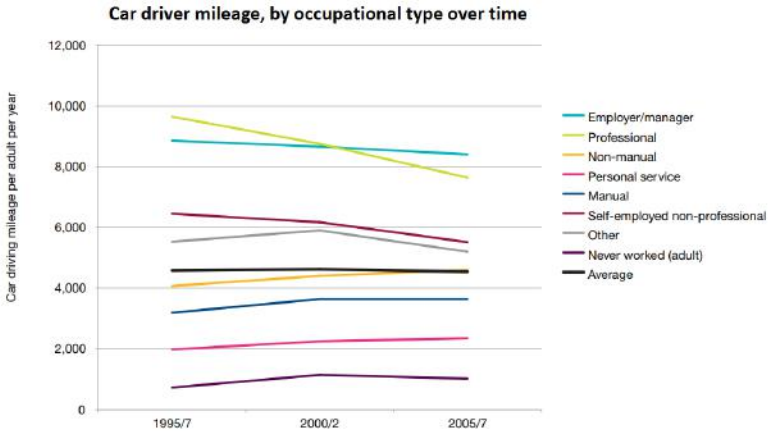
3.37 Figure 3.5 also shows similar patterns for occupational type. Groups with less annual mileage (below 5,000 a year, such as personal service workers) have experienced increasing mileage, whilst those who drive the most (e.g. professional workers) have experienced the greatest declines, although it is unclear to the precise causes of this. Conversely, for rail, all occupations have increased their mileage, with the increase for professional occupations the greatest.

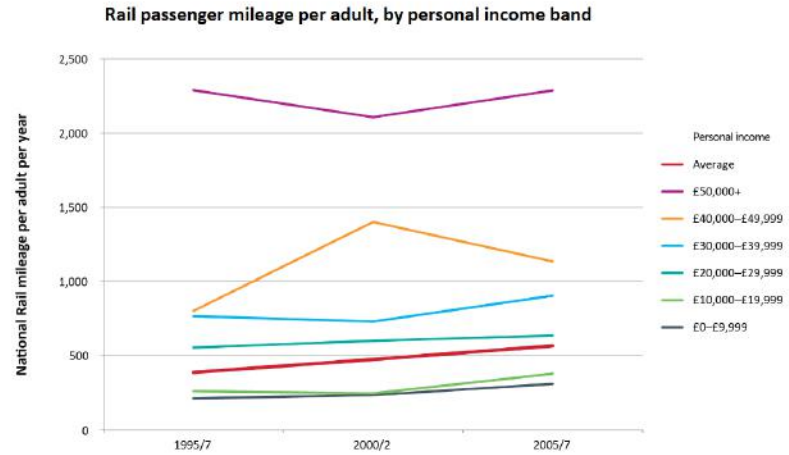
Car usage appears to be influenced less by income and occupation than in the past, with mileage for the highest and lowest groups tending towards the average.

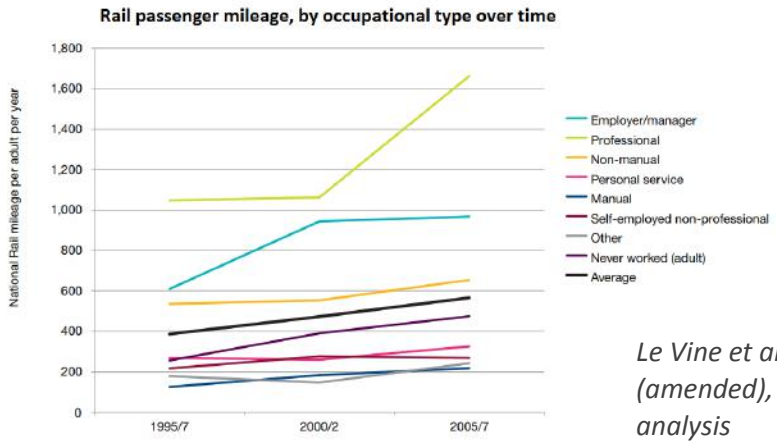
Rail mileage is increasing for all, but in particular professional groups.

Figure 3.5: Trends in car and rail mileage by income and occupation









Le Vine et al (2012) (amended), sourced from NTS analysis

User Segmentation

3.38 User segmentation refers to the process of dividing a broad population, consumer or business market into specific *segments* or groups with similar behaviours, based on common characteristics such as similar demographics or attitudes. Such characteristics are argued to form a key differentiators of a group's behaviour, and segmentation can therefore help to better understand their motivations, behaviours and attitudes.

3.39 Whilst market segmentation is commonly used in a commercial context (such as to target advertising for specific products more effectively), it has also been used in a transport context to better understand the travel behaviours, attitudes and motivations of specific socio-demographic groups within local geographies. This can help to ensure that transport infrastructure is planned more effectively, and targeted towards the needs and attitudes of local populations.

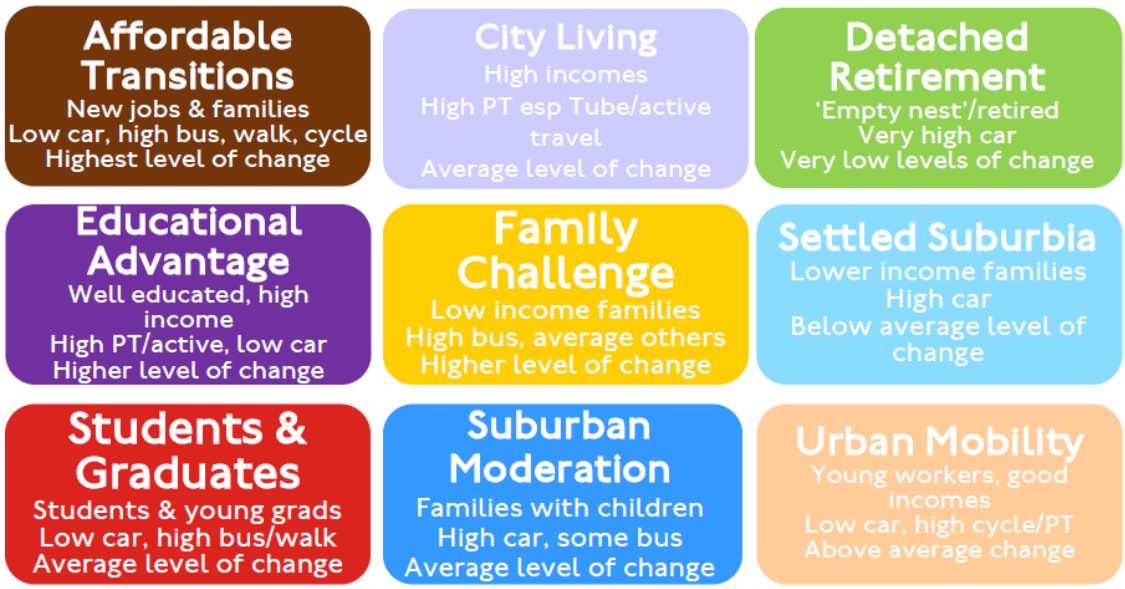
Recent Approaches to User Segmentation

3.40 Steer Davies Gleave (2014, 2017) has adopted segmentation techniques in several contexts to better understand the travel behaviours and motivations of different demographics.

3.41 On behalf of Transport for London (TfL), Steer Davies Gleave (2017) constructed a multi-modal segmentation tool to support TfL's understanding of the distinct groups of Londoners that its network serves, and their respective travel patterns. The resulting *Transport Classification of Londoners (TCoL)* tool categorised Londoners into nine segments based on socioeconomic and travel behaviour variables, such as life stage, mode use and the propensity to change travel mode.

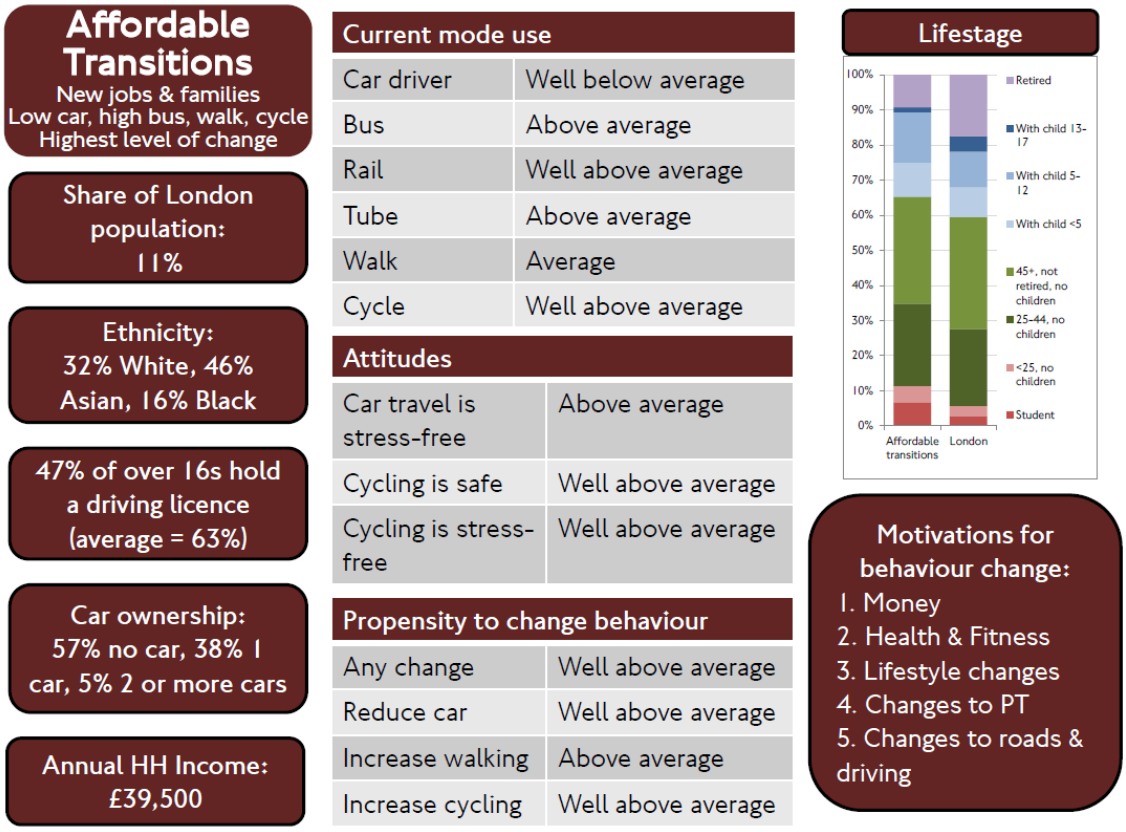
3.42 Figures 3.6 presents these nine segments, and Figure 3.7 a sample 'pen portrait' used to summarise the behaviour of one segment of Londoners. Segments were also mapped at an Output Area level to better understand the geography of these segments within the Capital.

Figure 3.6: Transport Classification of Londoners – Segment Summary



Source: Transport for London (http://content.tfl.gov.uk/transport-classification-of-londoners-presenting-the-segments.pdf)

Figure 3.7: Pen Portrait for the 'Affordable Transitions' user segment

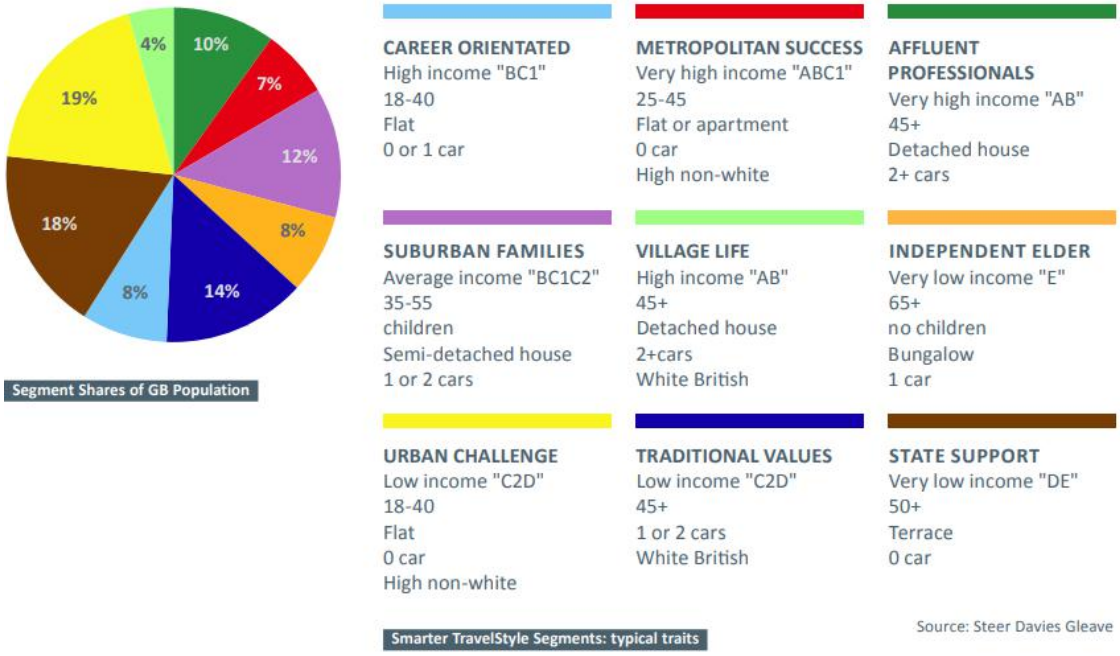


Source: Transport for London (http://content.tfl.gov.uk/transport-classification-of-londoners-presenting-the-segments.pdf)

3.43 Previous work by Steer Davies Gleave (2014) constructed *Smarter TravelStyle*, a bespoke segmentation tool which understands an area in terms of the local population's receptiveness to smarter choices or travel behaviour change projects. Past applications have included identifying the most suitable neighbourhoods for undertaking Personalised Travel Planning (PTP) or investing in cycling infrastructure. There are nine segments, each with its own attitudes, travel preferences and propensity to respond. Figure 3.8 shows the nine segments within Smarter TravelStyle, and an overview of the key demographic traits identified for each segment.

3.44 Analysis by Thornton *et al.* (2011) segmented the population based on attitudes to climate change and travel decisions. Nine segments were developed from variables such as self-reported travel behaviour, interest in reducing emissions and sociodemographic factors, with six segments of 'car owners' and three segments of 'non-owners', reflecting the status of car ownership as a key determinant of travel behaviour. Each segment differed in both their current environmental 'impact' and their 'potential for change'. The segments were designed to support local communities develop targeted sustainable transport initiatives which reflect of the nature of local populations.

Figure 3.8: Smarter TravelStyle segments



3.45 Segmentation techniques have also been used outside of a purely transport planning context, in order to better understand the nature of local geographies and populations, or better target other public policy initiatives. Singleton *et al.* (2017) created the *London Workplace Zone Classification (LWZC),* a workplace typology for Greater London. Data from 2011 census and other sources was used to group census Workplace Zones (WZ) into segments based on workers' and businesses' characteristics, such as commuting patterns and residential context, to better understand the geography of local employment within London.

3.46 Anable (2005) segmented visitors to National Trust sites based on their propensity to switch transport modes and their motivations for doing so. The study focused on how attitudes, beliefs and psychological factors influence the propensity to change travel behaviour, to assists in the design on a mobility management policy. Sociodemographic variables such as age or gender were not included in the six resulting segment profiles.

3.47 Transport Systems Catapult (2015) developed a basic segmentation of types of travellers based on both their travel behaviour and their possible response to intelligent mobility opportunities, such as their attitudes towards 'physical' car ownership and use of digital infrastructure (such as smartphone use). This was used to identify key audiences and target groups for intelligent mobility opportunities, as outlined in Figure 3.9.

3.48 Sport England and Experian (2010) segmented the adult population of England into 19 segments based on the propensity a group of individuals would have to take part in an activity or have a motivation or attitude towards sports.

Figure 3.9: Transport Systems Catapult traveller segments

Traveller[1] Type	Description	Intelligent Mobility Opportunity
Progressive Metropolites	Living in the heart of the city, typified by the technology-savvy young professional, with significant amounts of personal and business travel. Want to reduce their transport footprint.	Leverage as lead users for new intelligent mobility solutions (shared, digital) in urban environments.
Default Motorists	High mileage drivers, with a mix of those who enjoy driving and many for whom it is a functional choice.	Remove the burden of driving – either through increasing productive time, or by providing viable alternatives.
Dependent Passengers	Dependent on others for their mobility needs, representing a mix of students, elderly, and those with impairments.	Develop solutions that can increase independence without relying on being driven in a personal vehicle.
Urban Riders	City dwellers, who travel less frequently than the Progressive Metropolites, making use of public transport available to them.	Well served today, although potential to improve access to national transport services.
Local Drivers	Mainly retirees or stay at home parents, making low mileage local journeys.	Their needs are currently well met. Possible opportunity to improve current experiences.

Source: Transport Systems Catapult

Methodological Approaches

3.49 User segmentation has traditionally relied on the use of existing geodemographic segmentations – such as the Output Area Classification or MOSAIC – as a starting point. These provide an existing segmentation based on the 'clustering' of socio-demographic variables. For example, statistical analysis of correlations between variables from the 2011 Census – such a tendency for households with higher incomes to live in detached houses, often in suburbs or semi-rural areas with high levels of car usage – forms the basis of the 24 subgroups within the Output Area Classification.

3.50 Existing segments can then be combined and amended based on further primary and secondary research based on specific variables of interest (such as transport behaviour) to develop the desired user segmentation. Other approaches have involved a greater focus on primary research (such as Anable, 2005), or where an existing geodemographic segmentation cannot be used, a 'bottom-up' analysis of Census data (see Singleton *et al*., 2017). These approaches are discussed below.

Steer Davies Gleave (2017): TfL Classification of Londoners

3.51 The Transport for London Classification of Londoners (Steer Davies Gleave, 2017) uses the London Output Area Classification (LOAC) as the starting point. LOAC is a version of the Output Area Classification developed from the 2011 Census specifically for the Capital.

3.52 Survey data such as the London Travel Demand Survey and a bespoke Segmentation Survey were analysed to identify seven socioeconomic and travel behaviour variables which exhibited the greatest differentiation between groups in terms of propensity to change travel modes. LOAC Sub Groups were grouped together based on these variables to form nine segments, with further analysis of survey data used to understand the profile of each segment in greater detail.

Sport England and Experian (2010): Sport Market Segmentation

3.53 Sport England and Experian (2010) used MOSAIC, an alternative geodemographic tool developed by Experian with a greater focus on commercial applications, to segment the adult population of England down to a postcode level. This was used combined with PIXEL, a person-level combination of key variables, to provide sociodemographic detail for the segments. Cluster analysis on survey data containing attitude and motivation questions, such as the 'Taking Part' survey, was then carried out to identify 19 distinct segments. Additional socio-demographic and attitudinal datasets were then analysed using these segments, to provide additional detail and 'colour' into each segment.

Steer Davies Gleave (2014): Smarter TravelStyle

3.54 Similarly, Smarter TravelStyle is based on the MOSAIC system, which classifies UK postcodes into 66 different segments. Over 400 variables were used to build the classification, around half of which were from the 2011 census. Ten segments were developed, each of which vary with their propensity to respond to different measures and policies, such as promoting electric vehicles or providing car clubs. TravelStyle was first developed for the rail industry, but has been tailored for different markets using datasets such as the London Travel Demand Survey, customer databases and numerous local travel surveys.

Singleton et al. (2017): London Workplace Zone Classification

3.55 The London Workplace Zone Classification (LWZC) used data from the 2011 census (amongst other sources) to group census Workplace Zones (WZ) into segments, based on workers' and businesses' characteristics. The study required the manipulation of data sources at Output Area (OA) level, to be able to use them at the scale of the WZ. The correspondence between OAs and WZs was identified using zonal shapefiles, the Office for National Statistics Postcode Directory (ONSPD) and the 2011 census Postcode headcount data. The final selected variables were statistically clustered to draw associations between WZs sharing characteristics.

3.56 Consultation with stakeholders took place during the creation process, to identify variables that were viewed as important in determining the segments, such as Commuting Patterns, Residential Context and Employee Characteristics.

Transport Systems Catapult (2015): Traveller Needs Study

3.57 Based on a large market research sample of 10,000 respondents, together with expert and company interviews, TSC developed a segmentation based on primary research tailored to specific indicators of possible opportunities – such as smartphone use. Such an approach benefits from being able to develop segments based on specific attitudinal data commonly lacking from existing datasets – such as the extent to which individuals try to optimise their travel to the good of society or are likely to consider the use of autonomous vehicles – helping to create a unique and highly focused segmentation.

Anable (2005): 'Complacent Car Addicts' or 'Aspiring Environmentalists'? Identifying travel behaviour segments using attitude theory

3.58 Relying on primary research, Anable utilised established psychological theory to categorise National Trust visitors, based on their propensity to switch transport modes and their motivations for doing so. A bespoke self-completion questionnaire was administered to around 1000 National Trust visitors, using multi-dimensional attitudinal statements based on a version of the Theory of Planned Behaviour (TPB). The variables used in the questionnaire also

included those identified as important in a literature review and focus groups, such as environmental knowledge.

3.59 Data on travel behaviour was collected through self-report of travel use, frequency of the use of modes and observed behaviour on the survey day. Statistical analysis was conducted on both the questionnaire and travel behaviour data to segment the respondents. Six distinct groups, each of which with a unique psychological profile, were identified. Each exhibited difference in the degree to which public transport, cycling and coach travel are perceived as a viable alternative to the car for day trip travel. Socioeconomic and demographic factors were found to have little variance amongst the segments and so were excluded.

3.60 These driver typologies were also later used by Steer Davies Gleave with Anable and Stradling to add an attitudinal dimension to the MOSAIC-based geodemographic database, with the aim of creating a more comprehensive segmentation of drivers for Transport for London.

Thornton et al. (2011): Climate Change and Transport Choices Segmentation Model

3.61 Thornton *et al*. segmented the population based on attitudes to climate change and travel decisions for the Department for Transport (DfT). A bespoke survey was designed to complement previous studies, such as the National Travel Survey, and captured variables on travel behaviour, environmental attitudes and behaviours and demographic factors. Nine key segments were identified through cluster analysis and focus groups were used to test the segmentation and further understand attitudinal differences, such as the barriers and motivations to using different transport modes.

3.62 The study recognised that 'the attitude-behaviour gap can be wider in relation to travel behaviour compared to other green behaviour' (Anable *et al*., 2006) and therefore unlike Anable (2005), chose to discriminate segments by socio-demographic factors as well.

3.63 The study also incorporated some ad hoc segmentation in that car users and non-car users were segmented separately. This enabled the widest possible selection of attitudinal, behavioural and structural factors to be included in the segmentation model, as respondents were able to answer all of the questions given to them.

Strengths and Weaknesses

3.64 Perhaps the key difference amongst the studies is that some implement geodemographic techniques, whereas others solely use attitude-based survey data. Strengths of the geodemographic technique include that it is possible to 'build up' segment profiles for an area. MOSAIC allocates every postcode in the UK to a segment, meaning it is possible to profile almost any area, town, neighbourhood or catchment area, whereas the OAC/LOAC segmentation can be applied to any Output Area within the UK/London, including for example along specific public transport routes or for particular neighbourhoods.

3.65 An advantage of using the OAC/LOAC classification is that it is open source (unlike geodemographic systems such as ACORN and MOSAIC), meaning that they can be used without licensing restrictions and they can be distributed freely. While there is a limitation in that OAC/LOAC treats the entire population of an output area as being from the same segment (approximately 300 people), this is typically only an issue when using segmentation at a very disaggregate level, such as individual streets.

3.66 Underpinning segments on the basis of a geo-demographic classification also means that segments can be appended to additional data sources, such as customer records or Electoral

Rolls. This provides a wealth of data which can be utilised when there is a desire to go into greater depth, such as when evaluating a particular policy. Thornton *et al*. (2011) also note that by producing segments that are demographically distinct, travel campaigns and messages can be targeted at specific segments, as much is already known about the demographic profiles of media audiences. Such techniques allow the widest possible selection of factors to be included in the segmentation model, such as car ownership, as segmentation techniques work best when all measures have been asked of all respondents.

3.67 Studies tend to overlay geodemographic segmentation with attitude and behaviour survey data, to estimate the propensity of a segment to behave in a certain way and to add 'colour' to segment profiles. In a review into the segmentation of businesses based on their travel behaviour, Pangbourne *et al*. (2015) note that relying solely on variables defining business demographics would be "too broad to be meaningful given the diversity in behaviours and determinants within the modes". Statistical analysis on existing or bespoke survey data is most commonly used to identify these variables which significantly differ between groups. Some studies also conduct primary research such as focus groups with stakeholders and interviews with respondents, to identify variables which are viewed as important or to further refine attitudinal variables.

3.68 Attitudinal surveys based on primary research (such as TSC, 2015 or Anable, 2005) can be highly effective in exploring factors poorly covered within secondary datasets (such as the Census), or where segments are expected to be driven by different socio-demographic factors to those captured within the OAC or MOSAIC. However, a reliance on primary research can mean they lack analytical depth with smaller sample sizes, and it can be difficult to map the locations of individuals within distinct segments since the geography of individuals within each segment cannot be identified unless links are made to those other secondary (such as Census) datasets. Other issues can arise from the existence of a 'attitude-behaviour gap' in travel behaviour, with Thornton *et al*. (2011) noting that purely attitudinal segmentation may not differentiate between actual travel behaviours, together with the more subjective nature of capturing attitudes.

Geo-demographic approaches (e.g. OAC / MOSAIC) benefit from the ability to rapidly develop segments using existing demographic data which can be easily mapped to understand their geographies.

However, they can suffer from problems regarding data availability – especially where segments need to be highly focused or based on traveller attitudes.

Alternatively, primary research can be used, but this may lack analytical depth (dependent on sample sizes), and can only effectively be mapped by linking to other secondary datasets (e.g. Census).

4 Transport, Travel Patterns and the Northern Economy

Introduction

4.1 Chapters 2 and 3 focused on exploring the evidence base regarding the headline transport trends within the North for *individuals*, together with analysis of how travel behaviour varies amongst different socio-demographic groups. This chapter explores the evidence base regarding the performance of the Northern economy and the role of transport infrastructure in supporting economic activity, and explores how workers within different economic capabilities (defined as part of the NPIER) currently travel.

4.2 Different groups of workers exhibit different travel patterns, influenced by the geography and type of employment, together with their occupation. Understanding the makeup of the Northern economy, its strengths and weaknesses, and possible future economic trajectories, enables us to understand how the composition of the Northern workforce could change and thereby how this change may influence travel patterns in future.

4.3 If the Northern economy were to become more productive, for example, the number of 'skilled young professionals' could be expected to increase in population whilst the number of people with lower skills or out-of-work would be expected to decline – with associated changes in the population of associated segments. As skilled young professionals have different travel patters to those out of work, other things being equal such a change would also influence the volume and nature of travel in the North.

4.4 Understanding the current economic performance of the North – and hence the background to any subsequent changes in the socio-demographic mix of the Northern population – is hence important to understand possible future trajectories for the TfN user segments outlined in this chapter.

Economic Performance and the NPIER

Current Economic Performance and Trajectories for Future Growth

4.5 In 2015, the North of England generated an economic output of around £290bn of Gross Value Added (GVA), approximately one-fifth of the UK's total. While the North is home to many international-class assets, research, businesses and expertise, as highlighted by the Northern Powerhouse Independent Economic Review (NPIER), there remains a persistent gap in productivity relative to the rest of the UK.

4.6 The NPIER identifies that GVA per capita within the North is 25% below the rest of England, or 10-15% below the rest of England excluding London, a gap which has broadly persisted for

thirty years and widened since the 2008/2009 recession. However, as argued by Osbourne (2015), boosting productivity within the North represents a significant opportunity for the country as a whole. HM Treasury indicates that if the Northern economy were to grow as rapidly as the UK average to 2030, compared to its historical growth rate over the past two decades, economic output would be £37bn higher in real terms (Osbourne, 2015)[11].

> If the Northern economy were to grow as rapidly as the UK average to 2030, compared to its historical growth rate, economic output would be £37bn higher in real terms

4.7 The NPIER also identifies that in a 'business as usual' scenario the 'productivity gap' between the North and the rest of England would continue to widen, with an annual rate of GVA growth 0.3% behind the rest of England to 2050. In a 'transformed future' scenario where the growth rate in the North matches that of the UK average, GVA would be 15% greater, with a 4% increase in productivity and an additional 850,000 jobs by 2050 relative to the 'business as usual' approach.

4.8 The NPIER argues that achieving this 'transformed future' scenario will need growth in a number of economic 'capabilities' in which the North benefits from key strengths and competitive advantage. It identifies four 'prime' capabilities – advanced manufacturing, health innovation, energy and digital – argued to be key drivers, together with three 'enabling' capabilities – financial and professional services, logistics and education – which support these drivers.

Travel Patterns by NPIER Capability

4.9 Workers within each of these seven capabilities have distinctive travel patterns, in part a result of the different geographies and occupational breakdowns within each capability, but also because of the different mix of people who work in each capability. As outlined in Chapter 2, more highly skilled and/or qualified individuals, and those employed in professional and technical positions are more likely to travel more and over greater distances, especially by rail. Notably, in 2013, individuals within the three highest occupational groups accounted for over 70% of total rail passenger miles.

4.10 Since those employed in the four prime and three enabling NPIER capabilities are typically more highly skilled, better qualified and in higher occupational groups, they would be expected to have a greater propensity to travel, especially by rail. By combining evidence regarding the travel habits of different groups of people with information on the prevalence of those groups in the NPIER capabilities, the travel behaviour of a worker within each capability can be estimated.

[11] https://www.gov.uk/government/speeches/chancellors-speech-at-the-cbis-2015-annual-dinner

Note on Estimation of Travel Behaviour by NPIER Capabilities

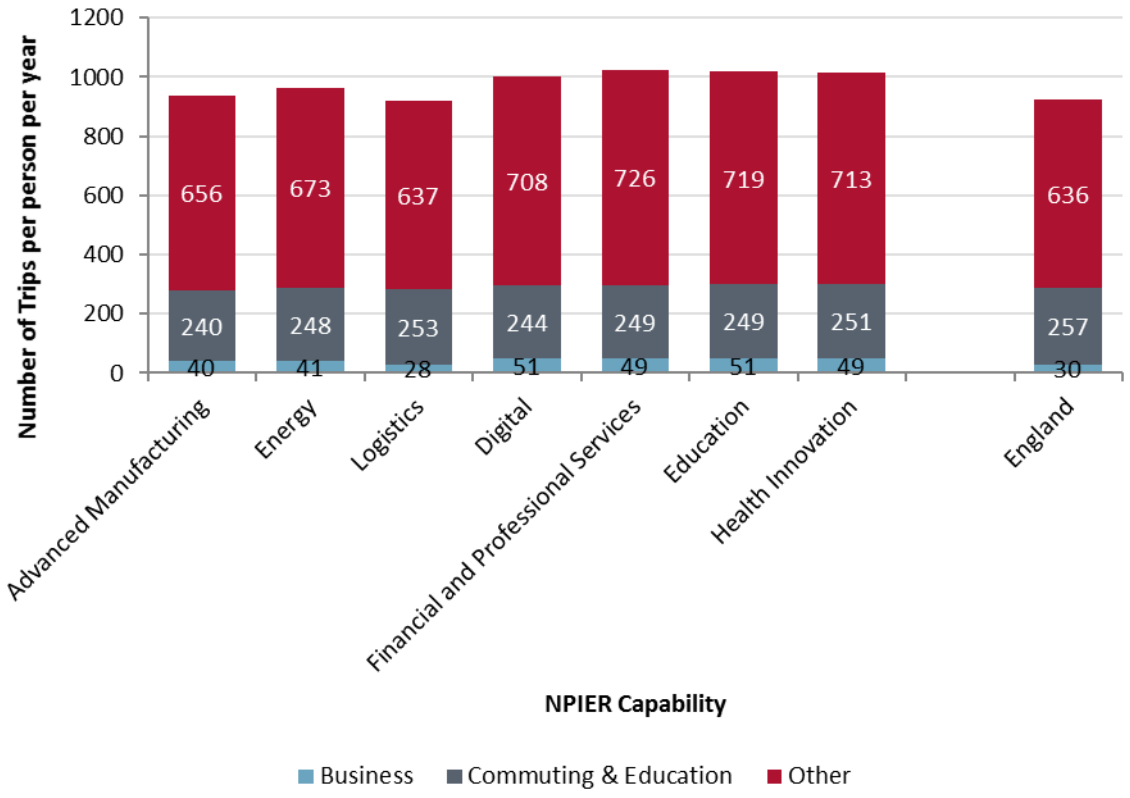
Specific travel behaviour data is not available within the NTS by NPIER capability. However, each capability is made up of workers within specific industries, which can be linked to the Standard Industrial Classification (SIC) at a 2-digit level using a lookup developed by Cambridge Econometrics as part of the NPIER. The occupational breakdown of workers within each capability can then be estimated using a lookup, developed by the ONS, to the Standard Occupational Classification (SOC) based on the SIC breakdown of each capability.

NTS data is available for *England only* for 2013, which provides details on travel behaviour (all trips and rail trips) of individuals by their occupation (SOC). Hence, based on a weighted average of the occupational and industrial split of each capability, the travel behaviour of an individual within that capability can be estimated.

It should be noted that these are estimates, and are based on travel behaviour data for individuals in England, not the North (although the lookups used are specific to the North). However, they form a useful indication of the differences in behaviour amongst the capabilities.

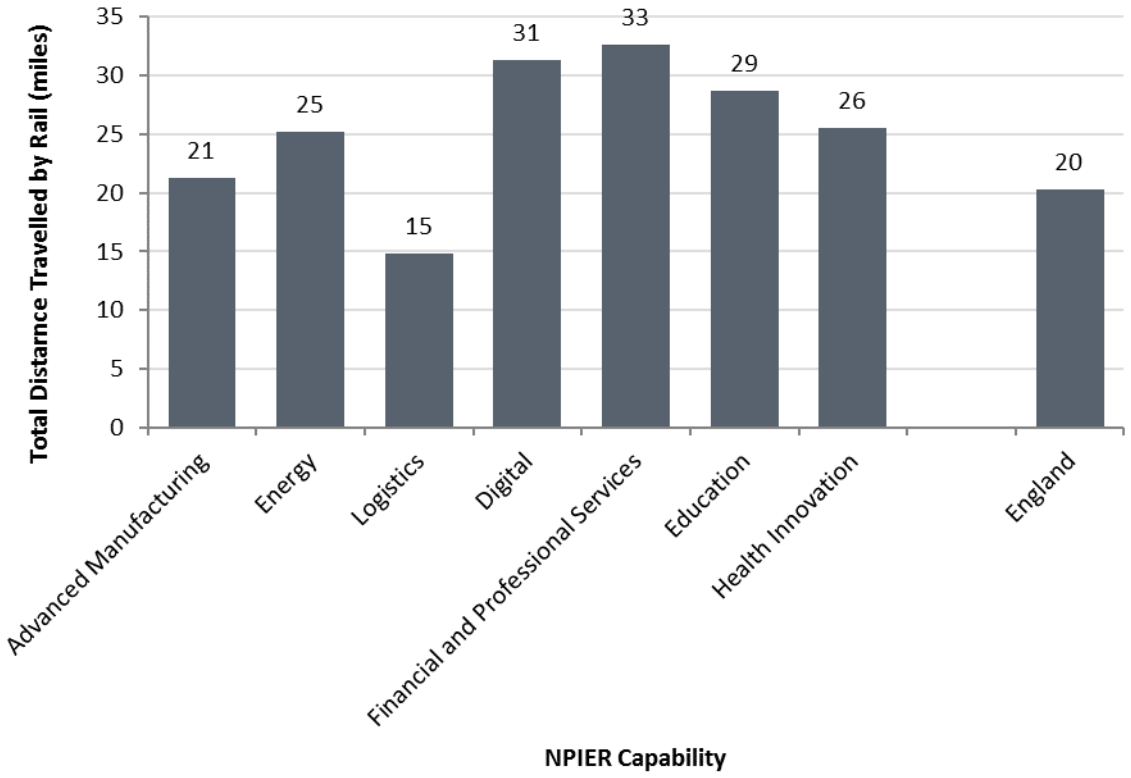
4.11 Figure 4.1 shows the *estimated* total number of trips per person by each NPIER capability by journey purpose, based on 2013 National Travel Survey data, and Figure 4.2 shows the estimated number of rail trips per person by each NPIER capability.

Figure 4.1: Weighted average total trips per person per year by NPIER Capability *in England*



Data Source: Analysis of National Travel Survey (2013) and Business Register and Employment Survey (2015) data

Figure 4.2: Weighted average rail trips per person per year by NPIER Capability *in England*



Data Source: Analysis of National Travel Survey (2013) and Business Register and Employment Survey (2015) data

4.12 Whilst there is limited variation in total number of trips, it can be observed that, with the exception of logistics, individuals employed in the NPIER capabilities have a greater propensity to travel by rail than the national average. Each worker within Finance and Professional Services, for example, makes more than 50% more rail trips than the national (England) average.

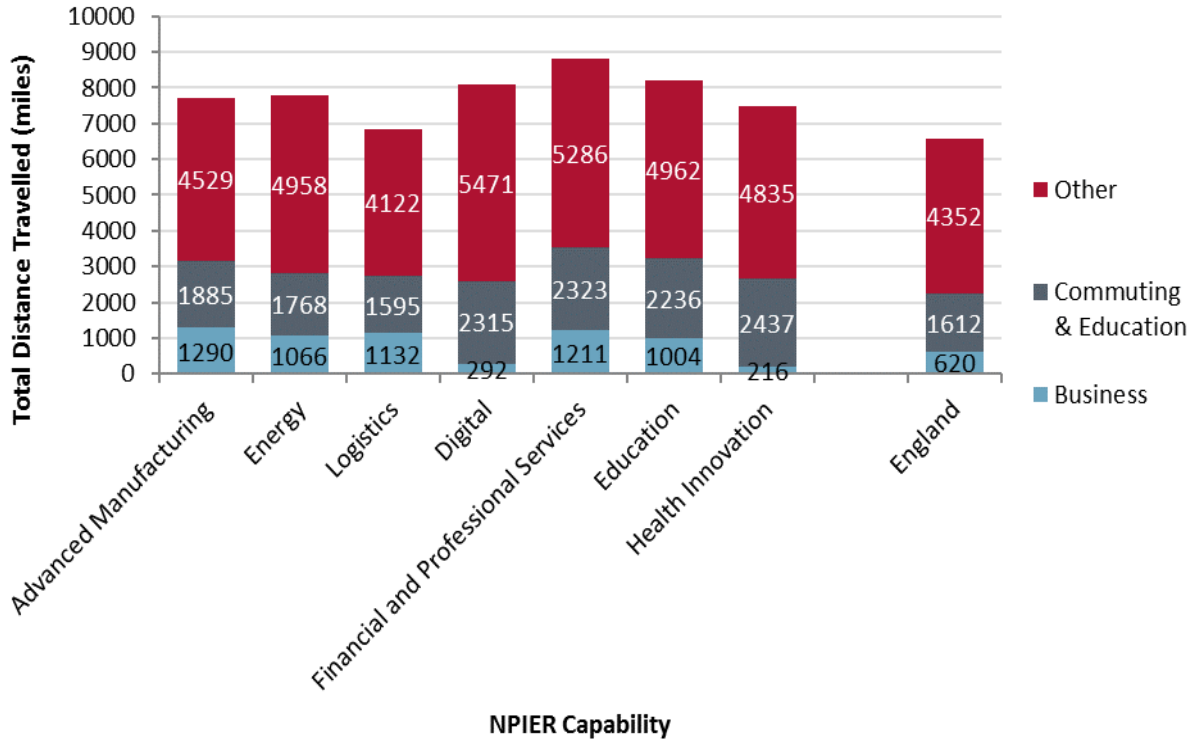
4.13 Similar trends can be observed in terms of total distance travelled. Figure 4.3 and 4.4 show the total distance travelled, and total distance travelled by rail, per person by NPIER capability respectively.

4.14 Workers within all capabilities travel greater distances than the England average, with those in the digital, financial and professional and educational capabilities travelling the greatest distances. Notably, workers within Finance and Professional Services travel the greatest distances for business, and more than 65% further by rail than the England average.

Workers within different NPIER sectors exhibit different travel patterns, largely a result of the different split of occupational groups within each capability compared to the rest of the country.

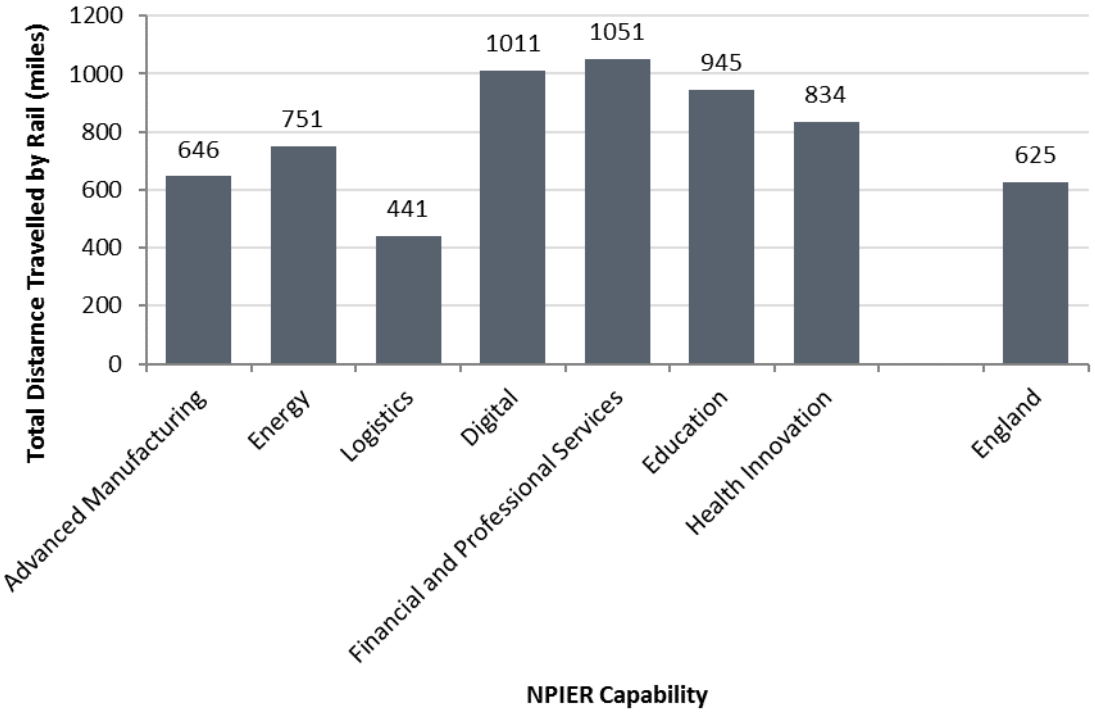
Except Logistics, workers within the NPIER capabilities have a greater propensity to travel – especially by rail – than the England average.

Figure 4.3: Weighted average total distance travelled per person per year by NPIER Capability *in England*



Data Source: Analysis of National Travel Survey (2013) and Business Register and Employment Survey (2015) data

Figure 4.4: Weighted average total distance travelled by rail per person per year by NPIER Capability *in England*



Data Source: Analysis of National Travel Survey (2013) and Business Register and Employment Survey (2015) data

Exploring the 'Performance Gap'

4.15 The NPIER identifies two core factors as the cause of the 'performance gap': the lower economic activity rate within the North, and lower productivity per worker. Several factors are argued by the NPIER to drive the productivity gap between the North and the rest of the UK, including:

- **Skills** are argued to be the most significant driver, with the North having both a higher percentage of people with lower skills levels and a lower percentage of people with higher skills than the rest of the country, in part shaped by the out-migration of skilled workers (especially graduates) to London and the South East;
- **Enterprise, Innovation and Technology,** with fewer new businesses, less patents and 'creativity' and investment in the science, research and innovation base;
- **Investment,** with lower capital investment compared to the rest of the country;
- Limited **agglomeration**, and relatively **poor transport connectivity** between the North's economic centres, with each Northern city being too small individually to take full advantage of the positive externalities associated with the concentration of economic activity within the North.

4.16 In a 'transformed future' scenario, the Northern economy would become more productive partly through increasing the skills of its workforce and lowering levels of economic inactivity. As shown in Chapter 2, both these factors are associated with an increased propensity to travel. All other things being equal, increased productivity would therefore be expected to lead to marked changes in both the travel patterns of individuals and aggregate patterns across the entire North.

4.17 Changes in investment or economic agglomeration could also be expected to lead to greater employment within higher-level occupations and higher incomes, and potentially different lifestyles, leading to further changes in travel patterns. Understanding how these factors – and the wider success of the North's economy – could change in future is therefore key to understanding future changes in travel patterns.

Transport Connectivity and Economic Agglomeration

4.18 Furthermore, poor transport connectivity in particular is argued within the NPIER to represent one, but by no means the only factor, hindering the North's productivity. Since the North is argued to be fragmented by poor transport links between key settlements, the agglomeration benefits that come with the concentration of economic activity – including sharing common resources, increased economic specialisation, deeper labour markets and better matching of employers and workers, and increased knowledge spill-overs – are limited.

4.19 This relationship between transport and the economy is highlighted by One North (2014), which concludes that transformed transport connectivity should be at the heart of delivering transformed economic growth in the North. Transport connectivity was argued to increase employment through improved access to employment sites, with productivity boosted through improving the attractiveness of investment and by allowing firms to specialise and innovate through accessing more extensive labour markets.

4.20 Hence, the NPIER argues that enhanced pan-Northern *city-centre to city-centre* rail links are needed specifically to facilitate the larger labour markets that support the success of knowledge-based firms. This is partly since those who work in the prime and enabling

capabilities tend to be higher skilled, travel further than average and have a higher propensity to use rail. Businesses in the capabilities and in sectors such as retail, leisure and hospitality have a high propensity to locate in and around town and city centres. Therefore, if these capabilities and sectors grow, improved city-region transport will be needed to support this growth. Improved access to international gateways, such as Manchester Airport, will also be necessary; businesses within the seven NPIER capabilities rely heavily on international connectivity to compete for investment. Much advanced manufacturing, for example, is reliant on air freight for the export of low-volume, high-value products.

4.21 NPIER also highlights the importance of *integrated* city-region public transport systems, in terms of joining up with wider networks, including frequent rail services, light rail and bus, and by being supported with multi-modal smart ticketing systems.

4.22 Together, these considerations have led to developments such as the Northern Powerhouse Rail (NPR), a North-wide programme of connectivity enhancements, facilitating faster and higher capacity rail services between Liverpool, Manchester, Sheffield, Leeds, Hull, Newcastle and towns and cities in between, and to Manchester Airport. The National Infrastructure Commission (NIC) considered the connectivity needs of the North in its report *High Speed North* and identified that the cities of the North need to be connected by a railway that is faster and more reliable than today's. The report recommended a high capacity rail network, which rather than being a single piece of new infrastructure should be fully integrated with the current network (including HS2). While it called this network *HS3,* the NIC proposition is synonymous with Northern Powerhouse Rail.

Implications for Travel Behaviour

4.23 Major new infrastructure schemes, be they road or public transport focussed, have the ability to change travel patterns within the North, opening up new commuting and business opportunities for residents and companies within the North. If met, the NPR outputs would increase the number of higher skilled workers within 45 minutes from home of two or more Northern cities more than five-fold, and bring 58,000 businesses within 45 minutes of two or more of the largest Northern cities[12].

4.24 Different groups of people will be expected to take advantage of these opportunities, with the user segments outlined in Chapter 5 providing a robust starting point for identifying *which* groups of people have the greatest likelihood of altering their travel behaviour to take advantage of new employment opportunities. Continued growth in employment in the NPIER capabilities – each with their respective travel behaviours – could further be expected to drive increased demand for travel, especially by rail.

> New transport infrastructure has the ability to create new commuting and business opportunities, which will benefit specific groups within the North.
>
> Growth in the NPIER capabilities will create changes in travel patterns within the North, and could drive increased demand for travel, especially by rail.

4.25 Further discussion of the wider linkages between transport and the economy is provided in Appendix A.

[12] Steer Davies Gleave Analysis of NPR and Business Accessibility, December 2016

5 User Segmentation

Introduction

5.1 Chapter 3 outlined some previous approaches to segmenting groups of people based on their travel behaviour and socio-demographic characteristics. Building upon this, along with our analysis of travel behaviour in the North and the findings of our literature review, this Chapter describes our segmentation of groups of people within the North of England. These are summarised in a series of distinct 'pen portraits'.

Approach

Determining the Broad Methodology

5.2 Prior to developing our segmentation of different groups of people within the North and informed by our past experience and the literature review, we determined a number of key principles. These identified the need for the segmentation to be:

- **Comprehensive** - the segmentation should cover the entirety of the North of England, with every area allocated to a distinct segment;
- **Distinctive** – the specific segments should be distinctive, with clear differences in socio-demographic characteristics and travel behaviour between them;
- **Geographic** – the segmentation should be based on geographic areas, both to ensure that the segments can be mapped, as well as the travel behaviours of people within different places can be best understood;
- **Evidence-based** – developed using a 'bottom-up' approach, based on robust data to identify patterns between travel behaviour and socio-demographic variables. In practice, this pointed towards a segmentation based on National Travel Survey data, since it provides the only North-wide detailed data linking travel behaviour to socio-demographic indicators;
- **Open-sourced** – use data that is publicly available and accessible, to ensure that the methodology and makeup of the segments can be easily understood and recreated, rather than relying on commercial datasets that are not easily shareable.
- **Limited in number –** to be useful and tractable, previous experience suggests that there should be no more than a dozen segments.

5.3 Previous approaches (as identified in Chapter 3) have either used travel behaviour data (perhaps supplemented by primary research to amend existing geodemographic segmentations such as the Output Area Classification (OAC) or MOSAIC), or alternatively used a bespoke segmentation based on primary data typically collected from individuals.

5.4 Our aim of developing a comprehensive segmentation for the North, together with the need to map segments geographically, strongly pointed towards the use of an existing

geodemographic segmentation, supplemented by additional data. While both the OAC and MOSAIC could be used for this purpose, only the OAC is based on publicly-available non-commercial data, and was hence deemed most suitable on which to develop the segmentation.

5.5 National Travel Survey data, as outlined earlier in this report, provides the most robust and comprehensive evidence base for understanding the travel behaviour of different groups within the North. Additionally, within the NTS there is a link between an individual (and their subsequent travel behaviour) and their OAC group, together with a number of other socio-demographic indicators including age, life stage, geography of residence (rural/urban and metropolitan/non-metropolitan area) and income. These allow OAC groups to be split and joined based on differences in travel behaviour within these indicators. Combining the NTS with the OAC therefore allows Output Areas in the North to be mapped against a specific user segment with identifiable travel characteristics. Output Areas can be combined to larger geographic units, for example Local Authority Districts.

Developing the Specific User Segments

5.6 As set out above, the ONS's Output Area Classification formed our starting point for the TfN user segmentation. Table 5.1 shows the proportion of the North's population in each of the OAC groups. As outlined in Chapter 2, travel behaviours of each group – in terms of their propensity to travel by different modes – have been analysed and this confirmed that each group is sufficiently distinctive to form the basis of the TfN segmentation.

Table 5.1: Summary of OAC Groups

OAC Group	% of North population
Constrained city dwellers	9%
Cosmopolitans	3%
Ethnicity central	1%
Hard-pressed living	27%
Multicultural metropolitans	10%
Rural residents	8%
Suburbanites	25%
Urbanites	16%

5.7 However, it was noted that there are significant differences in the population of each group within the North. This undermines the ability for the OAC segments to reflect a comprehensive view of the population of the North. Notably, 'Ethnicity Central' – a group whose population is primarily concentrated within inner city areas in London – only represents 1% of the North's population; conversely, more than half of the population of the North falls within the 'Suburbanites' and 'Hard-Pressed Living' groups. Hence, it was decided to combine and split the OAC groups to better reflect the population of the North.

5.8 Any split would need to be based on socio-demographic variables that:

- are both available within the NTS data and at a local geographic level (preferably Output Area) from the Census or other datasets, covering the entire North;
- create segments with different travel behaviours, to ensure that the new segments are sufficiently distinctive from one another.

5.9 Several possible variables were identified for this purpose:

- **Income** – whilst income was found to be a clear differentiator of travel behaviour (as outlined in Chapter 2), and is available within the NTS, it is not available at a sufficiently local level within the Census or other ONS datasets;
- **Life stage** (retired/full-time worker/family status/etc) – key events in life were also identified with differences in travel behaviour, and data regarding this is available both in the NTS and at local geographies from the Census. However, there is clearly significant variation between the life stages of individuals within any single population – every town in the North will have a different mix of retired people, students, young people with families and so forth. Hence, whilst groups could be split based on whether an area had, for example, more retired people than average, NTS data would only be available for a segment comprised *entirely* of retired people (rather than a greater proportion of retired people). Although weighted averages could be used to determine average travel behaviours within segments with a (higher than average) proportion of retired people, they would be less distinct, with less robustness within the data underpinning the segments;
- **Geography of residence** – whether an individual lives in an urban or rural area, or a metropolitan or non-metropolitan area, was also found to be a key differentiator of travel behaviour (Rural Residents, for example, travel further distances due to the need to travel further to access services and employment). Additionally, this data is available both in the NTS and at an Output Area level from ONS datasets.

5.10 Geography of residence was determined to be the best way of splitting the 'Hard-Pressed Living' and 'Suburbanites' segments. Several combinations of 'rural/urban' (based on the ONS classification) and 'metropolitan/non-metropolitan area' (based on standard local authority definitions of the five metropolitan areas in the North) were explored to identify which were associated with the greatest variation in travel behaviour. Based on this, the segments were split as shown in Table 5.2.

Table 5.2: Summary of OAC Group 'splitting'

OAC Group	Rural / Urban Classification (Output Area level)	Metropolitan / Non-Metropolitan Area (Local Authority level)	TfN User Segment	% North population
Hard Pressed Living	Urban	Metropolitan	Hard Pressed Living 2	14.5%
	Urban	Non-Metropolitan	Hard Pressed Living 1	9.7%
Hard Pressed Living	Rural	Metropolitan	Hard Pressed Living 1	0.7%
	Rural	Non-Metropolitan	Hard Pressed Living 1	2.6%
Suburbanites	Urban	Metropolitan	Metro Suburbs	12.7%
	Urban	Non-Metropolitan	Small Town Suburbs	9.5%
Suburbanites	Rural	Metropolitan	Small Town Suburbs	0.8%
	Rural	Non-Metropolitan	Small Town Suburbs	2.3%

5.11 Table 5.3 shows how the new TfN segments are made up from the OAC groups.

Table 5.3: OAC Make of TfN User Segments

TfN User Segment	OAC Group	Rural / Urban Classification (Output Area level)	Metropolitan / Non-Metropolitan Area (Local Authority level)	% North population
Hard Pressed Living 1	Hard Pressed Living	Urban	Non-Metropolitan	9.7%
	Hard Pressed Living	Rural	Metropolitan	0.7%
	Hard Pressed Living	Rural	Non-Metropolitan	2.6%
Hard Pressed Living 2	Hard Pressed Living	Urban	Metropolitan	14.5%
Metro Suburbs	Suburbanites	Urban	Metropolitan	12.7%
Small Town Suburbs	Suburbanites	Urban	Non-Metropolitan	9.5%
	Suburbanites	Rural	Metropolitan	0.8%
	Suburbanites	Rural	Non-Metropolitan	2.3%

5.12 'Ethnicity Central' and 'Multicultural Metropolitans' were also combined, reflecting the very small proportion of the North's population of the former, and the similar demographics, geographies and travel behaviours of the two groups.

5.13 This generated five distinct 'new' user segments, as shown in Table 5.4 alongside the four OAC segments that have been adopted unamended.

Table 5.4: Summary of 'new' TfN user segments

New/Existing	TfN User Segment	% North population
New	Hard Pressed Living 1	13.0%
	Hard Pressed Living 2	14.5%
	Metro Suburbs	12.7%
	Small Town Suburbs	12.6%
	Multiculturals (Ethnicity Central + Multicultural Metropolitans)	11.0%
Existing	Rural Residents	8.3%
	Urbanites	15.4%
	Constrained City Dwellers	9.2%
	Inner City Cosmopolitans	3.2%

5.14 The travel behaviour and socio-demographic attributes of each of these five 'new' segments – together with the remaining four OAC groups the definition of which are unchanged – was then analysed, and a series of pen-portraits were developed which succinctly characterise each group.

Pen-Portraits

5.15 Figure 5.1 presents the summary pen-portraits for each user segment, together with an accompanying map indicating the location of residents across the North. Each dot represents 100 people, and the shading and naming of local authorities on the maps corresponds to the five local authorities within the North that have the highest proportion of their population within that segment.

5.16 Table 5.5 summarises the key attributes of each segment.

Table 5.5: Summary of each Northern User Segment

Segment	% of the North's population	Key demographics	Key property/geography characteristics	Key travel characteristics
Rural Residents	8%	Older, married, better educated. Working in primary industries.	Rural, less dense, detached houses	High car ownership and car commuting
Small Town Suburbs	13%	Older and without children.	Outside metropolitan areas. Detached/semis majority owner occupied.	Travel more, travel further, less public transport. Greater car ownership & travel further by car. Significantly less bus.
Urbanites	15%	Employed full-time in middle occupational roles. Families with children & couples with no children.	Smaller towns and outer fringes of larger cities. Semis and terraces, majority owner occupied.	Travel more, travel more by rail, less bus. Own car and greater propensity to commute by rail
Hard Pressed Living 1	13%	Families with children. High percentage with no qualifications. Working in manufacturing.	Smaller towns and cities outside metro areas. Terraces houses and semis - around half rented.	Travel less, shorter journeys, considerably less by rail but much higher bus. Greater car ownership.
Constrained City Dwellers	9%	High percentage singles, divorced or widowed. High percentage with no qualifications, unemployed and long-term sick.	Densely populated, large towns and cities. High percentage social rented & flats.	Fewest trips, shortest distance, much more bus, much lower rail. More than 50% no car. High walking/bus commute
Inner City Cosmopolitans	3%	~50% students. Young, well educated, single.	Dense inner cities, private rented flats.	Significantly above average rail. Low car usage and ownership - almost 50% no car.
Multiculturals	11%	High percentage families with children. Younger with more children in households.	Larger towns and cities. Around half rented.	Travel less, shorter journeys. Much higher bus. Almost 50% no car.

Metro Suburbs	13%	Older, employed in high occupations. More likely to be employed full-time and aged 45-59.	Outer suburban areas of metropolitan areas. Majority owner occupied. Semis/detached.	Travel more & further by car and rail. Much lower bus. Car ownership higher. More likely to have 1-2 cars in household and travel to work by car.
Hard Pressed Living 2	15%	Families with children. Lower occupations in public admin & education. Relatively high percentage no qualifications.	Inner suburbs and small towns within metropolitan areas. Approximately half owner-occupied, living in terraces or semis.	Travel less and shorter distances. Slightly higher rail and much higher bus. ~30% no car. Commute more likely by bus & rail

Rural Residents

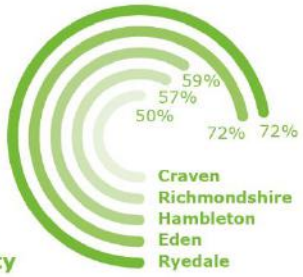
Propensity to Travel

Rural residents travel greater distances than other groups in the North, a result of a need to travel further to access employment and basic services. They are also more car dependent, with a smaller proportion of trips by rail or bus but these journeys are typically longer in distance.

1,283,600

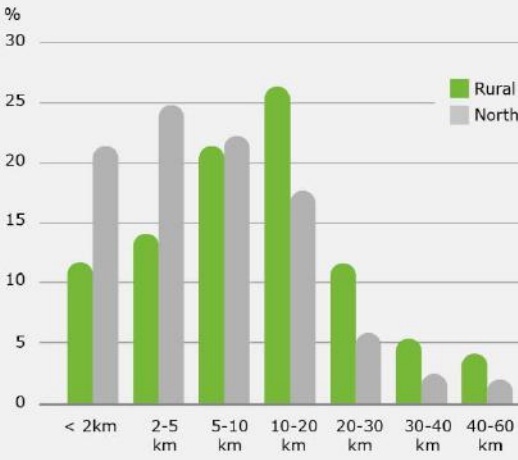
people are Rural Residents, which is

8 % of North's population

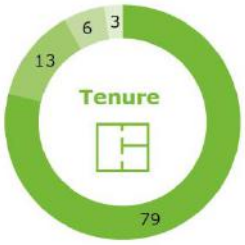


Highest % segment by local authority

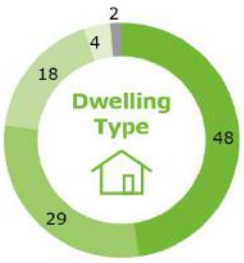
Propensity to Travel	Rural Residents	Segment vs North
Total Distance Travelled per person per year	10,063 miles	↑ 60%
Total Distance Travelled by rail per person per year	615 miles	↑ 32%
Total Trips per person per year	994 trips	↑ 5%
Percentage of trips by car	79.0%	↑ 20%
Percentage of trips by rail	0.7%	↓ 43%
Percentage of trips by bus	3.0%	↓ 56%
Total Long-Distance Trips (> 10 miles) per person	276 trips	↑ 89%



Distance Travelled to work

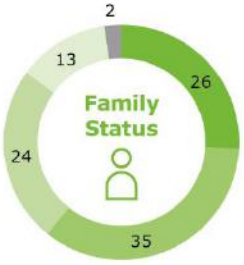


- Owner Occupied
- Privately Rented
- Social Rented
- Other



- Detached
- Semi-Detached
- Terraced
- Flat / apartment
- Other

- No cars or vans
- 1 car or van
- 2 cars or vans
- 3 + cars

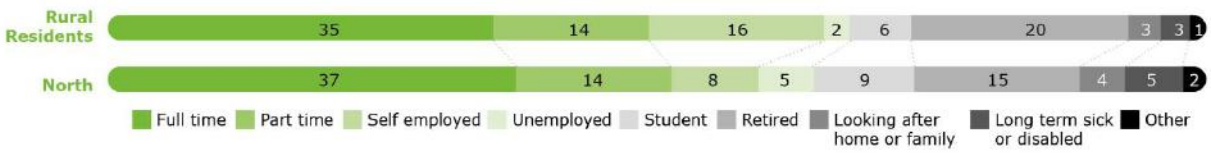


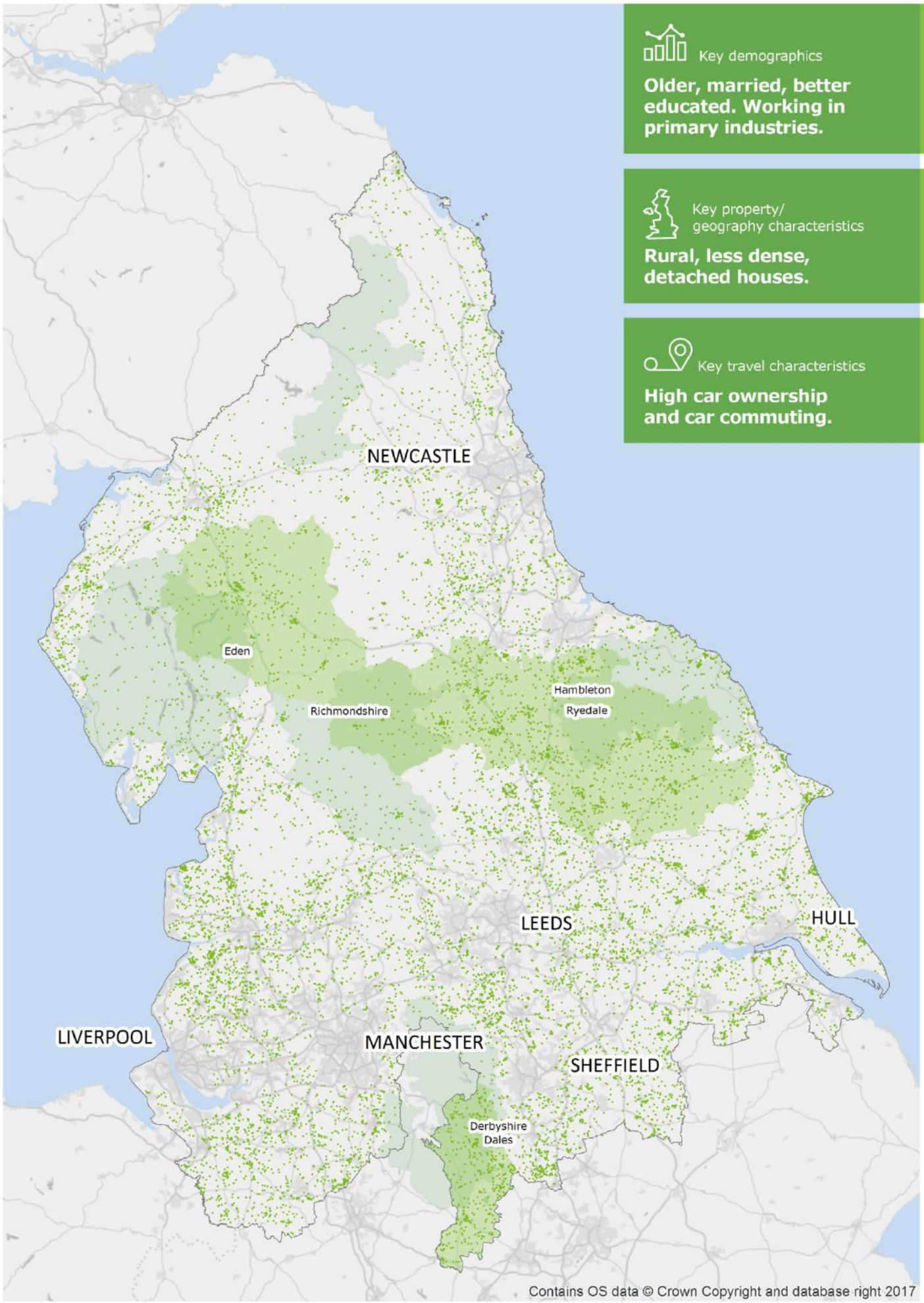
- Elderly Residents
- Families with Children
- Couples without Children
- Singles and Students
- Other

- No qualifications
- 5+ GCSEs A*-C or equivalent
- 2+ A /4+ AS levels or equivalent
- Degree / Higher Degree

Age Profile

Employment status




Key demographics
Older, married, better educated. Working in primary industries.
Key property/ geography characteristics
Rural, less dense, detached houses.
Key travel characteristics
High car ownership and car commuting.
NEWCASTLE
Eden
Richmondshire
Hambleton
Ryedale
LEEDS
HULL
LIVERPOOL
MANCHESTER
SHEFFIELD
Derbyshire Dales
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Small Town Suburbs

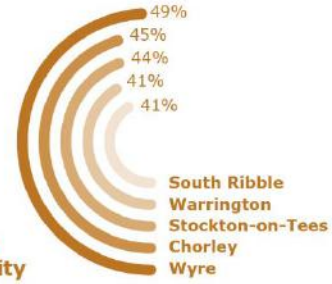
Propensity to Travel

Small Town Suburbs make more trips per year than any other segment, and travel further distances than any other segment except Rural Villages. Propensity to travel by rail – in terms of both trips and distance – is comparable to the Northern average, with the group having a strong propensity to travel by car.

1,936,400

people are Small Town Suburbs, which is

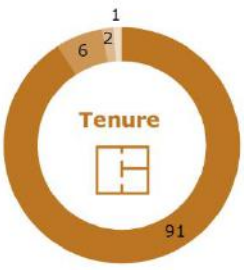
13 % of North's population



Highest % segment by local authority

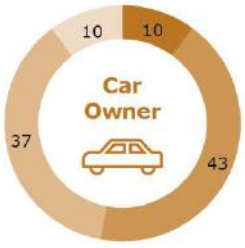
Propensity to Travel	Small Town Suburbs	Segment vs North
Total Distance Travelled per person per year	8,229 miles	↑ 31%
Total Distance Travelled by rail per person per year	598 miles	↑ 29%
Total Trips per person per year	1,079 trips	↑ 14%
Percentage of trips by car	75.6%	↑ 15%
Percentage of trips by rail	1.1%	↓ 8%
Percentage of trips by bus	3.2%	↓ 55%
Total Long-Distance Trips (> 10 miles) per person	201 trips	↑ 37%

Distance Travelled to work

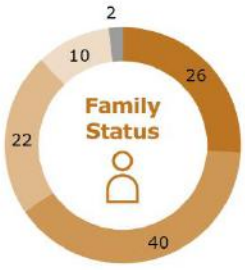


- Owner Occupied
- Privately Rented
- Social Rented
- Other

- Detached
- Semi-Detached
- Terraced
- Flat / apartment
- Other



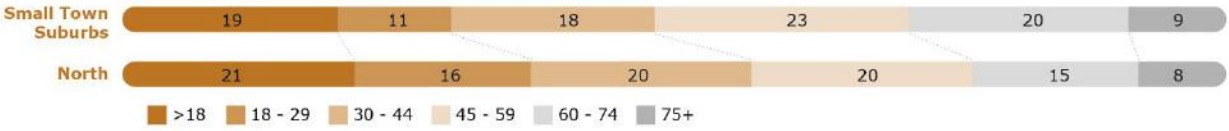
- No cars or vans
- 1 car or van
- 2 cars or vans
- 3 + cars



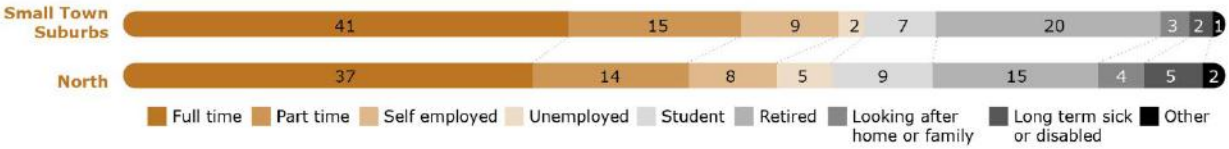
- Elderly Residents
- Families with Children
- Couples without Children
- Singles and Students
- Other

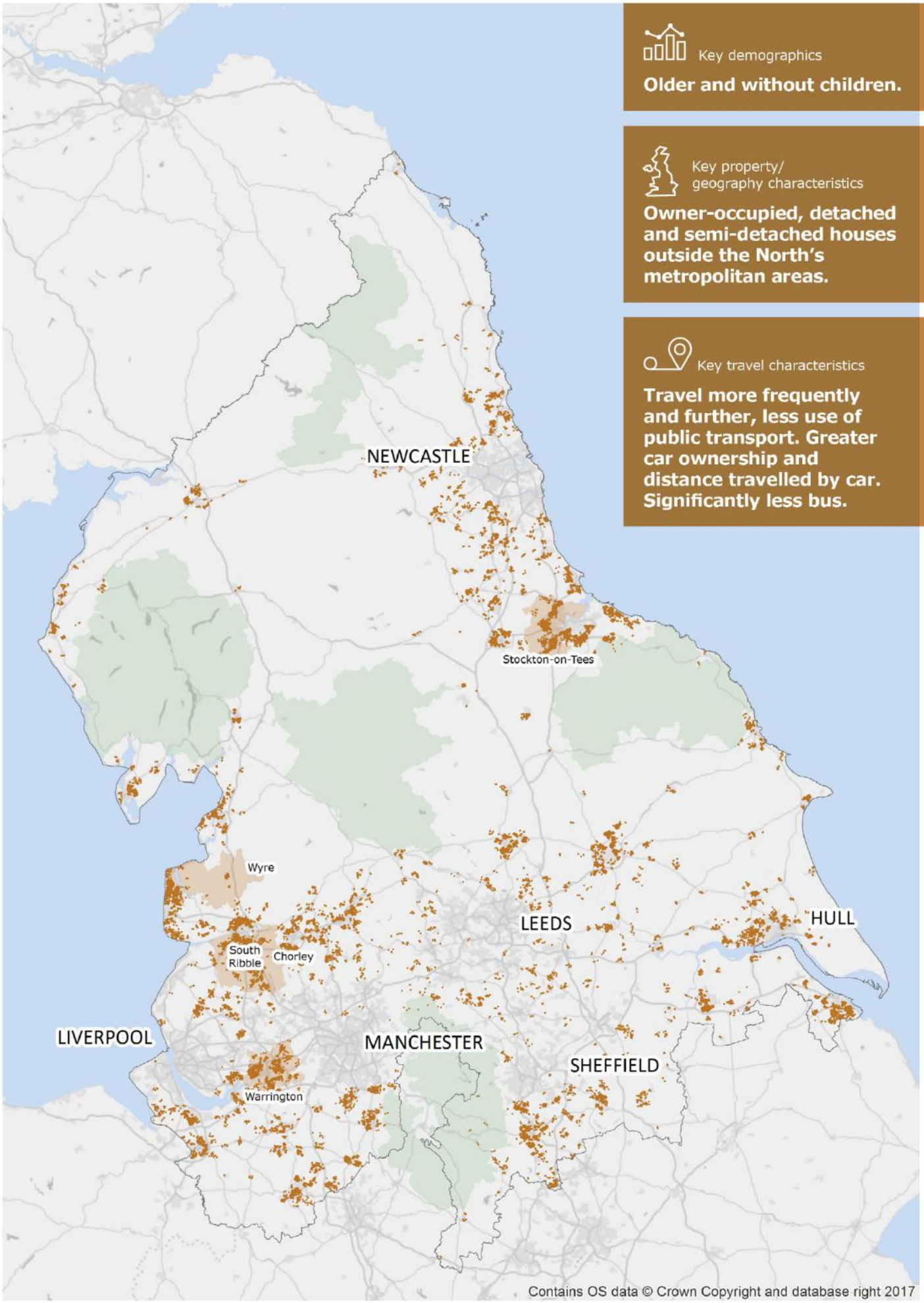
- No qualifications
- 5+ GCSEs A*-C or equivalent
- 2+ A /4+ AS levels or equivalent
- Degree / Higher Degree

Age Profile



Employment status




Key demographics
Older and without children.
Key property/ geography characteristics
Owner-occupied, detached and semi-detached houses outside the North's metropolitan areas.
Key travel characteristics
Travel more frequently and further, less use of public transport. Greater car ownership and distance travelled by car. Significantly less bus.
NEWCASTLE
Stockton-on-Tees
Wyre
South Ribble
Chorley
LEEDS
HULL
LIVERPOOL
MANCHESTER
SHEFFIELD
Warrington
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Hard Pressed Living 1

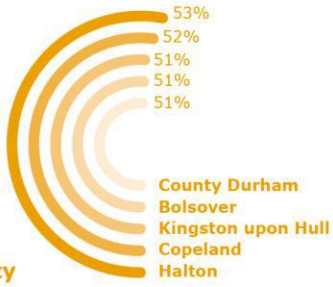
Propensity to Travel

Hard Pressed Living 1 residents make fewer trips and travel shorter distances than the Northern average. They are also more likely to travel by car for longer-distance trips, and less likely to travel by rail, making 40% fewer rail trips than the Northern average.

2,004,300

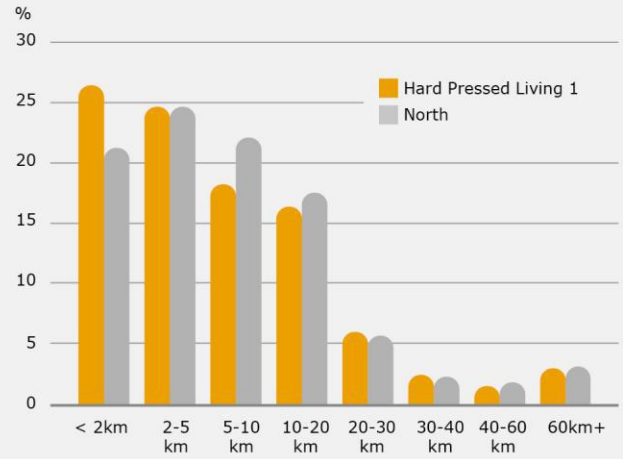
people are Hard Pressed Living 1, which is

13 % of North's population

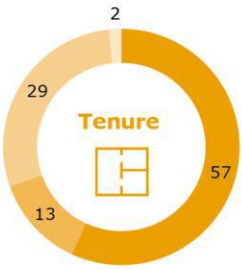


Highest % segment by local authority

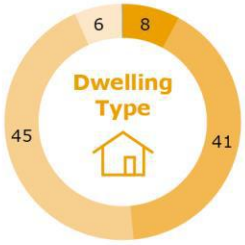
Propensity to Travel	Hard Pressed Living 1	Segment vs North
Total Distance Travelled per person per year	5,408 miles	↓ 14%
Total Distance Travelled by rail per person per year	253 miles	↓ 45%
Total Trips per person per year	885 trips	↓ 7%
Percentage of trips by car	60.4%	↓ 8%
Percentage of trips by rail	0.7%	↓ 41%
Percentage of trips by bus	7.7%	↑ 10%
Total Long-Distance Trips (> 10 miles) per person	133 trips	↓ 9%



Distance Travelled to work

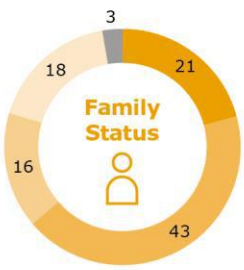


- Owner Occupied
- Privately Rented
- Social Rented
- Other



- Detached
- Semi-Detached
- Terraced
- Flat / apartment
- Other

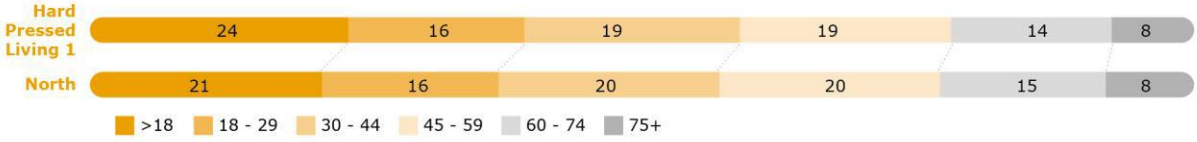
- No cars or vans
- 1 car or van
- 2 cars or vans
- 3 + cars



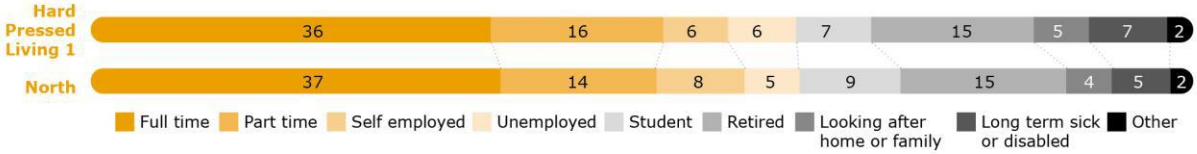
- Elderly Residents
- Families with Children
- Couples without Children
- Singles and Students
- Other

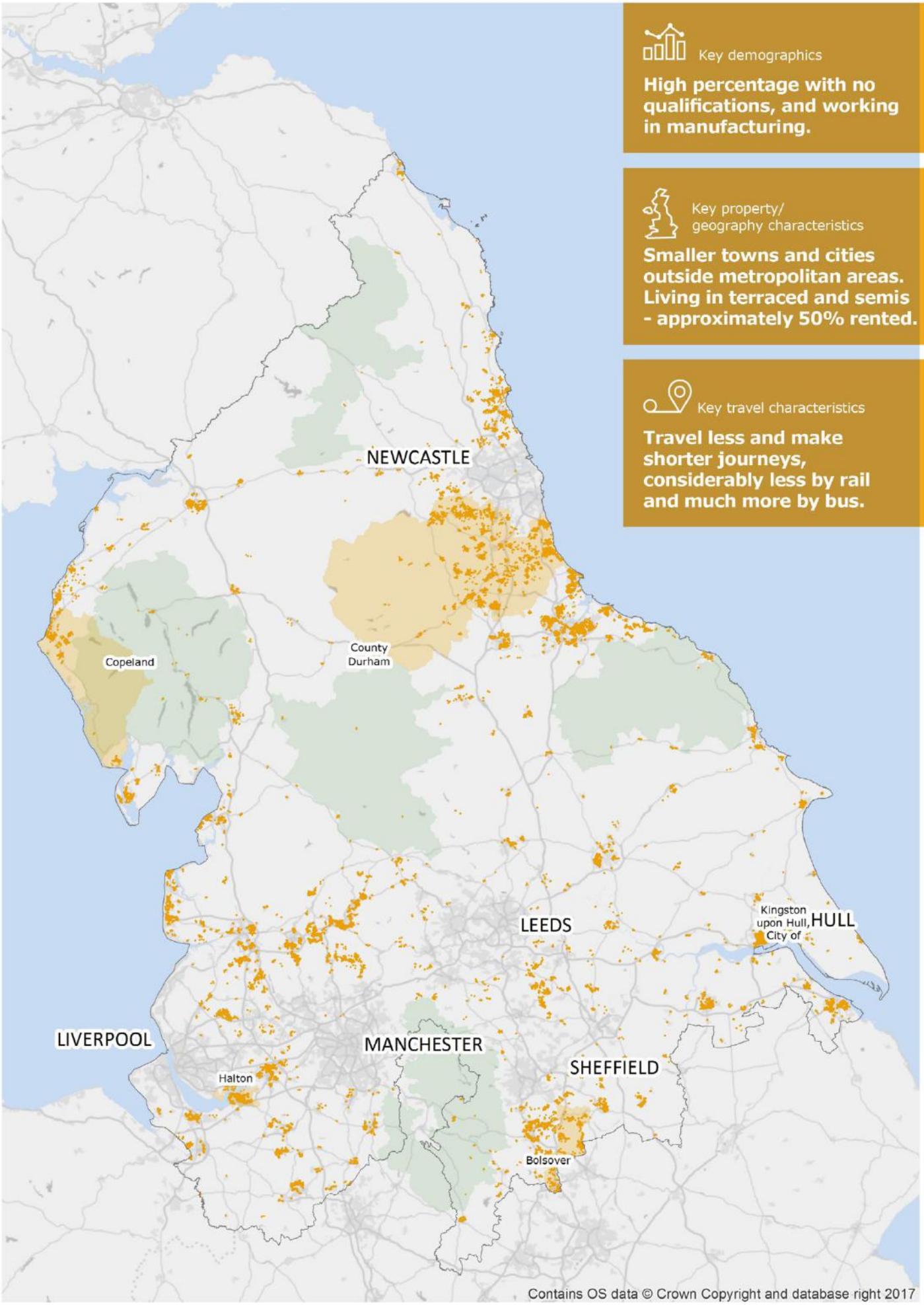
- No qualifications
- 5+ GCSEs A*-C or equivalent
- 2+ A /4+ AS levels or equivalent
- Degree / Higher Degree

Age Profile



Employment status




Key demographics
High percentage with no qualifications, and working in manufacturing.
Key property/ geography characteristics
Smaller towns and cities outside metropolitan areas. Living in terraced and semis - approximately 50% rented.
Key travel characteristics
Travel less and make shorter journeys, considerably less by rail and much more by bus.
NEWCASTLE
Copeland
County Durham
LEEDS
Kingston upon Hull, City of
HULL
LIVERPOOL
MANCHESTER
Halton
SHEFFIELD
Bolsover
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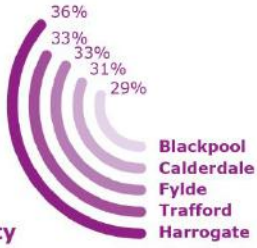
Urbanites

Propensity to Travel

Urbanites typically make more trips and travel further than other groups in the North, likely a result of more being in full-time work. They also have a greater propensity to travel by rail, especially for longer-distance trips.

2,372,100
people are Urbanites, which is

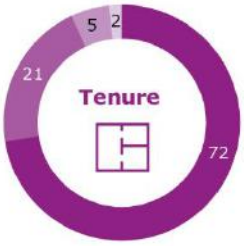
15 % of North's population



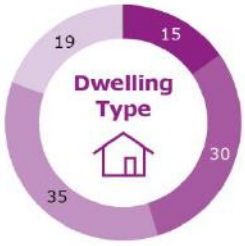
Highest % segment by local authority

Propensity to Travel	Urbanites	Segment vs North
Total Distance Travelled per person per year	7,122 miles	↑ 13%
Total Distance Travelled by rail per person per year	702 miles	↑ 51%
Total Trips per person per year	1,019 trips	↑ 8%
Percentage of trips by car	67.1%	↑ 2%
Percentage of trips by rail	1.5%	↑ 34%
Percentage of trips by bus	4.4%	↓ 37%
Total Long-Distance Trips (> 10 miles) per person	155 trips	↑ 6%

Distance Travelled to work

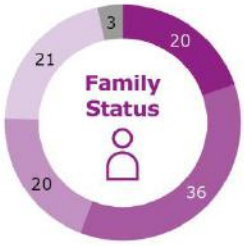


- Owner Occupied
- Privately Rented
- Social Rented
- Other



- Detached
- Semi-Detached
- Terraced
- Flat / apartment
- Other

- No cars or vans
- 1 car or van
- 2 cars or vans
- 3 + cars

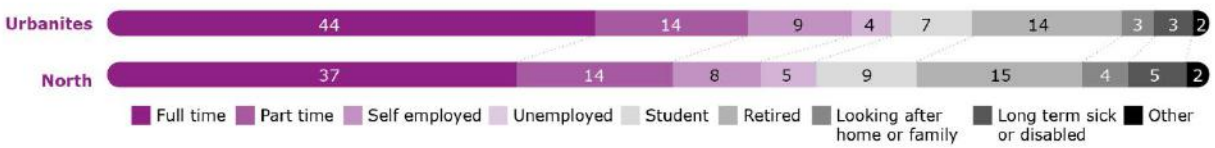


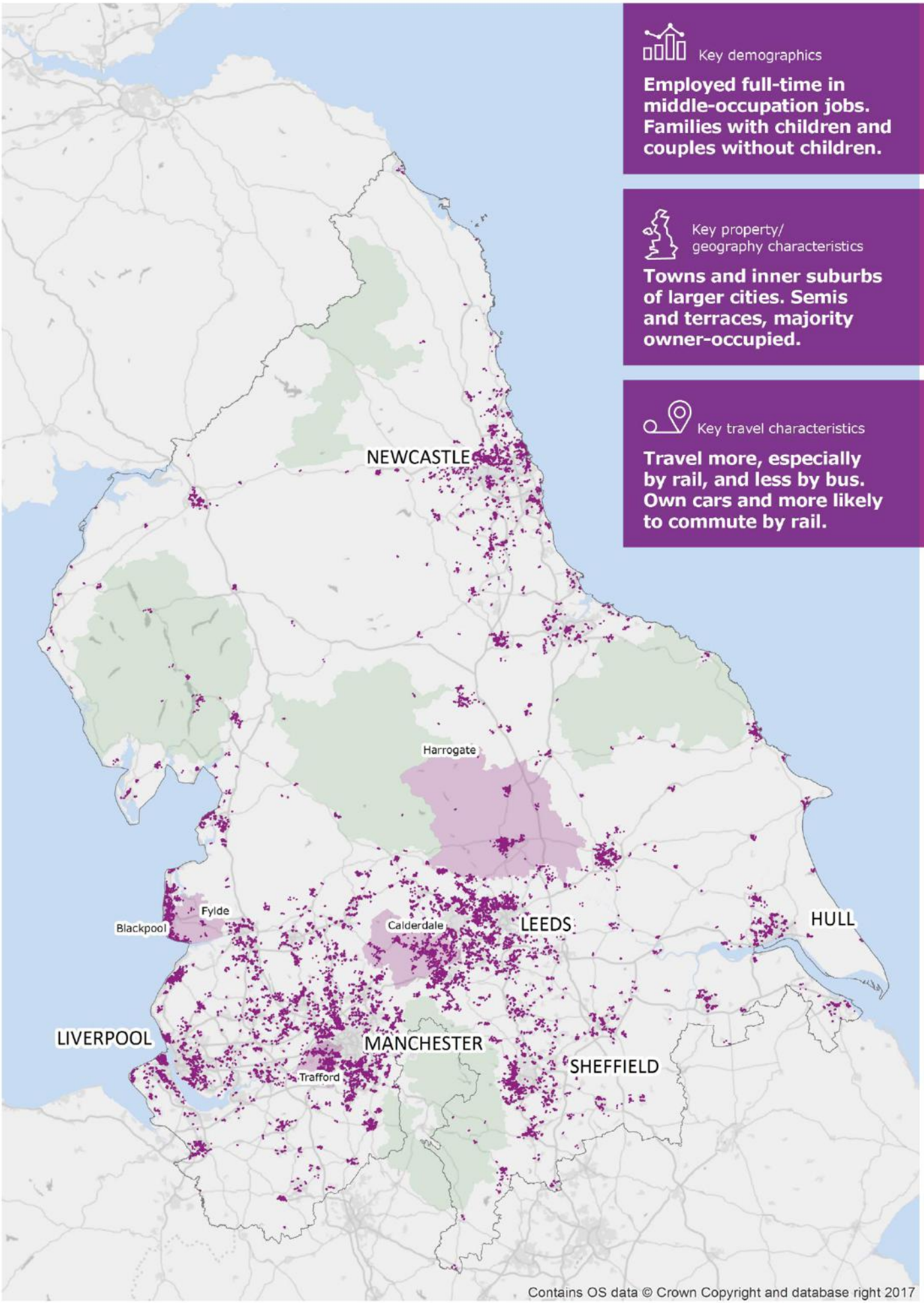
- Elderly Residents
- Families with Children
- Couples without Children
- Singles and Students
- Other

- No qualifications
- 5+ GCSEs A*-C or equivalent
- 2+ A /4+ AS levels or equivalent
- Degree / Higher Degree

Age Profile

Employment status




Key demographics
Employed full-time in middle-occupation jobs. Families with children and couples without children.
Key property/ geography characteristics
Towns and inner suburbs of larger cities. Semis and terraces, majority owner-occupied.
Key travel characteristics
Travel more, especially by rail, and less by bus. Own cars and more likely to commute by rail.
NEWCASTLE
Harrogate
Fylde
Blackpool
Calderdale
LEEDS
HULL
LIVERPOOL
MANCHESTER
Trafford
SHEFFIELD
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Constrained City Dwellers

Propensity to Travel

Constrained City Dwellers make the fewest trips and travel the shortest annual distance of all the user segments in the North, likely a result of living in denser urban areas and being significantly less likely to be in employment. Rail usage is below the Northern average, whilst they travel double the distance by bus than an avarage Northerner.

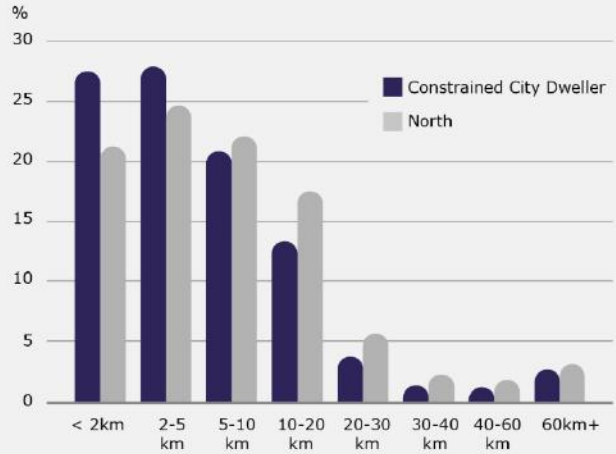
1,418,200

people are Constrained City Dwellers, which is

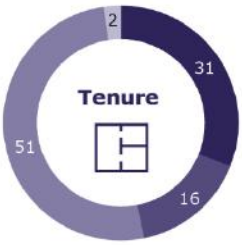
9 % of North's population

Highest % segment by local authority

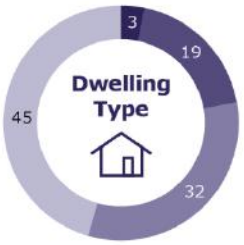
Propensity to Travel	Constrained City Dwellers	Segment vs North
Total Distance Travelled per person per year	4,000 miles	⇓ 37%
Total Distance Travelled by rail per person per year	164 miles	⇓ 65%
Total Trips per person per year	785 trips	⇓ 17%
Percentage of trips by car	52.1%	⇓ 21%
Percentage of trips by rail	0.7%	⇑ 41%
Percentage of trips by bus	12.7%	⇑ 83%
Total Long-Distance Trips (> 10 miles) per person	87 trips	⇓ 41%



Distance Travelled to work

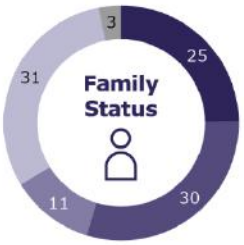


- Owner Occupied
- Privately Rented
- Social Rented
- Other



- Detached
- Semi-Detached
- Terraced
- Flat / apartment
- Other

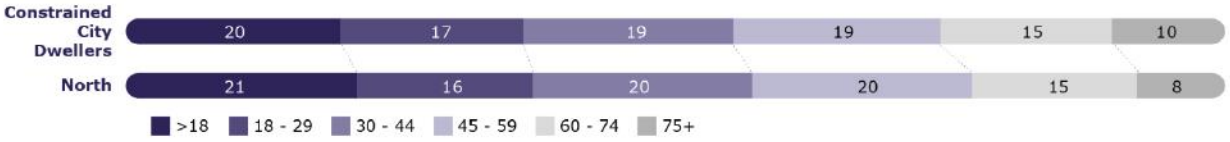
- No cars or vans
- 1 car or van
- 2 cars or vans
- 3 + cars



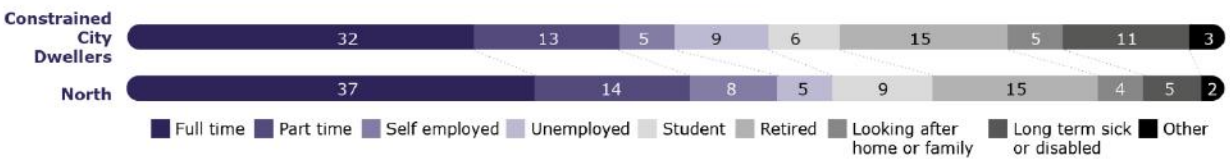
- Elderly Residents
- Families with Children
- Couples without Children
- Singles and Students
- Other

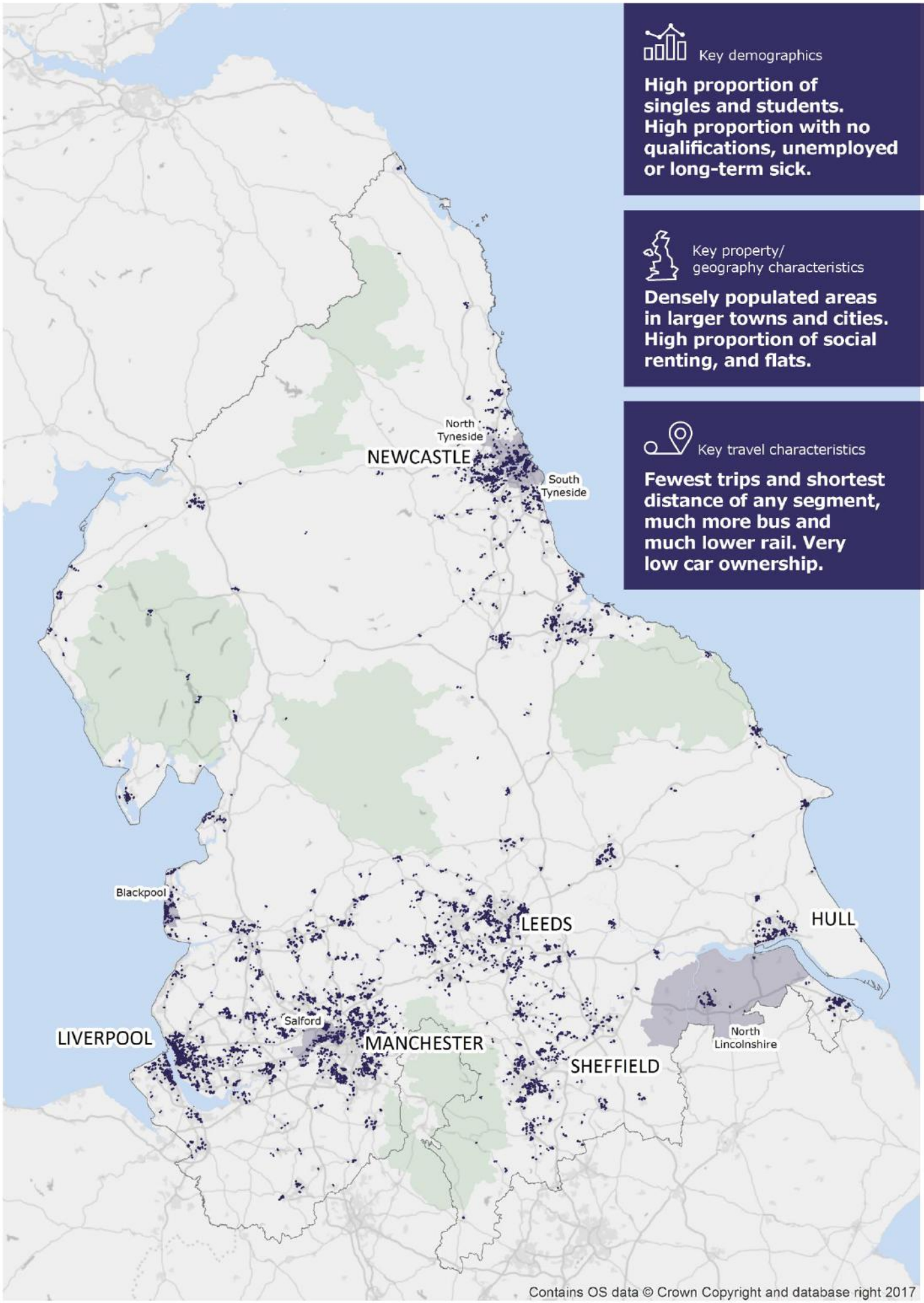
- No qualifications
- 5+ GCSEs A*-C or equivalent
- 2+ A /4+ AS levels or equivalent
- Degree / Higher Degree

Age Profile



Employment status




Key demographics
High proportion of singles and students. High proportion with no qualifications, unemployed or long-term sick.
Key property/ geography characteristics
Densely populated areas in larger towns and cities. High proportion of social renting, and flats.
Key travel characteristics
Fewest trips and shortest distance of any segment, much more bus and much lower rail. Very low car ownership.
North Tyneside
NEWCASTLE
South Tyneside
Blackpool
LEEDS
HULL
Salford
LIVERPOOL
MANCHESTER
North Lincolnshire
SHEFFIELD
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Multiculturals

Propensity to Travel

Multiculturals are make fewer trips and travel lower distances than other groups in the North, especially by car, likely a result of living in denser urban areas and being significantly less likely to be in employment. While they are more likely to use rail for longer-distance trips, each person travels less distance by rail than the Northern average, and bus usage is significantly greater

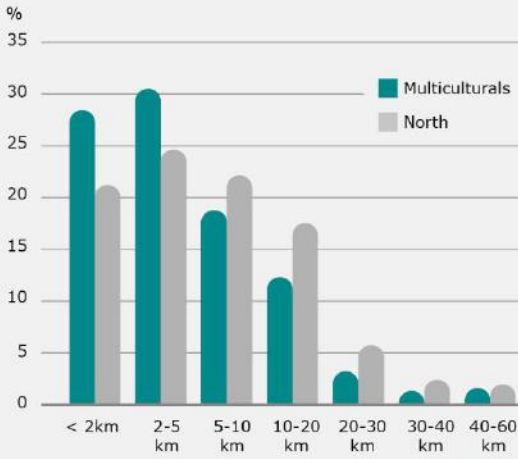
1,693,675

people are Multiculturals, which is

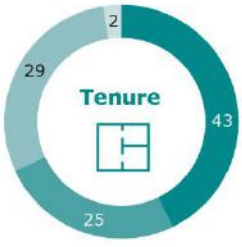
11 % of North's population

Highest % segment by local authority

Propensity to Travel	Multiculturals	Segment vs North
Total Distance Travelled per person per year	4,551 miles	⇓ 28%
Total Distance Travelled by rail per person per year	407 miles	⇓ 12%
Total Trips per person per year	879 trips	⇓ 7%
Percentage of trips by car	53.8%	⇓ 18%
Percentage of trips by rail	0.8%	⇓ 30%
Percentage of trips by bus	13.3%	⇑ 92%
Total Long-Distance Trips (> 10 miles) per person	82 trips	⇓ 44%



Distance Travelled to work



- Owner Occupied
- Privately Rented
- Social Rented
- Other

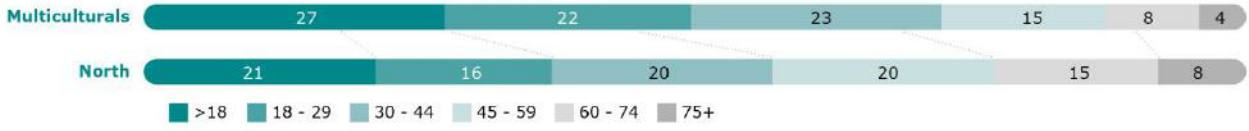
- Detached
- Semi-Detached
- Terraced
- Flat / apartment
- Other

- No cars or vans
- 1 car or van
- 2 cars or vans
- 3 + cars

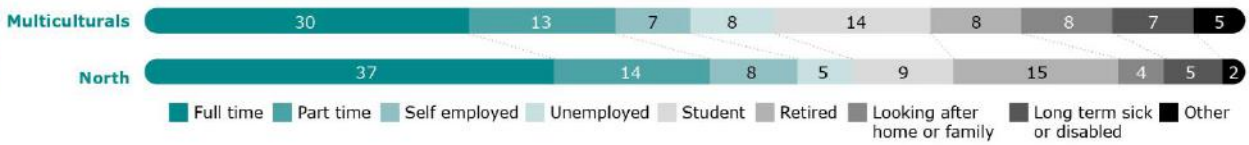
- Elderly Residents
- Families with Children
- Couples without Children
- Singles and Students
- Other

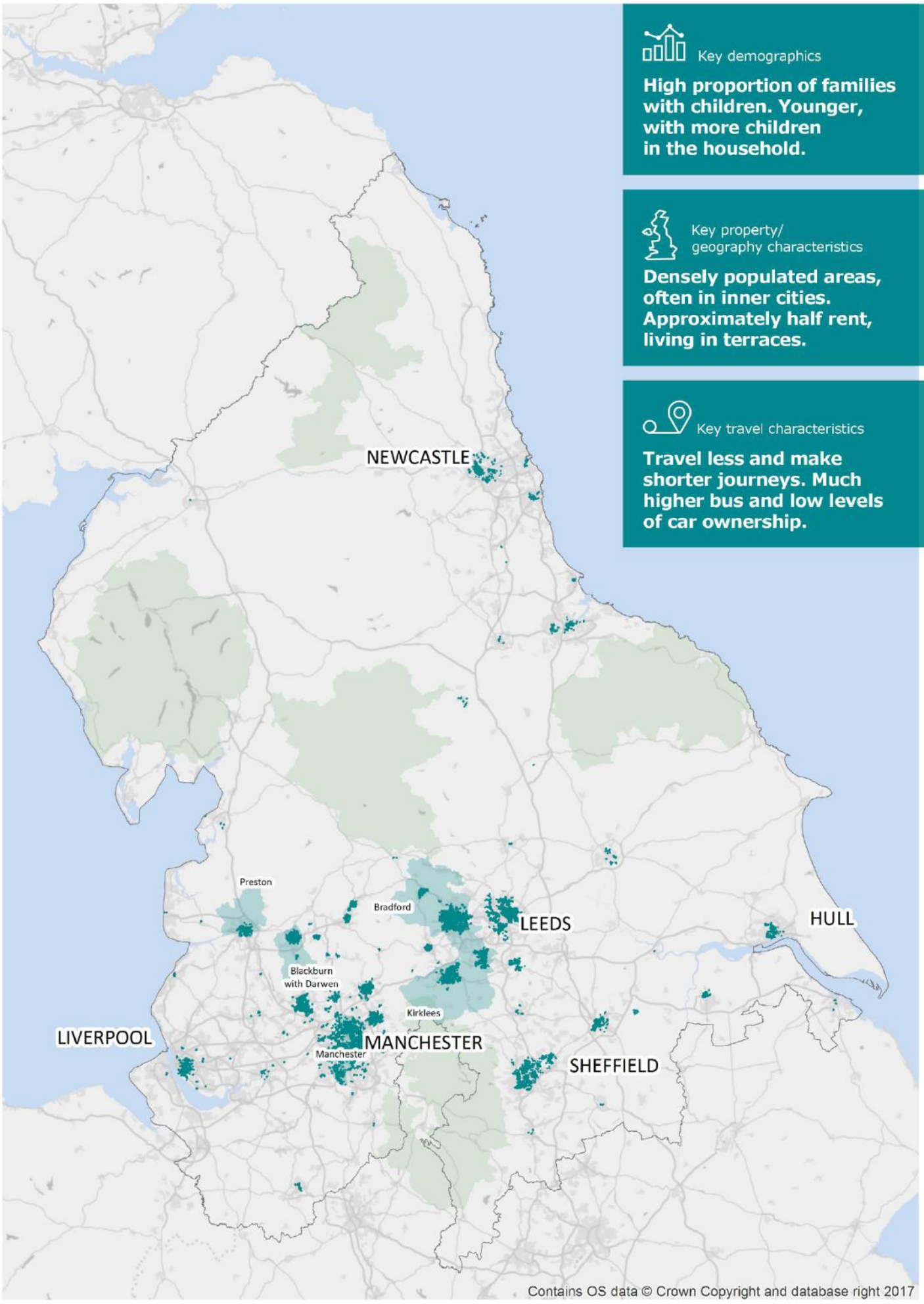
- No qualifications
- 5+ GCSEs A*-C or equivalent
- 2+ A /4+ AS levels or equivalent
- Degree / Higher Degree

Age Profile



Employment status




Key demographics
High proportion of families with children. Younger, with more children in the household.
Key property/ geography characteristics
Densely populated areas, often in inner cities. Approximately half rent, living in terraces.
Key travel characteristics
Travel less and make shorter journeys. Much higher bus and low levels of car ownership.
NEWCASTLE
Preston
Bradford
LEEDS
HULL
Blackburn with Darwen
Kirklees
LIVERPOOL
Manchester
MANCHESTER
SHEFFIELD
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Inner City Cosmopolitans

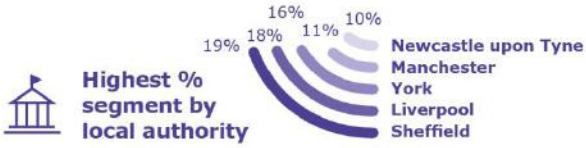
Propensity to Travel

Cosmopolitans travel greater distances than other groups in the North, despite comparatively few being in full-time work. Travel by rail is especially high, with a typical cosmopolitan travelling three times further in distance by rail than an average person in the North.

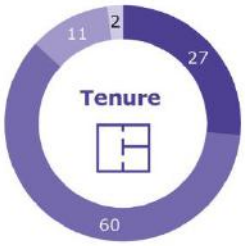
493,700

people are Inner City Cosmopolitans, which is

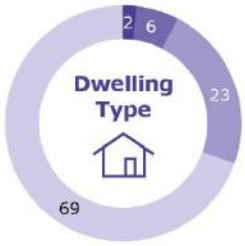
3 % of North's population



Propensity to Travel	Inner City Cosmopolitans	Segment vs North
Total Distance Travelled per person per year	7,407 miles	⇑ 17%
Total Distance Travelled by rail per person per year	1,434 miles	⇑ 209%
Total Trips per person per year	944 trips	⇒ 0%
Percentage of trips by car	43.2%	⇓ 34%
Percentage of trips by rail	2.5%	⇑ 116%
Percentage of trips by bus	7.4%	⇑ 6%
Total Long-Distance Trips (> 10 miles) per person	133 trips	⇓ 9%

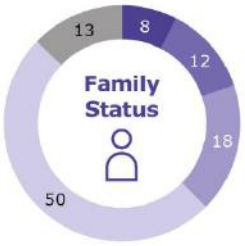


- Owner Occupied
- Privately Rented
- Social Rented
- Other



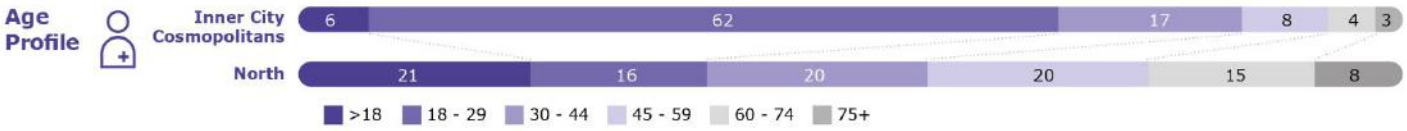
- Detached
- Semi-Detached
- Terraced
- Flat / apartment
- Other

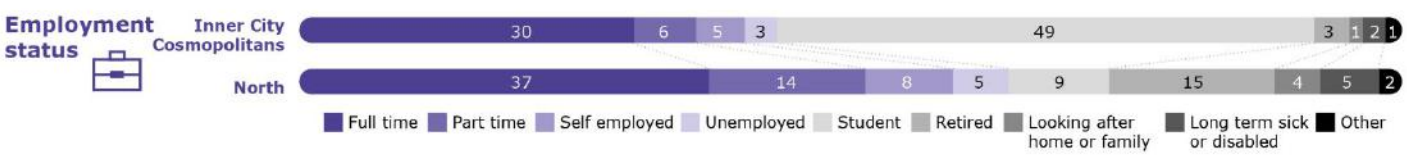
- No cars or vans
- 1 car or van
- 2 cars or vans
- 3 + cars

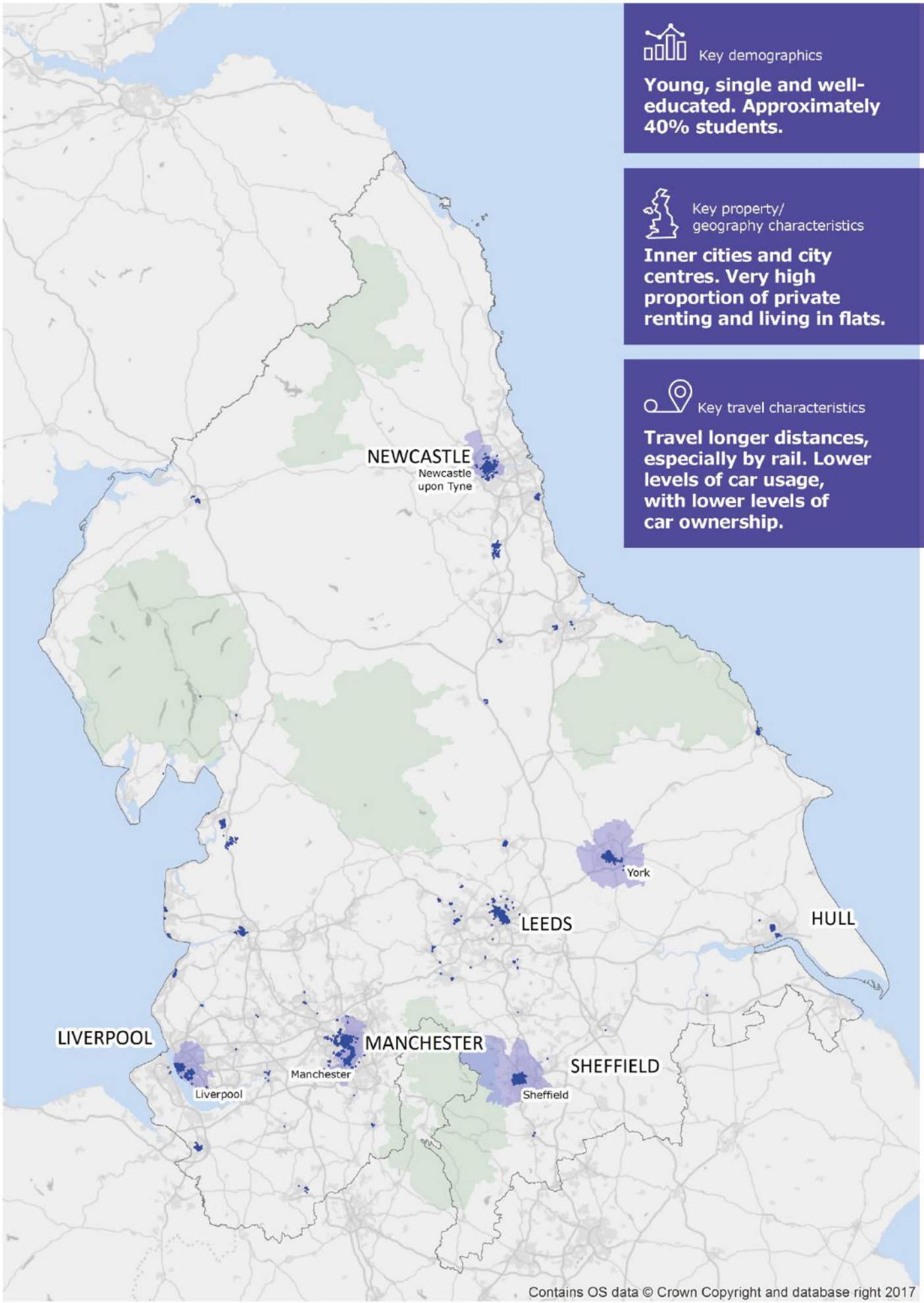


- Elderly Residents
- Families with Children
- Couples without Children
- Singles and Students
- Other

- No qualifications
- 5+ GCSEs A*-C or equivalent
- 2+ A /4+ AS levels or equivalent
- Degree / Higher Degree






Key demographics
Young, single and well-educated. Approximately 40% students.
Key property/ geography characteristics
Inner cities and city centres. Very high proportion of private renting and living in flats.
Key travel characteristics
Travel longer distances, especially by rail. Lower levels of car usage, with lower levels of car ownership.
NEWCASTLE
Newcastle upon Tyne
York
LEEDS
HULL
LIVERPOOL
Liverpool
MANCHESTER
Manchester
SHEFFIELD
Sheffield
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Hard Pressed Living 2

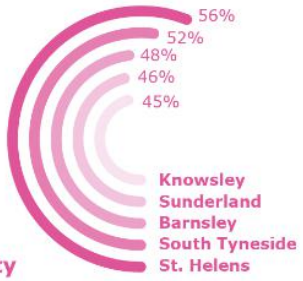
Propensity to Travel

Hard Pressed Living 2 residents make fewer trips and travel shorter distances than the Northern average, reflective of their occupational status and location. They make broadly the average number of rail trips per year, but these trips are typically short in nature, making fewer long-distance rail trips than the Northern average. Instead, individuals in this group travel 60% more miles by bus than the Northern average.

2,236,300

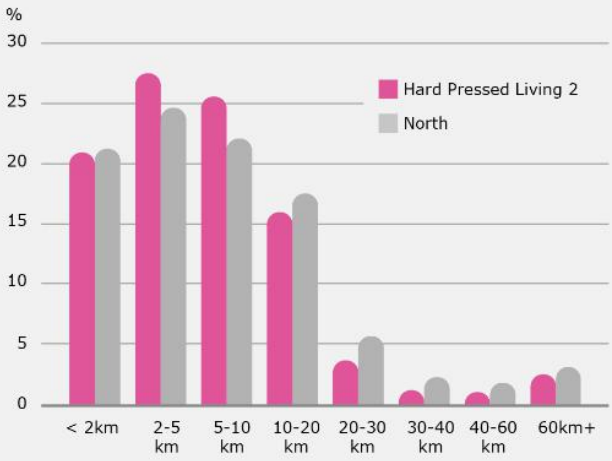
people are Hard Pressed Living 2, which is

15 % of North's population

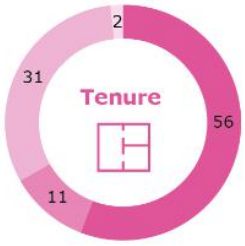


Highest % segment by local authority

Propensity to Travel	Hard Pressed Living 2	Segment vs North
Total Distance Travelled per person per year	4,438 miles	↓ 30%
Total Distance Travelled by rail per person per year	221 miles	↓ 52%
Total Trips per person per year	851 trips	↓ 10%
Percentage of trips by car	60.6%	↓ 8%
Percentage of trips by rail	1.3%	↑ 15%
Percentage of trips by bus	11.1%	↑ 59%
Total Long-Distance Trips (> 10 miles) per person	100 trips	↓ 31%



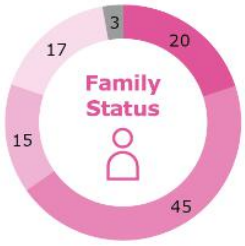
Distance Travelled to work



- Owner Occupied
- Privately Rented
- Social Rented
- Other

- Detached
- Semi-Detached
- Terraced
- Flat / apartment
- Other

- No cars or vans
- 1 car or van
- 2 cars or vans
- 3 + cars

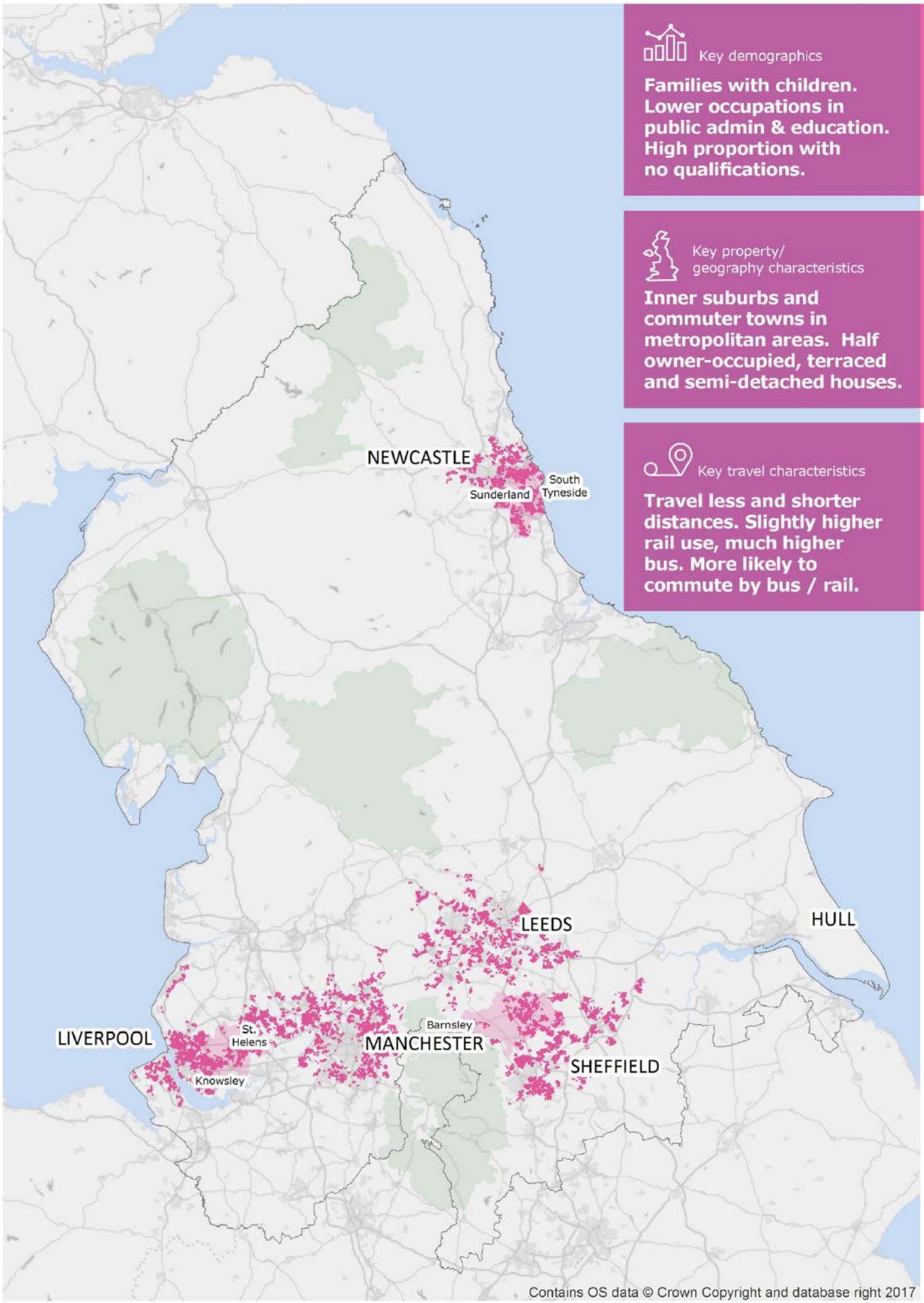


- Elderly Residents
- Families with Children
- Couples without Children
- Singles and Students
- Other

- No qualifications
- 5+ GCSEs A*-C or equivalent
- 2+ A /4+ AS levels or equivalent
- Degree / Higher Degree

Age Profile

Employment status



Key demographics

Families with children. Lower occupations in public admin & education. High proportion with no qualifications.

Key property/ geography characteristics

Inner suburbs and commuter towns in metropolitan areas. Half owner-occupied, terraced and semi-detached houses.

Key travel characteristics

Travel less and shorter distances. Slightly higher rail use, much higher bus. More likely to commute by bus / rail.

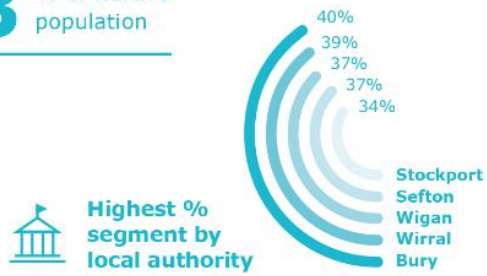
Metro Suburbs

Propensity to Travel

Metro Suburbs travel more than the Northern average in both total trips and distance, likely a result of both income and their location towards the fringes of large urban centres. They have an increased propensity to travel by both car and rail relative to an average person in the North, at the expense of bus and active modes.

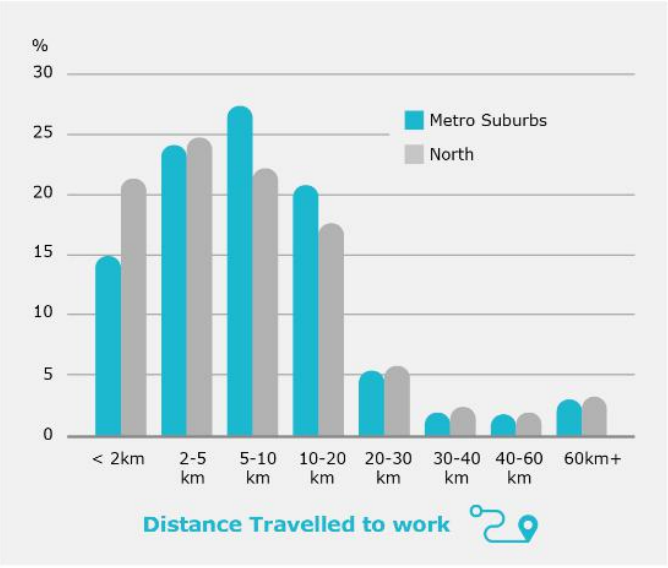
1,957,300
people are Metro Suburbs, which is

13 % of North's population

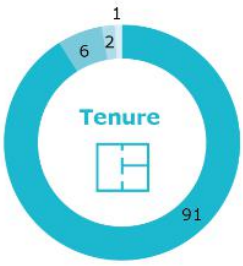


Highest % segment by local authority

Propensity to Travel	Metro Suburbs	Segment vs North
Total Distance Travelled per person per year	7,075 miles	↑ 12%
Total Distance Travelled by rail per person per year	579 miles	↑ 25%
Total Trips per person per year	1,044 trips	↑ 10%
Percentage of trips by car	74.5%	↑ 13%
Percentage of trips by rail	1.6%	↑ 44%
Percentage of trips by bus	4.2%	↓ 39%
Total Long-Distance Trips (> 10 miles) per person	166 trips	↑ 13%



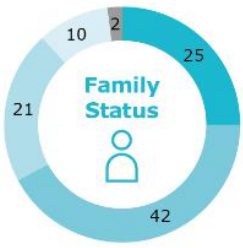
Distance Travelled to work



- Owner Occupied
- Privately Rented
- Social Rented
- Other

- Detached
- Semi-Detached
- Terraced
- Flat / apartment
- Other

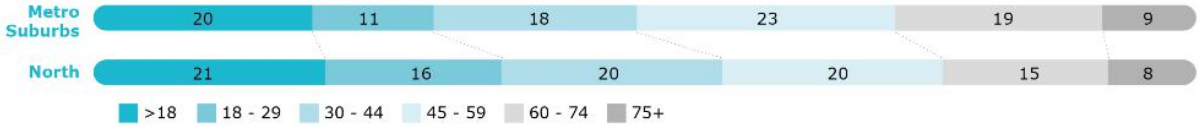
- No cars or vans
- 1 car or van
- 2 cars or vans
- 3 + cars



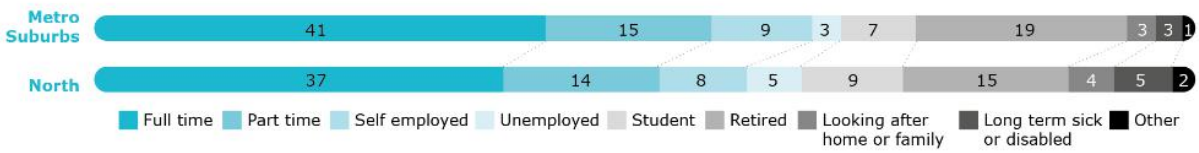
- Elderly Residents
- Families with Children
- Couples without Children
- Singles and Students
- Other

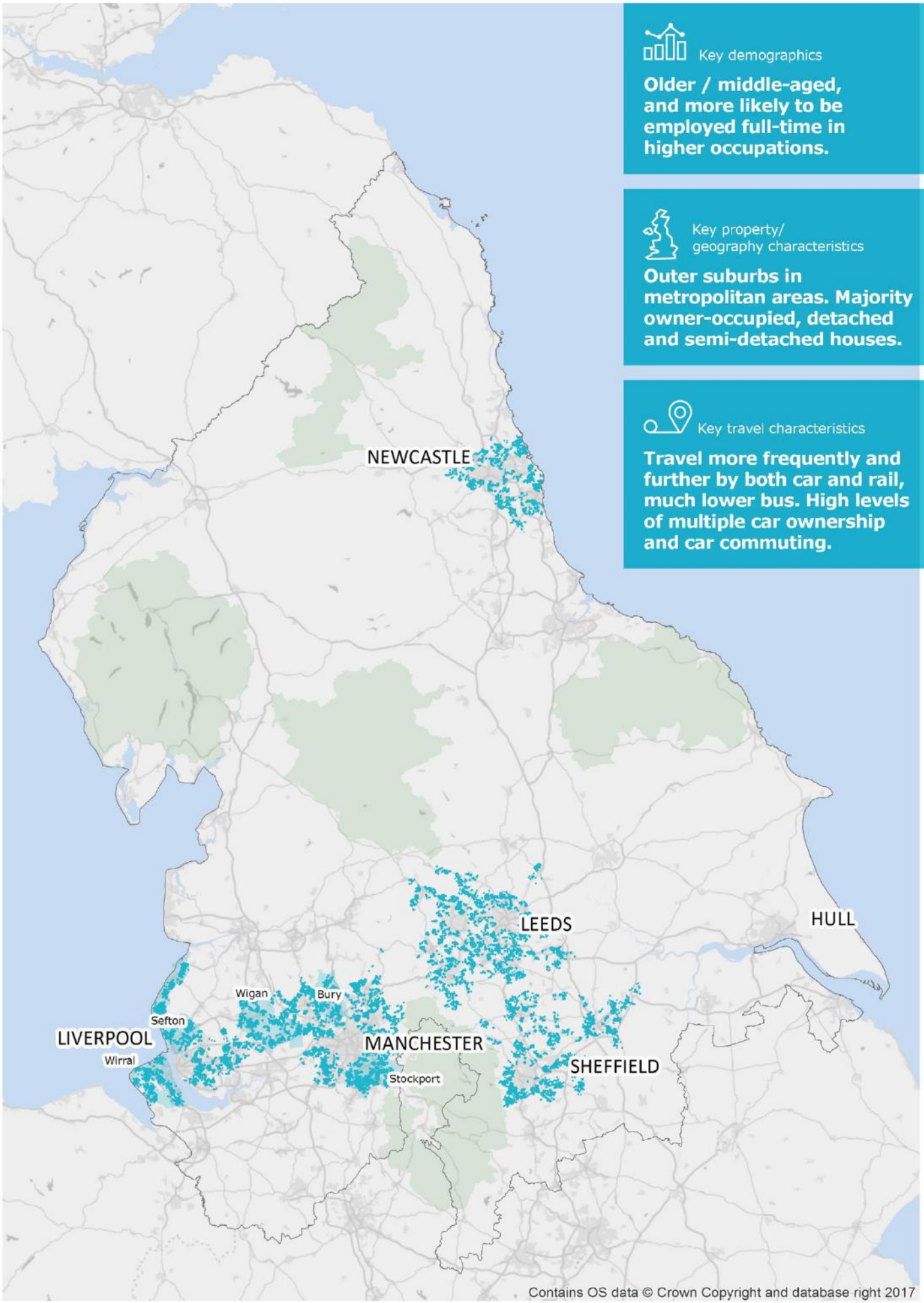
- No qualifications
- 5+ GCSEs A*-C or equivalent
- 2+ A /4+ AS levels or equivalent
- Degree / Higher Degree

Age Profile



Employment status




Key demographics
Older / middle-aged, and more likely to be employed full-time in higher occupations.
Key property/ geography characteristics
Outer suburbs in metropolitan areas. Majority owner-occupied, detached and semi-detached houses.
Key travel characteristics
Travel more frequently and further by both car and rail, much lower bus. High levels of multiple car ownership and car commuting.
NEWCASTLE
LEEDS
HULL
Wigan
Bury
Sefton
LIVERPOOL
Wirral
MANCHESTER
Stockport
SHEFFIELD
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Segment Industrial Composition and NPIER Capabilities

5.17 Figure 5.2 shows the broad industrial breakdown of employment within each user segment.

5.18 Employment within different segments clearly varies, and is closely linked to the varying occupational mix and the geography of the population within each segment. Rural Residents are more likely to be employed in primary industries such as agriculture or forestry; people within Hard Pressed Living 1 are more likely to be employed within the manufacturing sector. Cosmopolitans are more likely to be employed within the most productive, highly-skilled jobs within professional, scientific and technical activities. Segments associated with lower incomes, such as Constrained City Dwellers and Hard Pressed Living 2, are more likely to be employed within typically lower-skilled roles within retail, accommodation and food, and transport and storage.

5.19 Figure 5.3 shows the estimated[13] breakdown of employment within each user segment by each of the seven NPIER capabilities. Urbanites, Cosmopolitans Small Town Suburbs and Metro Suburbs have the greatest percentage of their workforce employed within a NPIER capability. This is largely driven by a variation in employment in Financial and Professional Services, which ranges from 8% of all employment in some segments to 12% for Cosmopolitans. There is little variation within the percentage employed within health innovation, energy, digital or advanced manufacturing; employment in logistics is typically greater for segments associated with employment in lower occupational statuses, such as Constrained City Dwellers and Hard Pressed Living 2[14].

[13] NPIER capabilities are defined based on a lookup with the 2-digit Standard Industrial Classification (SIC), as developed by Cambridge Econometrics. However, 2-digit SIC data is not available at a local level within the 2011 Census, and hence the industrial breakdown of employment within each group has been estimated from the detailed 2-digit Standard Occupational Classification for each user segment, using an ONS lookup between the SOC and SIC for the three regions of the North to estimate employment within each 2-digit SIC code, and in turn employment within each NPIER capability.

[14] It should be noted the percentage of total proportion of employment within an NPIER capability, at between 41% and 47% for each user segment, is greater than outlined within the original NPIER work undertaken by SQW and Cambridge Econometrics. This is due to a methodological difference in how the capabilities are defined. Within this report, they have been defined on the basis of 2-digit SIC data (available at a local level), whereas in the NPIER report and analysis they are defined using a more bespoke definition within the modelling adopted by Cambridge Econometrics, which is not available at local geographies.

Figure 5.1: Breakdown of employment of workers in the North within each user segment by industry (SIC), 2011 Census

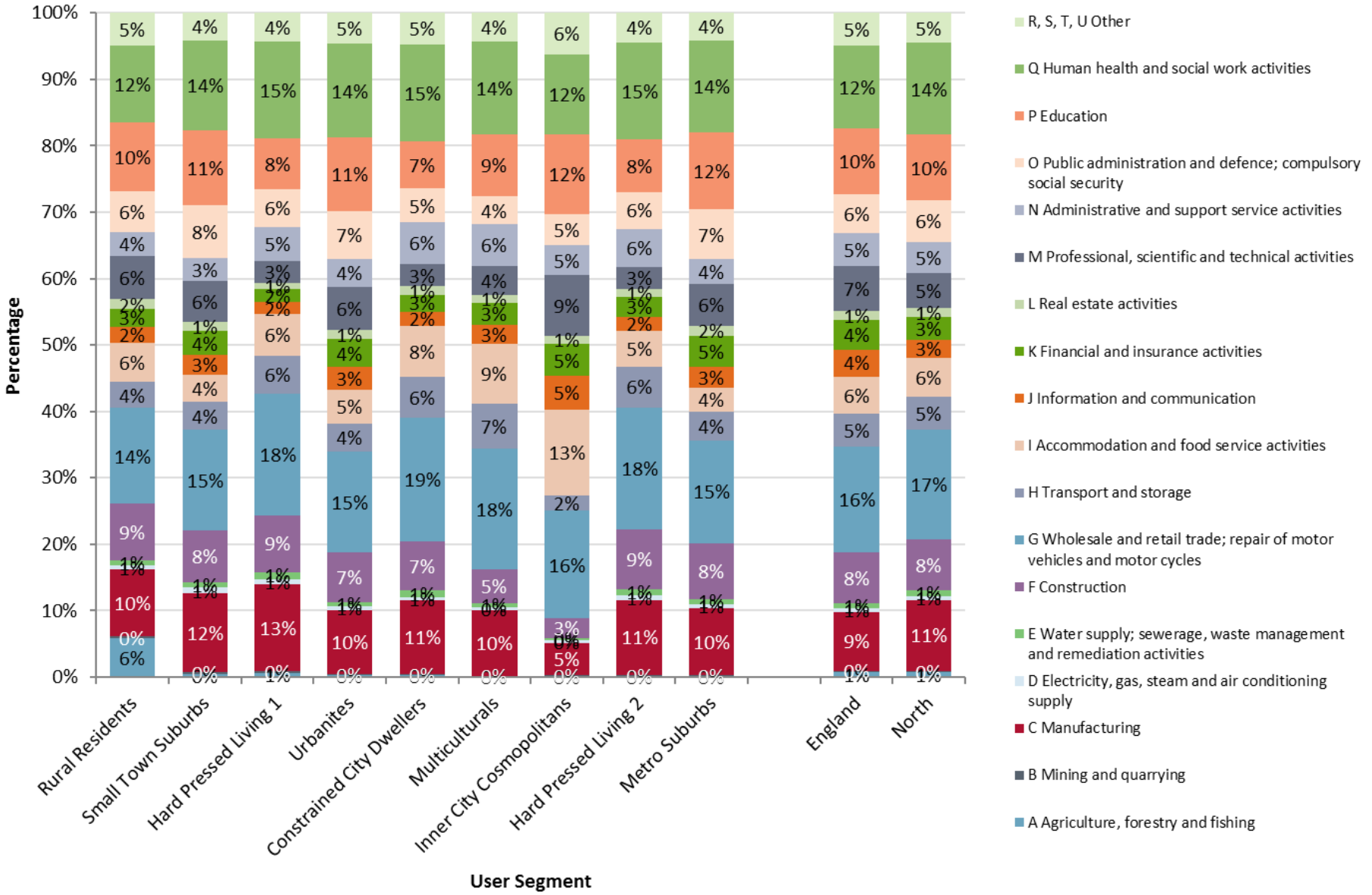
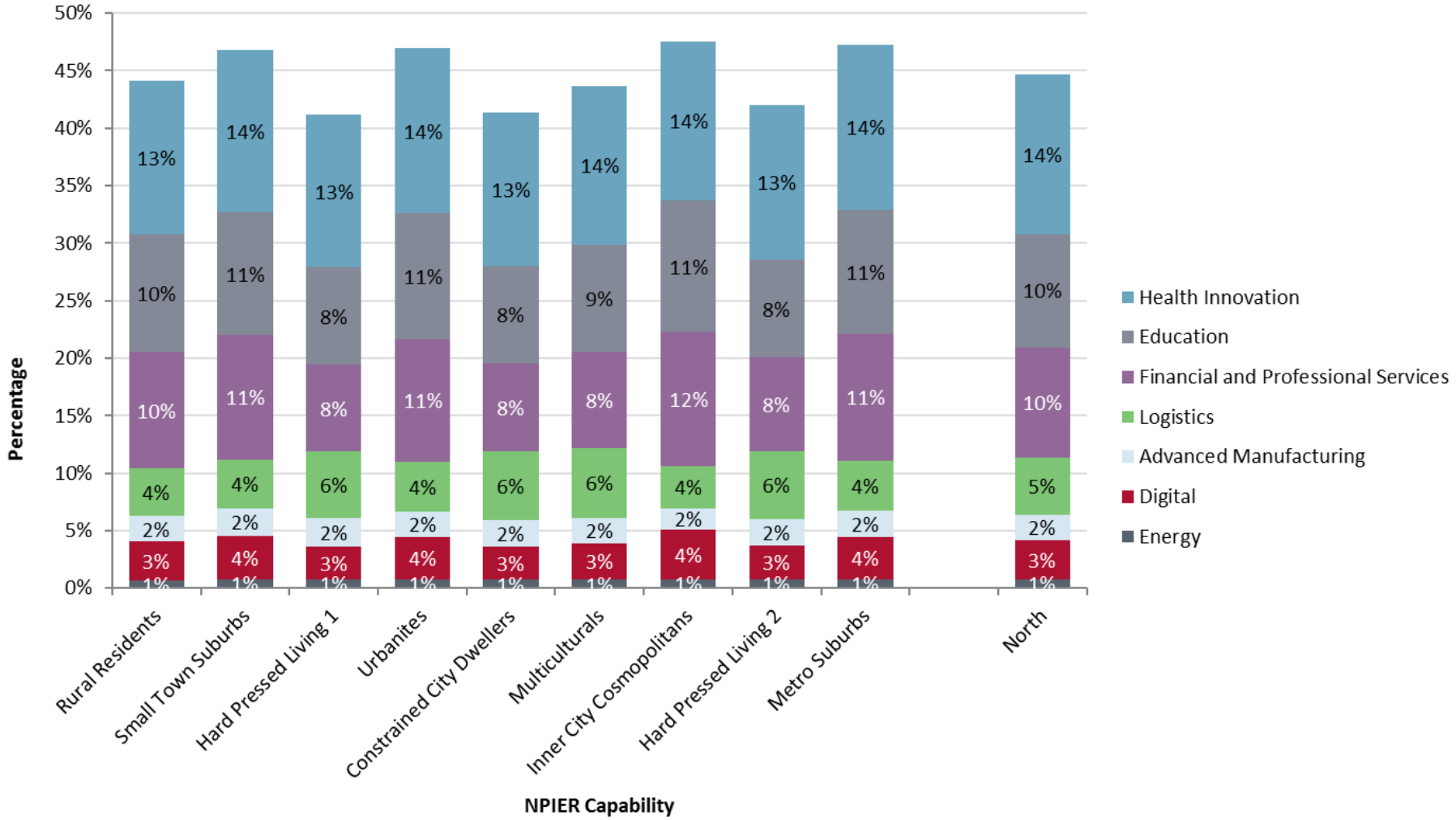


Figure 5.2: Estimated breakdown of employment of workers in the North within each user segment by NPIER capability, 2011 Census



6 Future Growth of the User Segments

Introduction

6.1 Chapter 5 described the development of nine distinct 'user segments' of the North's population, together with their socio-demographic characteristics and travel behaviour.

6.2 These are:

- Rural Residents (8% of the North's population)
- Small Town Suburbs (13%)
- Urbanites (15%)
- Hard Pressed Living 1 (13%)
- Constrained City Dwellers (9%)
- Inner City Cosmopolitans (3%)
- Multiculturals (11%)
- Metro Suburbs (13%)
- Hard Pressed Living 2 (15%)

6.3 Each segment was developed based on data derived from the 2011 Census, with additional data regarding travel behaviour from the National Travel Survey (2014 – 2016). Reflecting the continued change in the North's economy and population, the size of each segment is expected to change in the future, as is their travel behaviour.

6.4 Future population growth will be dependent on a range of factors, some of which are related to the economy and are considered within the Northern Powerhouse Independent Economic Review, as well as societal trends. More widely, social trends and new technology are each expected to influence behaviours and attitudes , for example attitudes towards public transport, car ownership and city-centre living.

6.5 Detailed forecasting of how these will affect the future size and travel behaviour of each segment is outside the scope of this work. However, we can consider the potential magnitude of the change in the size of each user segment in different growth scenarios, both to understand how future changes in the North's economy could have an impact on different population groups, together with subsequent changes to travel trends across the North as a whole.

6.6 The increases in higher-skilled, higher-occupation jobs forecast within the NPIER, for example, could be expected to result in greater-than-average growth of segments whose population have a greater proportion of workers within higher occupations (such as Metro Suburbs). Since these groups also tend to typically travel more, especially by rail, this would be expected to be accompanied by a commensurate increase in rail demand within the North.

6.7 Based on outputs provided by Cambridge Econometrics as part of a parallel piece of work, *Connectivity and Labour Markets in the North of England*, regarding the changes in the

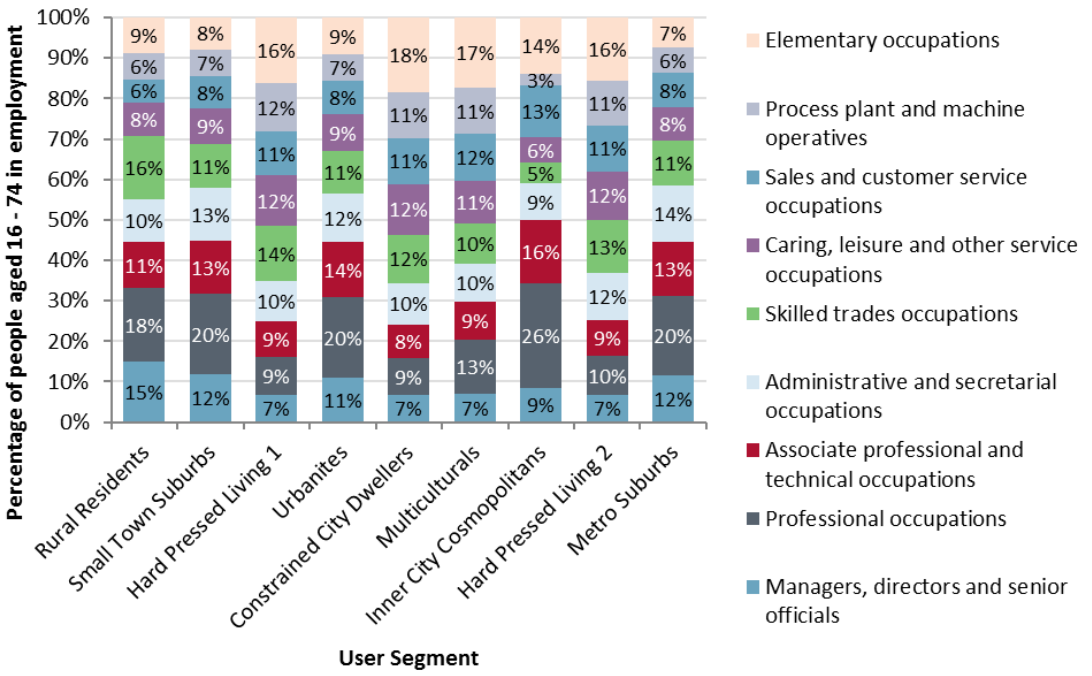
occupational structure of employment in the North in future NPIER scenarios, it is possible to estimate the potential changes in the number of people in each user segment.

Approach

6.8 Cambridge Econometrics' parallel work explored the future composition of the North's labour markets in different growth scenarios, based on previous outputs from the Northern Powerhouse Independent Economic Review. It concluded that, in all scenarios, that for the economy to grow to the size projected, the proportion of workers employed in higher-skilled, higher-occupation jobs would need to increase, with a corresponding decline in the proportion of workers in lower-skill and lower-occupation jobs[15].

6.9 In the 'Business as Usual' scenario, for example, the number of jobs in the highest occupational group - managers, directors and senior officials – would need to increase by 38% from 2015 to 2050, representing an increase from 9% to 11% of the total workforce. Conversely, the number of jobs in elementary occupations would to fall by 7%.

Figure 6.1: Estimated occupational split of workers within each user segment, 2011 Census



6.10 Figure 6.1 shows the different occupational split within each user segment, as derived from the 2011 Census. This is based on the Standard Occupational Classification (SOC) of all individuals within each user segment aged 16 – 74 in employment on Census Day 2011.

6.11 Since each user segment has a different proportion of the workforce within each occupation, each would have to have a different growth rate in order for the Cambridge Econometrics

[15] Cambridge Econometrics' approach relied on the GVA estimates for the NPIER forecasts as a starting point to estimate the future change in the occupational split of the North. This approach is mathematical in nature, and hence should not be considered a 'forecast' per se of the occupational split of the North in the future.

projections for the total number of jobs within each occupation to be met. It is therefore possible to estimate the change in the total population of each user segment from the Cambridge Econometrics forecasts, applying a weighted average approach.

Total Jobs by User Segment

6.12 Our approach involved estimating the future population of the user segments, based on a weighted average of the future jobs by occupation (from Cambridge Econometrics) and the occupational split of each user segment, as follows:

- The number of people employed by occupation for each user segment was uplifted from the 2011 Census to 2015 to be consistent with the base year of the NPIER and Cambridge Econometrics work, based on population growth between 2011 and 2015 at a local authority level;
- The percentage change in the number of jobs by occupation (from Cambridge Econometrics) in each NPIER scenario was applied to the total number of employed people aged 16 - 74 in each user segment in 2015, based on their specific occupational split;
- Adjustments were made to account for how the number of jobs in the North does not equal the number of employed people aged 16 - 74 (since some people work multiple jobs), and to ensure consistency between these estimates and the NPIER jobs forecasts.

6.13 This led to a central estimate of the number of jobs (by occupation) within each user segment, with the total number of jobs across all user segments in 2050 consistent with the forecasts in the NPIER.

Future User Segment Size

6.14 Estimates of the total size of each user segment were then developed, based on:

- applying the percentage change in the number of jobs in each segment to the size of the user segment in 2015, and;
- accounting for the change in household structure – notably a changing employment rate and a reduction in the proportion of the population of working-age[16] – between 2015 and 2050 envisaged in the NPIER. The NPIER outlined a series of forecasts for the future number of jobs and population within the North, each of which envisaged a decline in the total proportion of the population of the North who are employed (or the number of jobs per person), largely due to the effects of an ageing population.

6.15 Each user segment has a different number of jobs per person, since they each have different age profiles and hence proportions of the population of non-working age, and different levels of economic inactivity and unemployment. Within the Constrained City Dwellers segment, for example, there are 0.41 jobs per person in 2011, compared to 0.57 jobs per person within the

[16] For the purposes of this analysis, which considers *total* jobs and population in aggregate, we refer to these factors collectively as the 'number of jobs per person'. This includes both the effect of an increase in the employment rate (the proportion of those of working-age in work), and a decline in the proportion of the population who are working-age due to the effects of an ageing population.

Urbanites segment. Clearly, changes in this ratio for each user segment need to be considered in order to scale the change in the jobs to the change in population robustly.

6.16 Whilst the number of jobs per person is expected to fall for each segment, it is not possible from the NPIER or Cambridge Econometrics work to say whether the decline in the number of jobs per person in each segment is consistent across segments, or different for each. Hence, we developed two approaches to estimating the population of the segments:

Approach 1 - no change to the distribution of jobs per person within the segments

- This method assumes that the number of jobs per person *declines uniformly* across the segments and in line with the forecasts in the NPIER. This means that in 2050, there will continue to be differences in the age profiles and employment rates within the segments that are broadly similar to today.
- For example, there will continue to be high levels of economic inactivity and unemployment amongst some segments (such as Constrained City Dwellers), whilst others retain a comparatively young demographic with a low proportion of people of non-working age (such as Urbanites).

Approach 2 - similar employment rates within the segments:

Under this approach, the number of jobs per person averaged across all the segments continues to decline across the North in line with the forecasts in the NPIER, but that the number of jobs per person in each segment converge together, and in 2050 become *identical*. In practice, this means:

- segments with *high numbers of jobs per person* in 2011 (such as Urbanites), and correspondingly low levels of economic inactivity and a high proportion of the population of working-age, have the *greatest declines* in jobs per person, as their population age and leave the labour market, and there is little change in economic activity and employment amongst those of working-age;
- segments with *low numbers of jobs per person* in 2011 (such as Multiculturals), and correspondingly high levels of economic inactivity and a high proportion of people outside working age, have *small increases* in the number of jobs per person. In effect, this is because of:
    - large increases in the employment rate (more working-age people in work rather than unemployed, long-term sick or looking after home/family);
    - a more stable proportion of their population outside working-age.

6.17 We have presented results for both of these approaches, and also presented the population of each user segment as a range estimate between them. This reflects how, for each user segment, one approach is likely to underestimate the population and the other overestimate it. It should be stressed that the figures are illustrative, based solely on the occupational changes forecast by Cambridge Econometrics, and do not seek to explore how other factors could lead to changes in the population over time.

Future Commuting Trips

6.18 Cambridge Econometrics also developed estimates of the implications of changes in the geography of the North's labour and employment markets on patterns of commuting flows

across the North. This is based on the 'compact' and 'dispersed' scenarios presented in *Future Transport Demand in the North,* which provides an estimate of the proportion of workers at each skill level (which are aggregations of the Standard Occupational Classification)[17] who live and work in the same local authority district, commute across local authority districts within the North, or commute from outside the North under five scenarios in 2050.

6.19 Since each user segment defined for this work has a specific skills split (sourced from the 2011 Census), it is also possible to estimate the patterns of commuting trips in the North for each segment. This is based on applying the proportion of workers who live and work in the same local authority district, commute across local authority districts within the North, or commute from outside the North *for each skills level* (from Cambridge Econometrics) in 2050 to the estimates of the *proportion of workers within each skills level* for each of the user segments in 2050 calculated earlier.

6.20 This provides an estimate of the change in the number and distribution of commuting trips from each user segment, under the 'Business As Usual' and 'Transformational' 'dispersed'/'compact' and 'digital'/'travel friendly' scenarios.

Findings

Total Jobs by User Segment

6.21 Table 6.1 sets out the projected change in the number of jobs by user segment in the 'Business as Usual' and 'Transformational' NPIER scenarios. Despite a significant shift in the occupational structure of the North – with a forecast decline within some occupational classes (such as elementary occupations) – *all segments* are expected to experience employment growth in both NPIER scenarios. Reflecting the increases in higher-occupational roles forecast by CE, the percentage increases in the number of jobs are greatest for those segments that have the greatest proportion of their workforce in higher-status occupations.

6.22 Inner City Cosmopolitans, for example, are expected to experience jobs growth of 18% and 31% under the 'Business as Usual ' and 'Transformational' scenarios respectively, compared to 9% and 20% across the North as a whole. Urbanites, Metro Suburbs and Small Town Suburbs experience the greatest increase in the number of jobs in absolute terms, reflecting both their larger population size and higher proportion of higher-status occupation workers.

6.23 Note that the increase in the number of jobs across the North from 2015 to 2050 in each scenario is consistent with the core NPIER jobs forecasts.

Total Population by User Segment

6.24 Tables 6.2 to 6.4 set out the projected change in the population for each user segment, in both the 'Business as Usual' and 'Transformational' NPIER scenarios, with the two approaches towards the changes in the number of jobs per person within each user segment.

6.25 Similar to the jobs estimates, the greatest increases in population are for those segments which have the greatest proportion of their workforce in higher occupational roles. Inner City

[17] In *Connectivity and Labour Markets in the Northern Powerhouse*, 'high skill' refers to those in SOC groups 1 – 3, 'medium skill' refers to those in SOC groups 4 – 7, and 'low skill' refers to those in SOC groups 8 and 9.

Cosmopolitans, Urbanites and both Small Town and Metro Suburbs are projected to grow at the fastest rates, whilst in some scenarios, the population of Constrained City Dwellers and Metropolitans is expected to stay broadly static until 2050.

6.26 As before, the increase in the total population across the North from 2015 to 2050 is consistent with the core NPIER forecasts.

Table 6.1: Change in Total Jobs by User Segment, 2015 – 2050

User Segment	Current Jobs		NPIER 'Business As Usual'		NPIER 'Transformational'	
	Population aged 16 - 74 in employment, 2011 (2011 Census)	Total Jobs by User Segment, 2015 (estimated)	Total Jobs by User Segment, 2050 (estimated)	% change in Total Jobs, 2015 – 2050	Total Jobs by User Segment, 2050 (estimated)	% change in Total Jobs, 2015 – 2050
Rural Residents	591,457	659,700	735,100	11%	802,600	22%
Small Town Suburbs	902,386	1,006,900	1,132,500	12%	1,246,300	24%
Hard Pressed Living 1	787,368	876,000	911,300	4%	1,005,600	15%
Urbanites	1,209,720	1,355,900	1,531,400	13%	1,686,800	24%
Constrained City Dwellers	518,790	581,000	605,000	4%	669,900	15%
Metropolitans	634,740	717,700	764,400	7%	848,700	18%
Inner City Cosmopolitans	235,209	267,400	314,900	18%	350,200	31%
Hard Pressed Living 2	947,909	1,064,000	1,106,400	4%	1,221,900	15%
Metro Suburbs	982,209	1,101,900	1,235,000	12%	1,359,000	23%
North	**6,809,788**	**7,630,400**	**8,336,000**	**9%**	**9,191,000**	**20%**

Table 6.2: Population by User Segment, 000s, 2015 – 2050

User Segment	Current Population (000s)		2050 Population (000s) NPIER 'Business As Usual'		2050 Population (000s) NPIER 'Transformational'	
	Population (2011 Census)	Population (2015 Estimated)	No change to distribution of activity rates	Identical jobs rates amongst segments	No change to distribution of activity rates	Identical jobs rates amongst segments
Rural Residents	1,181	1,196	1,529	1,597	1,636	1,709
Small Town Suburbs	1,810	1,833	2,360	2,460	2,546	2,654
Hard Pressed Living 1	1,842	1,861	2,038	1,980	2,205	2,142
Urbanites	2,327	2,367	3,127	3,327	3,377	3,592
Constrained City Dwellers	1,393	1,416	1,434	1,314	1,557	1,427
Metropolitans	1,692	1,736	1,807	1,661	1,966	1,807
Inner City Cosmopolitans	493	509	670	684	730	746
Hard Pressed Living 2	2,236	2,279	2,483	2,403	2,688	2,602
Metro Suburbs	1,957	1,993	2,565	2,683	2,767	2,894
North	**14,933**	**15,190**	**18,108**	**18,108**	**19,572**	**19,572**

Table 6.3: Percentage change in population by User Segment, 2015 – 2050

User Segment	Population Growth, 2015 - 2050 NPIER 'Business As Usual'		Population Growth, 2015 - 2050 NPIER 'Transformational'	
	No change to distribution of activity rates	Identical jobs rates amongst segments	No change to distribution of activity rates	Identical jobs rates amongst segments
Rural Residents	+ 28%	+ 33%	+ 37%	+ 43%
Small Town Suburbs	+ 29%	+ 34%	+ 39%	+ 45%
Hard Pressed Living 1	+ 10%	+ 6%	+ 19%	+ 15%
Urbanites	+ 32%	+ 41%	+ 43%	+ 52%
Constrained City Dwellers	+ 1%	- 7%	+ 10%	+ 1%
Metropolitans	+ 4%	- 4%	+ 13%	+ 4%
Inner City Cosmopolitans	+ 32%	+ 34%	+ 44%	+ 47%
Hard Pressed Living 2	+ 9%	+ 5%	+ 18%	+ 14%
Metro Suburbs	+ 29%	+ 35%	+ 39%	+ 45%
North	+ 19%	+ 29%	+ 19%	+ 29%

Table 6.4: Percentage change in population by User Segment, 2015 – 2050

User Segment	Current Population		2050 Population NPIER 'Business As Usual'		2050 Population NPIER 'Transformational'	
	Population (2011 Census) (000s)	Population (2015 estimated) (000s)	Population (000s)	Population (% change 2015 – 50)	Population (000s)	Population (% change 2015 – 50)
Rural Residents	1,181	1,196	1,529 – 1,597	28 – 33%	1,636 – 1,709	37 – 43%
Small Town Suburbs	1,810	1,833	2,360 – 2,460	29 – 34%	2,546 – 2,654	39 – 45%
Hard Pressed Living 1	1,842	1,861	1,980 - 2,038	6 – 10%	2,142 – 2,205	15 – 19%
Urbanites	2,327	2,367	3,127 - 3,327	32 – 41%	3,377 – 3,592	43 – 52%
Constrained City Dwellers	1,393	1,416	1,314 - 1,434	-7 – +1%	1,427 – 1,557	1 – 10%
Metropolitans	1,692	1,736	1,661 - 1,807	-4 - +4%	1,807 – 1,966	4 – 13%
Inner City Cosmopolitans	493	509	670 - 684	32 – 34%	730 – 746	44 – 47%
Hard Pressed Living 2	2,236	2,279	2,403 - 2,483	5 – 9%	2,602 – 2,688	14 – 18%
Metro Suburbs	1,957	1,993	2,565 - 2,683	29 – 35%	2,767 – 2,894	39 – 45%
North	**14,933**	**15,190**	**18,108**	**19%**	**19,572**	**29%**

Future Commuting Trips by User Segment

6.27 Tables 6.5 and 6.6 set out the commuting patterns in the North for workers within the different user segments. In 2015, 61% of workers in the North both lived and worked within the same local authority district, with comparatively little variation amongst the user segments, both in 2015 and in the future scenarios. This is because commuting patterns in the *Connectivity and Labour Markets within the Northern Powerhouse* work with Local Authority commuting varies by only a small amount between the high-skilled (61.7%) and the low-skilled (60.7%). This is then reflected in the commuting behaviour of the user segments, each of which includes workers across different skill levels.

6.28 When projected forwards, different trends can be observed for each of the NPIER and Future Transport Demand in the North of England scenarios. These reflect the *Connectivity and Labour Markets within the Northern Powerhouse* work, and in particular that in each of the 'Transformational' scenarios, smaller proportions of the North's workforce across all segments are expected to live and work within the same local authority district. This effect is most pronounced under the 'travel friendly' scenario, reflecting the significant reductions in the cost of commuting envisaged in this scenario.

Table 6.5: Commuting Patterns in the North by scenario, 2015 – 2050, as % of all workers by user segment

Northern User Segment	2015	Business As Usual	Compact + Digital	Compact + Travel Friendly	Dispersed + Digital	Dispersed + Travel Friendly
Rural Residents						
Living and working in the same LAD	61%	61%	54%	40%	54%	41%
Commuting from within the North	36%	36%	45%	59%	45%	58%
Commuting from outside the North	3%	3%	1%	1%	1%	1%
Small Town Suburbs						
Living and working in the same LAD	61%	61%	54%	40%	55%	41%
Commuting from within the North	36%	36%	45%	58%	45%	58%
Commuting from outside the North	3%	3%	1%	1%	1%	1%
Hard Pressed Living 1						
Living and working in the same LAD	61%	61%	52%	39%	53%	39%
Commuting from within the North	36%	36%	47%	60%	46%	59%
Commuting from outside the North	3%	3%	1%	1%	1%	1%
Urbanites						
Living and working in the same LAD	61%	61%	54%	40%	54%	41%
Commuting from within the North	36%	36%	45%	59%	45%	58%
Commuting from outside the North	3%	3%	1%	1%	1%	1%
Constrained City Dwellers						
Living and working in the same LAD	61%	61%	52%	38%	52%	39%
Commuting from within the North	36%	36%	47%	60%	47%	60%
Commuting from outside the North	3%	3%	1%	1%	1%	1%
Metropolitans						
Living and working in the same LAD	61%	61%	52%	39%	53%	39%
Commuting from within the North	36%	36%	47%	60%	46%	60%
Commuting from outside the North	3%	3%	1%	1%	1%	1%
Inner City Cosmopolitans						
Living and working in the same LAD	61%	61%	54%	40%	54%	41%
Commuting from within the North	36%	36%	45%	59%	45%	58%
Commuting from outside the North	3%	3%	1%	1%	1%	1%
Hard Pressed Living 2						
Living and working in the same LAD	61%	61%	52%	39%	53%	40%
Commuting from within the North	36%	36%	47%	60%	46%	59%
Commuting from outside the North	3%	3%	1%	1%	1%	1%
Metro Suburbs						
Living and working in the same LAD	61%	61%	54%	40%	55%	41%
Commuting from within the North	36%	36%	45%	58%	44%	58%
Commuting from outside the North	3%	3%	1%	1%	1%	1%

Table 6.6: Commuting Patterns in the North by scenario, 2015 – 2050, as total commuting flows

Northern User Segment	2015	Business As Usual	Compact + Digital	Compact + Travel Friendly	Dispersed + Digital	Dispersed + Travel Friendly
Rural Residents						
Living and working in the same LAD	367,400	402,600	387,000	288,900	391,100	293,400
Commuting from within the North	214,000	236,200	325,000	421,100	321,000	416,700
Commuting from outside the North	17,500	18,800	6,700	8,600	6,700	8,600
Small Town Suburbs						
Living and working in the same LAD	560,800	620,200	602,500	450,200	609,000	457,100
Commuting from within the North	326,600	363,900	503,100	652,400	496,900	645,600
Commuting from outside the North	26,700	29,000	10,300	13,300	10,300	13,300
Hard Pressed Living 1						
Living and working in the same LAD	486,600	498,400	469,900	348,600	474,900	354,200
Commuting from within the North	284,800	293,100	421,700	540,700	416,900	535,400
Commuting from outside the North	23,700	23,700	8,700	11,100	8,700	11,100
Urbanites						
Living and working in the same LAD	755,100	838,600	813,400	607,400	822,100	616,800
Commuting from within the North	439,800	492,100	682,900	884,900	674,500	875,700
Commuting from outside the North	36,000	39,300	14,000	18,000	14,000	18,000
Constrained City Dwellers						
Living and working in the same LAD	322,600	330,900	311,500	230,800	314,800	234,500
Commuting from within the North	188,900	194,600	282,400	361,600	279,200	358,000
Commuting from outside the North	15,700	15,800	5,900	7,400	5,900	7,400
Metropolitans						
Living and working in the same LAD	398,800	418,100	396,400	293,800	400,600	298,500
Commuting from within the North	233,300	245,900	356,100	456,600	352,000	452,100
Commuting from outside the North	19,300	19,900	7,400	9,400	7,400	9,400
Inner City Cosmopolitans						
Living and working in the same LAD	149,000	172,400	168,100	125,300	169,900	127,200
Commuting from within the North	86,800	101,200	142,500	184,400	140,700	182,500
Commuting from outside the North	7,100	8,100	2,900	3,800	2,900	3,800
Hard Pressed Living 2						
Living and working in the same LAD	591,100	605,200	573,000	425,400	579,100	432,200
Commuting from within the North	345,900	355,800	510,500	655,200	504,700	648,700
Commuting from outside the North	28,700	28,800	10,600	13,400	10,600	13,400
Metro Suburbs						
Living and working in the same LAD	613,700	676,400	658,100	492,000	665,200	499,600
Commuting from within the North	357,400	396,800	547,500	710,400	540,700	702,900
Commuting from outside the North	29,300	31,600	11,200	14,400	11,200	14,400

Interpreting the Findings

6.29 These results provide an indication of how the user segments could be expected to change in the future, based on the forecast change in the occupational split of the North's workforce by 2050 in different NPIER scenarios. While they should not be viewed as a 'forecast' *per se* of future change, they provide useful insight into how the future economy of the North could affect the population of different groups of the people in the North, each of which with specific travel behaviours and motivations. Notably:

- Despite a shift in the occupational structure of the North – with a forecast decline within some occupational classes (such as elementary occupations) – the analysis suggests all user segments will experience employment growth;
- Reflecting the high proportion of their workforce within higher occupations, with 35% of jobs within one of the higher two occupational classes in 2015, the analysis suggest that Inner City Cosmopolitans will grow at the fastest rate by 2050, with a population increase of between 32% and 47% (albeit from a low base), noting:
  - Such individuals typically live within dense city centres, and if this continues, this would represent a continued shift towards city centre living within the North. If the segment were to grow by 47% as the analysis suggests it would in the 'Transformational' scenario, this would represent an increase in their share of the North's population from 3% to 4%;
  - Currently people in this segment also have distinctive travel patterns, travelling less distance by car and significantly more by rail – approximately 200% more – than the Northern average. If the segment – and others associated with high levels of rail demand – grows as outlined, this would lead to a substantial increase in rail demand across the North.
- The analysis suggests that other segments with a higher proportion of their workforce within higher occupational classes (Metro and Small Town Suburbs, Urbanites and Rural Residents) would also grow at a faster rate. These segments are broadly associated with longer commuting distances and high travel demand, both by car and rail, and hence again if they are to grow as outlined, this would result in a marked increase in overall travel demand within the North.
- The analysis suggests that some segments would experience a slower rate of population growth, or small population decline, such as Constrained City Dwellers. This is since the majority of their workforce is currently employed within lower occupations (such as process plant or machine operatives), jobs in which are expected to grow at a slower rate or decline based on Cambridge Econometrics forecasts.
- Across all the segments, the analysis suggests a significant shift in commuting patterns, with a greater proportion of workers commuting across local authority boundaries to work. This is especially true for both the 'compact' and 'digital' 'travel-friendly' NPIER scenarios.

6.30 It should also be stressed that these results represent an estimation of the possible change in the population of the user segments – both percentage and absolute – across the North by 2050. They should not be interpreted as a forecast of the possible change in population or employment within a particular segment in a specific place, since:

- trends are averaged across the North, and there are likely to be outliers in terms of how specific places change in the future;
- different levels of growth within the segments do not mean that simply that the current geographical distribution of segments in the North will stay unchanged. While some areas currently classed as 'Urbanites' would be expected to experience higher-than-average population growth, other areas would be expected to 'swap' between segments over time, as the demographics of their population changes over time. For example, an area of the North classed as Hard Pressed Living 1, with higher levels of unemployment and lower skills, could be expected to upskill, with their population moving into higher skilled roles and experiencing a decline in unemployment. Such as area could hence switch from 'Hard Pressed Living 1' to 'Small Town Suburbs' and experience significant population growth, rather than population stagnation.

Segments with the highest proportion of their population in higher-occupational jobs are expected to grow fastest under all NPIER scenarios by 2050.

Since these segments typically travel more – especially by rail – this is likely to lead to a substantial increase in overall travel demand within the North

7 Conclusions and Future Research

7.1 This report has explored and developed the evidence base regarding how different groups of people within the North of England travel. This has informed the development of a series of user segments of the population of the North, based on observed differences in travel behaviour and the Output Area Classification.

7.2 This chapter summarises our work, and highlights opportunities for future research.

Northern Travel Patterns

7.3 National Travel Survey (NTS) data provides extensive insight into the travel patterns of people within the North, how these differ to those elsewhere in the country, and differences in travel behaviour by socio-demographic group. Broadly:

- individuals within the North exhibit similar behaviour to those in the rest of England excluding London, in terms of total trips and distance travelled;
- car is the dominant mode within the North, similar to the rest of England excluding London;
- rail patronage has more than doubled over the past twenty years, with the increase being greater in the North than the rest of Great Britain. Rail now accounts for 1.1% of trips and 6.7% of distance travelled in the North

7.4 Additionally, there are strong relationships between key socio-demographic indicators and travel behaviour. Trips and distance travelled increase with age (until age 50), and the presence of children in the household is associated with an uplift in trip making. Those in higher occupational groups, those with graduate-level skills and those in higher-level income bands travel greater distances than average – especially by rail – and have a greater propensity to make long-distance trips. An individual in North within the lowest income quintile travels 216 miles by rail on average – less than a quarter of the average distance travelled by an individual in the highest income quintile (933 miles).

7.5 Many of these socio-demographic variables are strongly correlated: those with higher skills are more likely to have higher incomes within higher occupational groups, for example. The Output Area Classification, based on the clustering of Census variables, forms a useful technique for considering different groups of people within the North based on their socio-demographics – each displaying distinct patterns of travel behaviour.

Academic Research

Trip Patterns

7.6 Extensive academic research has also considered the key trends in travel behaviour within Great Britain. Broadly, trip rates – the number of journeys made per person per year – have fallen since the mid-1990s. However, the total *time* spent travelling has been broadly constant over the past 35 years; Metz (2010) argues that individuals have traded increased incomes for the ability to travel faster and further than before, accounting for the Flong-term increases in total distance travelled per person.

7.7 Notably, car mileage per person has fallen in recent years, a phenomenon refered to as 'peak car' by Goodwin (2012), with both per-person car trips and distance travelled by car falling by 13% between 2002 and 2016 (DfT, 2017). Several factors have been argued to have caused this, including:

- the advent and increasing popularity of telecommunications and the Internet
- changing demographics, such as delayed parenthood or full-time employment
- societal 'end of the love affair' with the car
- declining traffic speeds and worsening congestion, and/or modal shift to rail
- increased cost of car travel (especially insurance) for young people

7.8 However, it is dificult to identify the root causes of these trends, or disaggregate between these factors, and there is debate regarding the extent to which these trends can be expected to continue in future, or whether car mileage per person will resume an upward trend. Key to understanding these trends has been a long-term decline in commuting trips as a result of changing working habits and an increase in 'trip-chaining' (DfT, 2017), declines in per person car mileage amongst young men in particular, argued to be a result of 'delayed adulthood' and cost factors such as the increased cost of insurance (Chatterjee *et al*., 2018), and a decline in company car mileage, probably a result of changes in vehicle taxation (Le Vine et al, 2010). Conversely, rail trips have grown strongly, with rail patronage more than doubling over the past 20 years, with the greatest increases being outside of the core London commuting market (Le Vine et al (2010)).

User Segmentation

7.9 Several approaches have been used to previously segment transport users in order to better understand the travel behaviours and motivations of different demographics. Steer Davies Gleave (2017, 2014) have previously developed Transport of London 'Classification of Londoners' and Smarter TravelStyle, both based on existing geo-demographic classifications (London Output Area Classification and MOSAIC respectively). These benefit from the ability to use extensive existing secondary data to rapidly 'build up' geographic segments of local communities (which can be easily be mapped), complemented by travel behaviour and motivational data.

7.10 Other techniques have involved a greater focus on primary research, such as the Transport Systems Catapult (2015) segments of UK travellers based on their attitudes and propensity to benefit from Intelligent Mobility initiatives, and Thornton *et al*. (2011) segments based on attitudes to climate change and travel modes developed for the Department for Transport. While use of primary research can allow a more focused segmentation based on specific

attitudes and behaviours – typically missing within existing Census datasets – limitations on survey sample sizes can mean they lack analytical depth, and the lack of a link to 'geography' (other than the postcodes of survey respondents) typically means it is difficult to develop an understanding of where different segments are located within local geographies.

Northern User Segmentation

7.11 Informed by the data analysis and literature review, our approach involved developing a Northern user segmentation based on the Output Area Classification, complemented by data regarding travel behaviour from the National Travel Survey and the 2011 Census.

7.12 Nine segments were developed, as outlined in Table 7.1.

Table 7.1: Summary of User Segments

Segment	% of the North's population	Key demographics	Key property/geography characteristics	Key travel characteristics
Rural Residents	8%	Older, married, better educated. Working in primary industries.	Rural, less dense, detached houses	High car ownership and car commuting
Small Town Suburbs	13%	Older and without children.	Outside metropolitan areas. Detached/semis majority owner occupied.	Travel more, travel further, less public transport. Greater car ownership & travel further by car. Significantly less bus.
Urbanites	15%	Employed full-time in middle occupational roles. Families with children & couples with no children.	Smaller towns and outer fringes of larger cities. Semis and terraces, majority owner occupied.	Travel more, travel more by rail, less bus. Own car and greater propensity to commute by rail
Hard Pressed Living 1	13%	Families with children. High percentage with no qualifications. Working in manufacturing.	Smaller towns and cities outside metro areas. Terraces houses and semis - around half rented.	Travel less, shorter journeys, considerably less by rail but much higher bus. Greater car ownership.
Constrained City Dwellers	9%	High percentage singles, divorced or widowed. High percentage with no qualifications, unemployed and long-term sick.	Densely populated, large towns and cities. High percentage social rented & flats.	Fewest trips, shortest distance, much more bus, much lower rail. More than 50% no car. High walking/bus commute
Inner City Cosmopolitans	3%	~50% students. Young, well educated, single.	Dense inner cities, private rented flats.	Significantly above average rail. Low car usage and ownership - almost 50% no car.

Multiculturals	11%	High percentage families with children. Younger with more children in households.	Larger towns and cities. Around half rented.	Travel less, shorter journeys. Much higher bus. Almost 50% no car.
Metro Suburbs	13%	Older, employed in high occupations. More likely to be employed full-time and aged 45-59.	Outer suburban areas of metropolitan areas. Majority owner occupied. Semis/detached.	Travel more & further by car and rail. Much lower bus. Car ownership higher. More likely to have 1-2 cars in household and travel to work by car.
Hard Pressed Living 2	15%	Families with children. Lower occupations in public admin & education. Relatively high percentage no qualifications.	Inner suburbs and small towns within metropolitan areas. Approximately half owner-occupied, living in terraces or semis.	Travel less and shorter distances. Slightly higher rail and much higher bus. ~30% no car. Commute more likely by bus & rail

Future Segment Growth

7.13 Analysis was also undertaken exploring the potential future growth of the user segments, based on their occupational split and outputs from a parallel study by Cambridge Econometrics, *Connectivity and Labour Markets within the Northern Powerhouse.* Although this work is illustrative, based simply on applying forecast changes in the occupational structure of the North to the user segments, it does provide a useful indication of potential scale and direction of future growth.

7.14 Overall, despite significant shifts in the occupational structure of the North – including forecast declines within some lower-occupational classes – all user segments are expected to experience employment growth. Both employment and population growth is expected to be greatest for those segments with the highest proportion of their population in higher-level occupations, such as Inner City Cosmopolitans.

7.15 Notably, those segments expected to experience the highest population growth are also those associated with high levels of travel demand – especially by rail. If they are to grow as outlined, this would result in a significant increase in overall travel demand within the North.

Future Research

7.16 Our user segments have been created using Census data (specifically the Output Area Classification) and the National Travel Survey and these sources provide a solid foundation in terms of socio-demographics and travel behaviour. There are two broad questions to consider when thinking about future research:

3. How will the travel behaviour of people within each segment change over time, both in respect to changes in transport supply and the provision of transport services, and in response to exogenous changes?
4. How will the size of each segment change over time, again with respect to exogenous and transport stimuli?

Segment Travel Behaviour

7.17 As the TfN User Segments are based upon the OAC geodemographic classification system, using additional data from primary research it is possible to add extra layers of segment profiling.. This could be useful for exploring issues such as:

- how different segments are responding to emerging technologies and transport options such as electric vehicles, automated vehicles, car clubs, cycle hire schemes, taxi and cab apps such as Uber and mytaxi, and sharing schemes such as parklet (a scheme whereby you rent out your drive or garage to be used as a parking bay);
- more generally, how quickly each segment embraces change;
- the relative priority people in different segments place on factors such as saving money, improving health and wellbeing, saving time, making travel time more productive, personal freedom;
- the relationship between the segments and NPIER capabilities.

7.18 Depending on the issue of interest, a quantitative or qualitative approach can be taken. A quantitative survey using an online or telephone method could be used to collect basic information relating to many of the topics identified above. For example, it can be used to collect data on take-up and stated likely future take-up of newer (though relatively established) transport options such as electric vehicles and car clubs. This would provide a useful indicator of the relative potential amongst each User Segment for adopting new technologies and transport options. It could also be used to capture high level information on transport preferences and barriers to changing behaviour.

7.19 However, a qualitative approach such as using focus groups, is more appropriate when examining more complex issues such as the potential take-up of technologies which are not yet understood, such as autonomous vehicles. With a skilled facilitator, it is possible to overcome many of the barriers which limit people's ability to imagine how they would react in a new situation, such as how things may be in ten or twenty years' time. While a focus group approach does give a greater depth of understanding, because of the relatively small samples involved it is more difficult to attribute the findings from them to a specific User Segment.

Segment Size and Distribution

7.20 The second broad question relates to the future sizes of each segment and their distribution across the North. This can be broken down into thinking about:

- In a 'Business as Usual' scenario, how will the size and distribution of the segments change in response to endogenous factors (e.g. lifecycle factors as people get older, co-habit or have children), exogenous factors (e.g. economic growth) and transport stimuli;
- What will the size and distribution of the segments be in a 'Transformational' growth scenario, again in response to endogenous and exogenous factors, and transport stimuli;
- To what extent would the size and distribution of the segments be responsive to the transport interventions that TfN is pursuing.

7.21 Our simple approach to considering future growth of the user segments has only considered one of those factors – the future economy of the North, and its occupational split. Collectively, these questions point to the development of a population model for the North that can respond to endogenous, exogenous and transport variables.

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Appendices

A References

Anable, J. (2005). *'Complacent Car Addicts' or 'Aspiring Environmentalists'? Identifying travel behaviour segments using attitude theory.* Transport Policy, 12 (1): 65-78

Anable, J., Lane, B., & Kelay , T. (2006). *An evidence base review of attitudes to climate change and transport*. Report for the Department for Transport. London: HMSO.

Chatterjee, K., Goodwin, P., Schwanen, T., Clark, B., Jain, J., Melia, S., Middleton, J., Plyushteva, A., Ricci, M., Santos, G. and Stokes, G. (2018). Young People's Travel – What's Changed and Why? Review and Analysis. Report to Department for Transport. UWE Bristol, UK.

David Simmonds Consultancy (1999). *Case Study: A55 North Wales Expressway.* Report for the Department of the Environment, Transport and the Regions.

Department for Transport (2015). Road Traffic Forecasts 2015.

Department for Transport (2017). Commuting Trends in England: 1988 – 2015.

Department for Transport (2017). Rail Factsheet: November 2017.

Diamond, D., Spence, NA. (1989). *Infrastructure and Industrial Costs in British Industry*. Report for the Department of Trade and Industry.

Eddington, R. (2006*). The Eddington Transport Study – The case for action: Sir Rod Eddington's advice to Government.* Report for the Department for Transport.

Gibbons, S., Lyytikäinen, T., Overman, H., Sanchis-Guarner, R. (2012). *New Road Infrastructure: the Effects on Firms*. Spatial Economics Research Centre, Discussion Paper 117.

Goodwin, P. (2012). Three Views on Peak Car. World Transport, Policy & Practice, 17(4): 8–17

Graham, D.J. (2005). Investigating the link between productivity and agglomeration for UK industries. Report for the Department for Transport.

Le Vine, S., Jones P. (2012). On the Move: Making sense of car and train travel trends in Britain. RAC Foundation, London, UK.

Le Vine, S. and Polak, J. (2014) Trends in Urban Travel Behaviour. In: Moving Cities: The Future of Urban Travel. Edited by: Stephen Glaister and Elizabeth Box. RAC Foundation.

Melo, P., Graham, D., Brage-Ardao, R. (2013). *The productivity of transport infrastructure investment: A meta-analysis of empirical evidence*. Regional Science and Urban Econometrics, 43 (5), 695-706

National Infrastructure Commission (2016) *High Speed North: A National Infrastructure Commission Report*. Report for Transport for the North.

OECD (2015). *The Metropolitan Century*. Cited from *https://www.citymetric.com/business/cities-productivity-proportional-their-size-unless-theyre-british-782.*

One North (2014). *A Proposition for an Interconnected North.*

Osbourne, G. (2015). *Chancellor's speech at the CBI's 2015 annual dinner.*

Pangbourne, K., Lane, B., Anable, J. (2015). *Evidence Base Review of Business Travel Behaviour: Report on Qualitative Interviews*. Report for Department of Transport.

Standing Advisory Committee on Trunk Road Appraisal (SACTRA) (1997). *Transport and the economy.*

Steer Davies Gleave (2014). *Smarter TravelStyle.*

Steer Davies Gleave (2017). *Transport for London Classification of Londoners*. Report for Transport for London.

Singleton, A., Longley, P., Duckenfield, T. (2017). *London Workplace Zones Classification: Technical Report.*

Sport England and Experian Ltd (2010). *Sport Market Segmentation.*

SQW, Cambridge Econometrics and Steer Davies Gleave (2016). *The Northern Powerhouse Independent Economic Review (NPIER)*. Report for Transport for the North.

Thornton, A., Evans, L., Bunt, K., Simon, A., King, S., Webster, T. (2011). *Climate Change and Transport Choices Segmentation Model – A framework for reducing CO2 emissions from personal travel*. Report for The Department for Transport.

Transport Systems Catapult (2015) *Traveller Needs and UK Capability Study: Supporting the Realisation of Intelligent Mobility in the UK*

Venables, A., Laird, J., Overman, H. (2014). *Transport investment and economic performance: Implications for project appraisal.* Report for the Department for Transport.

What Works Centre for Local Economic Growth (2015). *Evidence Review 7: Transport*

Welsh Economy Research Unit (1996). *Delivering the goods? The economic impact of the A55 Expressway improvements*. Report for the British Road Federation. Cited in David Simmonds Consultancy (1999) Case Study: A55 North Wales Expressway.

B Transport and the Economy

B.1 Transport connectivity can also influence wider changes in the nature of local economies, including playing a key role in the decisions of individuals and businesses to live and work. This section briefly considers the wider linkages between transport and the wider economy, based on past research.

Direct Transport Impacts

B.2 Transport interventions can directly increase productivity, and hence economic performance, by reducing the time and costs to businesses of travel. Haulage firms, for example, will benefit from reducing vehicle operating costs, and the ability to serve more deliveries in a given timeframe – thereby saving on staff costs and enabling the business to operate more efficiently. Such benefits are typically captured through the estimation of business transport user benefits, which comprise the savings in terms of travel time, vehicle operating costs and 'generalised travel costs' associated with improved transport accessibility.

B.3 Market economies typically see these benefits transfer into the wider economy: for example, firms whose production costs fall due to a transport investment may pass the benefit on to consumers in the form of lower prices, stimulating increased demand, or they might be able to implement efficiency improvements by reorganising distribution and production (SACTRA, 1997). It has been estimated that a 5% reduction in business travel times in the UK would be worth around 0.2% of annual GDP (Eddington, 2006).

B.4 Changes in transport accessibility can further trigger a range of behavioural responses, which can affect economic productivity and the location of economic activity. Benefits arising from improved transport accessibility can be expected to accrue to firms best placed geographically to take advantage of journey time savings, who benefit from higher profits and employ more staff, whilst firms elsewhere who have not benefited from a transport scheme may find it harder to compete, and consequently make redundancies. Transport investment can therefore create 'winners' and 'losers', dependent on the scheme in question.

B.5 Whilst the local economy within the town where the first firm is located would therefore benefit, but this would partly be a result of displacement of jobs from elsewhere. Research by David Simmonds Consultancy (1999) for the SACTRA report into the construction of the A55 North Wales Expressway established that better accessibility exposed firms to increased external competition, forcing them to become more competitive to stay in business and driving economic efficiency and benefiting consumers in the long-run.

B.6 Other transport users may also, in turn, 'trade' their journey time improvements, such as through deciding to live in a new neighbourhood elsewhere, and thereby having an impact on local property markets. Individuals may choose to take advantage of new transport infrastructure to commute for the same length of time from further afield, thereby increasing local property prices in newly-commutable areas and impacting on the housing market.

B.7 The Impact of Crossrail on Property report (2018) illustrates this effect, suggesting that house prices in the areas surrounding future Crossrail stations have increased by 31% over the wider market since the project was announced, and drawing a relationship between the projected decrease in commuting times and the property price uplift – the report states that a time saving of 10% on a commute increases the property price by 6%.

Transport can directly impact on local economies, resulting in productivity gains to local firms and influencing locational decisions, with subsequent impacts on local property prices

Wider Impacts

B.8 Such impacts are traditionally captured primarily through the estimation of transport user benefits, which are assumed to trickle down into the wider economy to deliver subsequent impacts on secondary markets such as housing, employment and labour. Transport investment can, however, induce far-reaching changes in accessibility, which combined with 'distortions' or market failures in the wider economy, result in additional impacts as the impacts of transport schemes are transmitted into the wider economy.

B.9 The *Transport Investment and Economic Performance* report (Venables, Laird and Overman, 2014) commissioned by the DfT highlights these impacts, emphasising both their importance (especially for the largest projects), and how they can be diffuse and far-ranging.

Productivity and Employment Effects

B.10 Productivity impacts can arise from improved accessibility bringing firms closer together, known as *static clustering*. Productivity of some firms is affected by their proximity to others, since denser concentrations of firms deliver larger labour and product markets, greater opportunities for collaboration and knowledge-sharing, together with other agglomeration benefits. Hence, if firms become effectively closer together, their productivity will increase, referred to as increasing economic *agglomeration*. Firms additionally benefit from access to larger, thicker labour markets, resulting in an increased ability to better match people to jobs and fill vacancies with specific skills requirement.

B.11 Extensive research has provided robust results for this relationship; OECD (2015) found that productivity per capita within developed nations indicates that typically a doubling of city size (a measure of economic density) increases productivity by 2% - 5%. Agglomeration effects vary across sectors, with evidence suggesting that service sectors are impacted the most – Graham (2005) found that a doubling of city size is associated with a 20-30% increase in productivity for service sectors.

B.12 Evidence of such productivity and employment effects specifically from transport investment, however, is limited. Gibbons et al (2012) considered the impacts of major highway improvements in Great Britain between 1998 and 2007 on employment and firm productivity. They established that **a 10% improvement in accessibility leads to a 3% increase in employment and the number of businesses, up to 30 km from the highway scheme**. The average effect of all major road schemes was an additional annual increase in employment of 3,600 jobs.

> Improved transport accessibility within major urban centres can deliver productivity gains through increased agglomeration, although the academic evidence for such effects is limited

B.13 What Works Centre for Local Economic Growth (2015) also found evidence that road projects may have positive effects on firm entry, wages, income and productivity. It cited Gibbons et al (2012), which identified that the accessibility improvement delivered within 1 – 20 km of a highway improvement was associated with an increase of 0.4% in GVA per worker and 0.2% in local wages. However, it stressed that the number of studies that demonstrated a causal link from road projects to productivity was extremely limited, and that the extent to which employment and business growth arises from the displacement of jobs and economic activity is unclear. The review concluded that while road projects can positively impact local employment, the effects are variable, with most of the evaluations indicating no (or mixed) impacts on local employment. The Centre were unable to identify the extent to which these were genuinely additional jobs or those displaced from elsewhere.

B.14 The What Works Centre for Local Economic Growth (2015) also identified that agglomeration effects may attenuate quickly with distance and it is therefore not clear whether connecting cities will *always* generate significant agglomeration benefits.

Investment Effects

B.15 Improved transport can alter patterns of private sector investment and employment, through increasing the attractiveness of a place for investment. The *Transport and Economic Performance* report states that transport links are 'one factor shaping the location decisions of firms, although only one amongst many', and therefore are more likely to *facilitate* economic growth rather than *enable* it. For example, Construction of the Hemsworth – A1 Link Road, in a deprived area of South Yorkshire, was reported by the scheme promotor to have contributed towards the delivery of 1,200 homes and more than 29,000 m^2 of industrial and distribution floorspace.

B.16 It is worth noting that assessing the impact of transport on investment decisions and land value uplift can be ambiguous. This is due to the question of whether the investment is 'dependent' upon the transport scheme; whether it would have taken place regardless of scheme, and if not, whether the investment if displacing resources from elsewhere and therefore not creating an overall economic benefit.

B.17 However, in the existence of market failures, the case for transport facilitating economic growth is more apparent. For example, if there are significant complementarities between investment projects, so that one firm's investment plans are conditional on those of another (such as in the case of regeneration initiatives), there may be coordination failures in that transport constraints may restrict the speed or scale of a development. In this case, transport can be an important catalyst for development. Market failures may also exist in the form of poor transport connectivity restricting resources, such as labour or land, that would otherwise be more productive. Transport improvements can therefore facilitate economic growth by 'unlocking' these resources; for example, by providing access to derelict sites or to new job opportunities for the unemployed (SACTRA, 1997).

Improved transport accessibility within major urban centres can result in support additional development and investment, although it is unclear the extent to which development is likely to be displaced from elsewhere

Concluding Comments

B.18 It is also worth considering the spatial distribution of the economic benefits accruing from transport interventions. SACTRA (1997) note that there is no guarantee that transport improvements will benefit the local or regional economy. Benefits such as increased employment may instead be realised in competing regions and the impacts of a transport intervention on surrounding areas should therefore be considered. The report also highlighted the ability for transport improvements to harm a local or regional economy, by exposing indigenous firms to competition from stronger rivals outside of the area, known as the 'two-way road' argument.

B.19 Evidence from the Welsh Economy Research Unit (1996), for example, highlighted that improvements to the A55 North Wales Expressway resulted in a significant increase in visitors to the Snowdonia National Park, the ease at which visitors could now access the park encouraged them to make day trips rather than stay overnight, contributing proportionately less to the local economy and causing traffic problems elsewhere. Conversely, the seaside town of Llandudno was seen to have benefited disproportionately, since it had better access to both Snowdonia and tourists arriving from the east (who were now able to now bypass alternative coastal resorts), whilst its distance from the A55 itself meant it did not suffer disbenefits from traffic noise and pollution.

B.20 SACTRA (1997) also stress that none of the wider economic benefits explained above are guaranteed and are subject to 'strong dependence on specific local circumstances and conditions'. As a broad example of this, Melo et al. (2013) found that estimates of the productivity effect of transport infrastructure can vary across main industry groups, tend to be higher for the US economy than for European countries and higher for roads compared to other modes of transport.

B.21 Overall, it is worth noting that whilst the theoretical evidence linking transport investment and economic activity is strong, direct empirical evidence of the economic effects of changes in transport costs is limited. What Works Centre for Local Economic Growth (2015) highlighted a further lack of evidence in areas such as around the impact of rail infrastructure on

employment, or the impact of trams, buses, cycling and walking schemes on any economic outcomes. There is also little evidence to draw conclusions on whether large-scale projects have larger economic growth impacts than spending similar amounts on a collection of small-scale project e.g. light rail or junction improvements.

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