



National Travel Survey Analysis

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Poverty and travel behaviour in Great Britain – what the National Travel Survey tells us

Summary

Section 1 – Introduction

How poverty relates to travel behaviour is a huge subject which one paper cannot address in all its detail. This paper concentrates on a few key measures of travel and focuses on those in the lowest income quintile as a proxy for low income and poverty. It looks at the types of people in the lowest income quintile before studying the effect of income on behaviour and exploring concepts and measures of transport 'poverty', transport 'wealth' and transport 'affordability'.

The purpose of this TSU working paper is to act as an exploratory source document rather than to present policy conclusions. Much analysis presented is not used to draw conclusions but to provide a resource for other researchers wanting to know more about the subject. It is based primarily on analysis of the National Travel Survey provided by the Department for Transport via the UK data archive. The paper is unique in that whilst other analyses of the NTS abound they don't focus on the issue of poverty.

Most analysis is based on the 2002-2008 dataset released by the UK data archive in 2010 (with further requested variables kindly added by Department for Transport staff), but some analysis looks at trend data also using the 1995 to 2001 set.

Key findings

Section 2 briefly summarises previous research that has been carried out on the travel behaviour of those on lower incomes. It concludes that there has been a fair amount of research into transport and poverty, exclusion and disadvantage but little has taken a large scale quantitative overview.

Section 3 looks at the characteristics of those on low incomes. The analysis points to low income being related to age, gender, ethnic group, living arrangements and household structure. But low income is also related to transport characteristics such as the presence of absence of a car in the household. While the lack of a car will usually be thought of as a result of low income this may not always be the case – for example disability can lead to the inability to use a car which can lower people's income opportunities. Mobility difficulty is more prevalent amongst those on lower incomes, especially for people under retirement age.

Section 4 contains basic analyses of the travel behaviour of those on low incomes, comparing their behaviour to those on higher incomes. The amount of travel made (measured by trips, distance and time spent travelling) is strongly related to income, and also to other variables such as gender, economic activity, age, and are of residence. Analysis of averages for different groups shows the bulk of variation is much greater amounts of travel by a large minority of people, and these effects

are much greater for higher income groups. About 70% of people in the highest income decile travel further per week than all but 20% of those in the lowest income decile.

The amount of car driving (and use of a car as a passenger) is more affected by income than other aspects of travel behaviour such as public transport use. Though being in full time employment is strongly related to car ownership and use. Air travel is not 'the reserve' of those on high incomes, but like car travel the major differences are much greater amounts of air travel by some on higher incomes than lower amount by those on lower incomes. 75% of those in the lowest income quintile did not fly in the year before the survey. There is little difference in the age that children are allowed to travel independently to school according to income group, but the reasons for parents not wishing their children to travel independently varies.

Section 5 then looks at how travel behaviour for different income groups has changed over time concentrating on changes between 1995 and 2008, the period for which relatively consistent data is available from the National Travel Survey (see Annex One). Since 1995 people in higher income quintiles have travelled a shorter distance per person (from 12,200 miles per year down to 11,200), while those in the lowest income quintile have travelled about the same (about 4,300 miles per year). At the same time people on the lowest incomes (in absolute terms) – less than £5000 per year, have increased their ownership and use of cars (with ownership rates rising from 20% to 50% between 1995 and 2008, while those on the highest incomes (over £50,000 per year) have reduced their car use.

Section 6 uses regression analysis to try to ascertain the relative importance of different factors in affecting travel behaviour, to assess the importance of income relative to factors such as stage in lifecycle, rurality, economic activity, disability, ethnic group etc. Regression analysis points to income being one of the key factors relating to measures of travel behaviour (trips per week, time spent travelling and distance travelled), but is secondary to economic activity, and has a similar effect to some other variables such as ethnic group, living in high IMD area score areas, and rurality.

Section 7 uses cluster analysis, recognising that the 'average' travel behaviour of low income people is made up of different types of behaviour. It groups people according to aspects of their behaviour into groups such as those who make little travel, and those who use cars for most of their journeys. Cluster analysis shows that there is a large group of people on low incomes who make little travel, and do not use a car. In all income groups this is a relatively large group, but for people on low incomes the group is much larger and the numbers of trips smaller. There is also a group who use cars a great deal, but this group is small in the lowest income quintile. Increased prevalence of this group amongst those on lower incomes is found especially in full time and part time workers, and home-makers.

Section 8 discusses notions of transport poverty, transport affordability and transport wealth and includes tentative analyses of what we can surmise about these notions from NTS data. There is no simple way to measure 'transport poverty' or 'transport affordability' but patterns of travel behaviour relate strongly to incomes, with people in lower income households tending to be much

less likely to have a car available, likely to make fewer trips per week, and to travel shorter distances per week.

‘Transport wealth’ can be described as the transport and accessibility opportunities available to people – in terms of access to modes (car, bus, rail etc), and to the ability to reach services on foot. Analysis of this area is tentative, but points to car availability being very strongly related to income, while access to bus, rail and walk access is not related so much to income, but is related to areas with different Index of Multiple Deprivation (IMD) levels with poorer IMD areas tending to have better access (being more likely to be in inner urban areas).

Finally Section 9 discusses the key findings and implications that can be drawn. Unlike fuel poverty which is relatively easy to define and measure, ‘transport poverty’ or ‘transport wealth’ is much more complex.

This analysis points to real issues that need to be addressed, but isolating those for whom improvement is needed is not straightforward. There is a question mark over whether the most fruitful approach for further work on transport poverty and wealth would be to explore the issues in greater analytical detail, or to educate transport practitioners and those from other areas of policy in the issues that are raised.

Poverty and travel behaviour in Great Britain – what the National Travel Survey tells us

Section 1 – Introduction

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The purpose of this TSU working paper is to act as an exploratory source document rather than to present policy conclusions. Some analysis presented here is not used to draw conclusions but to provide a resource for other researchers wanting to know more about the subject. The paper is based primarily on analysis of the National Travel Survey provided by the Department for Transport via the UK data archive. The paper is unique in that whilst other analyses of the NTS abound they don’t focus on the issue of poverty. Most analysis is based on the 2002-2008 dataset released by the UK data archive in 2010 (with further requested variables kindly added by Department for Transport staff), but some analysis looks at trend data also using the 1995 to 2001 set. Annex One contains more details about the analysis methods used.

The form of this report and key findings

The rest of this report is structured as follows – key findings of each section are described in bullet points.

Section 2 briefly summarises some previous research that has been carried out on the travel behaviour of those on lower incomes.

- There has been a fair amount of research into transport and poverty, exclusion and disadvantage but little has taken a large scale quantitative overview.

Section 3 looks at the characteristics of those on low incomes.

- The analysis points to low income being related to age, gender, ethnic group, living arrangements and household structure. But low income is also related to transport characteristics such as the presence of absence of a car in the household. While the lack of a car will usually be thought of as a result of low income this may not always be the case – for example disability can lead to the inability to use a car which can lower people’s income opportunities.
- Mobility difficulty is more prevalent amongst those on lower incomes, especially for people under retirement age.

Section 4 contains basic analyses of the travel behaviour of those on low incomes, comparing their behaviour to those on higher incomes.

- The amount of travel made (measured by trips, distance and time spent travelling) is strongly related to income, and also to other variables such as gender, economic activity, age, and area of residence. Analysis of averages for different groups shows the bulk of variation is much greater amounts of travel by a large minority of people, and these effects are much greater for higher income groups. About 70% of people in the highest income decile travel further per week than all but 20% of those in the lowest income decile.
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- Air travel is not 'the reserve' of those on high incomes, but like car travel the major differences are much greater amounts of air travel by some on higher incomes than lower amount by those on lower incomes. 75% of those in the lowest income quintile did not fly in the year before the survey.
- There is little difference in the age that children are allowed to travel independently to school according to income group, but the reasons for parents not wishing their children to travel independently varies.

Section 5 then looks at how travel behaviour for different income groups has changed over time concentrating on changes between 1995 and 2008, the period for which relatively consistent data is available from the National Travel Survey (see Annex One).

- Since 1995 people in higher income quintiles have travelled a shorter distance per person (from 12,200 miles per year down to 11,200), while those in the lowest income quintile have travelled about the same (about 4,300 miles per year).
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- Regression analysis points to income being one of the key factors relating to measures of travel behaviour (trips per week, time spent travelling and distance travelled), but is secondary to economic activity, and has a similar effect to some other variables such as ethnic group, living in high IMD area score areas, and rurality.

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- Cluster analysis shows that there is a large group of people on low incomes who make little travel, and do not use a car. In all income groups this is a relatively large group, but for

people on low incomes the group is much larger and the numbers of trips smaller. There is also a group who use cars a great deal, but this group is small in the lowest income quintile. Increased prevalence of this group amongst those on lower incomes is found especially in full time and part time workers, and home-makers.

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- There is no simple way to measure ‘transport poverty’ or ‘transport affordability’ but patterns of travel behaviour relate strongly to incomes, with people in lower income households tending to be much less likely to have a car available, likely to make fewer trips per week, and to travel shorter distances per week.
- ‘Transport wealth’ can be described as the transport and accessibility opportunities available to people – in terms of access to modes (car, bus, rail etc), and to the ability to reach services on foot. Analysis of this area is tentative, but points to car availability being very strongly related to income, while access to bus, rail and walk access is not related so much to income, but is related to areas with different Index of Multiple Deprivation (IMD) levels with poorer IMD areas tending to have better access (being more likely to be in inner urban areas).

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- There is a question mark over whether the most fruitful approach for further work on transport poverty and wealth would be to explore the issues in greater analytical detail, or to educate transport practitioners and those from other areas of policy in the issues that are raised.

Section 2 - Previous work on travel behaviour and poverty

The predominance of an economic and engineering approach to transport planning up until the 1990s combined with an approach to policy described as “predict and provide” tended to assume that we were moving towards universal car ownership and that catering for demand was the important issue.

However, a sizeable body of academic research in the UK has aimed to highlight many of the equity issues in transport dating back to the 1970s (e.g. Hillman and Whalley, 1977, Banister and Hall, 1981). Since then, UK academics have continued to raise the issue of transport inequalities in relation to a number of different social groups, such as women (e.g. Grieco et al, 1989; Hamilton et al, 1991); children (e.g. Hillman, 1993; Cahill et al, 1996; Mackett et al, 2003), young people (e.g. Pilling and Turner) older people (e.g. Gilhooly et al, 2002; Banister and Bowling, 2004; Shergold and Parkhurst, 2010), people with disabilities (e.g. Oxley and Richards, 1995) and certain minority ethnic groups (e.g. Institute for Employment Research, 1999; Rajé, 2004). Other studies have looked at affordability of car travel (Stokes, 1995; Cain and Jones, 2008)

In the early 2000s, researchers extended these studies of transport disadvantage to consider how this might lead to the wider economic and social exclusion of these groups (e.g. Church and Frost, 2000; TRaC, 2000; Lucas et al, 2001; Hine and Mitchell, 2003; Hodgson and Turner, 2003; Kenyon et al, 2003; Rajé, 2003). In response, the Social Exclusion Unit (SEU) formally recognised that many past transport and land use policies within the UK may have served to exacerbate existing social inequalities in a number of instances. The report also recommended that the life chances of low income groups and communities might be enhanced through the introduction of targeted local transport and land use measures (Social Exclusion Unit, 2003).

There have been numerous relevant UK-based studies undertaken since the publication of the SEU report in 2003, which further explore the various issues of mobility, accessibility and transport provision in different contexts (e.g. Rajé, 2004; Preston and Rajé, 2007; McDonagh, 2006; Farrington, 2007; Bristow et al, 2008; Lucas et al, 2008; Wright et al, 2009) including various studies and programmes funded by the ESRC (e.g. Owen, 1998; Wrigley, 2000; Gilhooly et al, 2002; Power, 2003; McInnes, 2008) and the EPSRC (e.g. AUNT-SUE - Mackett et al, 2008; SAMP – Jones and Wixey, 2008). These have helped to develop new and improved methodologies for identifying gaps in the system of provision and have led to improved understanding of the issues. Nevertheless, there are still numerous gaps within the evidence base, particularly in relation to the measurement and assessment of transport-related exclusion, evaluation methodologies for intervention programmes, delivery processes, engagement and the transference of good practice (especially to stakeholders outside of the transport arena) and the development of new financial models.

This paper co-incides with the publication of a major study of fairness in transport (Sustainable Development Commission, 2011) which reviews a wide range of factors related to fairness and sustainability in transport and which proposes new approaches to dealing with the issues.

The reports of the National Travel Survey have generally contained a section relating to social inequality (for example Section 6 – Social Inclusion and Accessibility in the 2008 report (DfT, 2009)), and “Travel by car availability, income, ethnic group and household type” for the 2009 reporting (DfT, 2010). These have consistently shown lower rates of car ownership and less car use by those on lower incomes.

Section 3 - Who are the people on low incomes?

Firstly we look at the kinds of people who are on low incomes. There are many social factors that relate to low income. Many of these are independent of transport and we look at these first. Figures 3.1 to 3.5 below show the likelihood that a person was in the lowest income quintile¹ using data from the 2002 to 2008 National Travel Survey. In fact 17% of people live in households in the lowest income quintile – lower than the 20% one might expect, because lower income households tend to be smaller (even after equivalisation of incomes). The figures show that where a column is greater than 17% those people are more likely to live on lower incomes. The charts have been coloured such that an incidence of over 30% is coloured red and one under 15% is coloured green, to highlight those with high and low prevalence.

Summarising Figures 3.1 to 3.5:

- Children and people aged over 70 are more likely to be in low income households;
- Women are somewhat more likely than men;
- Single adults and single parent families are more likely;
- Non white people are very much more likely than white; and,
- Those separated or widowed are more likely, while those married or cohabiting are least likely to.

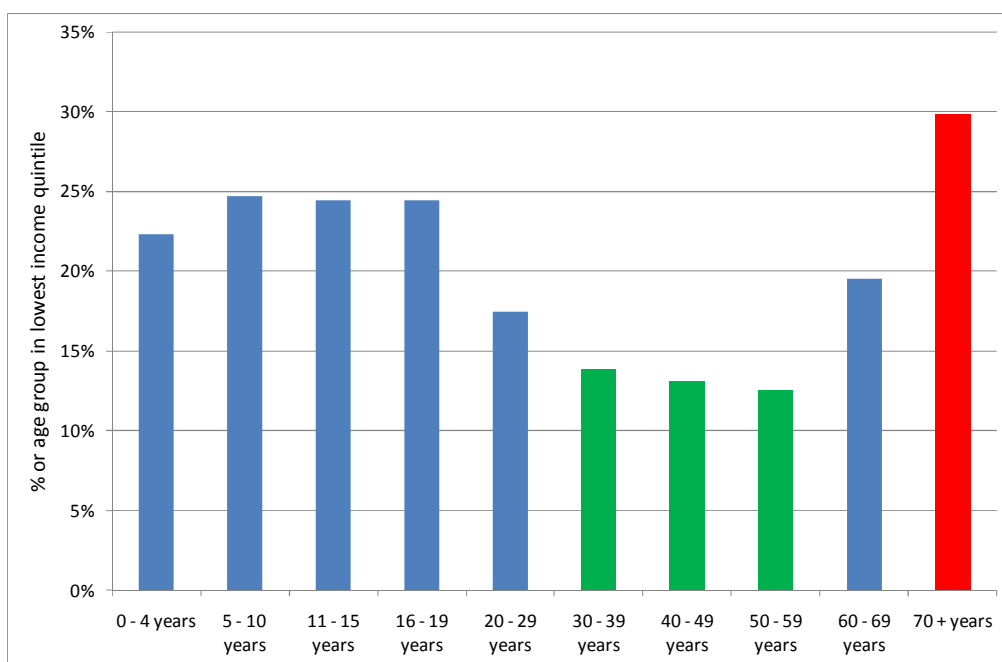


Figure 3.1 – Percentage of people in different age groups who are in the lowest income quintile

¹ The National Travel Survey uses the “McClement” method for equivalising household incomes (see Annex 1). Larger households are assumed to need more income to have the same relative income as a smaller household, so the number of adults and the ages of children are used to calculate ‘equivalised’ income.

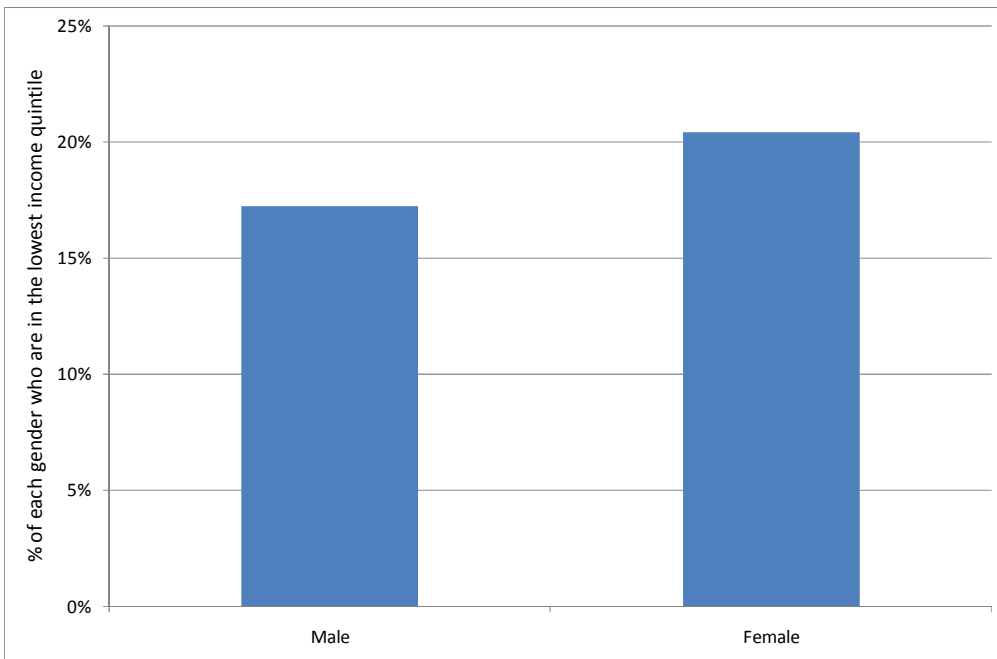


Figure 3.2 – Percentage of people by gender who are in the lowest income quintile

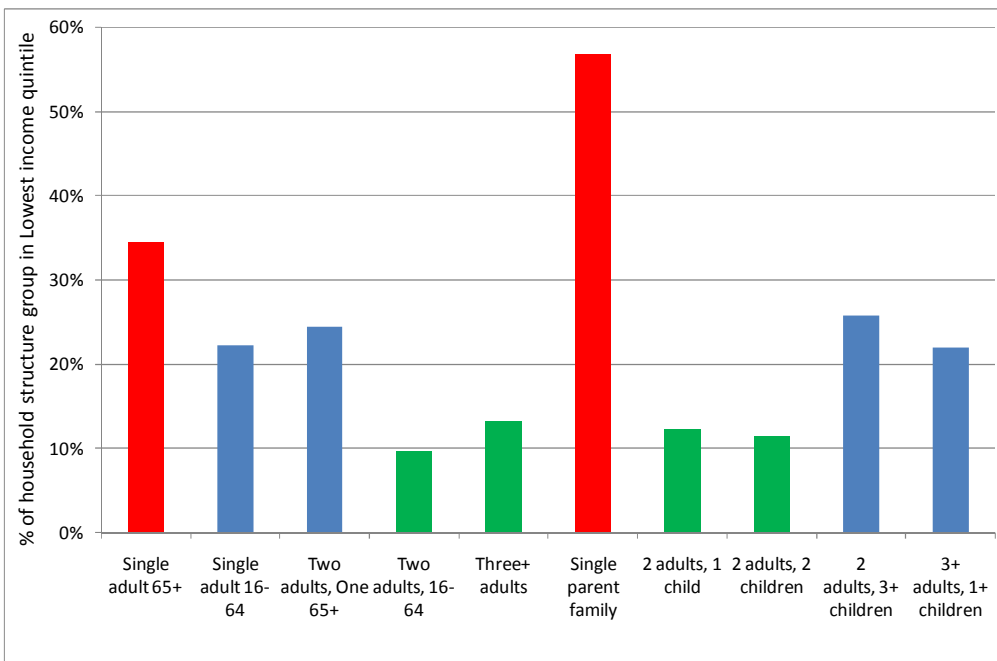


Figure 3.3 – Percentage of people by household structure, who are in the lowest income quintile

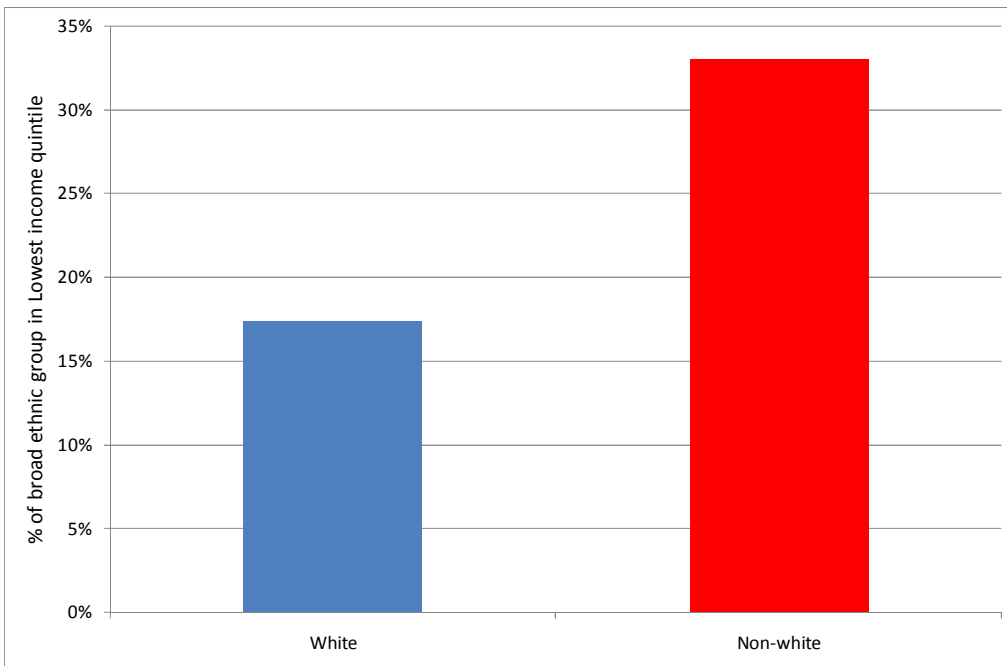


Figure 3.4 – Percentage of people by ethnic group who are in the lowest income quintile

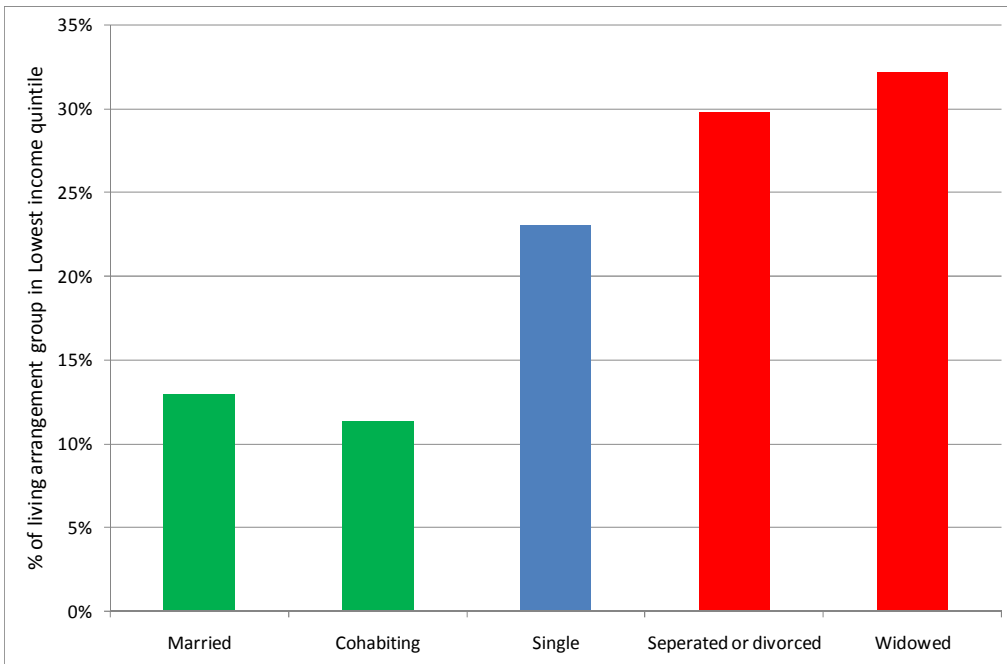


Figure 3.5 – Percentage of people who are in the lowest income quintile, by living arrangements

But factors related to mobility characteristics also show a strong correlation with low income (Figure 3.6 and 3.7). Generally we can assume that a lack of transport is a result of low income, rather than the other way round, but this is not necessarily so – for example, those with mobility difficulties may find their lack of travel an impediment to employment. Those on low incomes more are likely to be:-

- Non drivers, and
- In a household without a car.

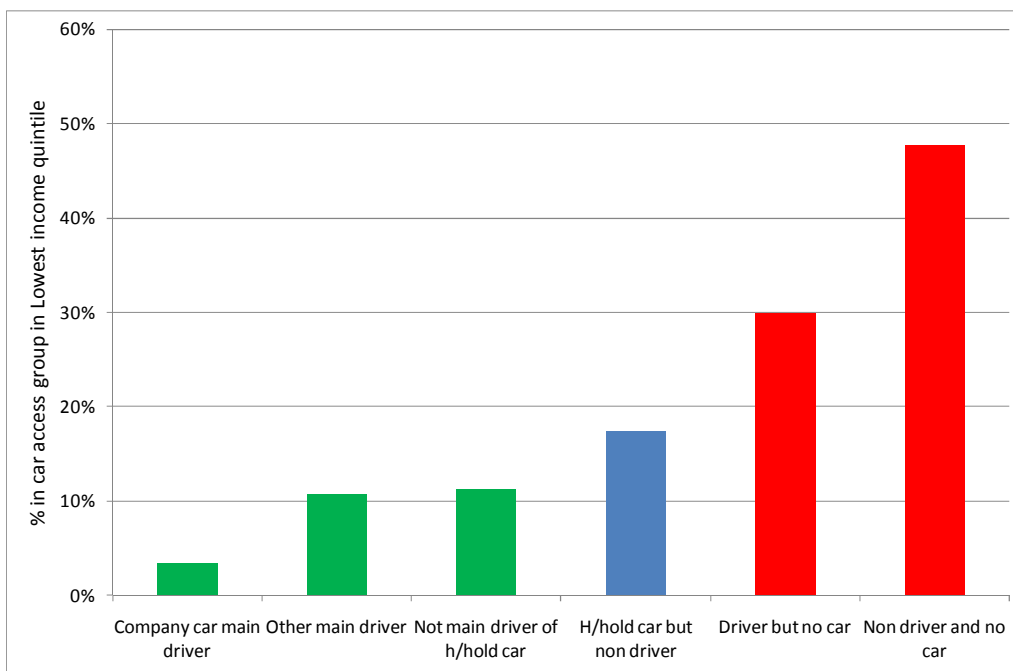


Figure 3.6 – Percentage of people who are in the lowest income quintile, by access to a car as a driver

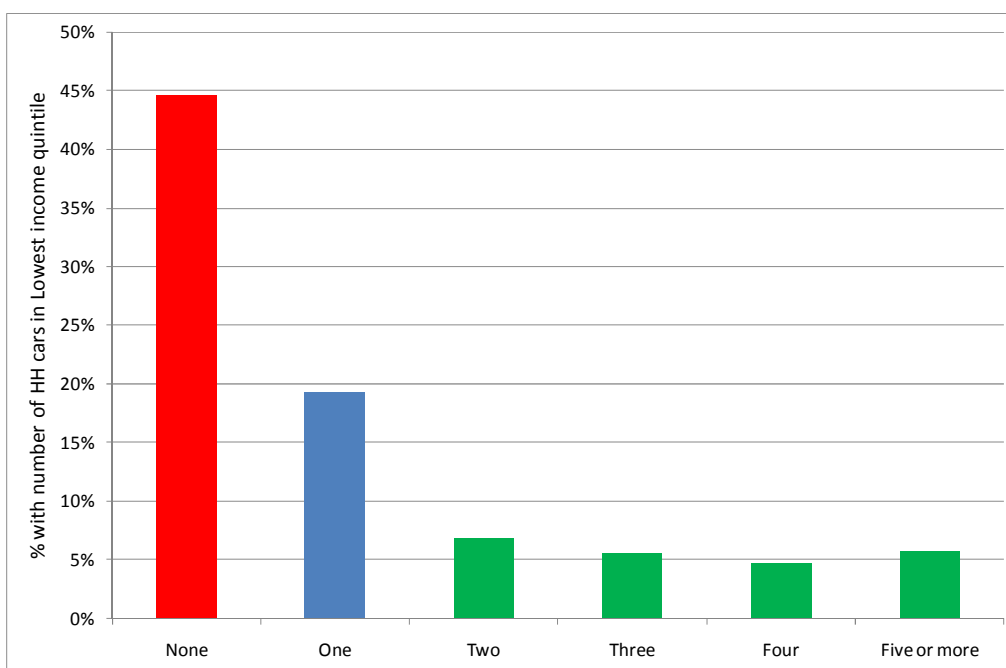


Figure 3.7 – Percentage of people who are in the lowest income quintile, by number of household cars or vans

The relationship between mobility difficulties and income quintile shows that the likelihood of recording a mobility difficulty is much greater for people on lower incomes than for higher incomes (Figure 3.8). While difficulties are more prevalent with increasing age in all income groups, levels for under 50s are very much higher, with 31% of 50-54 year olds in the lowest income groups recording a difficulty compared with 5% in the highest group.

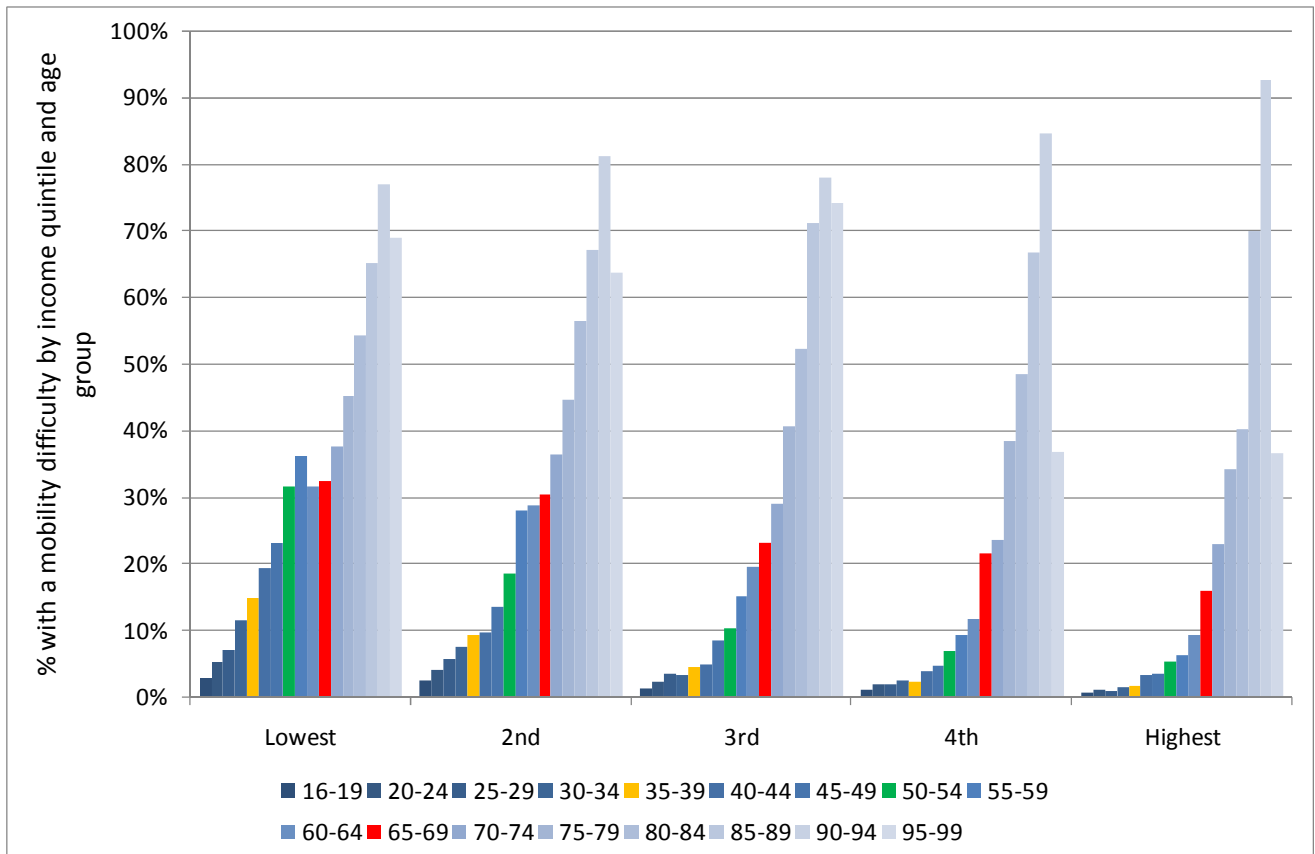


Figure 3.8 – Percentage experiencing mobility difficulty by age and income quintile (Colour is used to highlight groups of similar age in different income groups)

It is important to note that these likelihoods don't always point to where we find the bulk of the proportion of people who suffer low incomes. Many groups such as those who are unemployed, over 70, single parents, or non-white are minorities, so although they are more likely to be on low incomes, they only make up a small proportion of the population.

- 17.7% of those on low incomes are over 70; 10.1% are women over 70; 6.6% are men over 70; 10.1% are over 70 with no car; 6.6% are over 70 with a car.
- 27.8% are aged over 60; 24.8 are aged 15 or under
- 32.6% are retired or permanent sick; 10.3% work full time; 4.9% are unemployed; 50.6% are economically inactive adults.

But,

- Only 21% of those on the lowest incomes are aged between 17 and 64, do not have a mobility difficulty, are white, and are not unemployed or a homemaker

Summary

Those on lower incomes are disproportionately found among the elderly, single parent families, non white people, those with mobility difficulties, and to a lesser extent children and women. Those without cars are also much more likely to be on low incomes.

Section 4 – Travel behaviour and income

There are several broad-brush indicators that can be used to measure travel behaviour. Possibilities include whether there is a car in the household, cars per household, total distance travelled per person, or trips per person. All these are inadequate in terms of showing what we might call 'transport poverty', but are indicators which show something about how much mobility people have – in this paper we have generally concentrated on whether or not a household has a car, and the total distance travelled by any mode. But the paucity of these as an indication of travel difficulties is recognised.

Households in low income quintiles are very much less likely to have a car in the household (Figure 4.1). About 55% in the lowest quintile have a car, while by the fourth quintile a 'saturation' level of about 92% has been reached. But the right hand chart shows that while cars per household also flattens off at about 1.7 cars per household cars per person and cars per adults rise in a more linear fashion with income quintile.

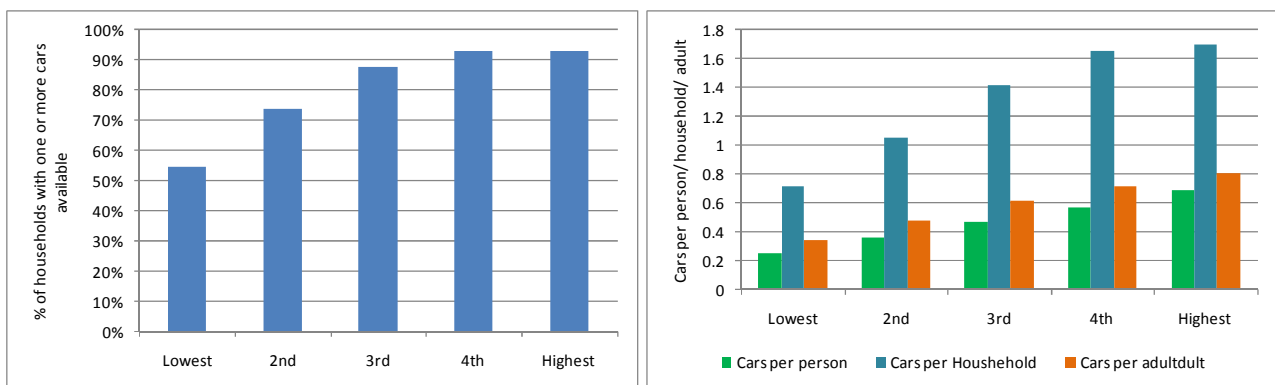


Figure 4.1 – Car ownership characteristics by Income Quintile

The number of trips made, the time spent travelling and distance travelled also varies with income (Figure 4.2). The number of trips made is broadly similar, but the lowest income quintile make around 17% fewer trips per person than average while the highest income quintile make about 10% more. Time spent travelling shows somewhat more variation but the effect is more that higher income groups travel for longer than low income groups travel for less time. This pattern of higher income associated with more rather than lower income associated with less is also pronounced for distance travelled.

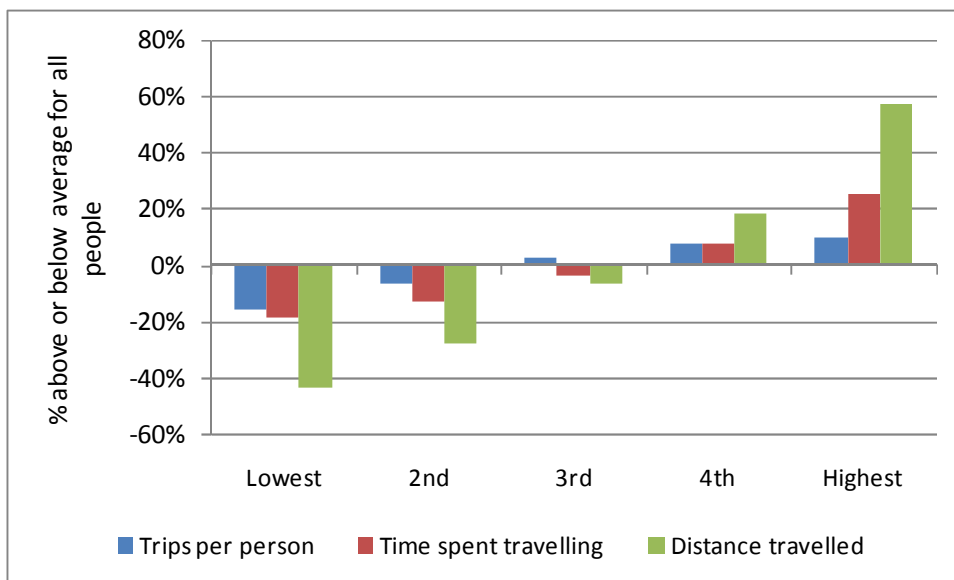


Figure 4.2 – Basic aspects of travel behaviour by income quintile

Much of this can be explained by people in lower income groups being more likely to be retired or otherwise economically inactive which is associated with lower trip rates and less time spent travelling. This will be explored later, especially using regression analysis in Section 6.

Effect of income combined with other factors

While much variation in distance travelled is related to the availability and use of a car and income, both have an effect on distance travelled (Figure 4.3 below). In general for those in similar income groups, people travel somewhat less than twice as far if they have a car in the household, but those in the highest income group travel between 2 and 2.5 times as far as those in the lowest income group.

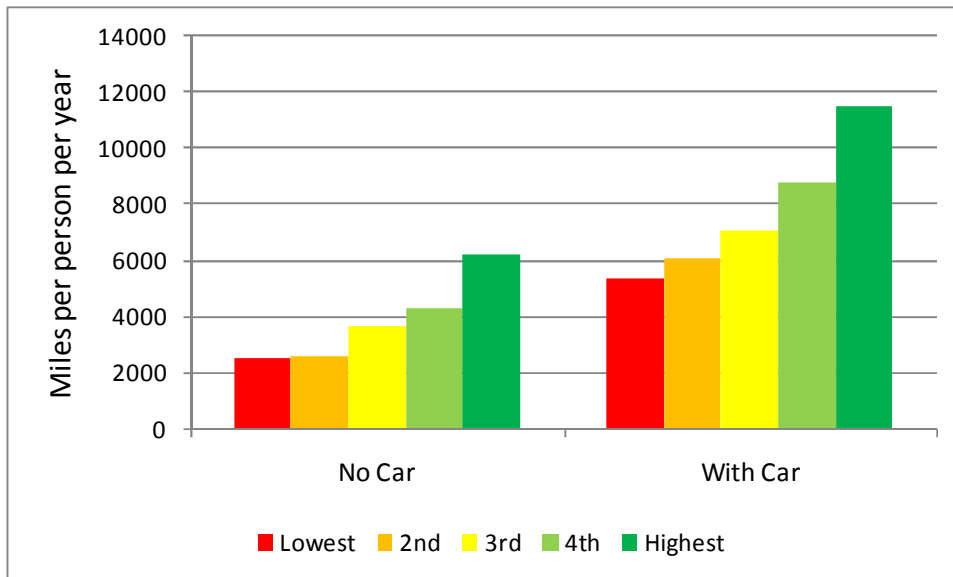


Figure 4.3 – Distance travelled per year by whether the household has a car and income quintile

The influence of other factors combined with income on travel behaviour

A number of the factors that affect travel behaviour also affect income, and the overall distance travelled by people in different situations varies. The charts below show how distance travelled varies according to a number of factors alongside income quintile. In all cases income has a separate effect.

Figure 4.4 (below) shows that for gender and income, while women travel less than men, income has a much greater effect than gender, but also that for those on lower incomes there is less variation than for those on higher incomes for distance travelled.

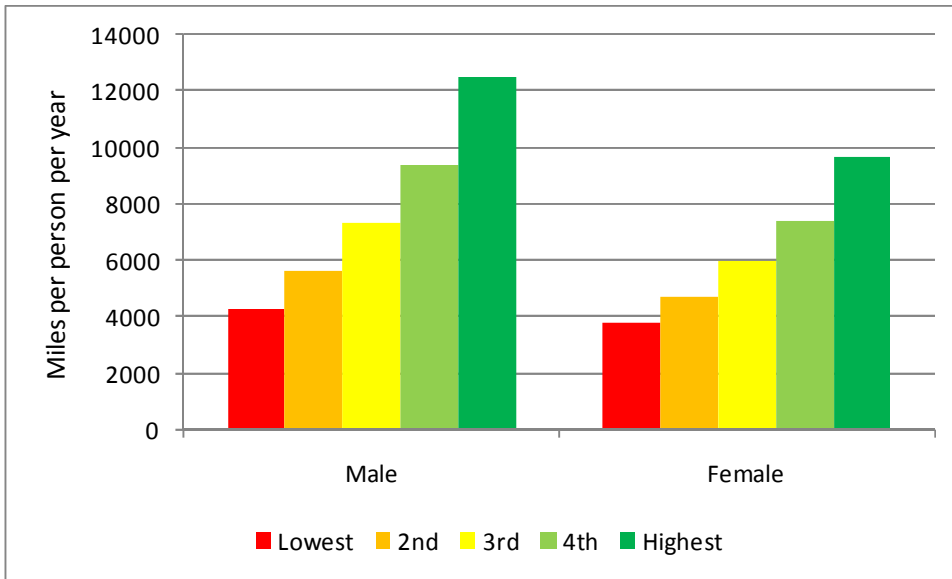


Figure 4.4 – Aspects of travel behaviour by gender and income quintile

Distance travelled rises between the ages of around 20 to 65 (Figure 4.5) when people are most likely to be in employment,

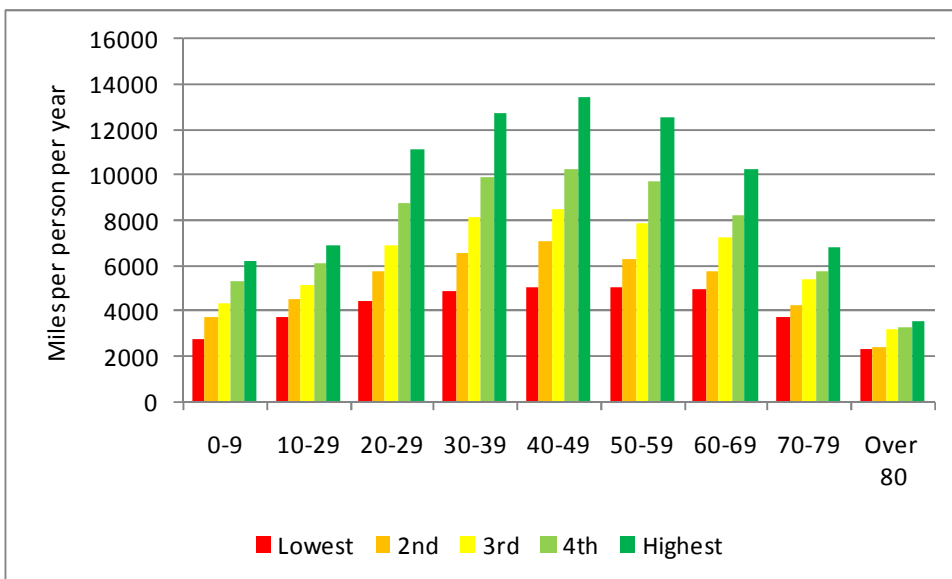


Figure 4.5 – Distance travelled per year by age group and Income Quintile

Being in full time work is associated with a higher amount of travel (Figure 4.6). The effect of income is seen for all age groups and economic activity types, but is most marked for those of working age. Students show the least variation according to income. Students show the least variation according to income.

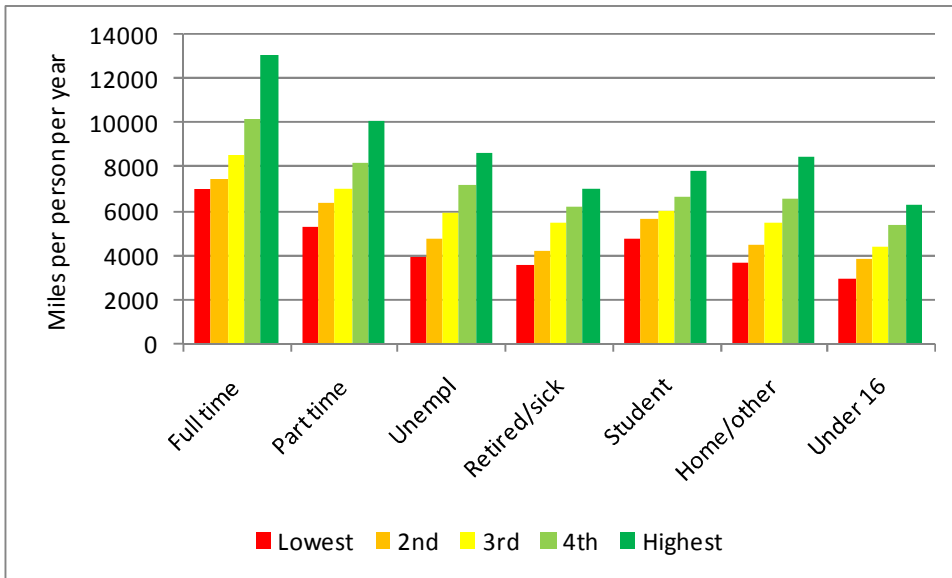


Figure 4.6 – Distance travelled per year by economic activity and income quintile

The type of area that one lives in has an effect (Figure 4.7), with larger cities showing the least distance travelled and rural areas showing the most. Income has an effect for all area types, but those on lower incomes in rural areas travel relatively further, given their income.

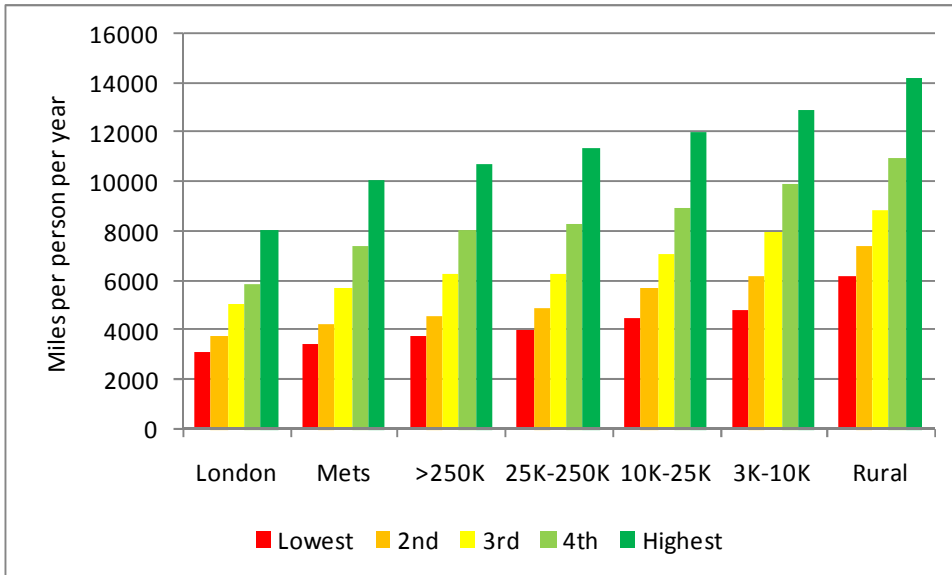


Figure 4.7 – Distance travelled per year by type of area and income quintile

Ethnic group (summarised to white/ non white) (Figure 4.8) is also related to distance travelled, and the effect of income here is not so great. Those in middle incomes who are non-white tend to travel less than one would expect.

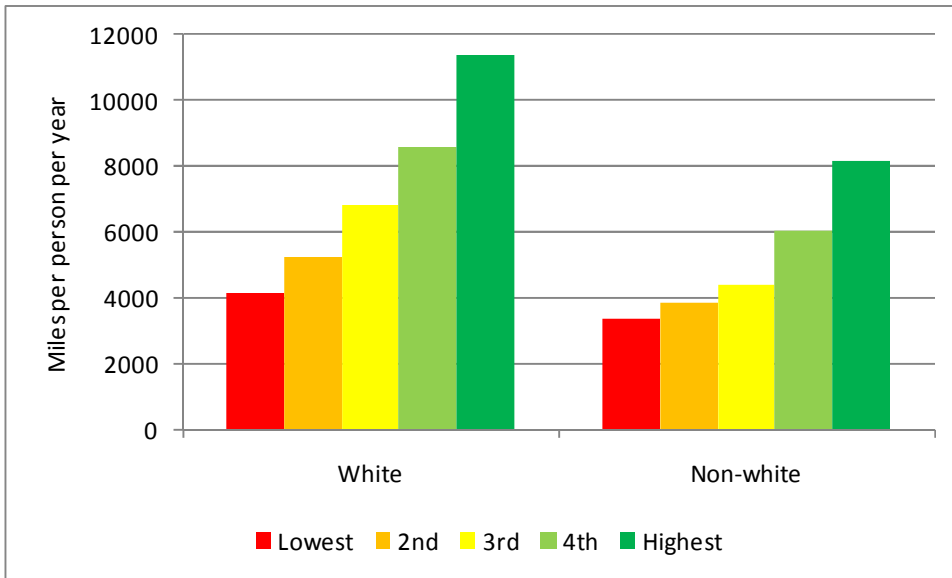


Figure 4.8 Distance travelled per year by whether white or non white and income quintile

A mobility difficulty has the effect of reducing the distance travelled (Figure 4.9) but again, the effects of income is greater. Again, the effect of disability on distance is greater for those in higher income groups.

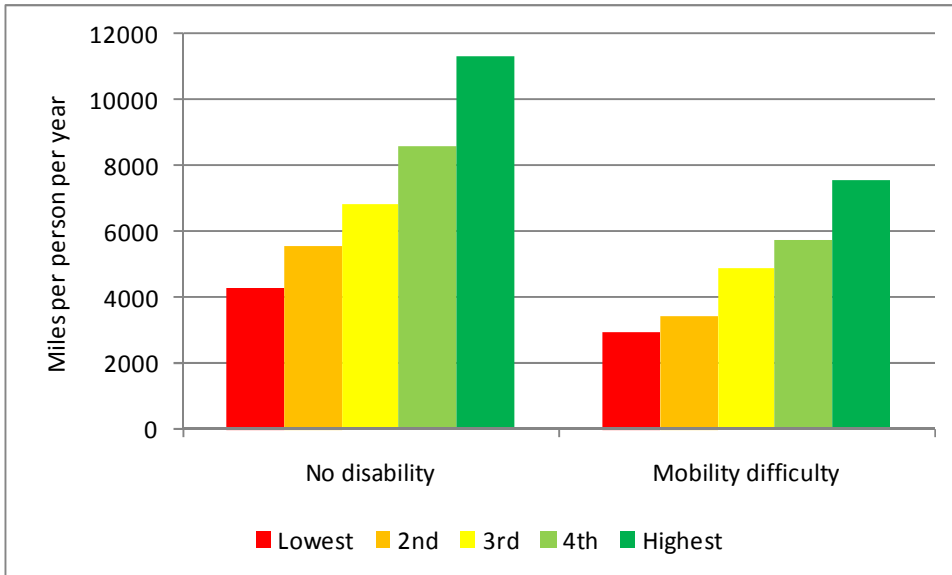


Figure 4.9 – Distance travelled per year by whether a mobility difficulty is experienced

Finally, as one would expect, one's access to a car has an impact on distance travelled (Figure 4.10). Here the effect of car access group can be greater than income quintile, but car access is itself very strongly related to income, and the income effect is still strong within each group – though less so for non-drivers.

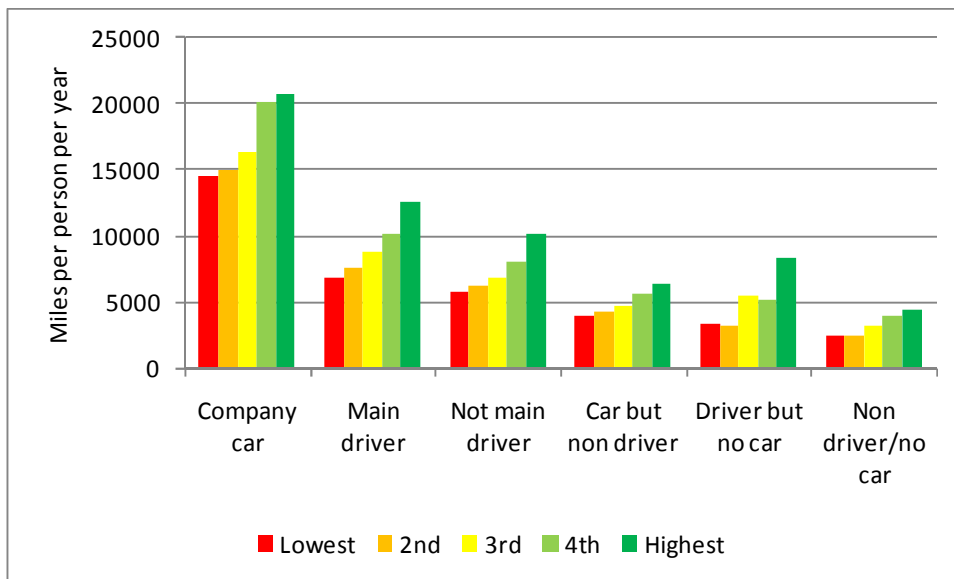


Figure 4.10 – Distance travelled per year by access to a car and income quintile

Modes of travel and journey purposes by income

If we compare travel behaviour of those on low incomes with all people, those in the lowest income quintile make 861 trips per year compared to the average for all incomes on 1022. So they make somewhat fewer trips, and this is probably mainly due to their economic activity status, with fewer people on low incomes being in work, and more retired. Figure 4.11 below shows the effect of income quintile on the numbers of trips and distance travelled by different modes. As we saw earlier, income has much less effect on the number of trips made than the distance travelled. There is a sort of ‘ceiling’ whereby the average number of trips made does not rise much above 1100 trips per year for any income group. (This is, of course, a ‘ceiling’ for the average for the group as a whole – many people will be making more than 1100 trips per year).

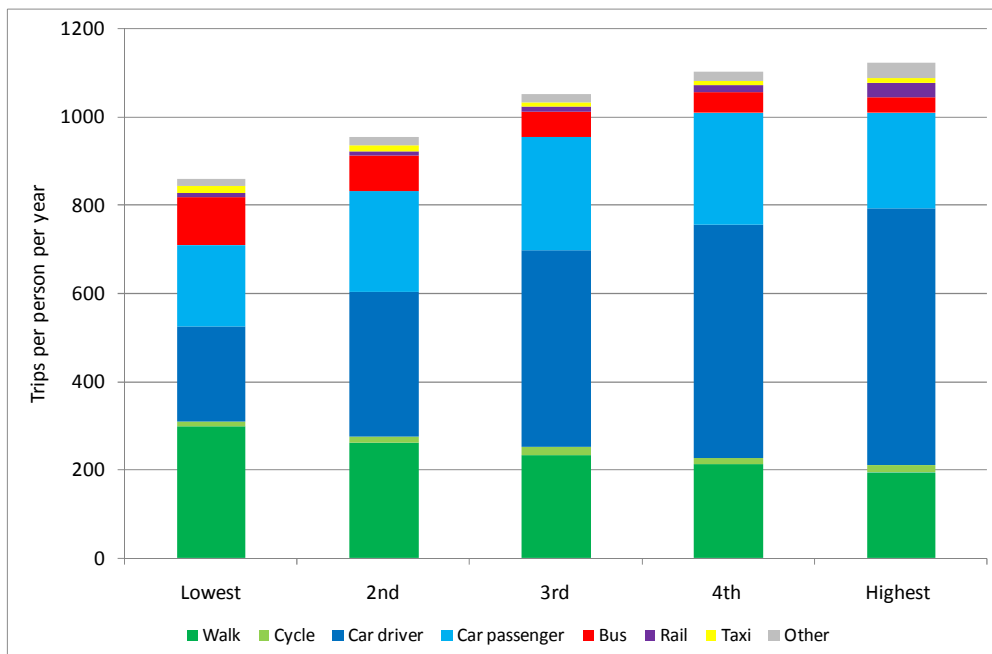


Figure 4.11 – Trips per week by each mode, by income quintile

The 'ceiling' of trip rates does not apply to distance travelled or the increasing use of the car. Mileage per person increases more for each income quintile group (Figure 4.12) and the bulk of this increase is made up of more car driver and passenger mileage, along with more by rail and 'other' but less walking and bus use.

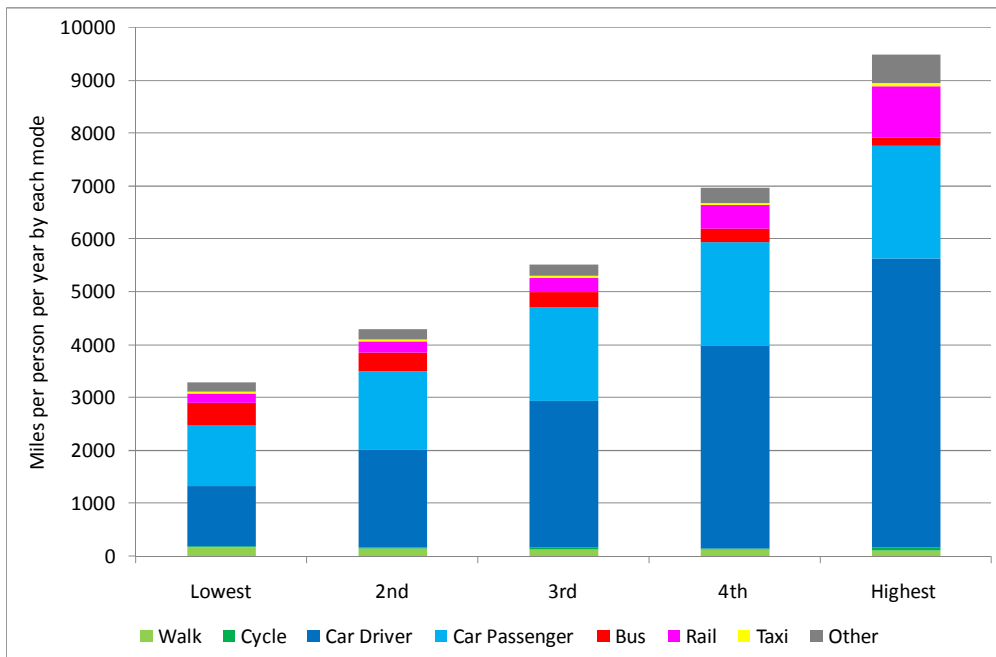


Figure 4.12 – Miles per year by mode and income quintile

Walk distance is insignificant (in terms of total distance travelled) for all incomes, but forms over 40% of trips for those in the lowest income quintile.

Figure 4.13 shows the distribution of trips per person for different journey purposes for each income quintile. People on lower incomes make very much fewer work trips, but somewhat more leisure trips. The numbers for most other purposes are relatively similar.

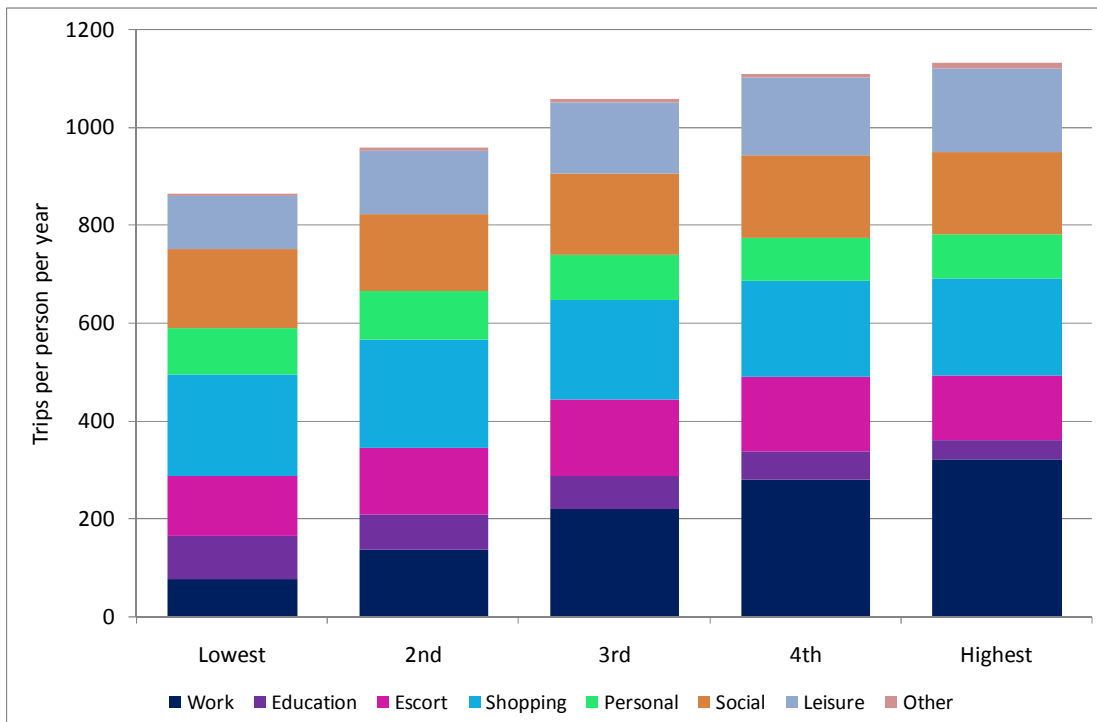


Figure 4.13 – Trips per person for different journey purposes by income quintile

As Figure 4.12 showed, the pattern for distance travelled differs from that for trip rates. Figure 4.14 shows that for trip purposes work accounts for much of the increased distance of by those in higher incomes, while distances for social, leisure and escort purposes also increase. Distances for shopping, education and personal business are fairly similar.

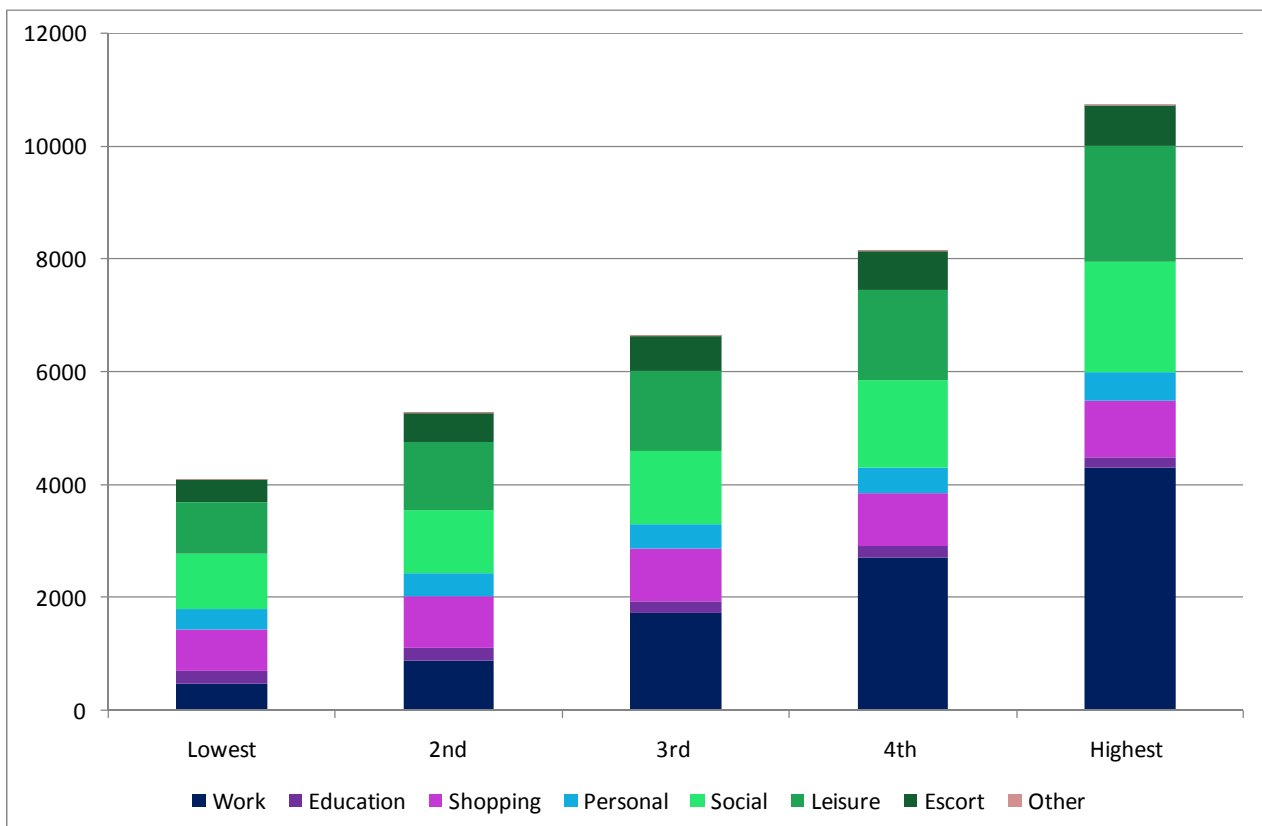


Figure 4.14 – Miles travelled per year by journey purpose and income quintile.

The patterns are not all straightforward and Figures 4.15 and 4.16 (which reconfigures the same analysis as shown in the previous four figures) compare modes and distances used for the lowest income quintile with the average for all people – they each show the same data, split in different ways. Figure 4.15 clearly shows the very much lower use of car as a driver, and that work trips count for much of the difference, but lower income people make fewer car driver trips for all purposes. It also shows some of the more subtle differences. The difference for car passenger are much less pronounced, but with work and social showing up as the major differences. People on low incomes make more walk and bus trips, and the major purpose differences here are for shopping, education and social.

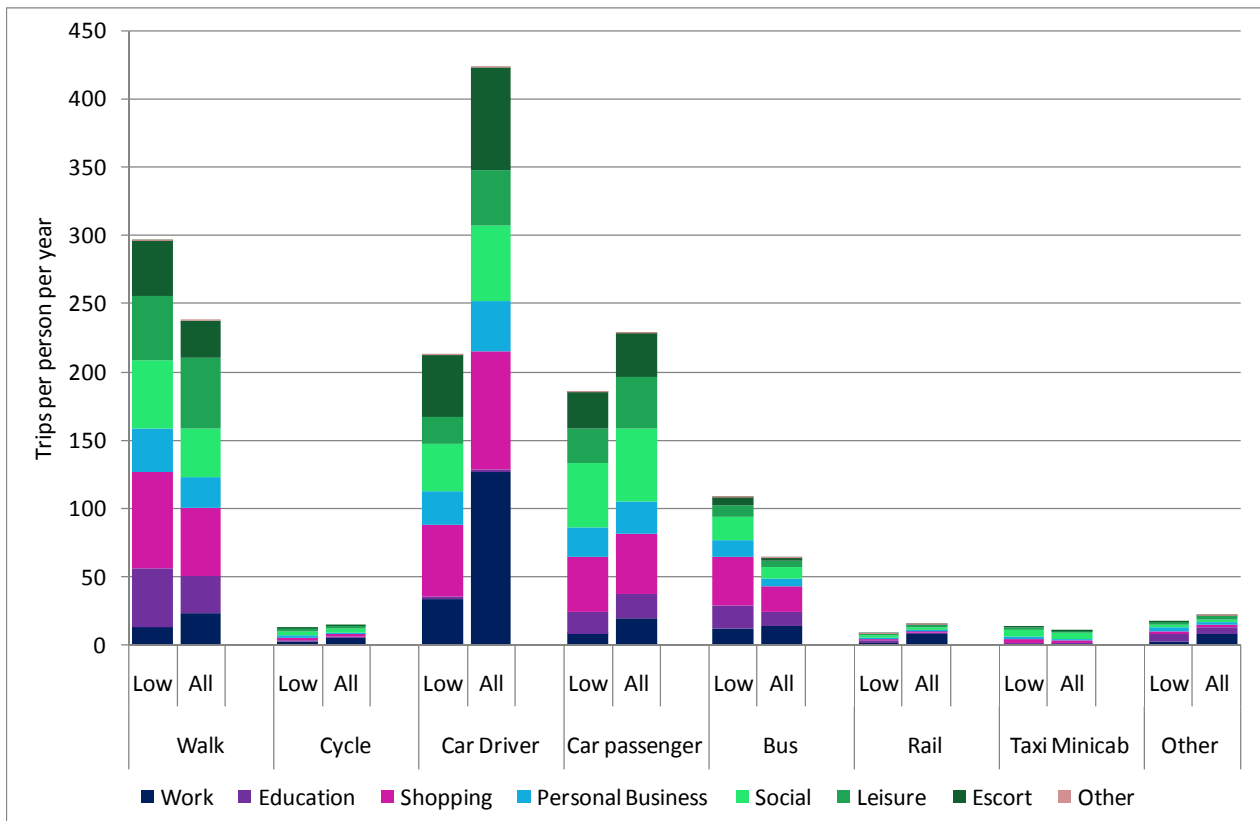


Figure 4.15 – Travel modes and purposes for lowest income quintile compared with all people – Focus on modes

People on lower incomes make more education trips and slightly more shopping trips, but fewer escort and leisure trips, but the overall trip rates for purposes are much more similar(Figure 4.16). But in all cases except education the lower use of car driving is notable, and for most purposes a higher use of walking is noted (but lower for work, and slightly lower for leisure).

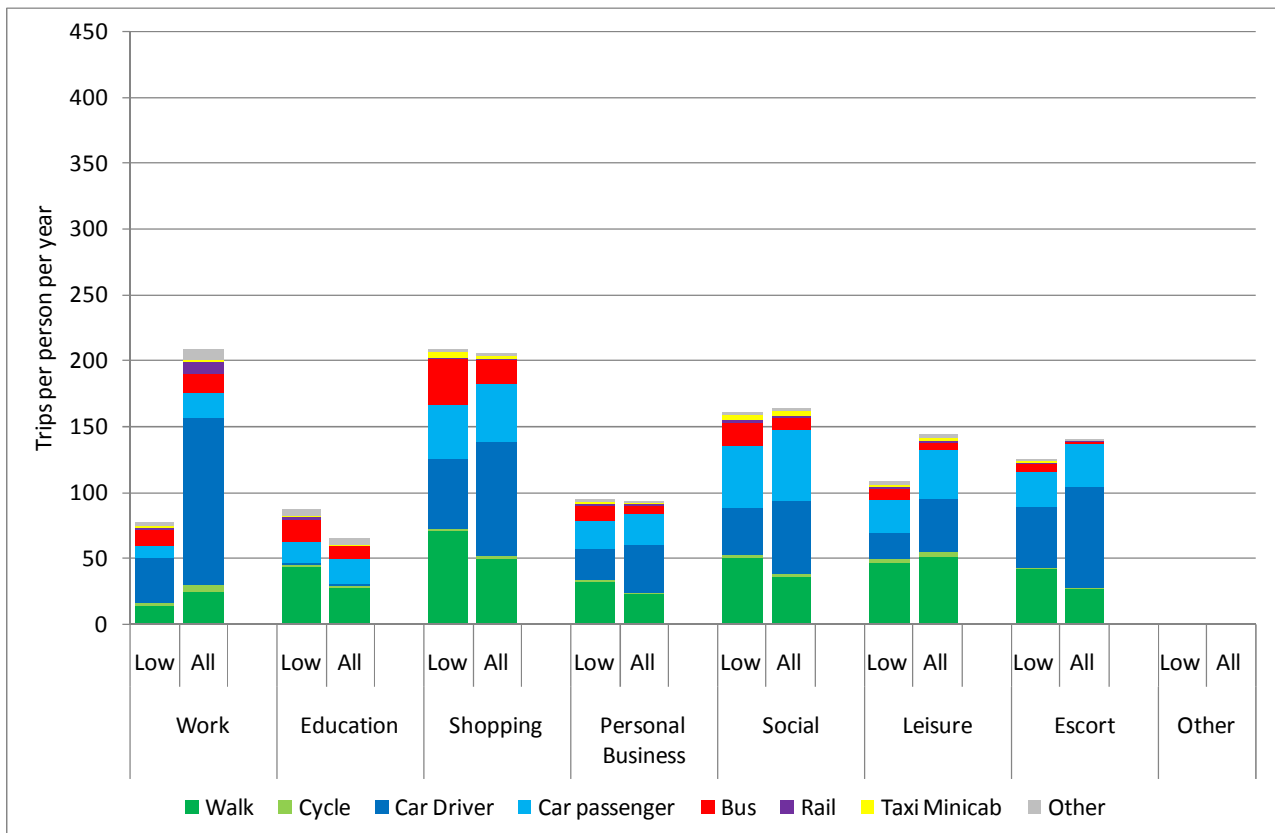


Figure 4.16 – Travel modes and purposes for lowest income quintile compared with all people – Focus on journey purposes

Distribution of personal total mileage by Income

The distribution of distances travelled does not follow a 'normal' distribution whereby the average distance reflects the most likely distance travelled, but is highly skewed to short distances but with a small proportion carrying out a lot of travel (Figure 4.17 below). But the small proportion who travel long distances mean that the "average" person travels 4494 miles in a year (the median), the 'mean' (all distance divided by the number of people) is very much higher at 7115 miles per year.

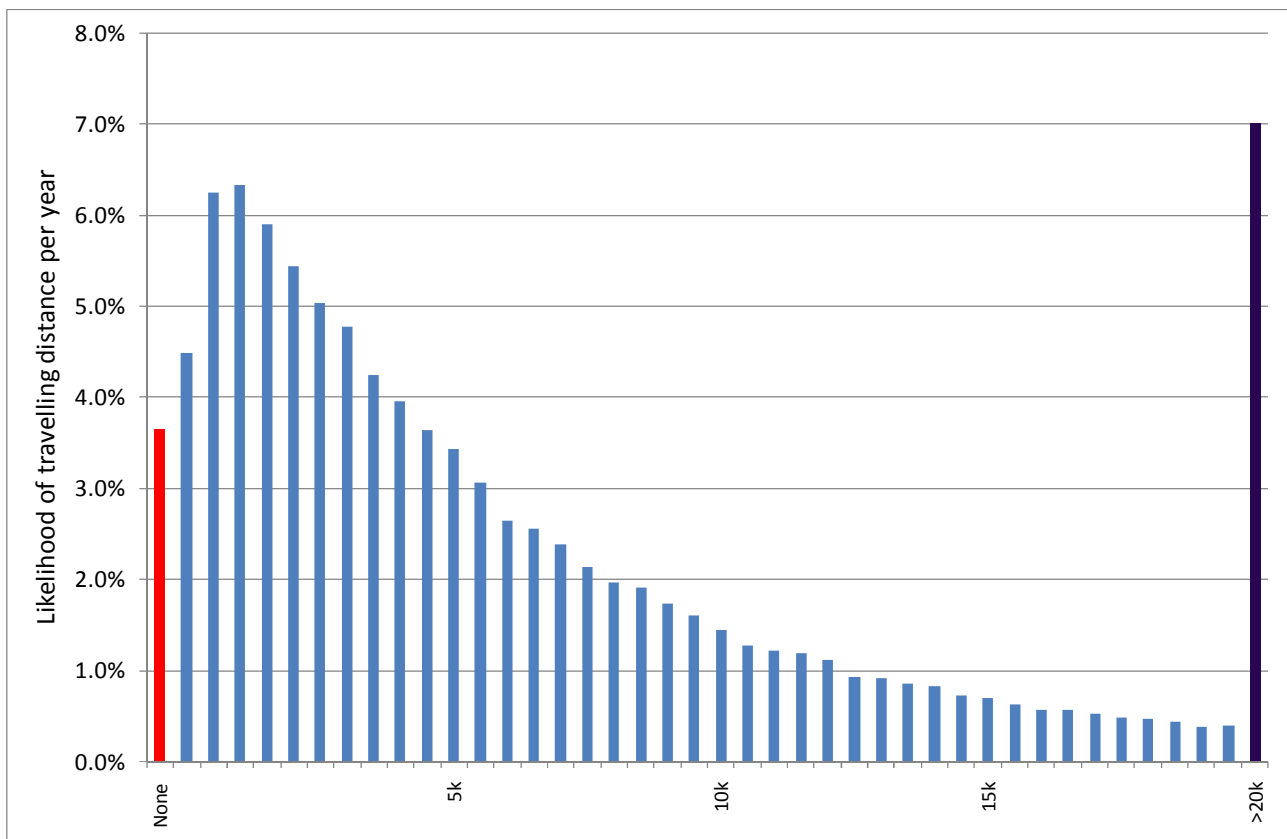


Figure 4.17 – Distribution of total distance travelled per year (all respondents in diary sample)

This difference between median and mean also exists for people in each income quintile. In the lowest income quintile the median distance travelled is 2300 miles while the mean is 4063. For the highest income quintile the median is 8051 and the mean is 11184 miles.

Figure 4.18 shows how distances travelled are distributed amongst each income quintile group. In accordance with what we would expect from the median figures 46% of those in the lowest income quintile travel less than 2000 miles per year. This compares with 23% in the middle income group and 11% in the highest income group). Conversely just under 10% in the lowest income group travel over 10,000 miles compared to 23% for the middle group and 47% for the highest group. (These mileages were not picked for their symmetry, but it is quite remarkable that the numbers are so similarly inverse).

Being on a low income does not guarantee low mileage as being on a high income does not guarantee high mileage, but the relationship is strong.

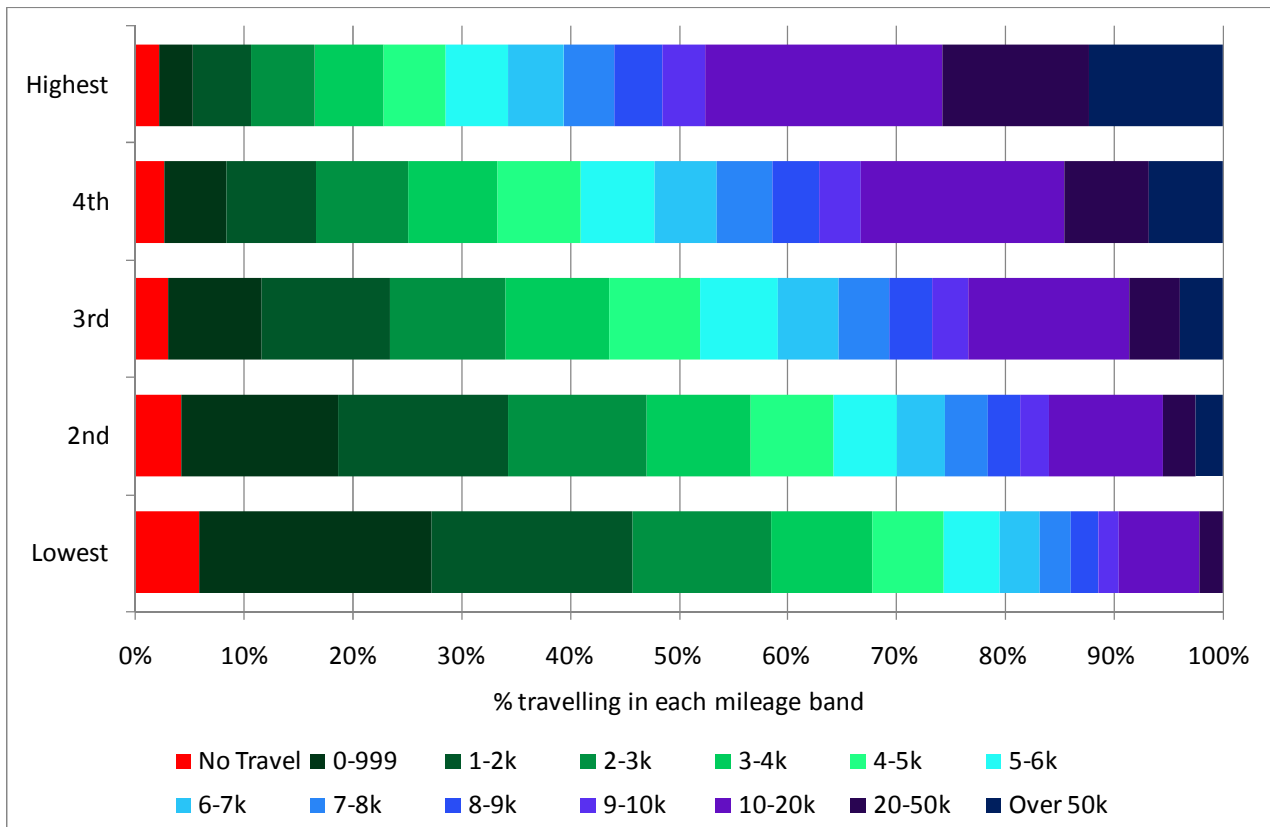


Figure 4.18 – Distribution of distances travelled per week (all individuals in diary sample)

Within the lowest income quintile the distribution of mileage also varies according to various factors as Figure 4.19 below shows. The proportion who do not travel at all is generally similar but higher for the over 80s and those with a mobility difficulty. The difference between male and female and for white/ non white is not marked, but for all others the differences can be quite large. Factors related to young and old age and mobility difficulties seem to have the greatest reducing effect, while being economically active has the greatest increasing effect. Rurality also shows through as a factor, with a very much higher proportion of low income residents travelling longer distances than people in larger settlements.

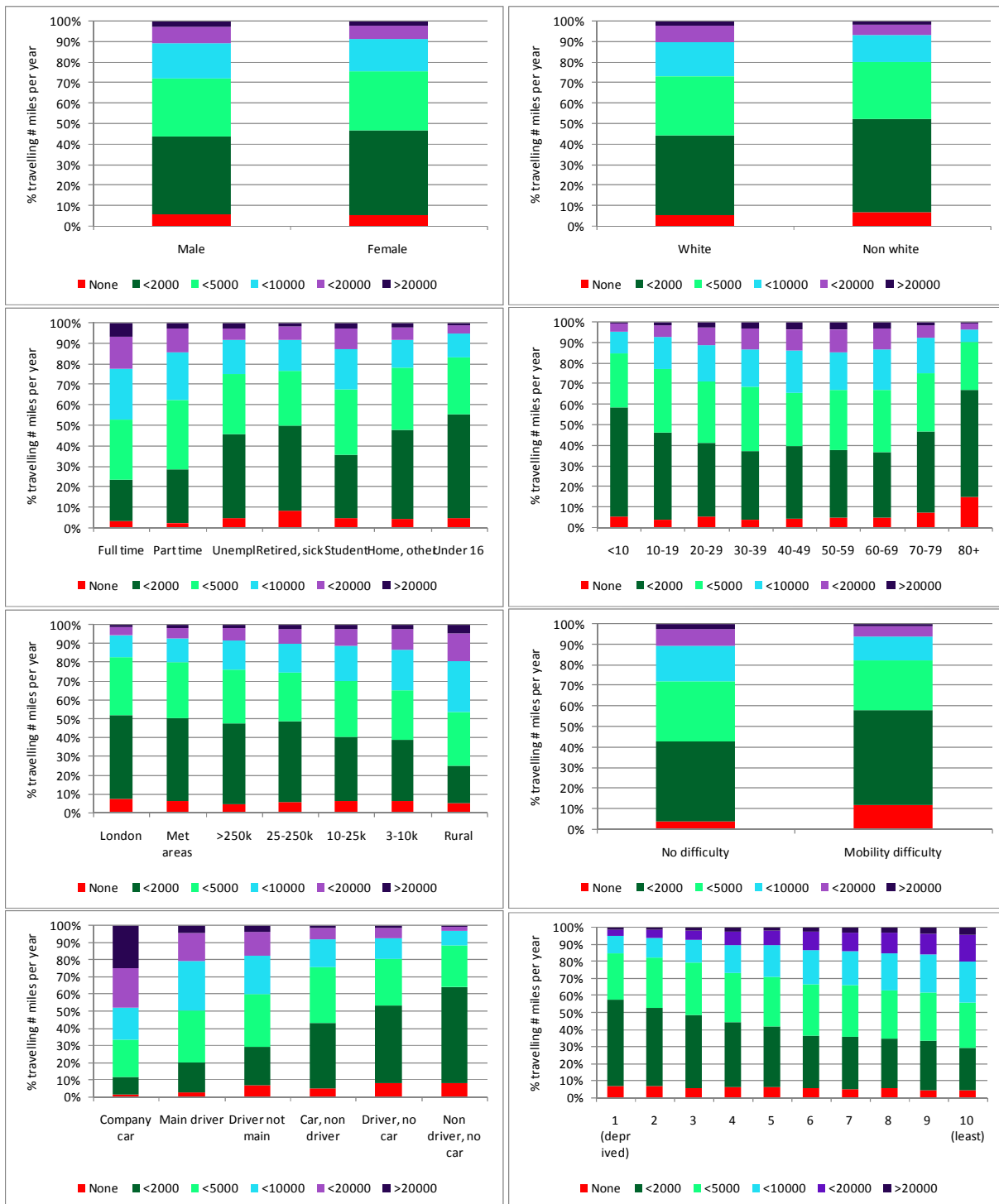


Figure 4.19 – Distribution of total distance travelled for lowest income quintile

Children's independent travel

The age at which children are allowed to travel independently is dependent on a number of factors relating to the environment in which travel would be made, and the attitudes and beliefs of their parents (Hillman, 1993, Joshi et al, 1997). Whatever the reasons, children in lower income quintiles are somewhat more likely to be allowed to travel independently at a younger age with 23% being allowed from age 11 in the lowest two groups compared to 17% in the highest group (Figure 4.20). But the effect is more marked for the highest income group – it appears to be they who restrict their children's travel, rather than low income groups allowing more – the difference between the lowest and second lowest income quintile is marked.

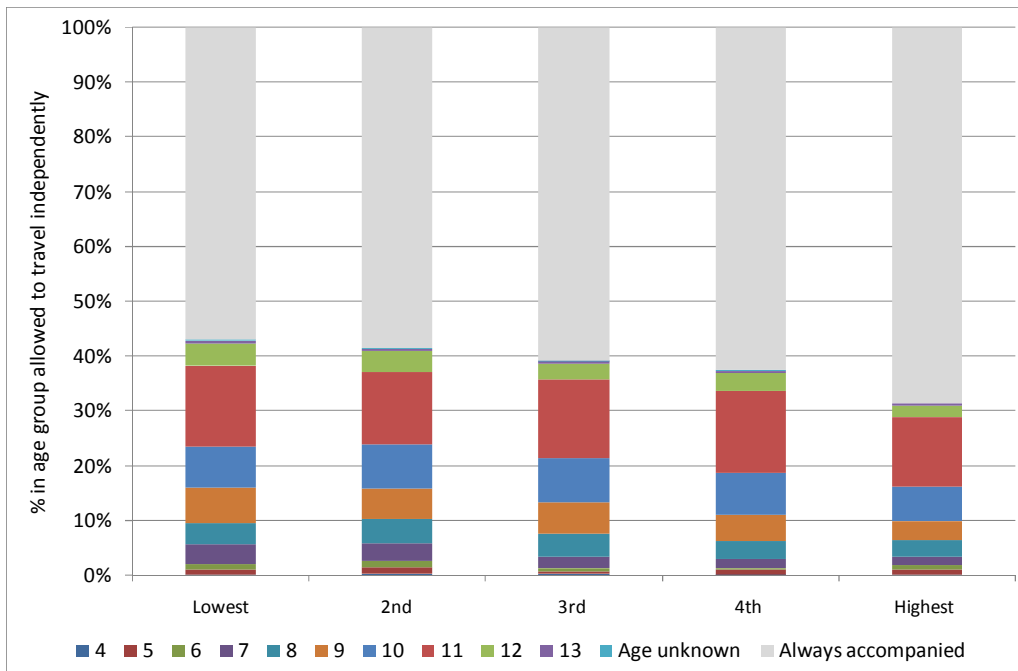


Figure 4.20 – Age at which children are allowed to travel to school independently, by income quintile

When asked why, the reasons are broadly similar, with traffic danger being the most likely for all incomes, and fear of assault or molestation also featuring highly (Figure 4.21). For most factors there is no obvious definite relationship to income. However, fear of traffic danger rises with increasing income then falls off for the highest group. Fear of assault or molestation is highest amongst middle income groups. “Child might get lost” and “might not arrive on time” are reported more by the lowest income quintile, while fear of bullying falls off quite dramatically with increasing income. Distance and convenience are more common amongst the higher income groups.

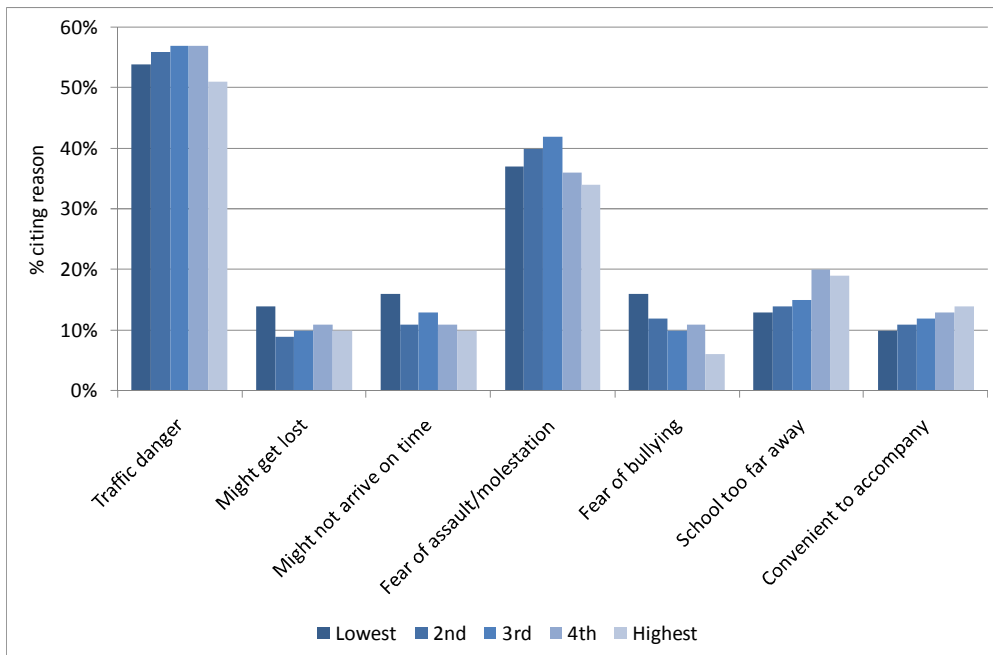


Figure 4.21 – Reporting of factors affecting willingness to allow children to travel alone

Air Travel

The National Travel Survey only includes internal flights in its travel diary, but the individual questionnaire does ask one simple question on the number of international air flights taken over the last 12 months. (There is no data on the destination or purposes of these trips). Figure 4.22 shows that there is a strong association with income quintile with 75% in the lowest income quintile having made no flights compared to 28% in the highest income quintile. In the lowest quintile 3% made more than two flights compared with 28% in the highest quintile. It is apparent that any notion of frequent international air travel becoming 'the norm' is based on the behaviour of a small section of society.

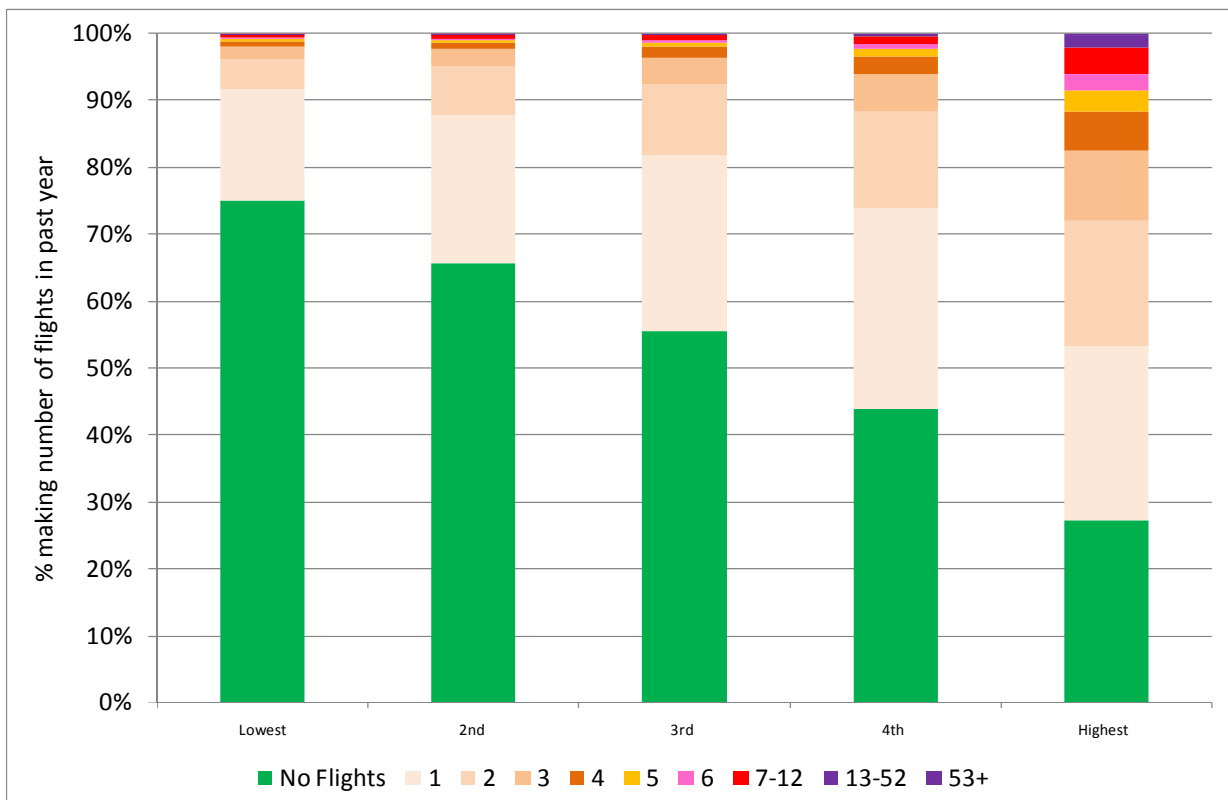


Figure 4.22 Number of international air flights in the last year by income quintile (2006-2008)

Summary

The travel behaviour of those on low incomes shows differences to those on higher incomes. At this level of analysis many variables appear to show a continuous relationship with income – the higher the income the greater the amount of travel, and the greater the use of trains, planes and automobiles. But in terms of daily travel it is the use of cars that shows most difference.

It seems that the effect of income is generally that higher incomes are associated with greater amounts of travel rather than lower incomes being associated with less. The analysis in this section has not found that all those in the lowest income quintile are a homogenous group displaying a paucity of travel – but that does not mean that there is something we might call 'transport poverty' that does affect those on low incomes in conjunction with other factors. This issue will be returned to in later sections.

Section 5 – Changes in travel behaviour over time, focussing on car use

For the last forty years, car use has generally been seen as the mode of choice of those who are not in 'poverty', and an assumption was often made that car travel would increase to a saturation level where all but those who could not drive would do so (reckoned to be about 95% of people aged over 17). But it has recently been noted that since the mid 1990s the overall distance travelled by car per person has stabilised after decades where it was growing quite rapidly (e.g. Metz, 2010). Here is not the place to study the reasons why or the extent to which this will continue into the future, but changes in the amount of car use by those on different incomes shows patterns are of interest.

Change in cars, trips and driver distance over time by income quintile (1995 to 2008)

Car ownership for the lowest income quintile² has grown rapidly since 1995 – while for the two highest income groups it has been stable, possibly falling (Figure 5.1).

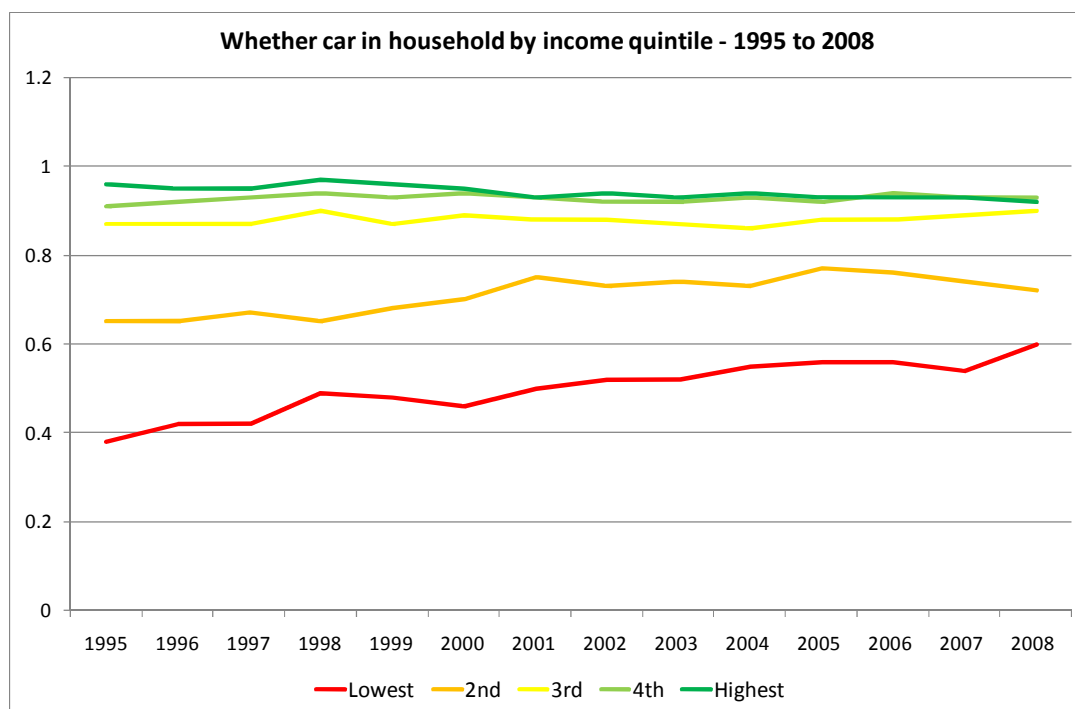


Figure 5.1 – Whether a household has a car by income quintile – 1995 to 2008

² This analysis uses a recalculated income quintile, based on the McClement equalisation approach applied to incomes provided within the NTS. More details are provided in Annex One. While the author is content that the resulting analysis is reasonably robust, the figures here would not co-incide with figures provided by the DfT National Travel; Survey team, and should be treated as exploratory.

Cars per household shows a similar pattern (Figure 5.2), but the patterns are more complex, as saturation in one car ownership for higher incomes has been reached, but saturation for cars per household seems to be nearer 1.7. (The second highest income group actually has had more cars per household than the highest group since 2006).

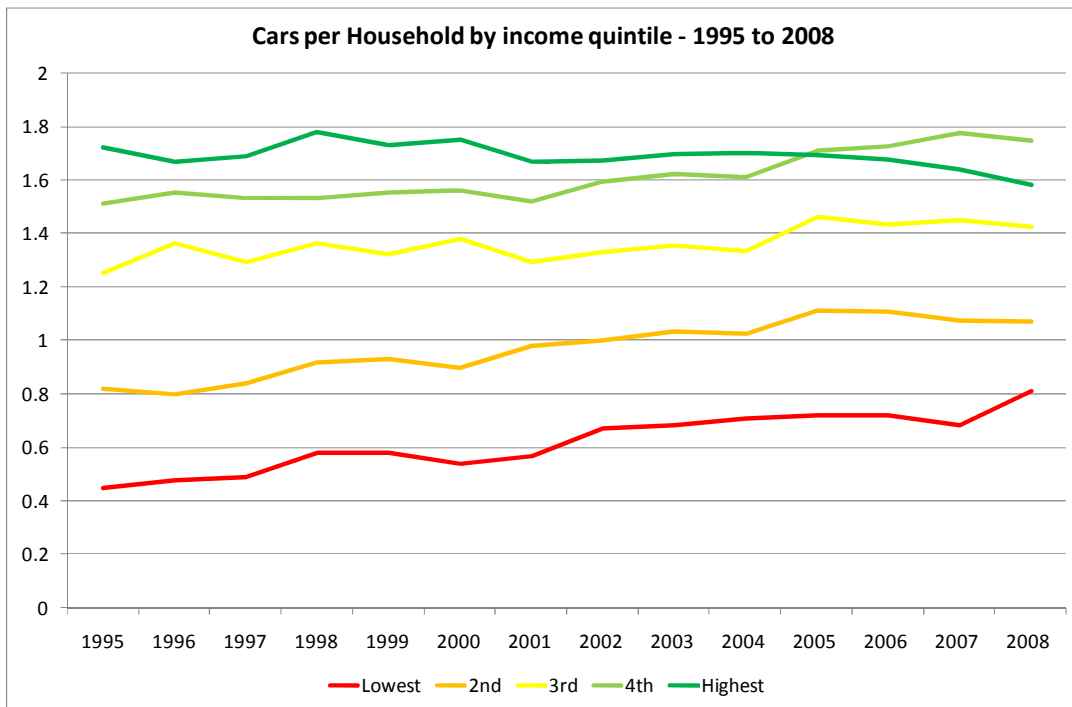


Figure 5.2 – Cars per household by income quintile – 1995 to 2008

Figure 5.3 below shows that trips per week has remained stable for lower income people and fallen for the highest (for the seven year periods of the two datasets)³, but there is still a big difference (850 per year for lowest against 1125 for highest). Trip rates do vary quite markedly according economic activity status so this will explain quite a lot, as more lower income people are not working. Change in the use of cars accounts for most of the difference in distance travelled.

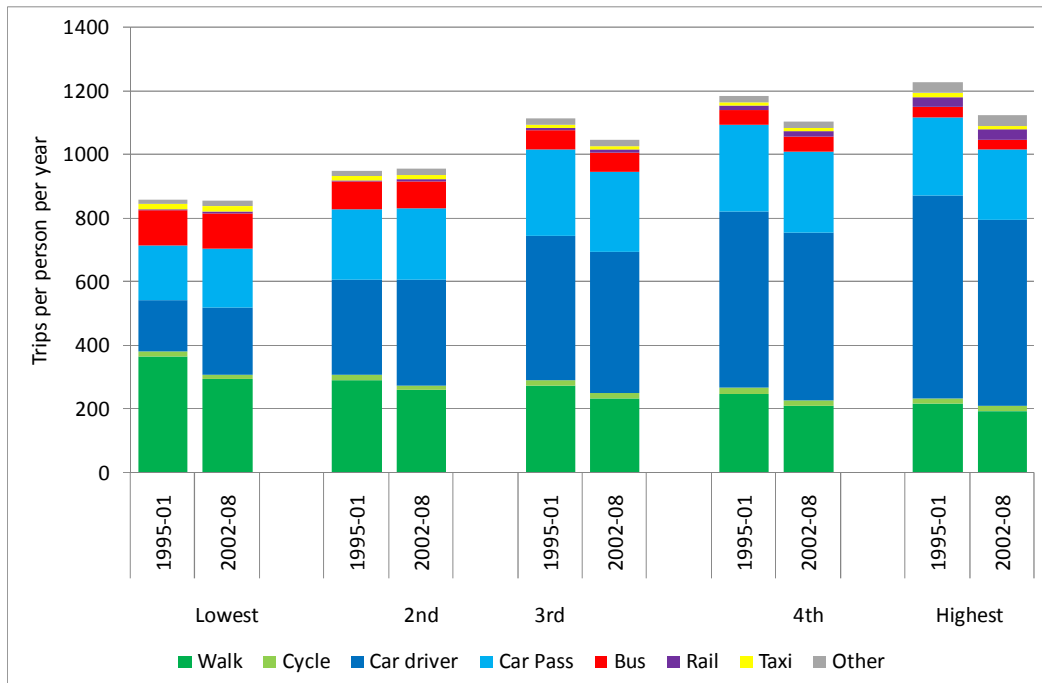


Figure 5.3 – Trips per person per week by mode by income quintile – 1995-01 and 2002-08

³ As the datasets used somewhat different methodologies one might argue that the differences are due to methodology rather than being real. But the long term trends of annual data presented in Figures 5.1 and 5.2 back up the evidence for a real trend over a prolonged period.

Likewise car driver distance per person (whether or not they drive) has fallen for the higher incomes and increased for lower incomes (Figure 5.4 below). This pattern shows some variation from year but the trend is consistent. (The variation could be due to inaccuracies in the methods used to assign people to income quintiles, and in the nature of the equivalisation process).

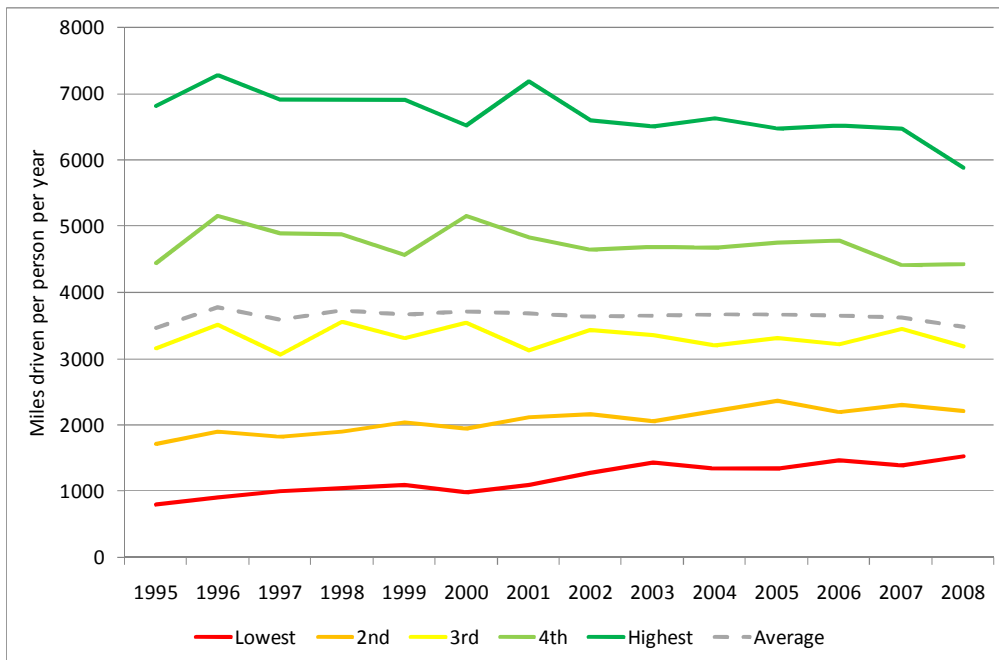


Figure 5.4 – Car driver mileage by income quintile (whether or not car is driven) – 1995 to 2008

So far we have looked at income quintiles in respect to changes in travel behaviour, but as real incomes rise over time (if they do) people should be better able to afford to run a car so we would expect increases to occur.

Below (Figure 5.5 and 5.6), we look at changes for people according to actual household income. It is striking here that for those households with an income of £5,000⁴ per year or less the likelihood of having a car in the household has risen quite dramatically over the thirteen year period from about 20% having a car to nearly 50%. During this time the costs of motoring did not rise very much (compared to the RPI and rose much less rapidly than public transport fares, and the purchase price for (new) cars did not rise significantly. But this still is very surprising.

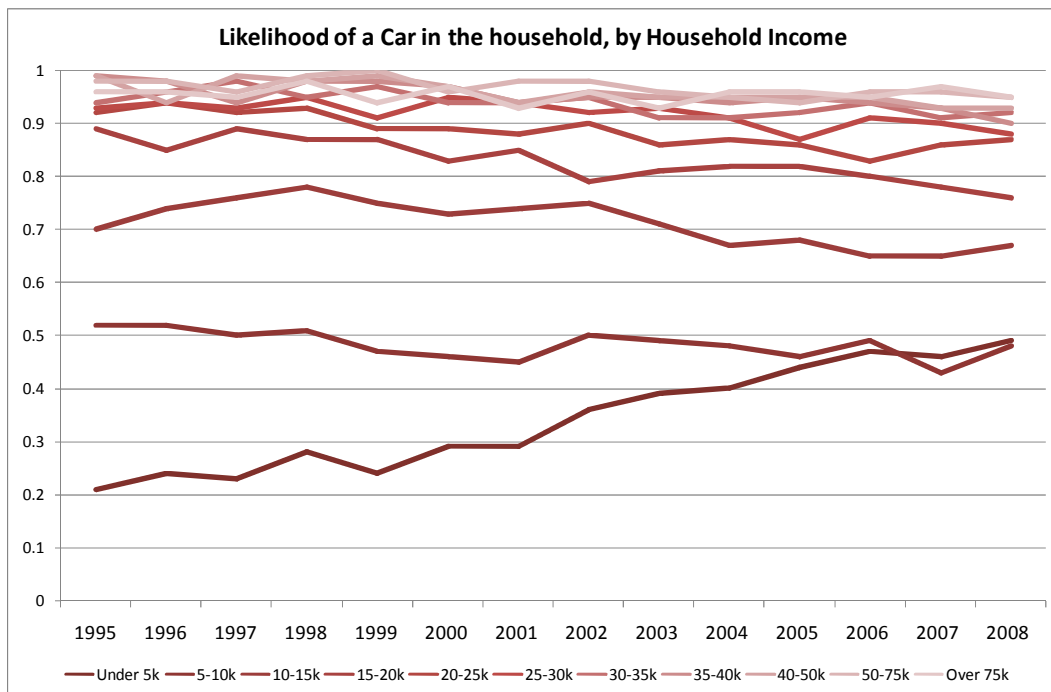


Figure 5.5 – Likelihood of a car in the household by household income – 1995 to 2008

⁴ It should be noted that those on incomes of less than £5000 will include temporary changes in people’s incomes. It does not necessarily imply that their ‘normal’ income is this low – for some, for example, it could be the result of a temporary period of unemployment. The honesty of people divulging correct income in surveys is also open to question. It should also be noted that some of the sample sizes are quite small and that yearly fluctuations should be taken as being due to sampling rather than showing any real difference.

When we look at miles driven per person (Figure 5.6) the pattern shows rough stability or a small rise for those on low incomes, but very small compared to car availability, while there are quite marked falls for those on the highest incomes. This implies that while there are more cars owned by people on low incomes they are being used less than they were. The much larger fluctuations between years for the higher income groups should be taken as relating to low sample sizes rather than a real change between years.

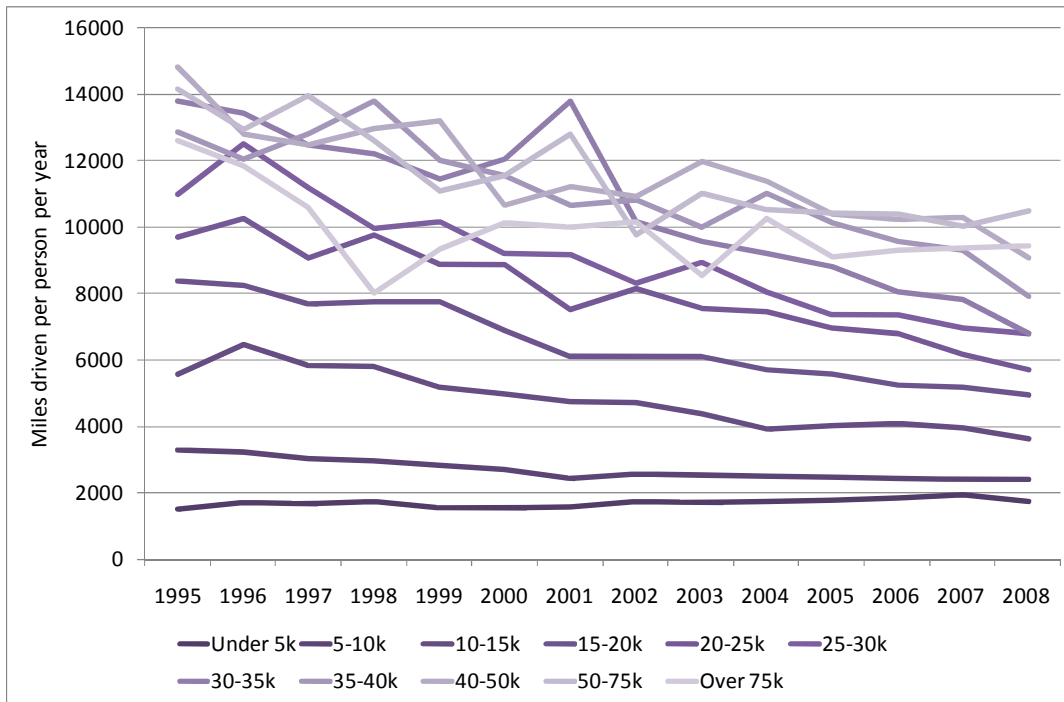


Figure 5.6 – Miles driven per person per week by household income 1995 to 2008

Summary

A pattern emerges that those with high incomes are using cars less than they were in the 1990s with some fluctuation but a steady trend towards lower use. At the same time those on lower incomes are becoming more reliant on cars, and are much more likely to own them, though their mileage has not grown so rapidly as ownership.

Section 6 – What factors relate most to travel behaviour? Regression analysis

So far we have looked at how travel behaviour relates to incomes, alongside other variables. But since the other variables such as economic activity are themselves related to incomes, and since we cannot compare many variables at once it is difficult to say which variables are having most effect.

Regression analysis is a way of showing how a number of factors are related to one variable that we are interested in. Here it is used to try to assess the relative importance of income against other factors that relate to the characteristics of people's travel. Regression cannot show whether factors are the *causes* of variation, and when multiple variables are used together the complex interactions (or cross correlations) between variables can affect the results considerably.

For this analysis⁵ various factors are used to look at what is most strongly related to three measures of travel behaviour – number of trips per person per year, minutes spent travelling per day, and distance travelled per year. The variables that are used include income, age, economic activity, gender, ethnicity, mobility difficulties, and type of area lived in. In order to be able to make comparison between variables each is reduced to an 'on/off' level – e.g. someone is either female; or they are not. But the analysis also is done such that people are classified as, say, aged under 16; or not – but another variable used is that they are aged 17-29; or they are not, etc. By doing this we can assess whether, say, getting older reduces travel, or whether being over 65 has a major effect. It also enables comparisons between the effects of different variables to be made more easily.

⁵ This regression analysis should be regarded as an exploratory analysis, since a robust analysis would involve much deeper consideration of variables and repeated regression analysis using different procedures than was possible here given the time and resources available.

How individual variables relate to travel behaviour

As a first stage the effect of each is looked at individually, before doing a full regression analysis.

From Figure 6.1 below it is apparent that (on the left) being in the lowest income quintile is associated with an average of about 75 miles travelled per year compared to 140 for others. For the other variables the main positive factors are;

- high income,
- being in full time work,
- being the main driver of a car, and
- living in a rural areas, and to a lesser extent,
- having a full driving licence, being an adult in a household with children (i.e. being a parent).

The main negative factors (in rough order of importance) are

- being without a driving licence in a household without a car,
- having a mobility disability.
- low income,
- living in a deprived area, and
- being aged under 17, being retired, non-white, female, or a single parent,

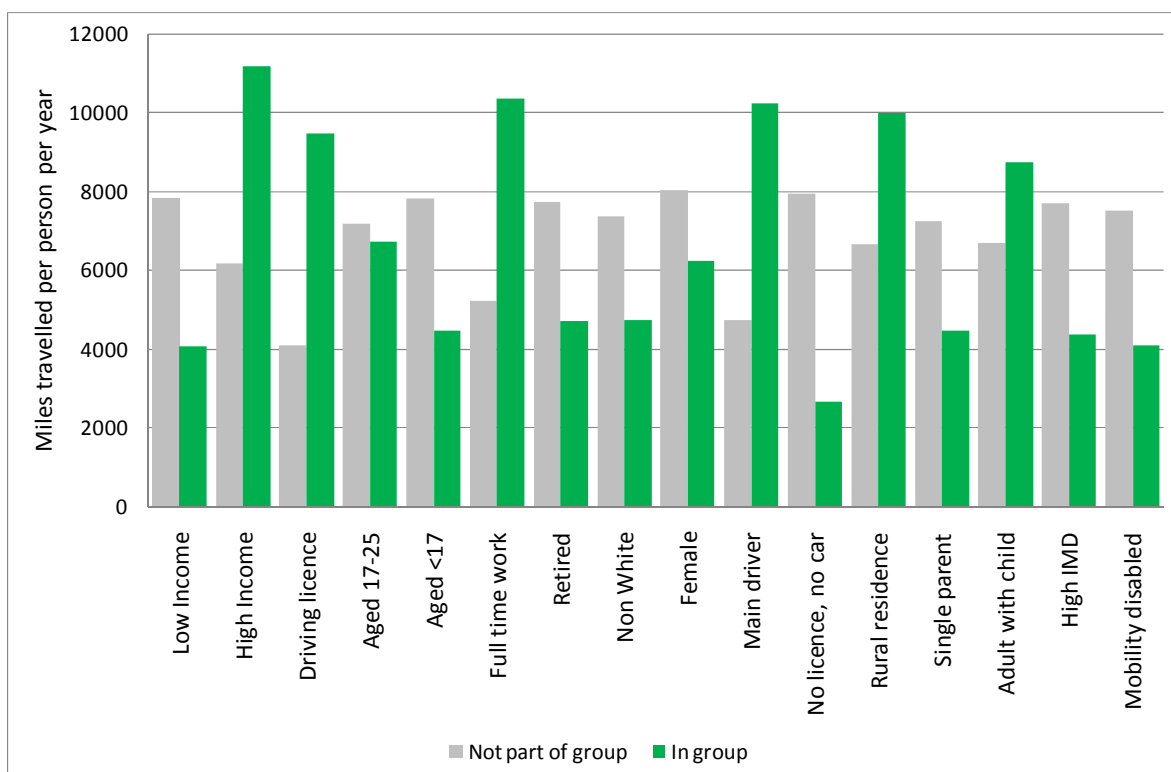


Figure 6.1 Miles travelled per year by variables used in regression analysis

When we look at the number of trips made per week (Figure 6.2) the effect of each is generally very much less and some differences appear. The biggest positive effects are

- having a full driving licence and
- being the main driver of a car as well as
- being one of two or more adults with children.

The largest negative effects are for

- having a mobility disability,
- having no licence or car, and
- being retired as well as
- being on a low income.

The importance of factors such as being in full time work or living in a rural area become much less important.

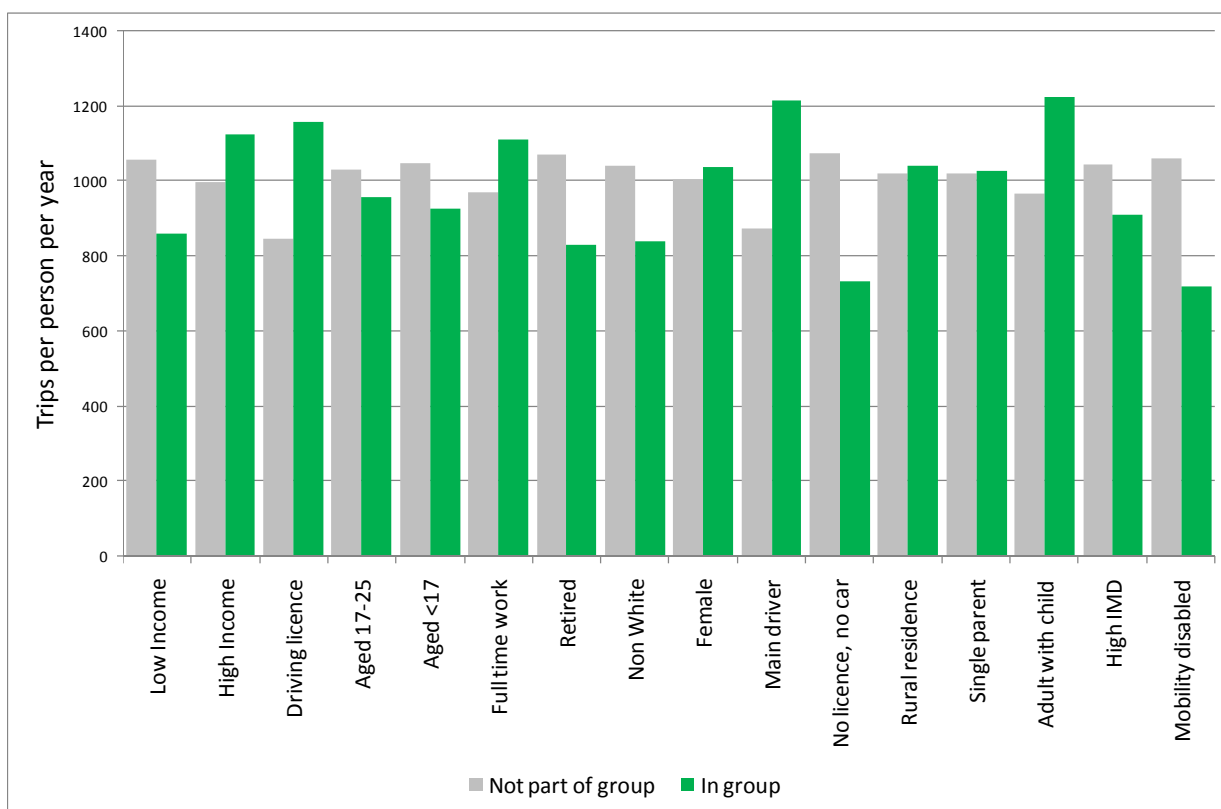


Figure 6.2 – Trips per person per year by variables used in the regression analysis

The time spent travelling tends to show less variation than for distance travelled but about the same as trips per person (Figure 6.3). The main positive factors are

- High income,
- being in full time work,
- being a main driver,
- and being an adult with children.

The main negative effects are:

- Having a mobility difficulty,
- having no licence or car,
- being retired,
- being aged 16 or under and
- being on a low income.

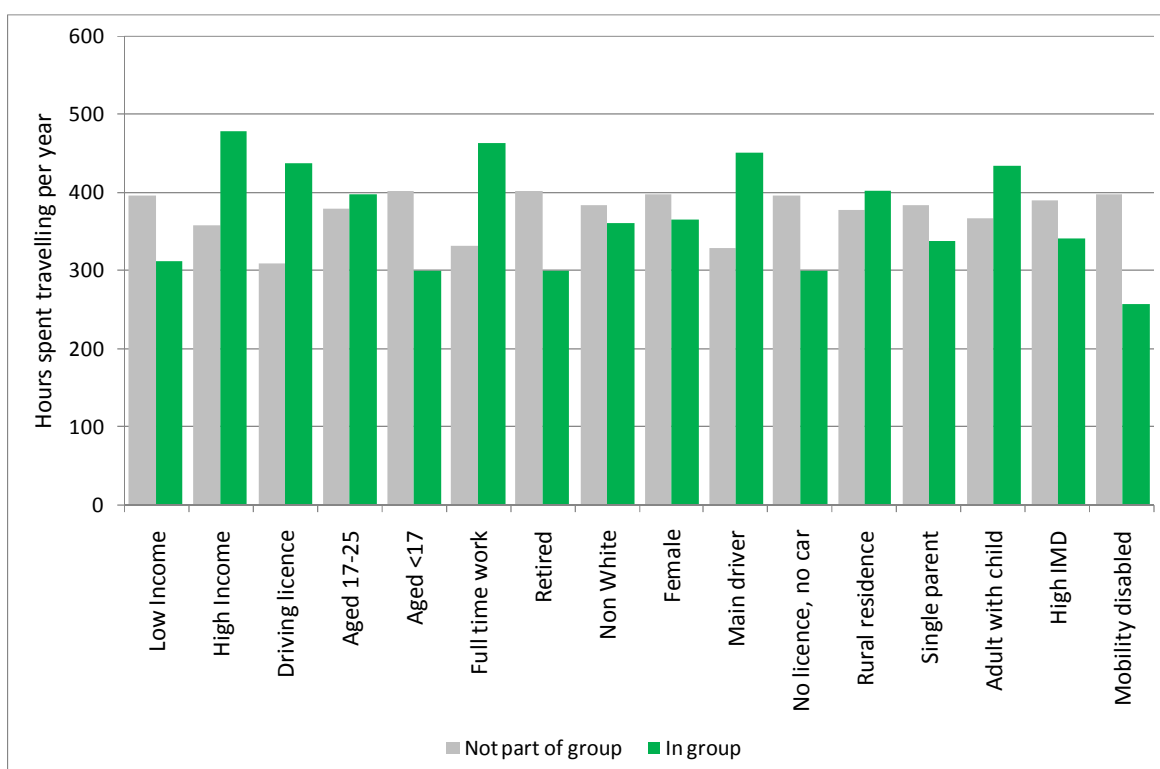


Figure 6.3 – Time spent travelling per person per year by variables used in the regression analysis

To make the above clearer in terms of which factors have a similar effect on trips, time spent travelling and distance, Figure 6.4 shows where the effects are positive or negative to a greater or lesser extent (capitals show a stronger relationship). The lines coloured red are ones where all are negative, and blue where positive. It can be seen that those constantly negative are being:

- in the lowest income quintile
- aged 16 or under
- retired
- having no licence and no car, and
- having a mobility difficulty

Those having a common positive effect are:

- Being in the highest income quintile,
- Having a full driving licence
- Being a full time worker
- Being the main driver of a household car
- Being an adult with children

	Trips per person	Time spent travelling	Distance travelled
Lowest Income Quintile	NEGATIVE	Negative	NEGATIVE
Highest Income Quintile	positive	POSITIVE	POSITIVE
Full Driving licence	POSITIVE	Positive	positive
Aged 17-25	negative	Equal	equal
Aged <17	negative	NEGATIVE	negative
Full time worker	positive	POSITIVE	POSITIVE
Retired	NEGATIVE	NEGATIVE	negative
Non White	NEGATIVE	Equal	negative
Female	equal	Equal	equal
Main driver of household car	POSITIVE	Positive	POSITIVE
No licence, no car	NEGATIVE	NEGATIVE	NEGATIVE
Rural residence	equal	Equal	POSITIVE
Single parent	equal	Negative	negative
Adult with child	POSITIVE	Positive	positive
Highest IMD quintile	negative	Negative	negative
Mobility disability	NEGATIVE	NEGATIVE	NEGATIVE

Figure 6.4 – Table summarising individual effects of variables on travel characteristics

For the multiple regression analysis it was decided to take out those variables relating to access to a car since their effect is complicated by being likely to be an effect of lifestyle rather more than affecting travel patterns themselves. The first graph (Figure 6.5 below) shows how the number of trips, time spent travelling and distance travelled are affected for the whole sample, regardless of income. The values shown are 'beta' values which give an indication of the relative effect that each variable has on what is being measured (e.g. distance travelled).

- Generally, what affects one measure affects the others similarly (trips per person, travel distance and travel time).
- Biggest negative effects – 16 or younger, retired, disability, and low income.
- Biggest positive effects – Highest income, full time worker, adult with children in HH.
- Some differential – adult with children affects trips, but not distance or time; rural affects distance but not trips, or time; full time working to fewer trips but more distance and time; non white to same time but fewer trips and less distance.

Income is important but is not over-riding in any of these.

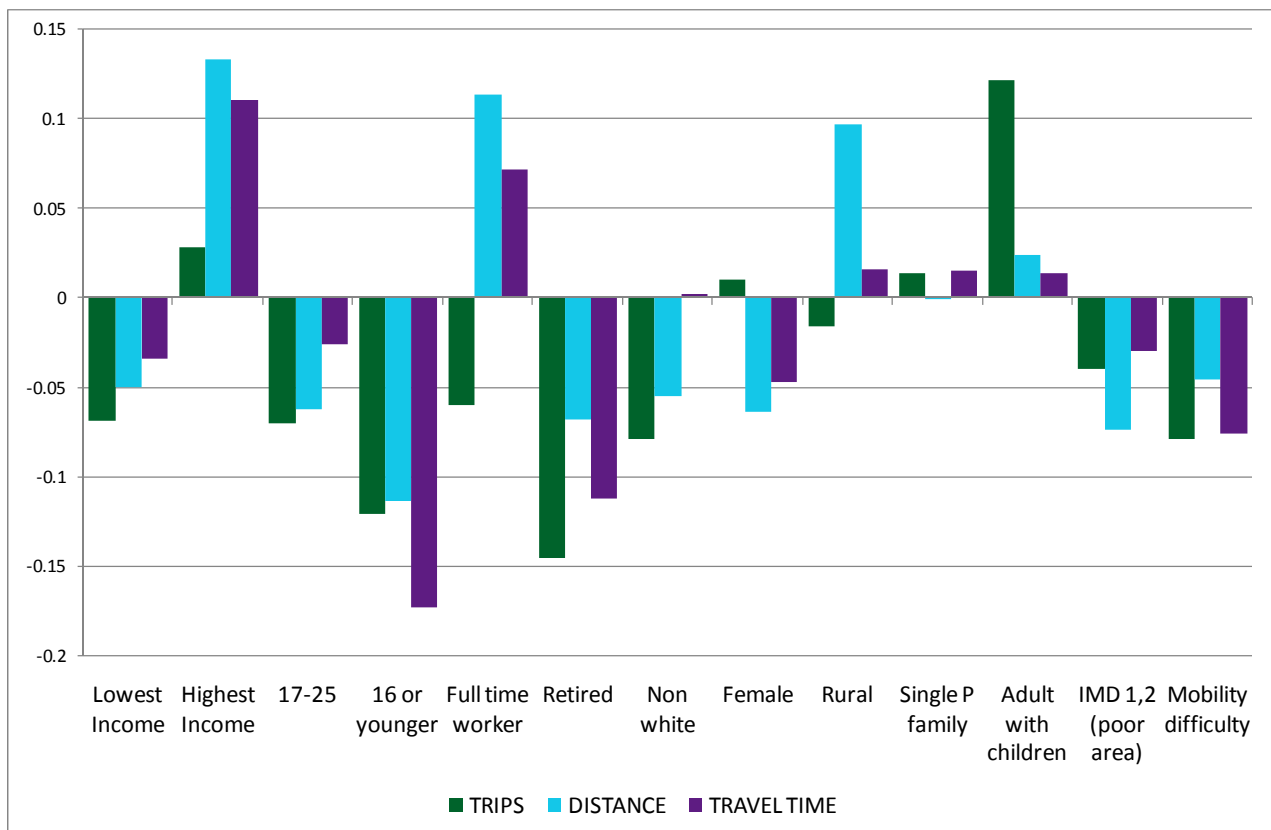


Figure 6.5 – Beta values for regression analyses (all respondents)

It is apparent that one's 'lifestyle' will have a major effect, so the Figure 6.6 below shows the effect (for travel distance only) for people in different economic activity groups. It is apparent that:

- The direction of the effect of any one variable is virtually always the same for each economic activity group,
- High income has a larger effect than low income for full time and part time workers and 'home/ other' but low income has a somewhat greater negative impact for unemployed, retired and students,
- Living in a rural area has a weak negative effect, and living in a High IMD area a strong negative effect,
- Being younger, non white, and having a mobility difficulty all have a negative impact on distance travelled.
- (NOTE – where results were not significant at the 95% level, bars have not been shown – this is especially the case for smaller groups such as unemployed people, as well as for some variables such as being a single parent or an adult with children).

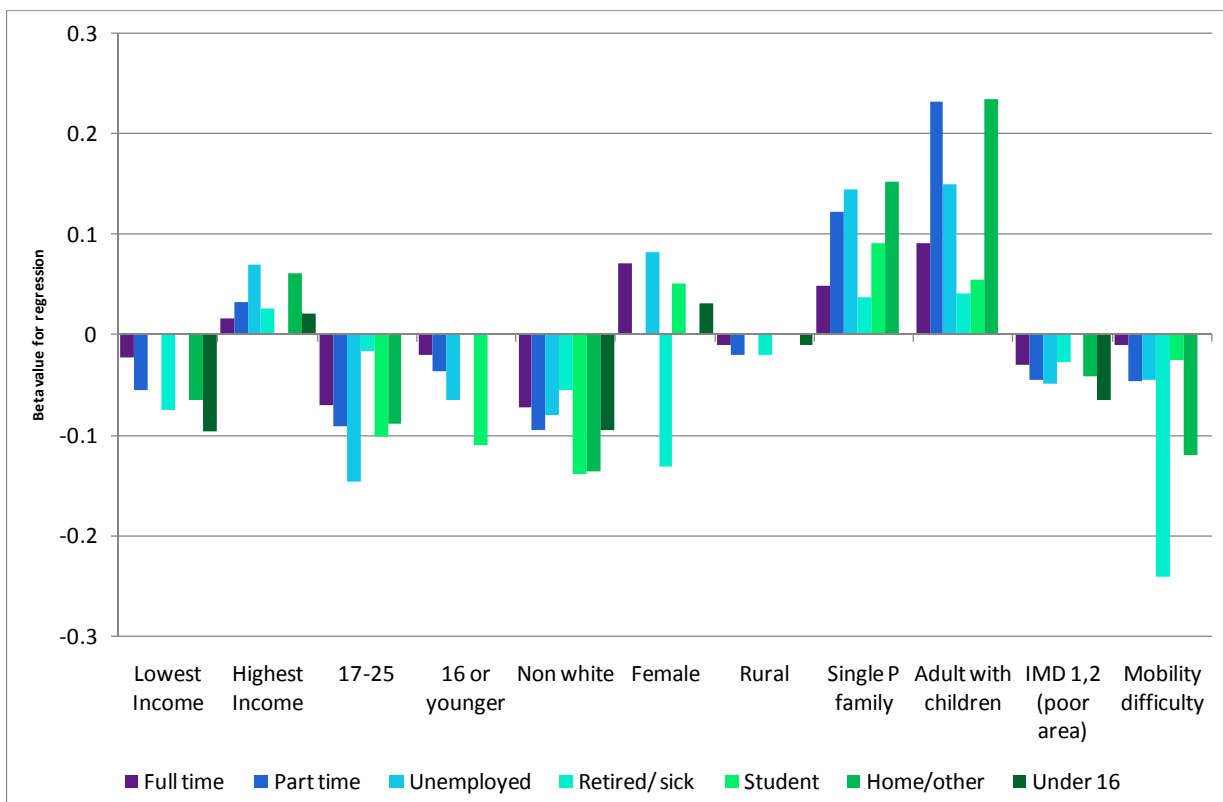


Figure 6.6 – Beta values for regression analyses (all respondents) by economic activity

When we look at those in the lower income group alone for travel distance (Figure 6.7 below):

- (Income as a variable is no longer relevant so is not shown),
- Geographic factors – rurality and High IMD – are the strongest factors,
- Age, ethnicity. Gender and having a mobility difficulty all have an effect.

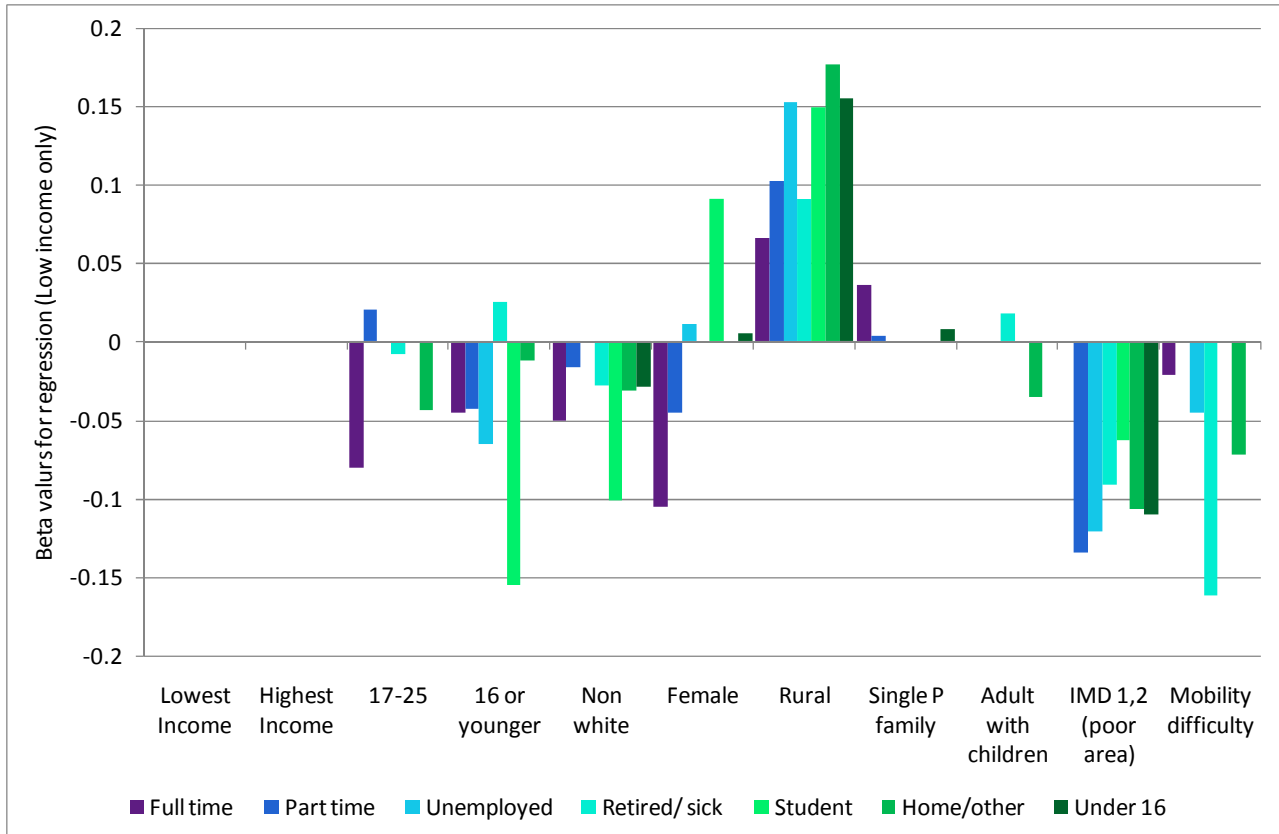


Figure 6.7 – Beta values for regression analyses by economic activity (lowest income quintile)

Summary

Regression analysis is complex and its results are easy to misinterpret, but it seems that when looking at what affects travel behaviour for the population as a whole, income is a major, but not over-riding factor. Having a high income has a stronger relationship with greater amounts of travel, than being on a low income has on less travel. Factors such as being retired, having a mobility difficulty and being aged under 16 have the greatest effect, but these are generally associated with lower incomes themselves.

When we look at effects for those in each economic activity group it is clear that low income is a major factor in distance travelled for virtually all groups, along with being young, non-white, living in an area with a high Index of Multiple Deprivation (IMD) and having a mobility difficulty. Having children seems to have the strongest upward effect on the amount of travel.

When we look at travel distance only for those on low incomes a different pattern emerges. Living in a rural area has a strong upward effect, while living in an area with a high IMD score has a strong negative effect. Being younger, non white and having a mobility difficulty also has an effect.

But although the regression analysis might seem to downplay the effect of low income it remains the case that low income has the strongest direct relationship to low trip rates, travel time and distance travelled. The factors associated with smaller amount of travel are also mainly associated with low incomes.

Section 7 – Patterns of behaviour – Cluster Analysis

So far we have generally looked at ‘average’ behaviour of different income groups (except for Figure 4.17 to 4.19 which looked at the distribution of travel distance). But those in any group are not all the same and the average can be made up of people with very differing travel characteristics.

Cluster analysis is a statistical technique that can group people according to how similar their attitudes, behaviour or some other factors are. It looks for cases of data that are most similar to each other, and then adds other relatively similar ones until all the data cases ‘falls’ into a number of groupings. In its simplest form, if we used a longitude and latitude of home addresses as two variables it would group people into urban areas, as that is where people are concentrated – it is a mapping of densities. But in most uses of cluster analysis one uses several variables, and the multi-dimensional nature of the results does not lend itself to graphic display like a map.

The analogy with city mapping is also somewhat misleading since it would include people in the ‘hinterland’ of the city as they are closest to that city. The number of groups chosen is also important – a map of two ‘city’ clusters in Britain would probably class all as ‘London’ or ‘Manchester’ while 15 might include Nottingham, but ascribe Leicester residents to Nottingham as well.

The method is used extensively in market research to identify people with similar purchasing or attitudinal patterns. Labelling of people as ‘upwardly mobile’ or ‘affluent greys’ are generally the result of cluster analysis. When its limitations are accepted it is a powerful analysis tool that can provide insight.

Here the interest is in whether people have trip making patterns that fall into groups. For instance we would expect high income rural car users to have different travel patterns to non car owning people in dense urban areas. For this analysis we are interested in people on low incomes to see whether they fall into groups over and above what we might expect from, say, their economic activity status.

The variables used are the number of trips by different modes and for different purposes. Initial analyses show that the modes of variation where groupings are large enough to be of measurable consequence are Walk, Car Driver, Bus, and Car Passenger, with rail, cycle, taxi and others being used so much less that they have little effect on groupings other than small minorities for which the technique and data is not robust enough to analyse meaningfully. The purposes used are Work, Education, Shopping, Food Shopping, Escorting others, and Leisure.

It should be made clear that this analysis is exploratory rather than robust, and is done to point to what kinds of groupings exist. The results cannot be used to draw policy conclusions.

An initial 9 way grouping for all respondents (using 2002 to 2008 data) shows a large group that can be labelled something like ‘low number of trips – mainly car passenger’. Another large group also shows a relatively low number of trips with car passenger forming a major proportion, and another making a relatively small number of trips has journeys to work predominating. These groups along with the rest grouped as ‘other’ are shown for each income quintile in Figure 7.1. The group with a low number of trips predominates for the lowest income quintile and gets smaller for higher income groups. Another group making more trips but with car passenger being common also gets smaller with higher income. There seems to be a group who travel a lot, but most of their travel is work based. This group gets larger with increasing income.

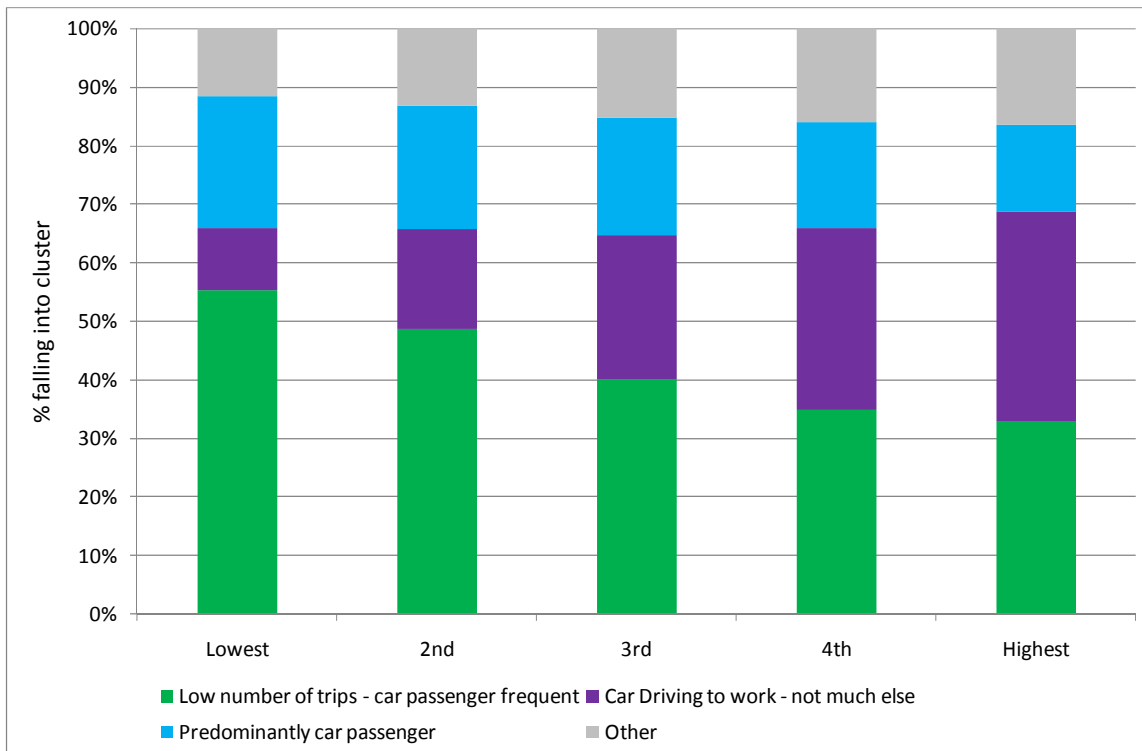


Figure 7.1 – Initial clusters of travel behaviour by income quintile

The results of this initial analysis for all was compared for the lowest income group against those in the middle 3 income groups for each economic activity group (Figure 7.2).

As a general rule there appears to be as much or more difference between economic activity groups as there is between different income groups within each economic activity group. The effect of income seems to be strongest for full and part time workers and for retired people.

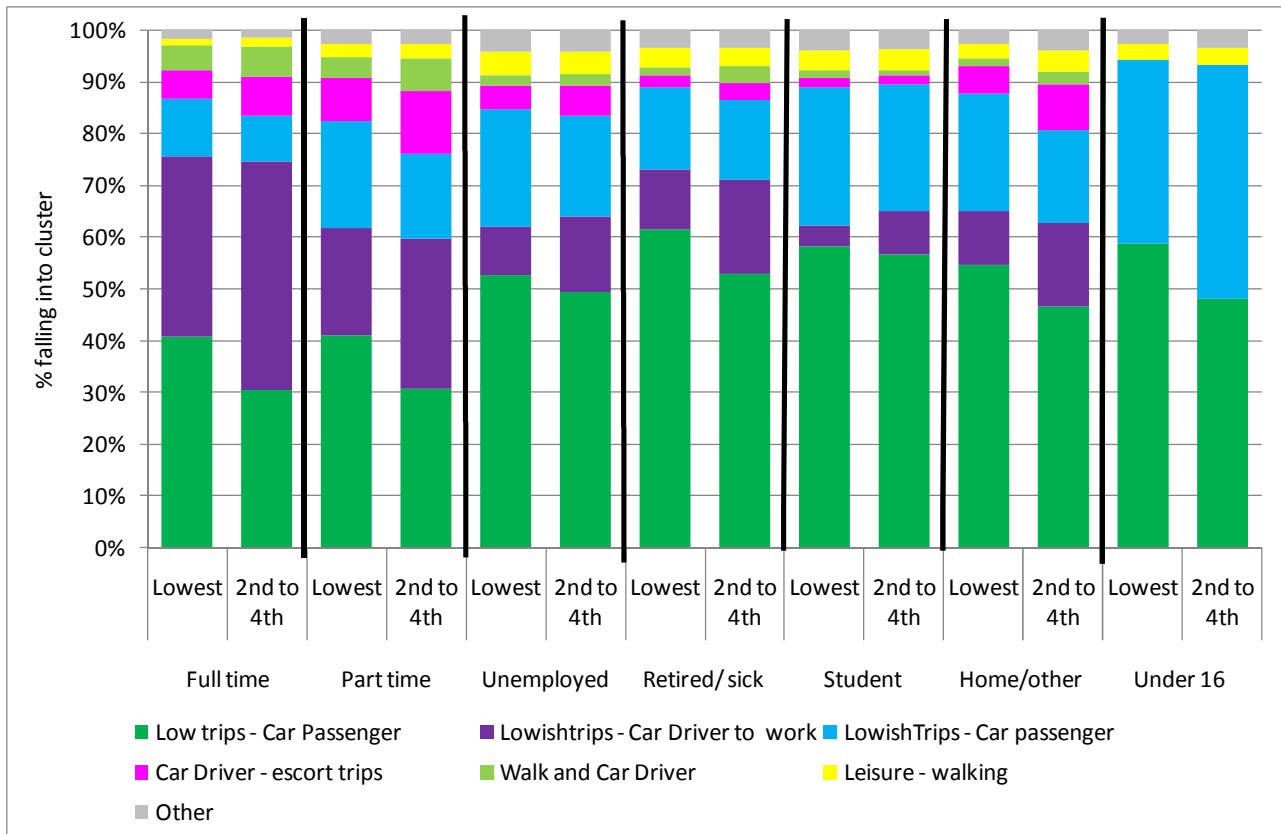


Figure 7.2 – Cluster analysis groupings for low and medium income, by economic activity

Besides looking at how these groupings are split amongst populations it is interesting to look at who makes up the bulk of these behaviour groupings. To do this a different cluster analysis was used that created 15 clusters, of which 6, contained over 1000 cases (out of 23,000 in the lowest income quintile), while the rest were grouped into “Other”.

The table below (Figure 7.3) shows the characteristics of these groups⁶, in terms of the trip characteristics, alongside the averages for the lowest income quintile, and the average for all respondents in the survey. Cells in red are where values are much higher than average for the lowest income quintile, while those in blue are where they are lower. In addition, bold type indicates a large difference from the norm for the quintile.

	Local	VLow Trips	Low-Bus	Average	High Trips	CarUser	Average Lowest Income Quintile	Average for all
Size of group	4%	37%	25%	16%	9%	5%		
Trips/yr	2273	484	845	1032	1201	1256	861	1022
Miles/yr	2708	641	2435	4945	8217	12368	4063	7115
Hours/yr	572	138	291	380	470	559	312	381
Walk	1732	268	254	212	228	213	298	239
Car Driver	159	26	151	350	540	622	214	424
Car passenger	174	87	223	274	286	300	186	230
Bus	142	73	160	128	84	56	109	65
Work	70	25	63	103	130	138	77	209
Education	74	91	104	80	60	51	87	65
Escort	642	49	103	158	202	223	124	141
Shopping	529	129	219	251	281	260	208	206
Leisure	384	42	92	136	176	207	108	144
Food shopping	293	79	115	122	127	120	109	100

Figure 7.3 – Characteristics of cluster analysis groups

The key groupings were (in the order used on graphs in Figure 7.3):

- LOCAL (4%) Very high trip rate with predominantly walking – very low distance travelled
- VLOWTRIPS (37%) A very low trip rate – quite a number of walk trips but very low rates for other modes
- LOWBUS (25%) – Lowish trip rates and low distance travelled, but high use of buses and many education trips
- AVERAGE (16%) Average trip making and distance – mixed mode and purposes
- HIGHTRIPS (9%) Slightly higher trip making and distance – mixed modes and purposes
- CARUSER (5%) Car used more than other groups – high trip rate and high distance travelled
- Others amount to 8%.

It should be noted that while the cluster analysis for all income groups also had a large “very low trip rates” group the trip making characteristics were different – the number of trips per year was 679 (compared with 484, and the distance travelled was 1349 miles compared with 641 for the

⁶ The figures shown are the ‘starting points’ for each cluster, and are roughly the average for the cluster. Due to the nature of the analysis method a person can therefore be assigned to a cluster but have trip rates that are different to those shown.

low income cluster. This is confirmed by the much higher 23% of people in the lowest income quintile who make fewer than 400 trips per year (compared with 14% for the whole population).

Figure 7.4 shows for 8 variables how the cluster groups are distributed across a number of other categorical variables.



Figure 7.4 – How cluster analysis groups are distributed among the lowest income quintile group

- The LOCAL group is relatively small and tends to be more concentrated amongst certain groups. Part time workers, the unemployed and homemakers, people aged 20-39, people without a car, in cities and smaller towns, but less in London and rural areas, in high IMD areas and those with good walk and bus access. In short they tend to be people who are able to live their lives 'locally'.
- Looking at the VERY LOWTRIPS group, they are found more amongst the young and old, those without access to cars, amongst non-white people, those in high IMD areas and those with mobility difficulties – they are found much less in rural areas.
- The LOW-BUS group are found in most area types and it seems as though they are probably not a homogenous group. While a high incidence of education trips was a characteristic they are not especially more frequent amongst students.
- Likewise, the AVERAGE group are also spread amongst different types of people and places. They are more common among drivers and in rural areas and in low IMD areas.
- The HIGHER group are found more amongst smaller settlement dwellers, working people, middle aged people.
- CARUSERS are a small group found generally amongst full time workers, in low IMD score areas, white, in rural areas and more distant from buses and food-stores. (It is no surprise that they generally have access to cars). The geographic distribution of this group implies that they are living in areas where in order to work they *need* a car.
- Finally, those who do not fit into these larger groups (the OTHER groups) include a very high proportion of company car drivers and full time workers, and tend to be found in areas with poor accessibility – rural areas, and areas with low IMD scores. Some of these groups will be ones for which the label of 'lower income' may not really apply in terms of their lifestyle and access to travel opportunities.

Summary

This cluster analysis has not provided definitive insights into the differences in behaviour between different types of lower income people, but does point to the existence of a large core of people on low incomes who make very little travel (about 37% of those in the lowest income quintile). They are predominantly young or old, and do not have access to a car. While a similar grouping is found by cluster analysis for all income groups, the group is much larger for low income households, and the level of trip making is lower than for higher income groups.

Another group notable for low incomes households is much smaller but is of people who are car users. These people are generally working. While such people in higher income groups make journeys for other purposes as well there is more likelihood that the low incomes people in this group make few non-work journeys. We may surmise that they need a car for their work, but do not have the resources to use it for much else than getting to and from work.

Section 8 – How do we measure transport poverty and transport wealth?

Transport poverty

A definition of fuel poverty has been *generally* accepted since around 2000 as being where households need to spend more than 10% of their income to keep living areas heated to 20C and other areas to 18C (Boardman, 2010). Calculations have been made (Centre for Sustainable Energy, 2003) using data on characteristics of houses, heating fuel availability and cost, and household incomes to calculate the percentage of people who suffer fuel poverty. Government programmes have used this definition to direct help to those likely to suffer fuel poverty (DECC 2011).

Similarly notions of housing affordability are commonplace usually measuring the average house price for an area divided by the average income (or 'lower quartile' housing affordability that measures the same for the lower quartile house for those on a lower quartile income).

But the same consensus does not exist for transport and a measurement of transport poverty or affordability is seldom attempted. There are a number of reasons for this but the prime difficulty relates to how we define the need for travel, which relates to the activities that a person 'needs' to carry out, and the distribution of places where they can be carried out. For some time literature has dealt with attempting to define the need for travel (e.g. Jones 1975) without any consensus having been reached. Analysis of expenditure on transport (EFS) shows that those on higher incomes spend very much more, proportionately, than those on lower incomes on transport, which points to a large element of choice on levels of expenditure. Cars are often described as a luxury item, and the status afforded to certain types of cars and other factors means that many willingly spend much more than they 'need' to on transport (e.g. Stokes, Kenny and Hallett, 1991). For fuel poverty there is a much less variation in what is spent, and much less 'status' attached to different heating systems – the definition of fuel poverty can safely assume that no one would wish to spend more than 10% of their income on heating. But Dainton (2007), analysing the Expenditure and Food Survey, showed that motoring costs could cause hardship to many lower income people.

Other recent studies looking at rural areas have identified groups where it can be assumed that expenditure on travel is more than one would reasonably expect for that income group – in both these cases it is households on low incomes in rural areas who need to spend a high proportion of the income on transport, mainly due to a lack of alternatives to the car.

Expenditure on travel was analysed for each income quintile in urban, small town and rural settlements (Commission for Rural Communities, 2010). Figure 8.1, from the report, shows that those in the lowest income quintile in urban areas spent £28 per week on travel, £32 in small towns (roughly 3000-10000 population) but £50 per week in smaller settlements. Since the average income for this group was around £170 per week at the time of analysis, this means that nearly 30% of income was being spent on transport on average. Other research in the same publication shows clearly that the extra expenditure correlates with higher levels of car ownership

amongst those in rural areas, implying that those on low incomes generally buy cars out of necessity rather than choice.

Figure 8.1 also demonstrates clearly that higher income households (in all types of area) spend much more on transport, and that there is no apparent ‘ceiling’ as one might expect with expenditure on fuel. More is spent by higher income rural households than higher income urban households, but the difference is not nearly so marked as for lower income households.

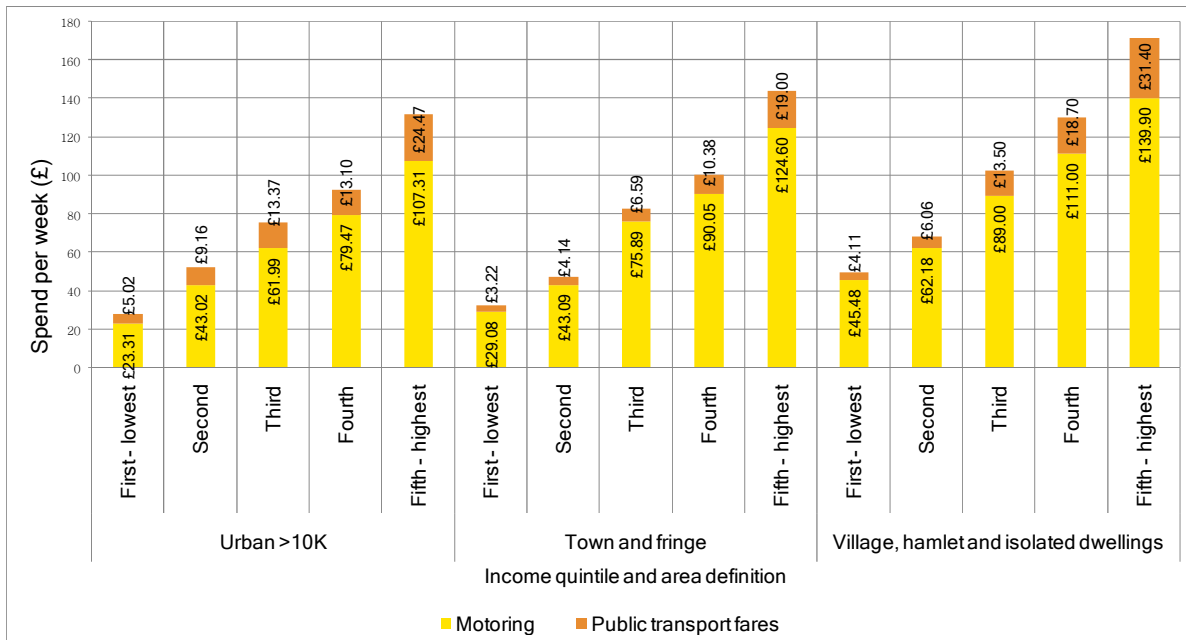


Figure 8.1 – Expenditure on transport by households in different area types, by income quintile

Research by Smith, Davis and Hirsch (2010) calculated the extra cost that rural households need to spend to maintain a standard of living regarded as acceptable using a research procedure known as “Minimum Income Standards”⁷. Residents of small towns and villages were regarded as needing to spend more, and the bulk of this extra spend was where a car was regarded as essential – to all rural residents except pensioner households in small towns. (Groups in urban areas had not regarded having a car as essential). When local costs were calculated this meant that single working adults needed to spend about £20 per week extra on transport (Figure 8.2) while a household with two parents and two children needed to spend over £50 a week more.

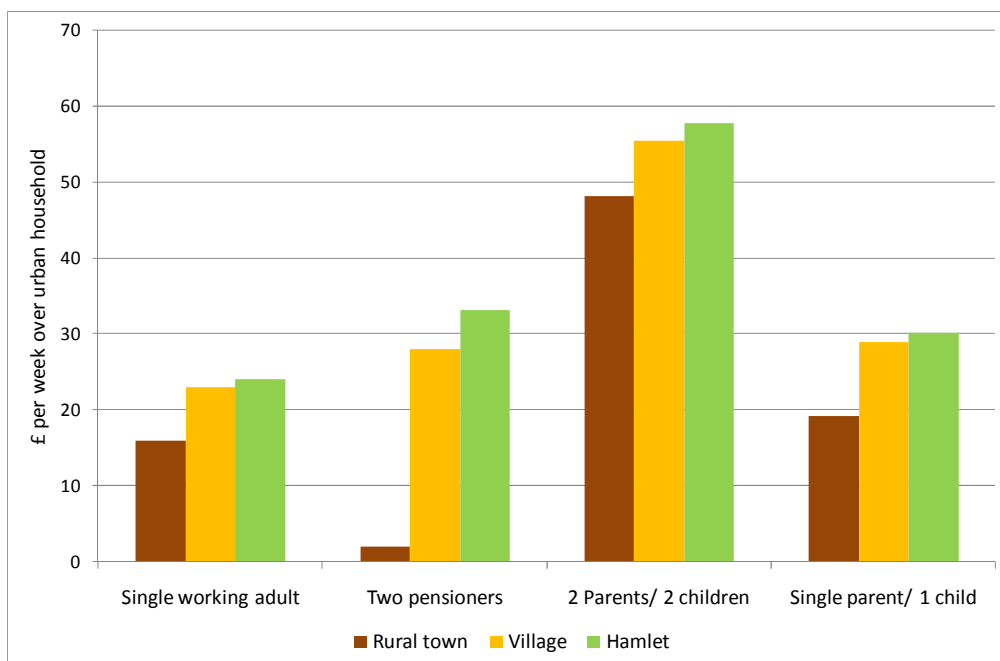


Figure 8.2 – Extra expenditure on transport required for those in rural areas

These two pieces of research both point to the existence of problems related to expenditure needed on transport for low income households, and the results, using very different approaches produce comparable results. Each specifically highlights the issue in rural areas, but the implication is that anyone on a low income who finds they need a car to fulfil their travel needs is likely to spend a high proportion of their income on travel. This points to a notion of transport poverty being a valid one, even if it difficult to define or measure.

⁷ The Minimum Income Standards approach has been developed by the Joseph Rowntree Foundation and involves asking groups of people what they feel is essential for different types of people to live a socially inclusive life. When consensus has been reached by a number of groups of people, what is considered essential is costed to give a weekly or annual expenditure, and then income. The method is described in more detail in Smith, Davies and Hirsch (2010)

Transport wealth (or mobility choice)

The notion of ‘transport wealth’ posited here is that one has greater ‘wealth’ of transport if one has access to more choices to move around – in effect this means that those who can use two or more different modes effectively have more choice (or wealth) than those who only have access to one mode. The notion is fraught with difficulties in terms of definition and measurement, but in the interests of expanding knowledge, this paper make a tentative attempt to provide some limited insight into the topic. So – what follows should not be read as a defensible argument, but as some cautiously raised issues. Of course while those on lower incomes may tend to live in areas that may be better served by public transport, that may not compensate for those who don’t have cars. And as the previous pages have shown, the cost of running a car may not compensate for having good quality cheap public transport close at hand. It’s a tricky concept.

An attempt to measure aspects of transport wealth

Access to mobility is measured here by availability of a car, bus and rail services, and services close enough to walk or cycle to. Here, we measure car access by access to a car as a driver, access to buses by a combination of walk time to bus stop and the frequency of services, rail access in a similar way, and walk access by the time taken to reach a convenience store. Having a mobility disability is taken to reduce the utility of otherwise ‘good’ access to public transport and local services.

Access to cars

Those in lower incomes and those in high IMD areas have lower rates of access to cars (Figure 8.3 below). The two graphs are similar even though the relationship between individual household incomes and the IMD score for an area (Lower level Super Output Area (LSOA) of around 1200 households) is by no means ‘perfect’ – people of differing incomes live in areas that may have quite a different average income or IMD score.

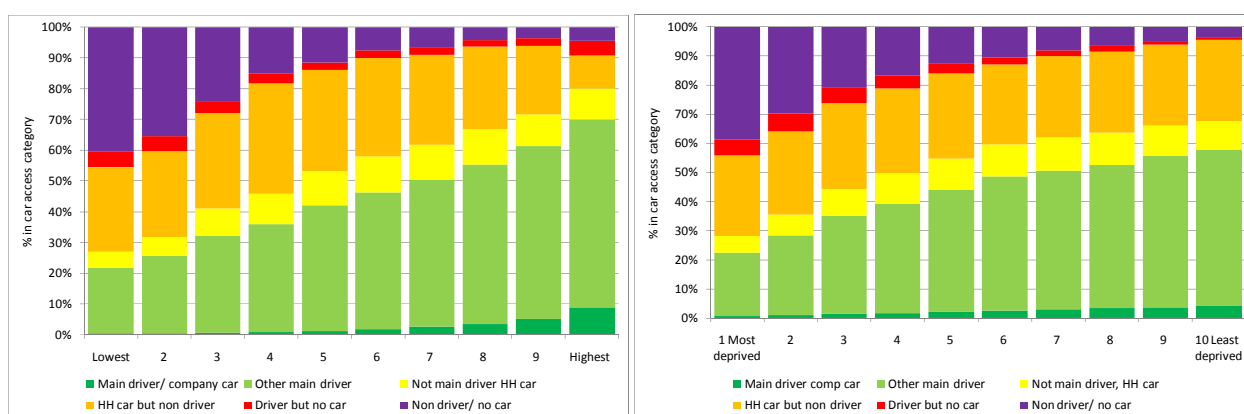


Figure 8.3 – Access to a car by income decile (left) and IMD decile (right)

Walking to local services

Walk ‘wealth’ shown by walk distance to a food-store [with those with a mobility difficulty assumed to have very poor walk access] (Figure 8.4 below) shows little difference by income group, but much more by IMD. The most deprived IMD areas tend to be closer to food-stores. This is also the case for those on lower incomes but when the percentage who have mobility difficulties are taken into account this difference disappears as more lower income people have mobility difficulties. (The limitations of using ‘access to a food-store’ as THE measure of the ‘wealth’ offered by walking as a mode of transport is recognised).

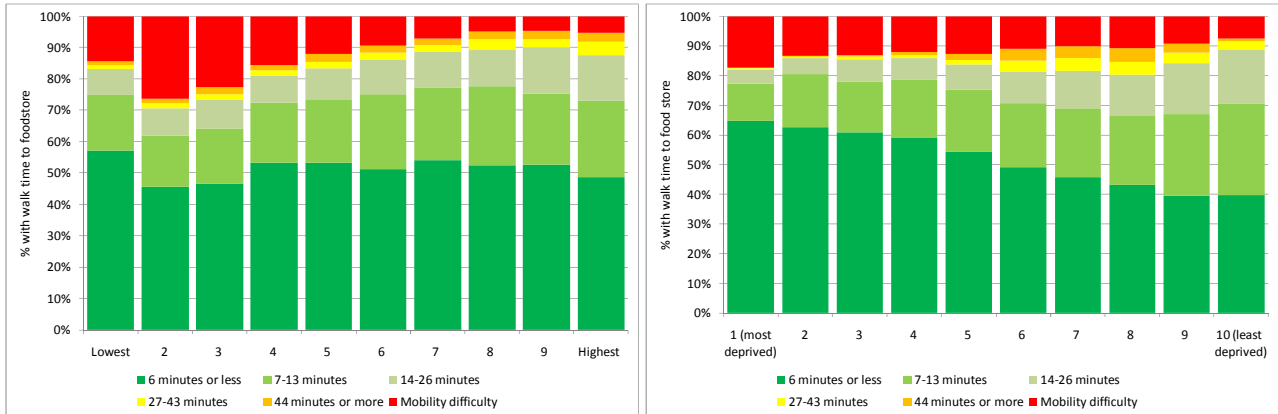


Figure 8.4 – Walk time to a foodstore by income decile (left) and IMD decile (right)

Access to public transport

Bus ‘wealth’ is measured here by combination of walk time to bus stop and service frequency, with the proportion with a mobility difficulty taken into account. In Figure 8.5 below the darker green bars show those with a 15 minute frequency service within 6 minutes walk which can be regarded as equating to a ‘turn up an go’ bus service. The light green is for a 30 minute or better service within 6 minutes walk, which can be regarded as a reasonable service if one plans one’s journeys. As with walk access, there is a much greater effect for IMD than for household income with the most deprived areas having better bus services. Those in the lowest income decile are most likely to have ‘good’ bus service levels. Here, cost of public transport is the issue rather than availability.

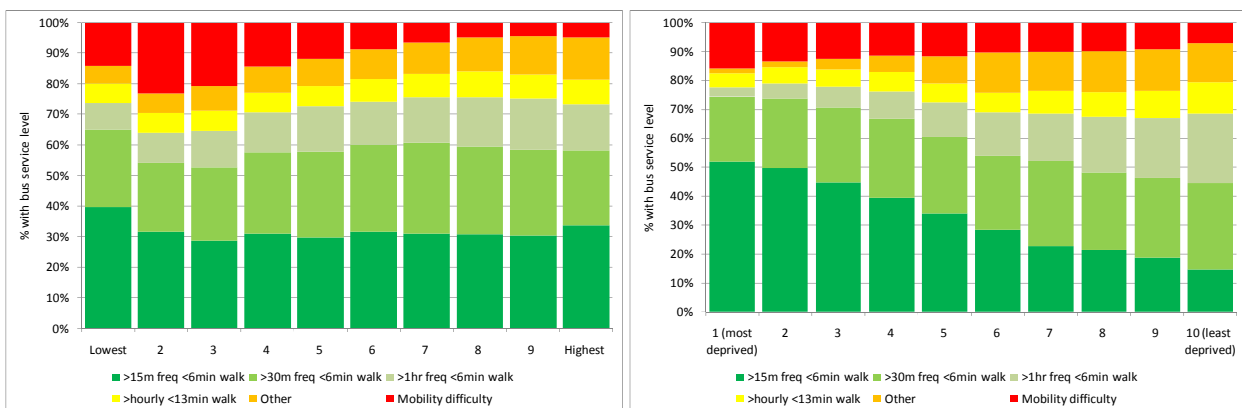


Figure 8.5 – Bus service level by income decile (left) and IMD decile (right)

The above analysis does seem to conflict with the notion that areas with a high IMD are often in areas poorly served by bus and without local facilities. To test this further, the same analysis was conducted with London excluded (since London generally has higher levels of bus services). There seemed to be no discernible difference to the graphs for all areas – the same was true when metropolitan areas were also excluded. Unfortunately the National Travel Survey does not include a variable that can distinguish the type of area of residence within urban areas (e.g. central or suburban), so no further tests can be made.

The pattern for rail (which is measured in a similar way) in Figure 8.6, shows a different pattern to that for buses, with access rising with income (although the lowest quintile shows better access too). For IMD, access falls with lower IMD scores, but then rises again for the areas with the lowest scores.

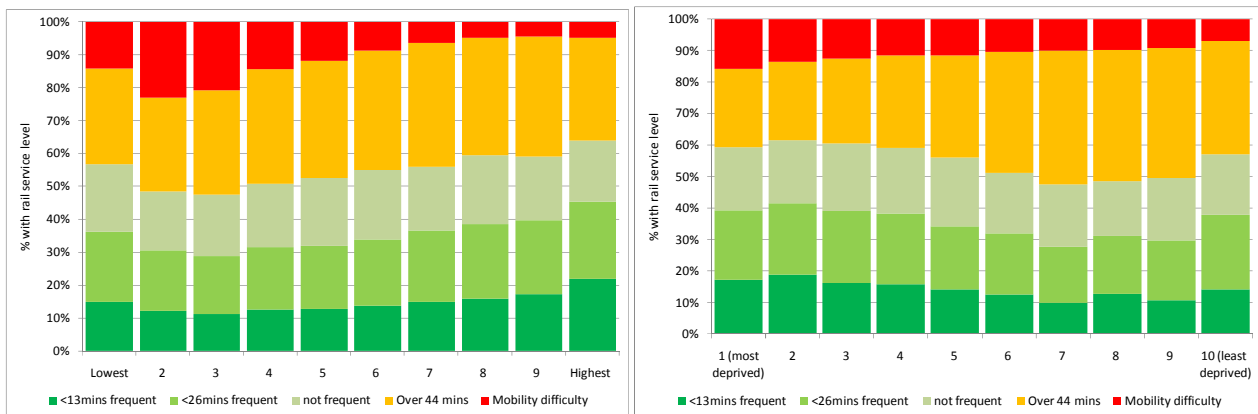


Figure 8.6 – Rail service level by income decile (left) and IMD decile (right)

An indicator of transport wealth?

In order to assess the degree to which people have access to a choice of modes, a simple indicator was created, whereby having access to a car as a main driver, being within 13 minutes walk of a food store (and not having a mobility difficulty), and having a 15 minute bus service frequency within a 6 minute walk (and no mobility difficulty) were each given a score of 1. Figure 8.7 shows that the scores were lower in lower income quintiles, with 35% having no mode at the assessed level, compared to 15% in the highest group. But the proportion with a choice of all three modes was small for any income group.

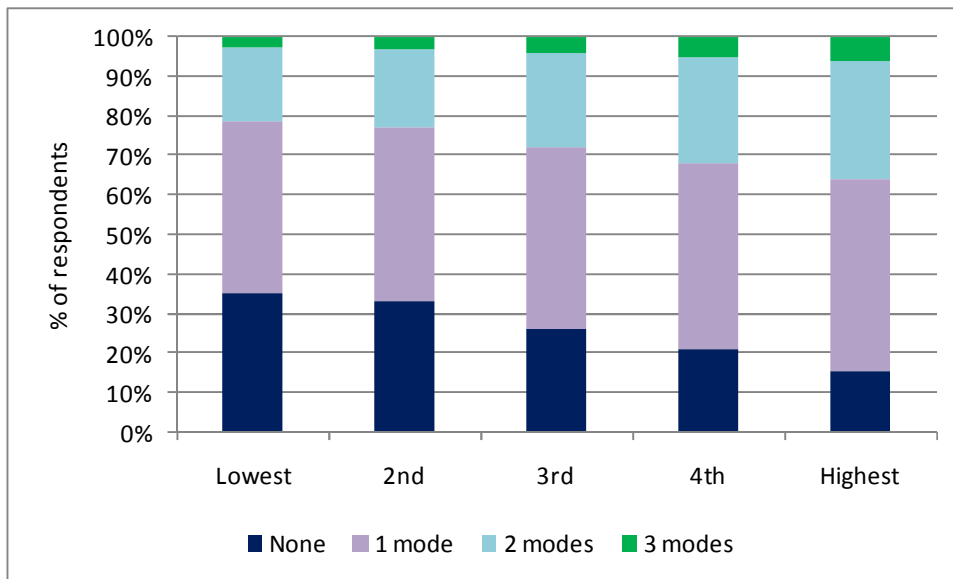


Figure 8.7 – Very simple transport wealth indicator by income quintile

Since a car is generally considered to provide more mobility and accessibility than walking or public transport, the same exercise was done again but giving the main drivers of a car 60% of the weighting and the bus and walk access groups 20% each.

This means that different mode combinations can be ascertained as shown in Figure 8.8. The groups for all three, and none remains the same as in Figure 8.7, but it can be seen that more in the lower income groups have bus or walk as a single option and somewhat more have bus and walk as their options.

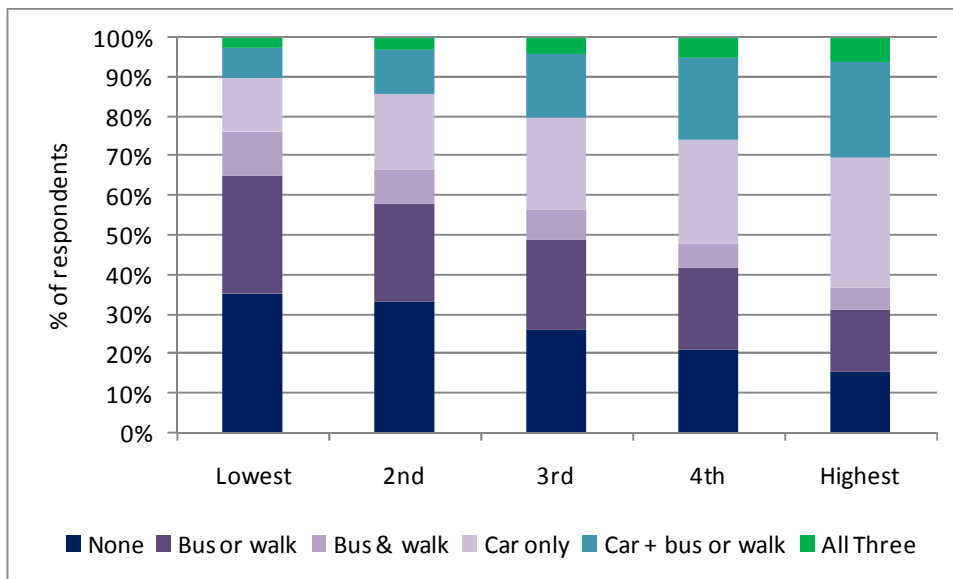


Figure 8.8 – A not quite so simple indicator of transport wealth by income quintile

While Figure 8.7 and 8.8 give some insight into the distribution of what we might call transport wealth it is debatable that they add much more to knowledge than the previous analyses implied.

In order for the concept to be of any practical value it would need to assess far more clearly the benefits offered by different modes in different geographic, social and economic situations. The National Travel Survey was clearly never intended to be able to fulfil such a role, and in depth survey work would be required to create a usable indicator.

At what income is a car a burden rather than a benefit?

The graphs for car access would seem to assume that having a car implies transport wealth, but for those on a low income a car is expensive. If one has a car because there are no alternatives rather than because it is a utility that is affordable, this can be taken to be negative transport wealth. But it is obviously difficult to decide who has a car because they want one, rather than because they feel 'forced' to use one. To provide some insight, Figure 8.9 shows whether or not a single adult household has a car by income bands (for the relevant year from 2002-2008). While some of those with an income of less that £6000 per year have one (about 20-30%), and although it is not until an income of about £20,000 that a 'saturation' level of about 80% is reached, it does seem that at under £10,000 per year car ownership is very much lower, which implies £10,000 may be crudely taken as an income below which one might avoid having one on the grounds of cost. When analysed for pensioner households and for adults of working age the results were very similar.

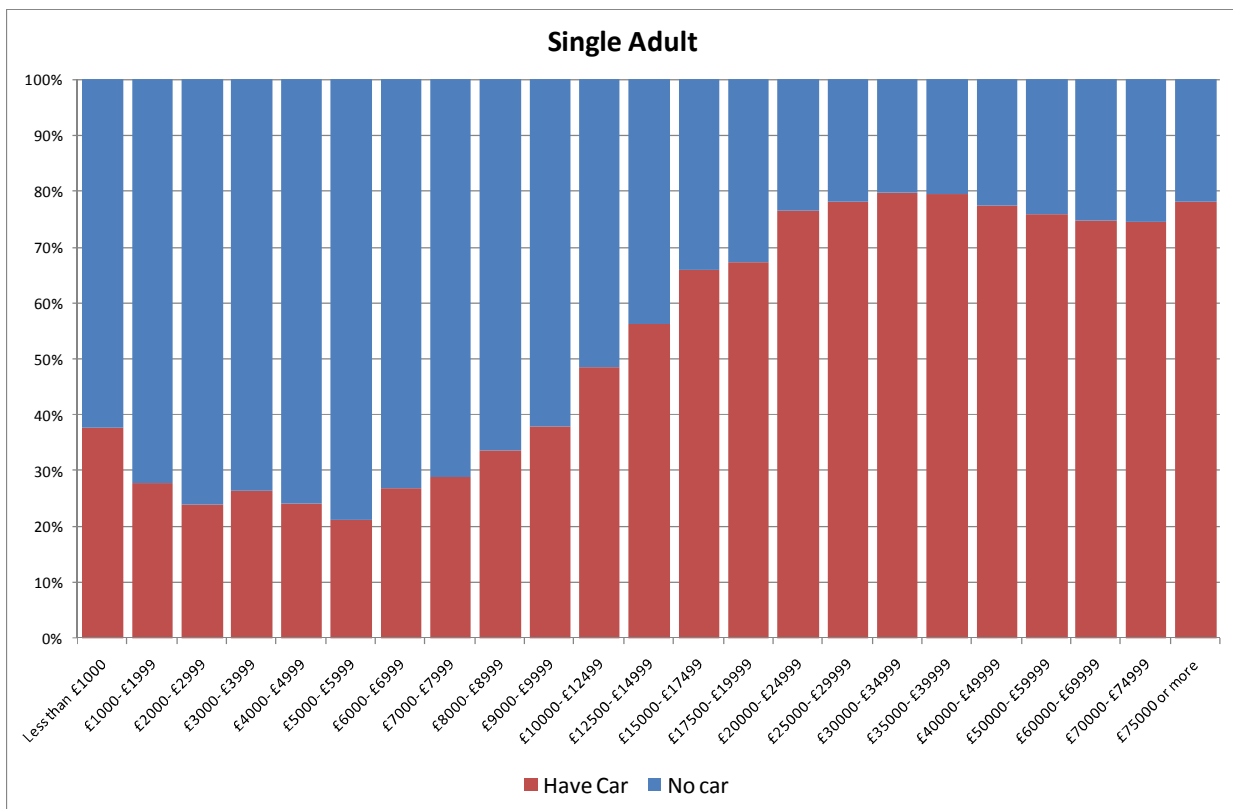


Figure 8.9 – Car availability by income for single adult households

Similar patterns are also found for other household types. The level of car ownership may be higher for households with children but the threshold remains (Figure 8.10).

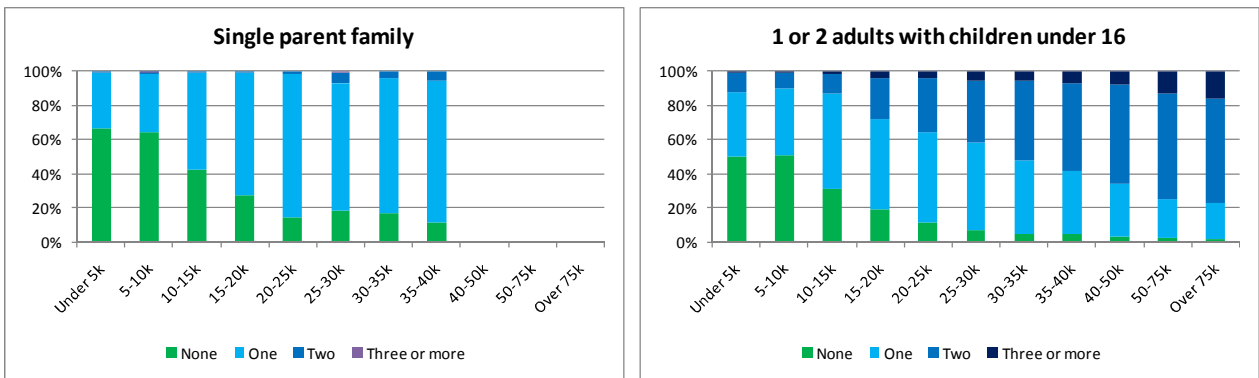


Figure 8.10 – Likelihood of having a car available by income group (adults with children)

We can, maybe, postulate that there is a threshold household income below which car ownership (where it occurs) is more of a necessity than a ‘luxury’, and that for data between 2002 and 2008 this was around £10,000 per year.

The extent to which a car is not owned is affected by access to other transport services as well as by income. The charts below show how bus and rail service level and walk access relate to car ownership. Especially for those in the lowest income quintile those with good bus service levels, have lower levels of car ownership (Figure 8.11), with 50% of those in the lowest income quintile with a 15 minute or better frequency service with 6 minutes walk having a car compared to 80% of those with worse than an hourly service further than 13 minutes walk. (Note that car availability for those with a mobility difficulty is lower than for those with good bus services).

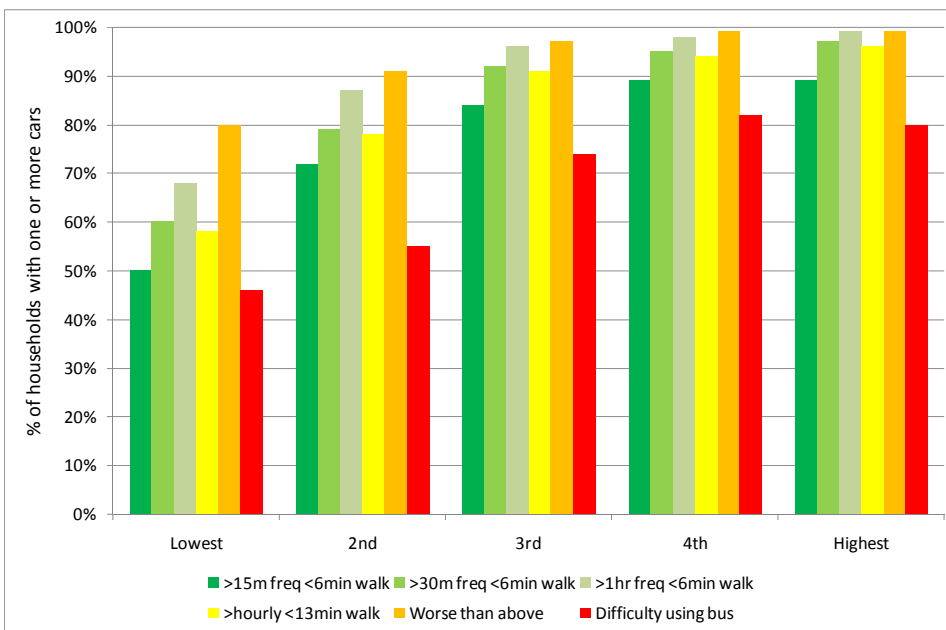


Figure 8.11 – Percentage of households with one or more cars by bus service level and income quintile

Walking accessibility (as indicated by walk time to a food store) shows a similar pattern though slightly less marked for the categories available (Figure 8.12).

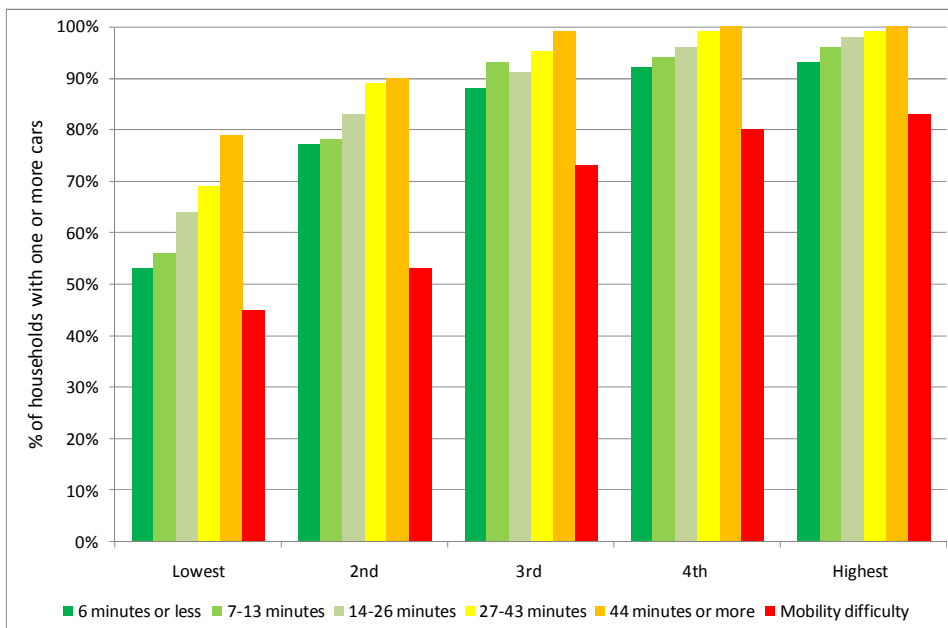


Figure 8.12 – Percentage of households with one or more cars by walk time to foodstore and income quintile

Even for car availability by rail service level there is a difference, though this is very much less marked and is not shown here. It is likely that the apparent effect of access to a rail service is due to cross-correlation with bus and walk service level, and other factors. There is also likely to be some cross correlation between bus and walk service level and other factors such as economic activity that would affect car ownership.

Summary

‘Transport poverty’ remains a difficult concept to define and measure, but the evidence appears to point to there being an issue of constraint upon mobility, or of using a disproportionate percentage of income to travel, for some people on low incomes.

While for house heating fuel one can measure income, the cost of fuel and the relative costliness of heating a house and come to an agreed criteria for fuel poverty, the large differences in travel ‘need’ mean that we cannot make such a judgement for transport in terms of the amount of mobility required.

The concept of ‘transport wealth’ has some validity in that people on all incomes (but especially those on lower incomes) may not feel the need for a car if they have accessibility by other modes. But much more detailed research than is possible from secondary data sources would be needed to operationalise either transport poverty or transport wealth.

Section 9 – Conclusions

The relationship between travel behaviour and poverty is, on the face of it, very apparent. Low income people, on average, travel less than those on higher incomes and they are much less likely to have access to cars. But, due to travel not being an economic 'good' that can be simply assessed as being one where 'more is better' and to other observations discovered through analysis, it is not so straightforward.

In a sense one could say it is high income that has a stronger influence on creating 'extra' travel behaviour than low income (in most cases) has on reducing travel, in that extra mileages and trips by higher income people appears greater than the lack of travel by those on low incomes. Travel poverty is difficult to 'pin down', but there is evidence that poorer people in rural areas suffer through reliance on cars when they have difficulty affording them. And there is evidence that other combinations of 'poverty', 'disadvantage' and 'exclusion' can act together to limit mobility.

Patterns of travel behaviour vary within income groups as well as between income groups. In any income groups there are people who do not travel very much and seem more reliant on others for the travel they do. Factors such as age and disability correlate with this, but there is a much larger proportion of the low income groups who display such a pattern.

This paper does not include enough analysis to identify specific aspects of behaviour that can identify people who suffer from 'travel poverty' but the results do point to a situation where policy research should address the issue.

One way forward would be to construct matrices of 'need' for accessibility to services (as described by economic activity, stage in family life cycle etc), levels of service provision, and travel availability, combined with the cost that the mobility judged to be necessary would imply. Given the inconclusiveness of discussions on travel need so far, it seems unlikely that agreement would be simple.

While the above approach is based on the notion of travel as a derived demand (where one travels in order to do something else at the destination) another approach would be to view each opportunity for mobility as a 'choice option' and the more available, the more 'transport wealth' one has. A very crude attempt was made to look into this approach in this paper, with the conclusion that this too is complex, and would be difficult to define to a level which would be practicable and accepted.

It seems we are left with a situation where it is apparent that a minority of people have a difficulty with transport that we can loosely define as transport poverty, but that our evidence for it does not lend itself to easy measurement. To further the debate there would seem to be two options:

- An consensual approach such as that used in Minimum Income Standards could be adopted to gain agreement on what constitutes travel poverty, or
- it may be more useful to provide transport researchers and practitioners with more knowledge about the issues and keep measurement of it simple, than to try to provide a complete picture.

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Annex One – Use of the National Travel Survey

The National Travel Survey

The National Travel Survey is a large scale household based survey which asks questions about the characteristics and travel behaviour of households and the individuals within the household. It also includes questions on vehicles available to the household, and includes a week long travel diary, and a three week diary for long distance journeys. It is conducted in England, Scotland and Wales.

The first survey was in 1965, and was followed by periodic surveys from 1975/6 onwards. Since 1988 it has run as a continuous survey, and in 2002 the sample size was increased from about 3,500 households (or about 8,000 individuals) to 9000 households (or about 20,000 individuals) per year.

Further information on the survey and reports can be found at:

<http://www.dft.gov.uk/pgr/statistics/datatablespublications/nts/>

The UK Data Archive data sets

The UK Data Archive (UKDA) maintains data collected by the National Travel Survey, while the service of providing this data is provided by the Economic and Social Data Service (ESDS) which is a jointly-funded initiative sponsored by the Economic and Social Research Council (ESRC) and the Joint Information Systems Committee (JISC). Further information on the UK data archive is available at <http://www.data-archive.ac.uk> and on the ESDS at <http://www.esds.ac.uk>.

This paper is primarily based on analysis of the UK Data Archive version of the National Travel Survey, focussing on the 2002 to 2008 data set. For Section 5 the 1995 to 2001 data set was also used.

Extra Variables provided by Department for Transport

The publicly available datasets are limited to those variables which are felt to be of most value to researchers, and avoids variables from which any person might be identifiable, or for which it is known that there are issues where misinterpretation could easily happen. Such data includes self reported variables such as accurate income, and origin and destinations for journeys. These variables can be made available to researchers who understand the issues involved.

For this analysis extra variables were provided, including more accurate data on ages, incomes and the Index of Multiple Deprivation.

Weighting of variables and sample sizes

In recent years (and especially since minor changes in methodology introduced in 2002) DfT staff have worked to provide weighting for data which overcomes issues relating to different sampling rates amongst different groups of the population, both for those who answer the household and individual questionnaires and those who complete the travel diary. In addition, the seven day

travel diary has always only recorded walking trips of less than one mile on the seventh day of the travel diary, and weighting has been needed to enable accurate comparisons of walk with other modes of travel. This weighting means that comparison of travel for years within each dataset is taken to be robust, and comparison between the 1995 to 2001 and 2002 to 2008 datasets is fairly robust.

The increase in sample size from 2002 means that basic analyses are now generally quoted by DfT on an annual basis allowing trends to be monitored more closely than before. But since this paper carries out more in-depth analyses than the sample would allow for on an annual basis all the analysis (except for trend data shown in Section 5) has been conducted for the entire 2002 to 2008 data set – or 152,000 individuals. This is a very large sample, but when data is broken down by income groups, types of area, and other variables using this large sample was felt to be more reliable than using one year at a time. To maintain comparison between analyses the whole period was chosen for all analyses where this was possible.

Income Equivalisation and income quintiles

Much analysis uses the notion of *income quintiles*. An income quintile is one fifth of the households, grouped as to which fifth (from lowest to highest income) they fall into. So the lowest income quintile is the fifth of households with the lowest incomes. As the concept was developed in relation to relative poverty and is concerned with households it is important to distinguish large households from small ones in a way that reflects their likely expenditure needs. So weighting is applied to household income based on the numbers and ages of household members. Two methods are commonly used – the “OECD” method which is relatively simple and the “McClements” method which is more complex and which the NTS uses. Further details of the McClement method can be found in the document labelled “S4” at

<http://www.ons.gov.uk/about-statistics/harmonisation/secondary-concepts-and-questions/index.html>

Household members are given scores as follows.

- First adult (head) 0.61
- Spouse/partner of head 0.39
- Other second adult 0.46
- Third adult 0.42
- Subsequent adults 0.36
- Dependent aged 0-1 0.09
- Dependent aged 2-4 0.18
- Dependent aged 5-7 0.21
- Dependent aged 8-10 0.23
- Dependent aged 11-12 0.25
- Dependent aged 13-15 0.27
- Dependent aged 16+ 0.36

It should be noted that since the 1995 to 2001 data set did not include an income quintile variable incomes for both datasets were equivalised using the income data made available (£1000 pound steps up to £10,000 per year, followed by larger categories up to £75,000), and a new income quintile variable made up which was used for comparisons over time in Section 5. In addition this method was used to create an income decile (tenths of income) which was used in Section 8. For all other analyses the DfT provided quintiles were used.

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