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MOTоring Along:

The lives of cars seen through licensing and test data

Dr Sally Cairns, Professor Jillian Anable,
Dr Tim Chatterton, Professor Eddie Wilson
and Dr Craig Morton

November 2017

The Royal Automobile Club Foundation for Motoring Ltd is a transport policy and research organisation which explores the economic, mobility, safety and environmental issues relating to roads and their users. The Foundation publishes independent and authoritative research with which it promotes informed debate and advocates policy in the interest of the responsible motorist.

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Disclaimer

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List of Abbreviations

CO_2	carbon dioxide
DECC	Department of Energy & Climate Change
DVLA	Driver and Vehicle Licensing Agency
DVSA	Driver and Vehicle Standards Agency
LSOA	Lower Layer Super Output Area
MSOA	Middle Layer Super Output Area
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NTS	National Travel Survey
PM	particulate matter
STATS19	national database of police-reported injury road collisions in Great Britain

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1. Introduction

For the past few years, the authors of this report have applied their expertise in transport studies, mathematical modelling, emissions analytics, statistics and geography to undertake innovative analysis of a dataset consisting of all registered light-duty vehicles in Great Britain and their annual mileages. Box 1 explains how this dataset has been created from two different sources to provide a unique information resource. It comprises a database of over 30 million vehicles in any given year. Statistical analysis of this database at the *vehicle* level allows for exploration of relationships between a large number of vehicle characteristics such as age, body type, changes in keepership, registered location and levels of vehicle usage – all of which was previously impossible. The dynamics of the car fleet can also be examined longitudinally, and monitored on an ongoing basis as the data comes on stream each year.

In this report, we focus on analysis at the *area* level for one year: 2011. The data allows vehicles and their annual mileages to be attributed to the location of the registered keeper. When linked with other data about each local area such as the economic and demographic profiles, the availability of public transport, collision rates and even the weather, it is possible to generate original insights about the distribution of cars, motorcycles, vans and other light duty vehicles, and about how the fleet and its usage varies across the country.

In these uncertain times of changing vehicle purchasing patterns, possible shifts in attitudes to travel and in actual travel behaviour amongst younger generations, and the rapid growth in van traffic, this work has the potential to contribute to many policy and business objectives.

Box 1: The MOT project dataset (the 'MOT dataset')

The MOT dataset used in this report is derived from two sources:

1. **The MOT records**: these are collected by the Driver and Vehicle Standards Agency (DVSA) during the annual inspection tests for all light-duty vehicles (up to 3.5 tonnes) of at least three years old in Great Britain, and since 2005/6 have been computerised. Data is organised by *test*, and includes details of the nature of the vehicle (date of first registration, make, model, colour, body type, fuel type and engine size), an odometer mileage reading and details of the test (date, test station location and test results).[1]

2. **The vehicle licensing data:** this is collected by the Driver and Vehicle Licensing Agency (DVLA) and is organised by *vehicle*; it includes details of all vehicles licensed in Great Britain over time. Unlike the MOT records (where test dates are vehicle-dependent), data is reported at regular, quarterly intervals. For this research, key details provided (which are not available from the MOT records) include the location of the *registered vehicle keeper* and an indication of whether the vehicle is in personal or company 'ownership'[2] (based on the title of the registered keeper). There are also a number of other key vehicle attributes available in this data, including emission factors, tax class, size and mass (albeit some characteristics have only been captured for vehicles joining the vehicle fleet from 2002 onwards). All of these variables are available from the date of first registration, meaning that each vehicle can be followed even before it has its first MOT test. For most light-duty vehicles, the first MOT test is when the vehicle is three years old.

In this report, we offer a selection of some of the topic areas we have investigated in our research to date. Whilst there is significant technical detail behind the generation of the MOT dataset and many of the additional variables that we have linked with it from sources such as the Census, we concentrate here on some key findings and why we believe these are novel and important. Technical details are saved for the final section of this report and in the further publications from the research team, which are detailed in the references section.

1 There are related tables providing more details of test failures, although those have not been used in this project. Computerised storage of this information was introduced in 2005, with full implementation by April 2006. Public release of anonymised data began in 2010. Some vehicle types appear in the table when they are younger than three years, depending on the frequency of required MOT testing.

2 Where we use the term 'ownership' from this point onwards in the report, we do so tentatively because, in fact, no database exists of true vehicle ownership. The DVLA data captures the registration of vehicle 'keepers', even though in reality this may not be the person or company who paid for the vehicle or uses it the most. Other data, such as the Census and the National Travel Survey, use questions which are worded to ascertain how many cars people have *access* to on a regular basis. Again, this is not the same as ownership.

Here are some key details about the MOT dataset to bear in mind in the following sections:

- A core analytical task has involved the generation of estimates of the mileage travelled by each vehicle for each quarter, including creating interpolated mileages for each vehicle's first three years,[3] with procedures explained in Wilson et al., 2013a and 2013b.
- As well as the manufacturer emissions values of carbon dioxide (CO_2), nitrogen oxides (NO_x) and particulate matter (PM) for individual vehicles, a separate set of values, based on best available data for the UK from a range of sources, were developed and attached to each vehicle, together with figures for fuel economy, energy use and annual fuel costs[4]. Procedures are outlined in Chatterton et al, 2015.
- In this report we focus mostly on cars in private ownership in the year 2011.[5] The DVLA body type definitions that have been primarily used to categorise vehicles are given in Table 1.

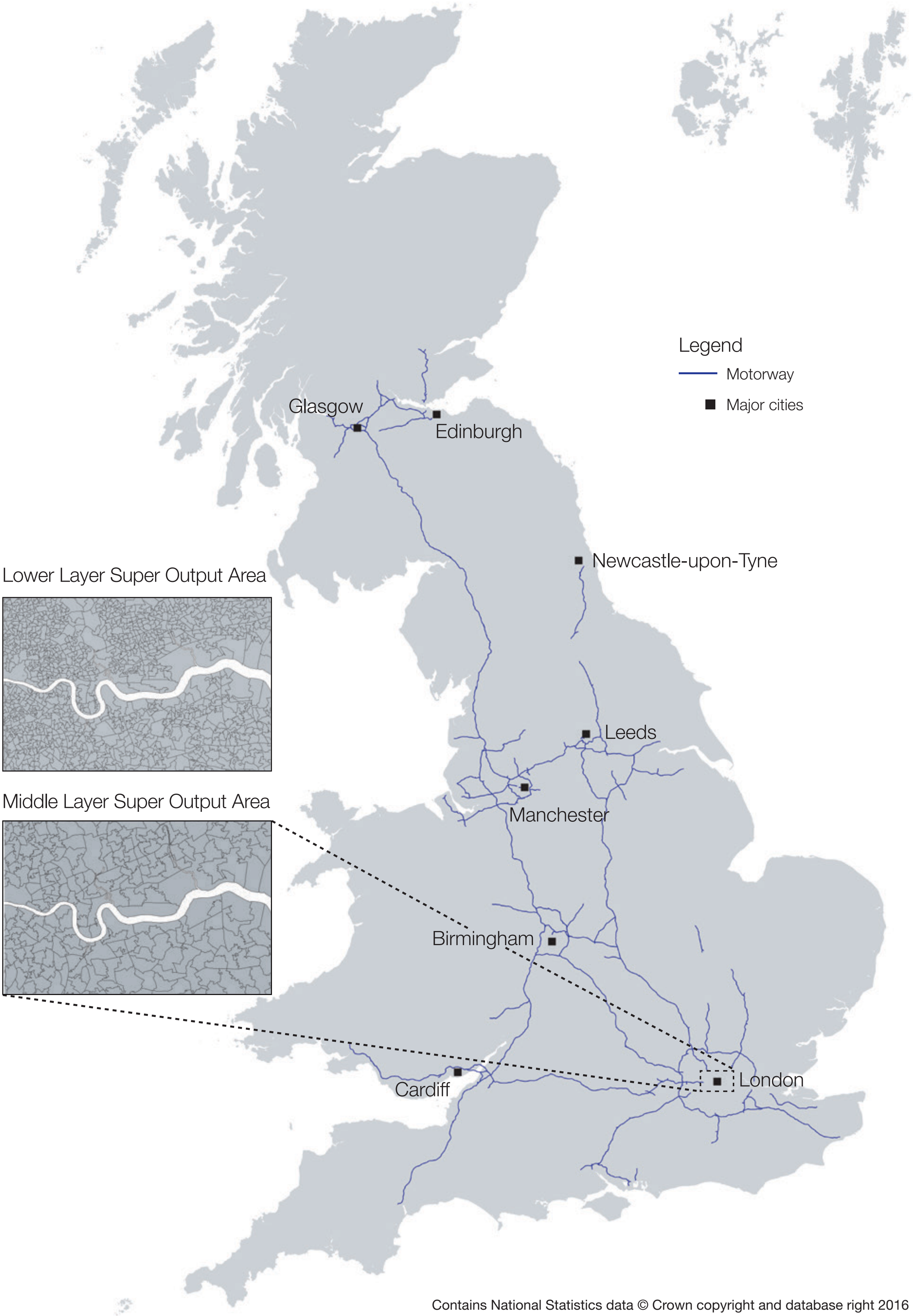
Table 1: Details of how vehicles are classified by body type

Cars: Four-wheeled vehicles including people carriers and all passenger carrying vehicles that can carry no more than eight passengers (excluding the driver). Private hire taxis that are car-based are included. Hackney carriages are in the 'Other vehicles' group.
Motorcycles: Two-wheeled vehicles powered by an engine. Scooters and mopeds are included.
Light goods vehicles (LGVs[6])/ light vans: Four-wheeled vehicles constructed for transporting goods, with a gross weight of 3.5 tonnes or less.
Buses and coaches: includes minibuses (which can carry no more than 16 passengers) and all other passenger carrying vehicles with nine seats or more (excluding the driver's seat).
Other vehicles: All vehicles not mentioned above, including rear diggers, lift trucks, rollers, ambulances, hackney carriages, three-wheelers, tricycles and agricultural vehicles.

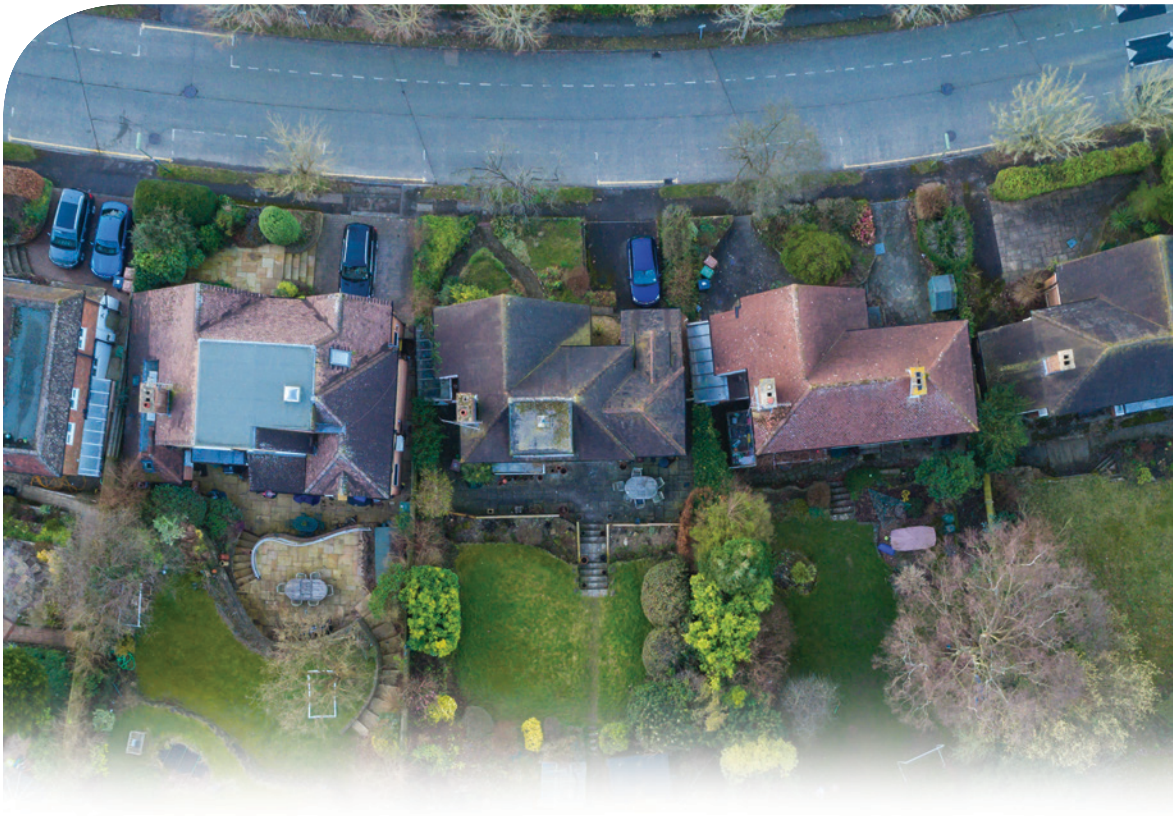
Source: Department for Transport (2017) Vehicle licensing statistics: notes and definitions (v09-17), DfT, London.
Note: Body type relates to the physical construction of the vehicle, and does not take account of the way in which it is currently being used.

3 Currently, estimates of mileage for vehicles of less than three years old are made by assuming that mileages increase linearly from zero miles at first registration to the mileage observed when the vehicle takes its first MOT test. This is a simplistic assumption that could be refined with further research into how vehicle usage typically varies within the first three years.
4 These values had only been added to the Version 8 dataset, at the time of preparing this report. See the final section for details of the different dataset versions.
5 The year 2011 has been used as the analysis year because of the synergy with the 2011 Census, and because all vehicles registered in 2011 will have appeared in the MOT test records by 2014, thereby ensuring that mileage values can be attributed to all vehicles.
6 Light goods vehicles are also known as light commercial vehicles (regardless of ownership). In this report, we use the DVLA terminology.

Figure 1: Reference map of Great Britain



2. Interpreting the Data Maps in this Report



On page 4, a reference map of Great Britain (Figure 1) is given to help with understanding the data maps throughout this document.

As explained previously, a vital element of the MOT dataset is the opportunity it affords to examine the detailed composition of the vehicle fleet in combination with the level of usage in particular local areas. The registered keeper determines the location associated with the vehicle, and we attribute the mileage of each vehicle to where the keeper is registered (i.e. the originator of the trips) even though not all of the mileage will have been carried out in that specific place. Other data about these local areas can then be used to attempt to explain the variations in ownership and use that are evident from place to place.

In this report, we have chosen to illustrate the significant breadth and depth of the MOT dataset by presenting a series of maps of Great Britain (or sometimes, where linked data was more limited in coverage, of only England and Wales) for a series of topic areas and key findings.

Here are some details about how most of the data maps have been created:

- Average values[7] for each areal unit have been calculated. These values have then been divided into ten equal size groups (deciles), which have been used for the map displays.
- Most of the maps in this report present average data for small geographical areas known as 'Lower Layer Super Output Areas' (LSOAs), as defined for the 2011 Census.[8] In England and Wales, there are 34,753 of these areas. They have been designed to be relatively similar in population size, containing 1,000–3,000 people, or 400–1,200 households, and to represent people with relatively similar characteristics. In Scotland, the equivalent unit is the Data Zone, of which there are 6,976, with a population of 500–1,000 residents.
- For the road safety information, data is presented at 'Middle Layer Super Output Area' (MSOA) level, which are conglomerations of LSOAs, with 5,000–15,000 people, or 2,000–6,000 households. There are 7,201 MSOAs in England and Wales. In Scotland, the equivalent unit is the Intermediate Zone, with 2,500–6,000 household residents. There are 1,279 Intermediate Zones.
- In some cases, the dominant factor explaining differences in local vehicle fleet characteristics or use might be population density or degree of rurality. In this case, the maps can look somewhat monocolour because rural areas cover much more land area of the country compared to the population they contain. To correct for this, cartograms can be used, in which the areal units are distorted to represent the size of the population rather than the land area. An example is Figure 11 on page 26.
- In addition, supplementary data from the official vehicle registration statistics has been used, to clarify trends over time.

7 In almost all cases, mean rather than median average values are used.
8 www.ons.gov.uk/ons/guide-method/geography/beginner-s-guide/census/super-output-areas--soas-/index.html; www.scotlandscensus.gov.uk/variables-classification/sns-data-zone-2011

3. Private Car Ownership in Great Britain

The distribution of private cars across the country in 2011, displayed as the number of cars registered per 1,000 people (of all ages), is shown in Figure 2. The resulting pattern is well known: the fewest cars per capita are seen in urban and metropolitan areas of the country, while especially high numbers of cars relative to the population are seen in areas of the South East, South West and the Midlands. This per-population display of car ownership also reveals, perhaps surprisingly, that the density of cars relative to the population is comparatively low in many of the most rural areas of Scotland and Wales.

The ability to display figures relating to the number of cars 'owned' at an area level is not unique to the MOT dataset. We display this here primarily as it is an important formative step to much of the subsequent analysis. In Table 2, we compare and contrast the estimates of the number of private cars in use available from the Census, the vehicle licensing statistics held by the Driver and Vehicle Licensing Agency (DVLA), and the MOT project dataset. The substantial differences between the numbers relates to the way in which they have been defined.

Figure 2: Levels of private car ownership

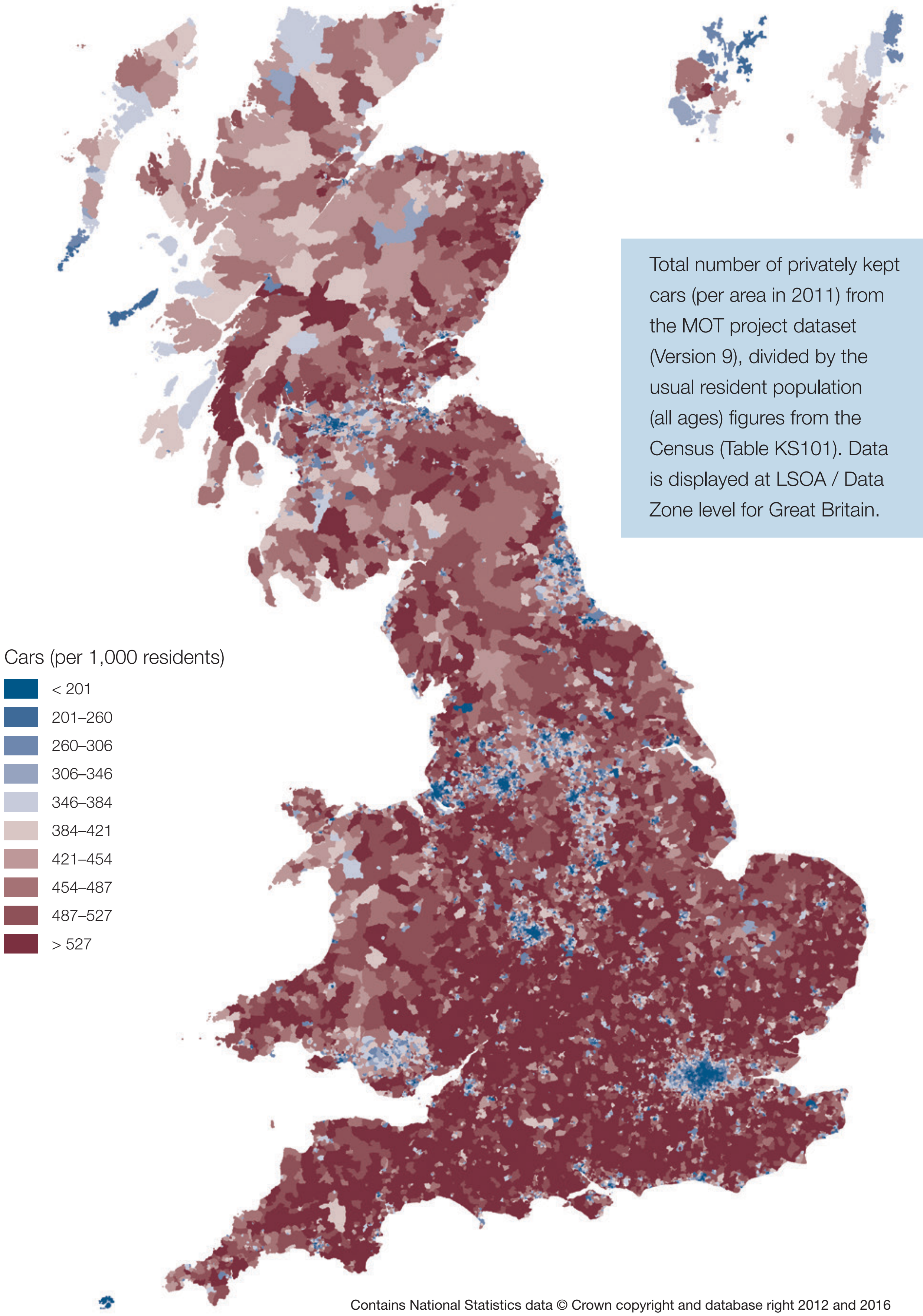


Table 2: Estimates of the number of cars available for personal use in Great Britain in 2011

Data source	Definition	Number
2011 Census	Number of cars/vans owned or available for use, by household members (including company vehicles available for private use) – from Census table KS404 and KS404SC (the latter being for Scotland)	**29,770,032**
DVLA	Number of privately registered cars as of 31 December 2011 (using the body type definition of cars) – from Vehicle Licensing Statistics table VEH0202[9]	**25,528,596**
MOT project dataset (Version 9)	Privately registered cars licensed on 31st December 2010, with a British keeper address and with a calculable annual mileage for 2011 – i.e. excluding cars only used for part of 2011 (Version 9 dataset[10])	**22,909,764**

Whilst other sources of car ownership data exist, the MOT dataset allows:

- **A fine spatial analysis:** the number of cars recorded in any one local area is comprehensive, in contrast to sampled datasets such as the National Travel Survey (NTS) which are unusable at this scale.
- **Car ownership and car use to be examined in combination:** the ability to attribute an annual mileage to a car is very powerful. Whereas Census data does provide a comprehensive estimate of the number of cars available to households at a fine geographical scale, and some information about the journey to work, it does not include any measure of total car use or detail about individual vehicle characteristics.
- **A focus specifically on private car ownership:** the distinction between company and private car ownership can be muddled in other datasets. The Census asks people to include all vehicles available for household use. Instead, the MOT dataset draws on the DVLA coding of vehicles as personal or company based on the title of the vehicle's registered keeper (e.g. Mr/Ms versus Ltd.). In 2011, DVLA data (table VEH0202[11]) indicated that 90% of licensed British cars were privately owned.

Note that in the future, the MOT dataset will also allow longitudinal analysis. In this report, for context, we have supplemented our reporting of the 2011 MOT data with DVLA registration data about changes over time in the British vehicle fleet.

9 DfT Cars *(VEH02)*, table VEH0202, https://www.gov.uk/government/statistical-data-sets/veh02-licensed-cars
10 345 cars with a calculated mileage of >55,000 miles per year have also been excluded.
11 DfT *Cars (VEH02)*, table VEH0202, https://www.gov.uk/government/statistical-data-sets/veh02-licensed-cars

4. Understanding Car Mileage

According to national estimates of road traffic,[12] motor vehicle traffic grew by 4% between 2006 and 2016. However, there was a distinctive geographical difference, in that traffic on motorways and rural roads increased, whilst traffic in urban areas reduced. A key strength of the MOT dataset is that it provides a way of looking at vehicle usage and characteristics on the basis of where the vehicle keeper lives, rather than where traffic is observed. This makes it possible to attribute mileage and associated externalities to those responsible for the vehicle travel. It also provides local authority policy makers with knowledge about their local vehicle fleets, which may be helpful when targeting local policies.

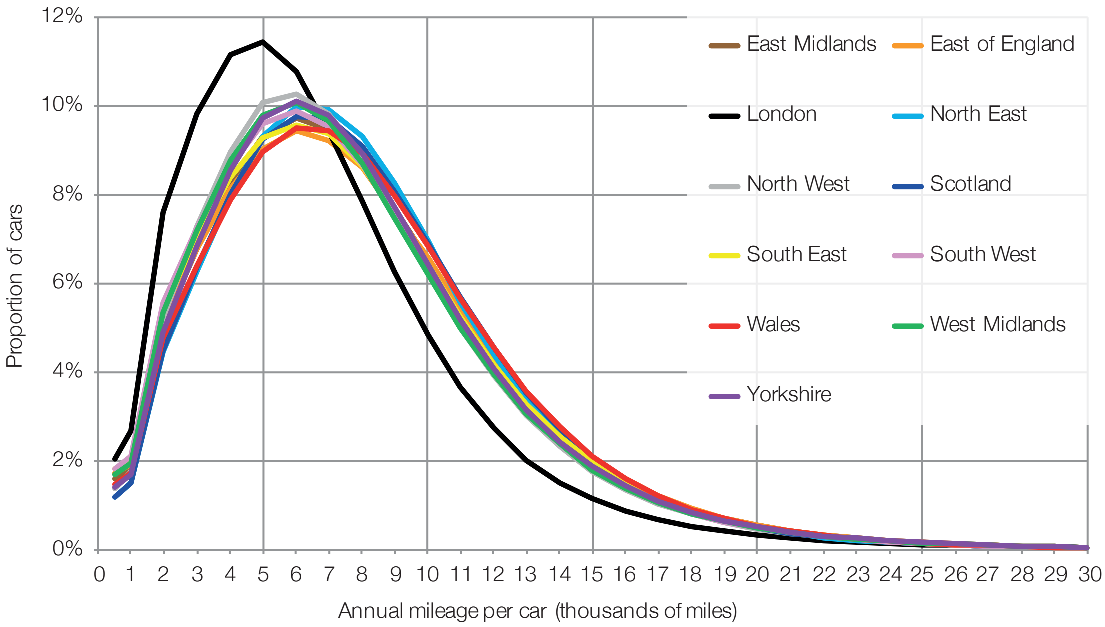
On page 12 (Figure 4), average mileages *per vehicle* (in contrast to *per person* in Figure 6) undertaken in private cars are displayed. As with the map of car ownership (Figure 2), the pattern reflects an urban/rural split. This time, however, the 'urban area effect' extends out much further – note, for example, the lower levels of per-vehicle private car usage around London, extending down to the south coast. One potential explanation is that mileage is spread across a larger number of cars per household.

In contrast to examining differences in average mileages *between* areas, Figure 3 shows how individual private car mileages vary *within* any given area.

12 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/611304/annual-road-traffic-estimates-2016.pdf

One of the significant findings is that, although the within-area variation increases as the spatial scale reduces (from, say, local authority district to MSOA or LSOA), the shapes of the mileage distributions are typically fairly similar – i.e. similar proportions of cars in each area carry out the same annual mileage. On average, 34% of privately registered cars travel less than 5,000 miles per year; 52% travel between 5,000 and less than 12,000 miles per year; and 14% travel 12,000 miles per year or more.

Figure 3: Private car mileage distributions in the British regions[13]



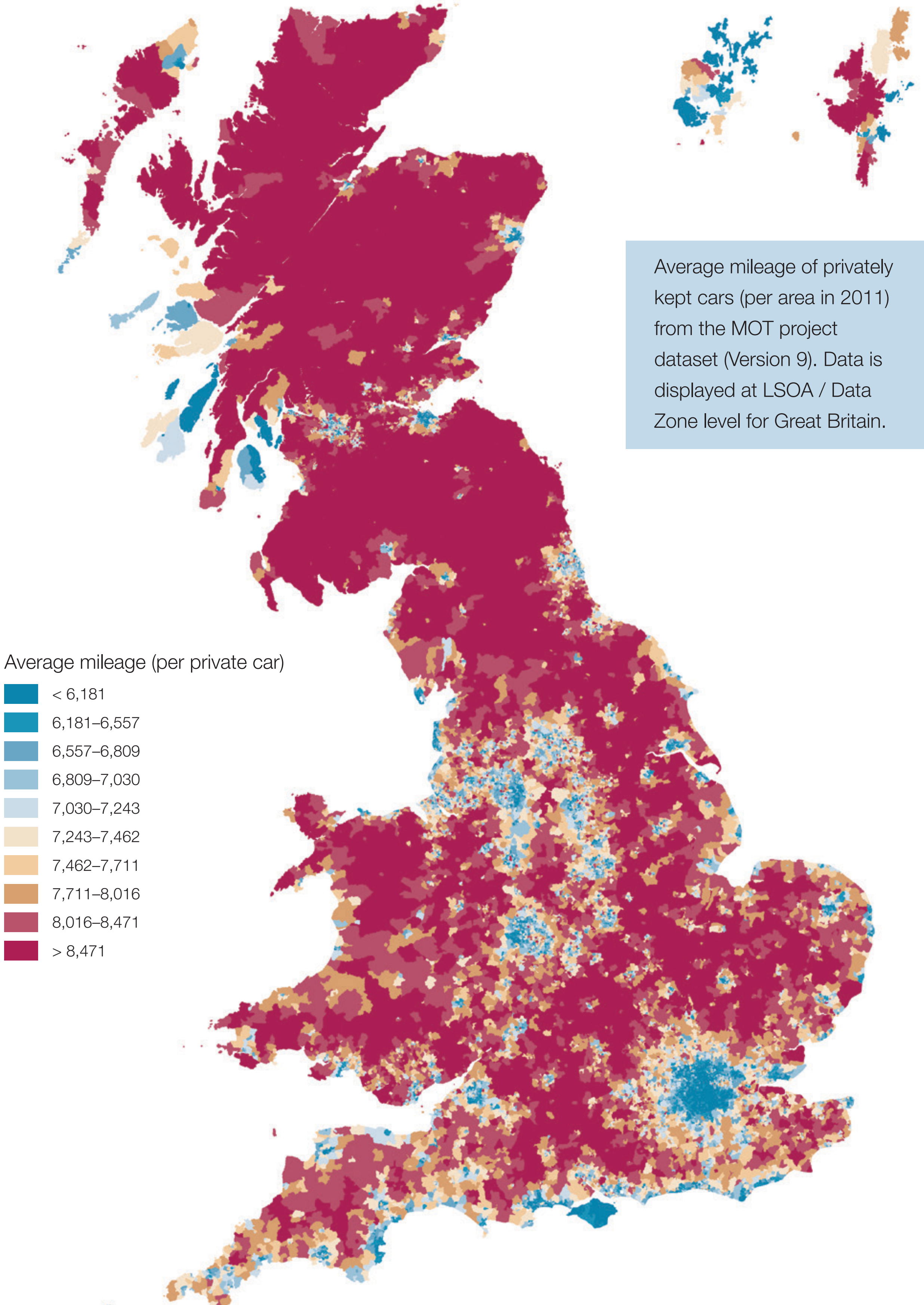
Basis on which region is chosen	Value in chosen region
Highest average mileage per private car	7,757 miles p.a.
Lowest average mileage per private car	6,428 miles p.a.
Highest proportion of private cars doing more than 12,000 miles a year	16%
Lowest proportion of private cars doing more than 12,000 miles a year	10%

Source: MOT project dataset (Version 8); Ball et al., 2016a, 2016b

In further research, we will investigate these mileage patterns across time and space. Whilst datasets such as the national road traffic estimates and the National Travel Survey can reveal trends relating to broad categories of vehicles and types of road or area, the MOT dataset allows a much finer-grained analysis. For instance, it is possible to investigate whether older cars are being used more than they used to be, and how this pattern varies across the country; whether cars are being held longer between keepers; whether turnover of the fleet is faster or slower in some areas than others; the migration patterns of cars across the country; the diffusion of plug-in electric vehicles and their usage over the first few years of their life compared to other powertrains – to name but a few possibilities.

13 Figure 4 data generated from the Version 8 dataset, using privately registered Class 4/4A vehicles as a proxy for cars.

Figure 4: Average mileage per private car



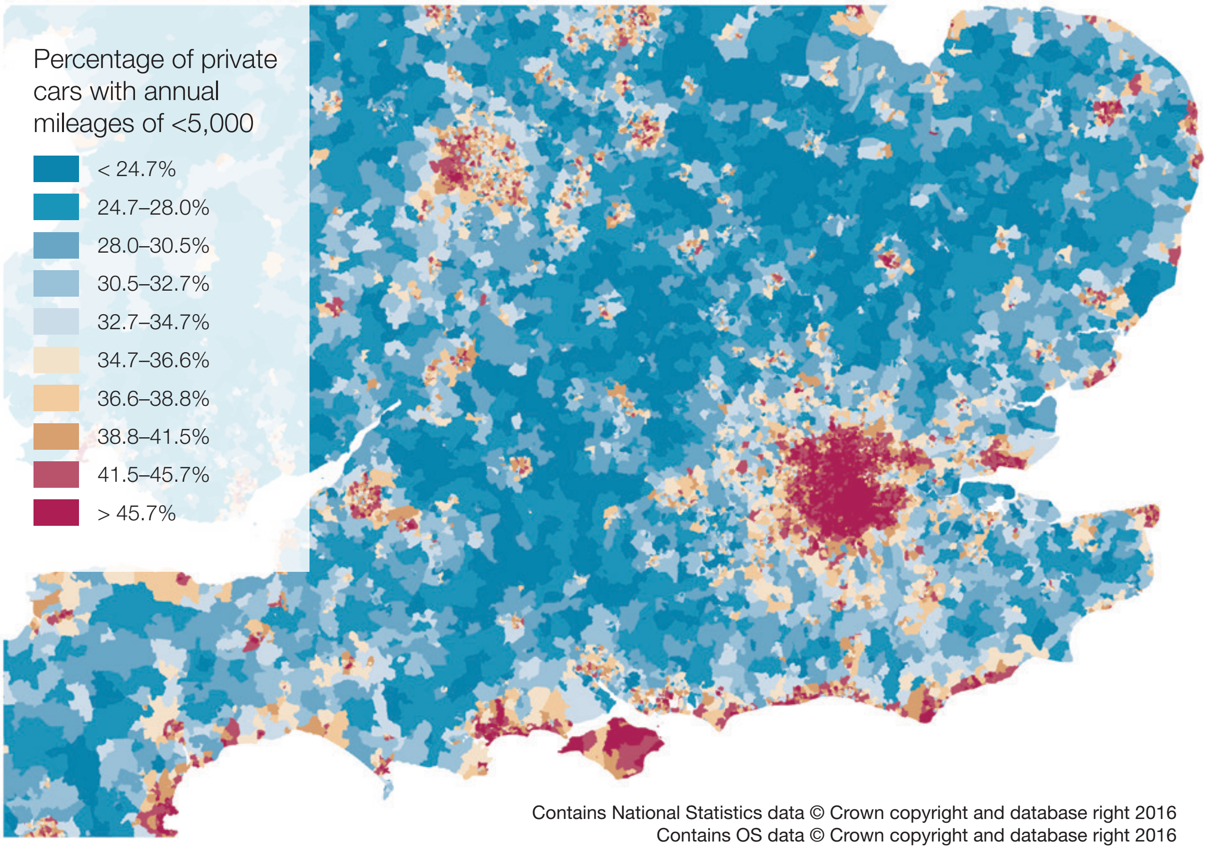
5. Looking at Mileage in Different Ways

One of the challenges when it comes to understanding vehicle use is deciding on the appropriate unit of measurement, as different units can give different impressions of where vehicle use is relatively high or low. For example, Figure 4 has shown average mileage *per car*. Meanwhile, Figure 5 shows the proportion of cars travelling less than 5,000 miles per year only, whilst Figure 6 gives private car mileage *per person*.

Comparing the part of the country shown in Figure 5 on all three maps, it is notable how the size and shape of London, and the differentiation of the southern coastal towns, changes. The area west of London around Oxfordshire and towards Somerset exhibits high car mileage per car as well as per person (Figure 6). Places outside this corridor, such as the area to the south of London towards the coast, would appear to be populated by people with high per-capita car mileage on average, but who use each car less intensively. In other areas, such as many coastal towns, individual cars are also used less on average, but here this is coupled with lower individual car mileage. Underlying factors associated with this variation include the number of cars per household, the age, wealth and employment of residents, differences in the built environment and other transport options, and a range of other factors, all of which are yet to be investigated in depth.

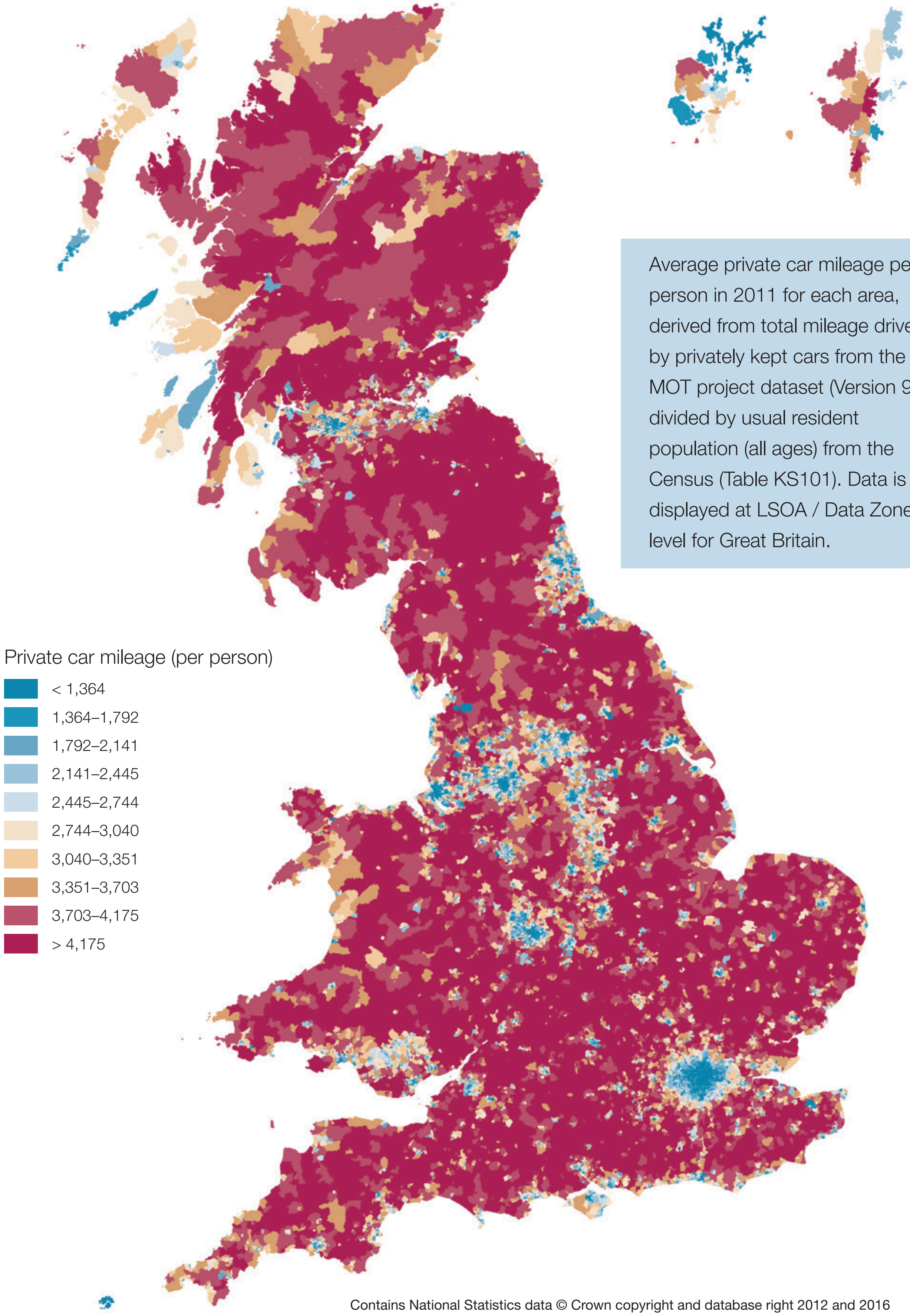
Understanding the interplay between car ownership and use is important for various policy agendas, including congestion and emissions reduction. For example, encouraging greater utilisation of individual vehicles could accelerate the rate at which they wear out and are replaced, thus bringing new and more efficient vehicle technologies into use more quickly. These patterns, explanatory factors and longer-term dynamics can all be investigated with the MOT data. There is also the ability to apportion the mileages, or subsets of it (such as high-mileage vehicles), across all people, all adults, only those with a driving licence, per household or per car owning household – depending on the topic of interest and the policy target.

Figure 5: Share of private cars travelling less than 5,000 miles per year



Data for the percentage of cars in private ownership that were travelling less than 5,000 miles per year (per area in 2011) from the MOT project dataset (Version 9). Data for this part of the country is displayed at LSOA level – based on deciles which were calculated using the full dataset for Great Britain.

Figure 6: Private car mileage per person (all ages)



Average private car mileage per person in 2011 for each area, derived from total mileage driven by privately kept cars from the MOT project dataset (Version 9), divided by usual resident population (all ages) from the Census (Table KS101). Data is displayed at LSOA / Data Zone level for Great Britain.

6. Car Age

According to vehicle licensing data[14], in 2011 the average age of a car was 7.5 years. Nearly 20% of cars were less than three years old, whilst about 10% were aged 13 years or over. Figure 8 shows how the age of vehicles has varied over time. By 2016, the average age had increased to eight years, with a greater share of both new and old cars.

Cars in private ownership are, on average, double the age of those in company ownership. The MOT dataset suggests, in 2011, an average age of eight years for privately-registered cars, compared to four years for cars with company keepers. Although at any one time, less than 10% of cars on the road are classified as in company ownership, each year just over half of new cars sold are registered to company keepers. Trends in the types of cars being adopted by commercial entities, their utilisation rate and the speed with which they change hands are vital determinants of fleet composition and emissions, and can be uniquely tracked through this dataset. They are also a key determinant of the subsequent private vehicle fleet.

Figure 7 shows an interesting pattern in terms of the average age of the private car fleet across different areas and regions of the country. The average age of cars is younger in the north of the country, and older in North and Central Wales, the South West and the East of the country.

In further research, we will investigate the underlying causes of the observed age patterns. To date, they appear to be significantly different to other patterns of vehicle characteristics, and attempts to model and predict car age using other social, geographic and economic characteristics of areas have been able to explain only some of the geographical variation so far. Other factors, such as the ratio of new to second-hand cars and the proximity of major car plants, also need to be explored.

Figure 7: Average age of private cars

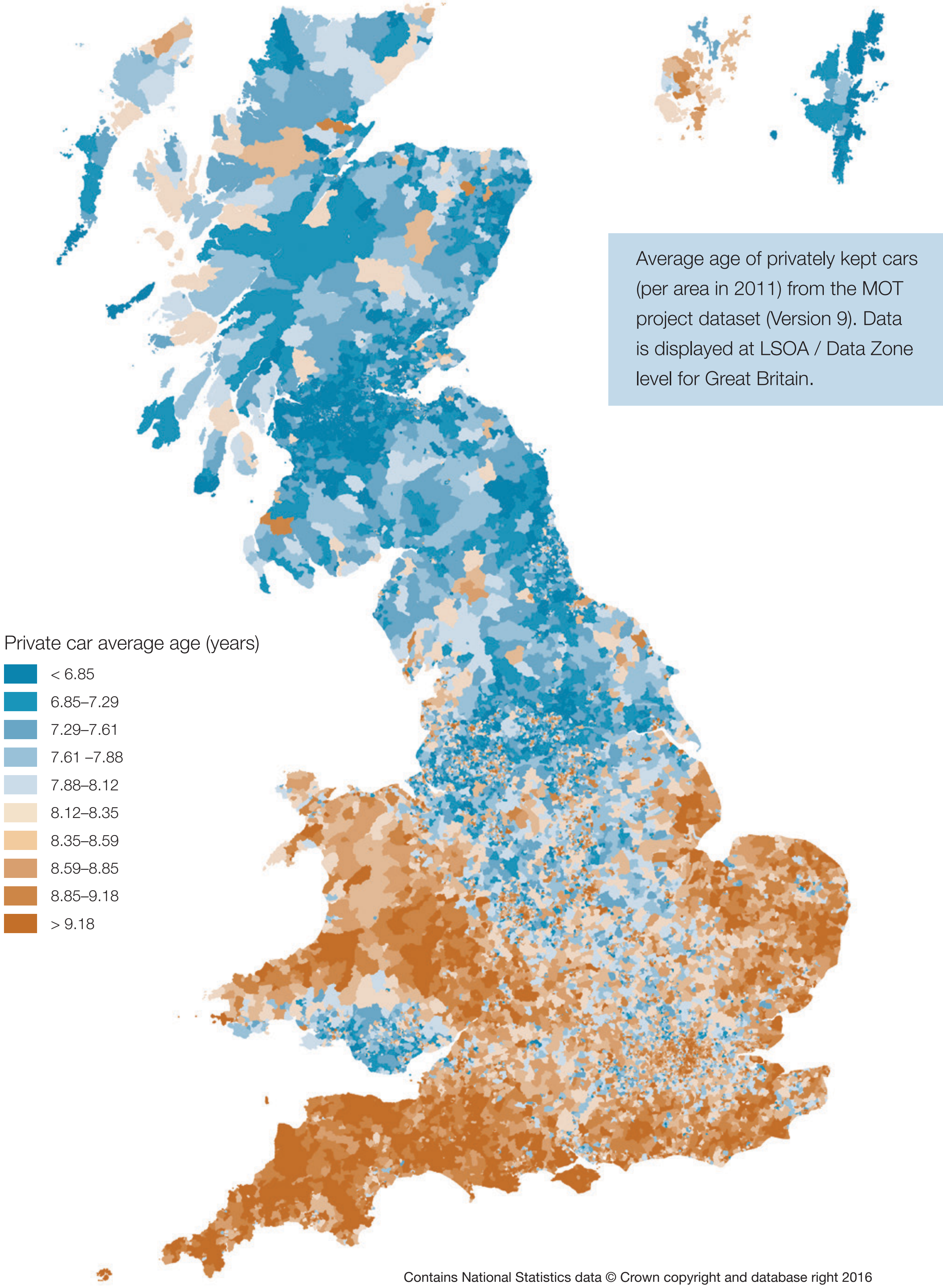
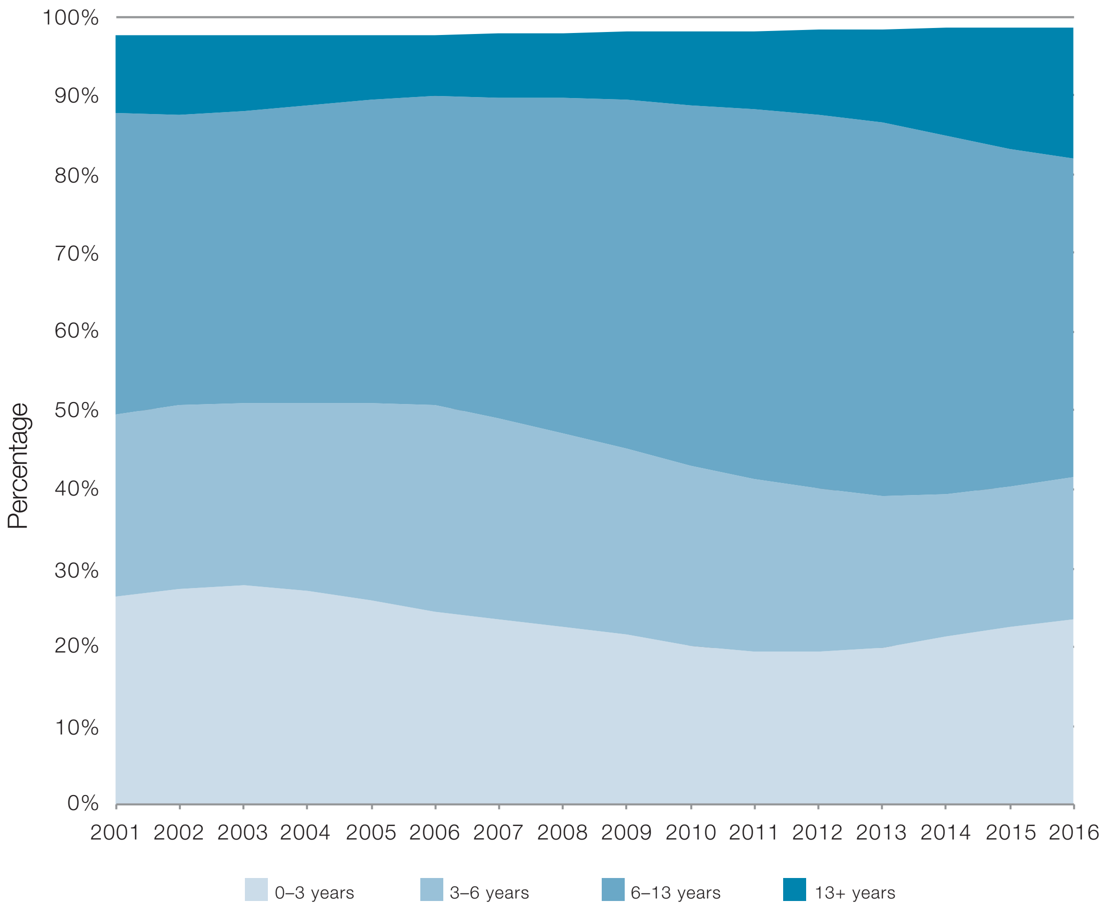


Figure 8: Variation in the age of all licensed cars in Great Britain over time



Source: Vehicle Licensing Statistics (2017) table VEH0207[14]

14 We have taken data from Vehicle Licensing Statistics (2017) table VEH0207 (DfT Cars (*VEH02*), table VEH0202, https://www.gov.uk/government/statistical-data-sets/veh02-licensed-cars) here in order to look further back in time than the MOT data allows. In any one year, typically between 1.4% and 2.4% of vehicles do not have a known first registration date, either because they are imported, or because they predate 1973.

7. How Mileage Varies with Car Age

We have used the MOT data to examine the relationship between car age and use. As other data, such as that found in the NTS, has revealed, private cars are typically driven fewer miles annually as they get older, with mileage dropping off steadily after their first five years. The MOT data allows a robust comparison to be made of the relationship between age and usage of private and company vehicles.[15] As shown in Table 3, analysis indicates that the average annual mileage of a 13+ year old private car is around half of that of one aged three years or less, and the annual mileage of company vehicles remains higher than private vehicles for the whole of their first decade. This is important because forecasts of car emissions rely on an understanding of both the rate of renewal of the fleet as well as the amount they are used across their lifetime. This requires a longitudinal analysis to examine whether, for instance, cars are tending to be kept on the road for longer than they used to be, and whether there is a difference between vehicle technologies with respect to their usage levels in later years.

15 It should be noted that we do not know the exact annual usage profile of cars in each of the years leading up to the first MOT test, so these have been interpolated from the first mileage reading.

We ran analyses on a variety of relationships between age, use and registered-keeper location and found that, although there is a strong geographical pattern to vehicle age (as shown in Figure 7), this does not result in a corresponding mileage pattern – i.e. where younger cars are overrepresented, this does not necessarily correspond to higher mileages, despite the fact that higher mileages are usually associated with younger cars. Instead, levels of use of private cars of similar ages appear to be closely linked to the local patterns of where car use is high and low more generally. Vehicles of less than three years old showed the greatest tendency to vary across space with respect to the age/use relationship, with the urban/rural low/high mileage distinction becoming slightly blurred for this young-car group when compared to a consideration of all car ages together (i.e. the pattern shown in Figure 4). However, the differences were small. This is corroborated by specific analysis of the average age of private cars in different locations. In 2011, the youngest cars were found in minor conurbations (where the average age was 8.0 years), whilst the oldest were found in villages in dispersed settings (8.6 years) – a difference of only 0.6 years (in average age), and less than 10%.

In summary, therefore, whilst we see an expected decline in annual mileage per vehicle as the car gets older, this relationship is strongest when looking at the very newest vehicles, where there is a clear tendency for cars to be driven more in the first few years but where there is considerable variation according to location. Moreover, although private cars undertaking relatively low mileages are likely to be older, when looking at vehicles doing at least 5,000 miles per year, the average age remains relatively similar between the average-mileage and the high-mileage vehicles (Table 4).

For policy, this presents somewhat of a conundrum. Newer cars can be the most efficient and, in this respect, may be worth encouraging.[16] However, one question is whether people who need to travel more tend to adopt newer vehicles, or whether new vehicles somehow facilitate or encourage more driving, thus potentially leading to more energy use, emissions (and congestion, with all that results from it) overall? Whilst we cannot solve that cause–effect mystery with the MOT data, we can offer a more sophisticated understanding of car use and car age by looking in more depth at their variance across factors such as vehicle size, fuel type, vehicle-specific motoring costs and total odometer readings. This will enable a more detailed impact analysis, as well as a social distributional analysis, of any policies – such as scrappage schemes – which might deliberately aim to accelerate the rate of reduction of the highest polluting vehicles.

16 The overall lifecycle emissions of vehicle replacement obviously need to be considered too.

Table 3: Annual car mileage by keeper type (private vs company) and age[17]

Age	2011 Private average annual mileage	2011 Company average annual mileage
0–3 years	8,711	13,565
3–4 years	9,074	15,566
4–5 years	8,763	14,055
5–6 years	8,378	12,239
6–7 years	8,020	11,081
7–8 years	7,597	9,754
8–9 years	7,210	8,717
9–10 years	6,892	7,904
10–11 years	6,506	7,019
11–12 years	6,136	6,379
12–13 years	5,844	5,979
>=13 years	4,448	4,091

Source: MOT project dataset (Version 9)

Table 4: How private car use affects average private car age

Mileage category	Average age
Private cars doing less than 5,000 miles per year	10.0
Private cars doing between 5,000 and less than 12,000 miles per year	7.3
Private cars doing 12,000+ miles per year	6.3

Source: MOT project dataset (Version 9)

17 Vehicle age has been calculated as the number of days between the date of first registration and 31 December 2011. Keepership is based on the situation as of 31 December 2010.

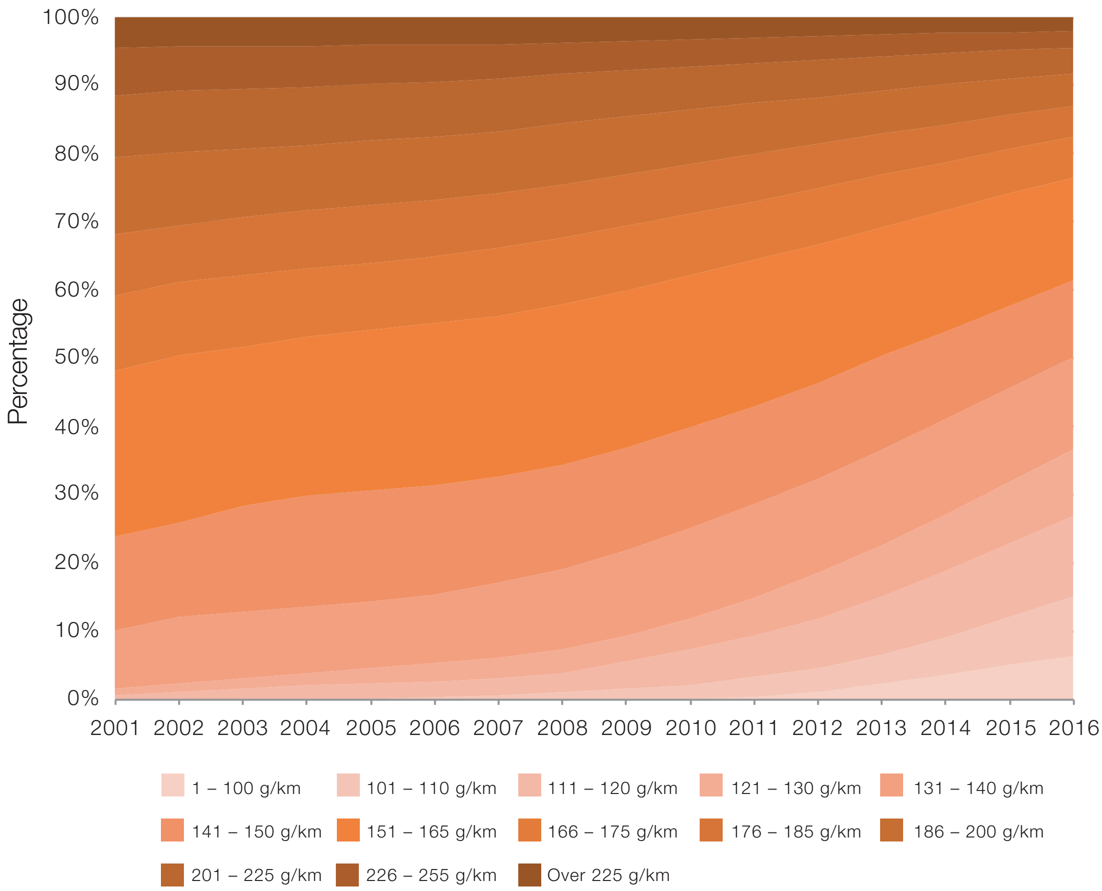
8. Fuel Type and Mileage Driven

Understanding the presence and use of diesel cars is extremely topical given the dilemma faced by their two opposing roles as key contributors to reducing greenhouse gas emissions of the car fleet and as dominant contributors to poor local air quality. This dilemma presents policymakers with a need for a detailed understanding of where diesels are most prevalent, where the drop-off in new diesels is happening most quickly, and how much they are driven (see next page), in order to be able to better manage the two relevant policy agendas: greenhouse gas reduction and improvement of air quality.

According to the MOT dataset, of *privately* registered cars in 2011, only 24% were diesel. Figures 10 and 11 display how this proportion varied across different areas. Figure 10 gives the impression that the majority of the country is dominated by areas where diesels comprise at least a third of each local private car fleet. However, as explained previously, the disproportionately large land area taken up by the more rural spatial units leads to a skewed perspective. For England and Wales, Figure 11 has therefore been supplied, providing a contrasting cartographic map, where the same information is presented using spatial units which reflect the size of the underlying population – meaning that areas in which a similar number of people live are displayed at a more similar size. Here, we still see that the country appears to be polarised into those most likely or least likely to have privately owned diesels, largely along urban/rural lines, but a more balanced impression is provided, and the dominance of petrol cars in urban areas and some of the coastal towns is more obvious.

The DVLA licensing statistics show that the share of diesel has risen from 13.8% of *all* licensed British cars in 2001, to 30.8% in 2011, and 39.1% in 2016.[18] However, over the last five years, the share of newly registered cars which are diesel-fuelled has fallen slightly, from 50.3% in 2011, to 47.4% in 2016. Figure 9 shows how the average emissions of carbon dioxide per kilometre (gCO_2/km) of the entire licensed British car fleet has dropped over time, a change which has been attributed in part to increased numbers of diesel cars (which are generally more efficient per kilometre driven due to the higher energy density of diesel fuel).

Figure 9: Changing per-kilometre carbon dioxide emissions profile of the licensed British car fleet (excluding cars of unknown emissions)



Source: Vehicle Licensing Statistics (2017) table VEH0206

18 Figures in the remainder of this section are taken from Vehicle Licensing Statistics tables VEH0203, VEH0253 and VEH0206.

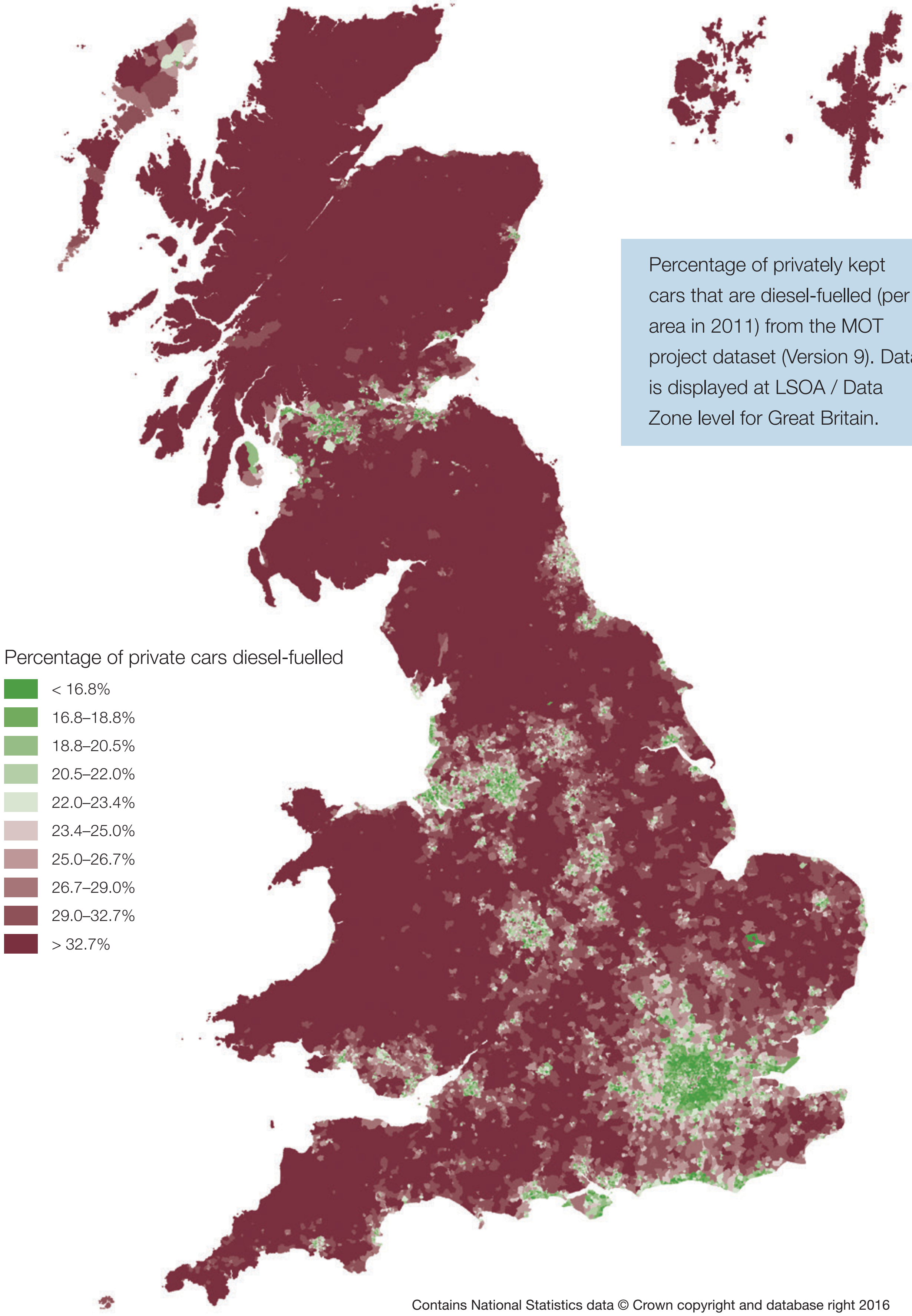
Data about the improvements in average *per-kilometre* emissions of new cars and the proportions of the fleet accounted for by different fuel types, including alternatives to fossil fuels, is an important way of tracking our progress towards decarbonisation of the transport sector. However, at the same time as the average gCO_2/km of new cars has been declining, total emissions from cars *in use* has failed to show any real decline as demand for travel has outpaced efficiency improvements.[19] In subsequent pages, we therefore make use of the unique potential of the MOT data to go beyond looking at the *per-kilometre* emissions, to looking at *total emissions* of cars once the mileage, the age and technology composition are examined together.

When compared to its connection with vehicle age, fuel type is more clearly linked to levels of usage, and to variations in usage patterns across the country. Table 5 indicates the relationship between the typical mileage done by a car and whether people have adopted diesel. On average, the MOT dataset shows that, in 2011, the annual mileage for a privately registered diesel car was 10,699 compared with 6,418 for petrol. This translates into the 24% of the private car fleet that was diesel in 2011 being responsible for 31% of the mileage driven. The share of mileage driven in diesel cars reduces for cars registered in urban areas, and increases for cars registered in rural areas, as shown in Table 6. This is partly mediated by vehicle ownership patterns, albeit with the indication that diesel cars in conurbations are responsible for a more disproportionate share of the mileage than is the case for settlements in relatively sparse settings.

In further research, we will seek to discover more about the usage profile of diesel versus petrol cars, particularly in combination with information about vehicle body type and size and the sociodemographic profile of those who continue to adopt and those who reject diesels. This will help to inform forecasts of what might happen to carbon dioxide (CO_2) emissions if diesel sales were to decline further.

19 CCC (2017) Meeting Carbon Budgets: Closing the policy gap. 2017 Report to Parliament. Committee on Climate Change, June 2017.

Figure 10: Percentage of private cars that are diesel-fuelled



Percentage of privately kept cars that are diesel-fuelled (per area in 2011) from the MOT project dataset (Version 9). Data is displayed at LSOA / Data Zone level for Great Britain.

Figure 11: Percentage of private cars that are diesel-fuelled (cartogram)

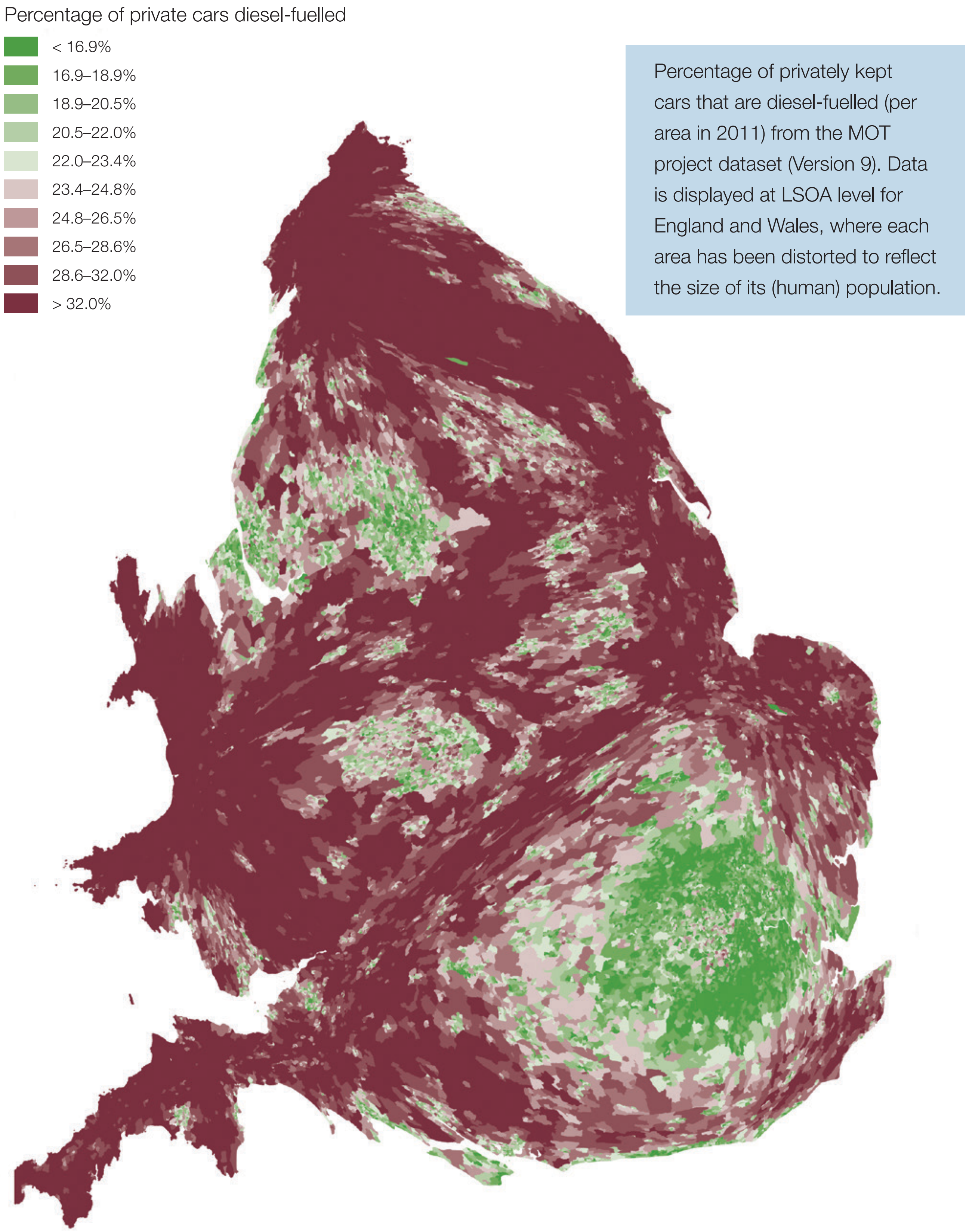


Table 5: How car use affects the share of diesel cars

Mileage category	Percentage that are diesel-fuelled
Private cars doing less than 5,000 miles per year	11
Private cars doing between 5,000 and less than 12,000 miles per year	25
Private cars doing 12,000+ miles p.a.	49

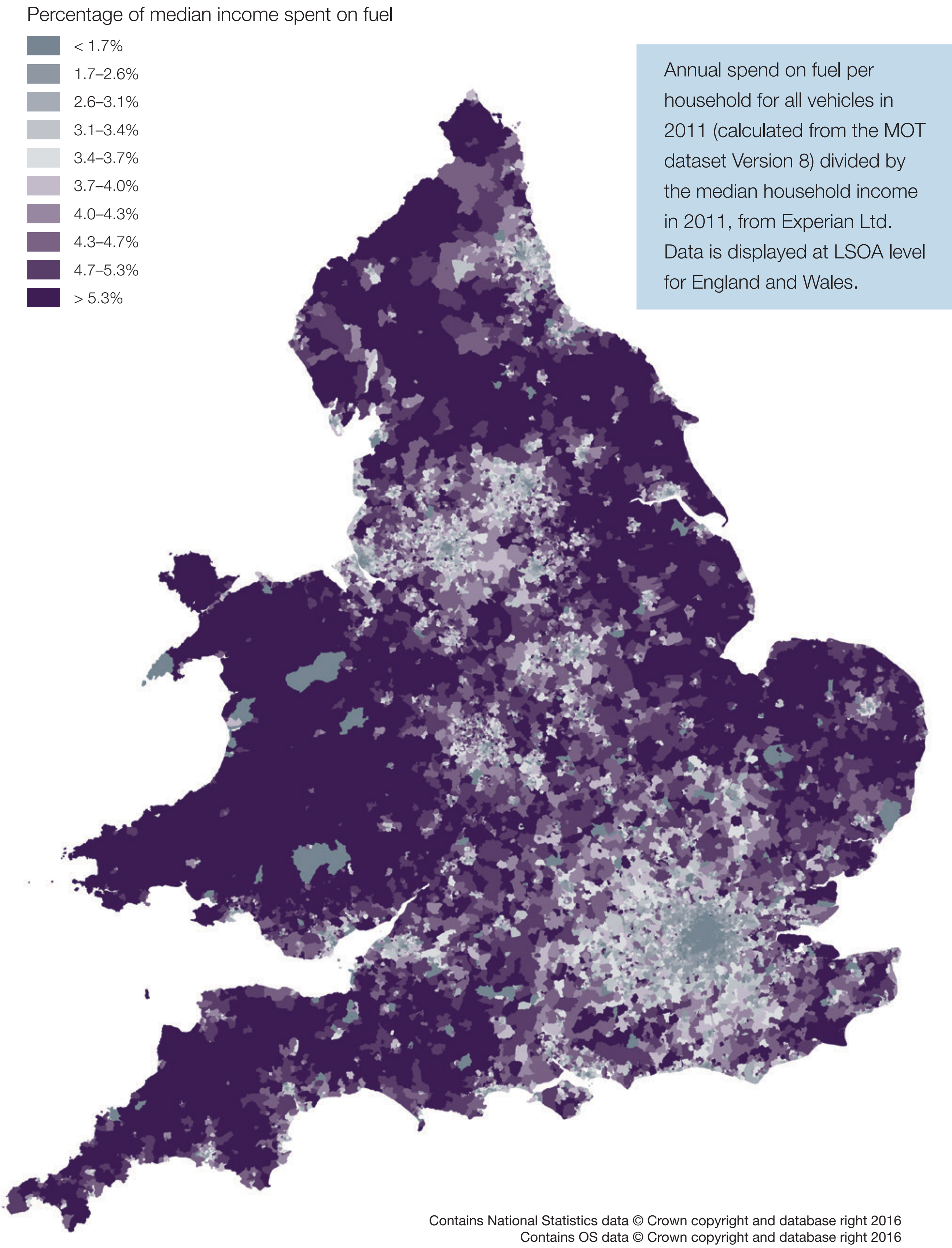
Source: MOT project dataset (Version 9)

Table 6: How keeper location affects the proportion of mileage driven in diesel cars

Type of area*	Percentage of privately registered cars that are diesel-fuelled	Percentage of mileage done by privately registered cars that is done in diesel cars
Major conurbation	21%	29%
Minor conurbation	25%	34%
City and town	24%	33%
City and town in a sparse setting	30%	29%
Town and fringe	29%	37%
Town and fringe in a sparse setting	34%	43%
Village and dispersed	34%	44%
Village and dispersed in a sparse setting	42%	50%

Source: MOT project dataset (Version 9)
Note: * The area type is defined according to the Office of National Statistics urban/rural classifications. 2011 data, analysed for England and Wales only.

Figure 12: Percentage of median household income spent on fuel



9. Motoring Costs

From a resilience as well as a social justice perspective, it is vital to know which sectors of the population and areas of a city or country are most vulnerable to increases in motoring costs. Running a car incurs a variety of costs, including fixed annual costs (road tax, MOT test fee, insurance), intermittent costs (repair and maintenance, including tyre replacement), fuel costs, and vehicle depreciation. Fuel costs are a particularly significant part of vehicle costs, given that they relate directly to use (Chatterton et al., 2016b).

Figure 12 shows how the proportion of median household income spent on fuel varies across the country, mostly in the range of 2–5% of income (also see Figure 19 which shows how income on its own varies).[20] The urban/rural pattern is somewhat less obvious in comparison to other maps. It is clear that in the more peripheral rural areas, where mileage can be high and incomes relatively low, we see high proportional expenditure on fuel. By contrast, the higher incomes in the South East, Midlands and around Manchester lead to a pattern which extends the low proportionate expenditure far out beyond the urban areas even where mileages, and therefore fuel expenditure, are higher.

20 Income data is taken from Experian Ltd Demographic Data, 2004–11, UK Data Archive Study Number 5738—http://doc.ukdataservice.ac.uk/doc/5738/mrdoc/pdf/5738_household-income_2011.pdf

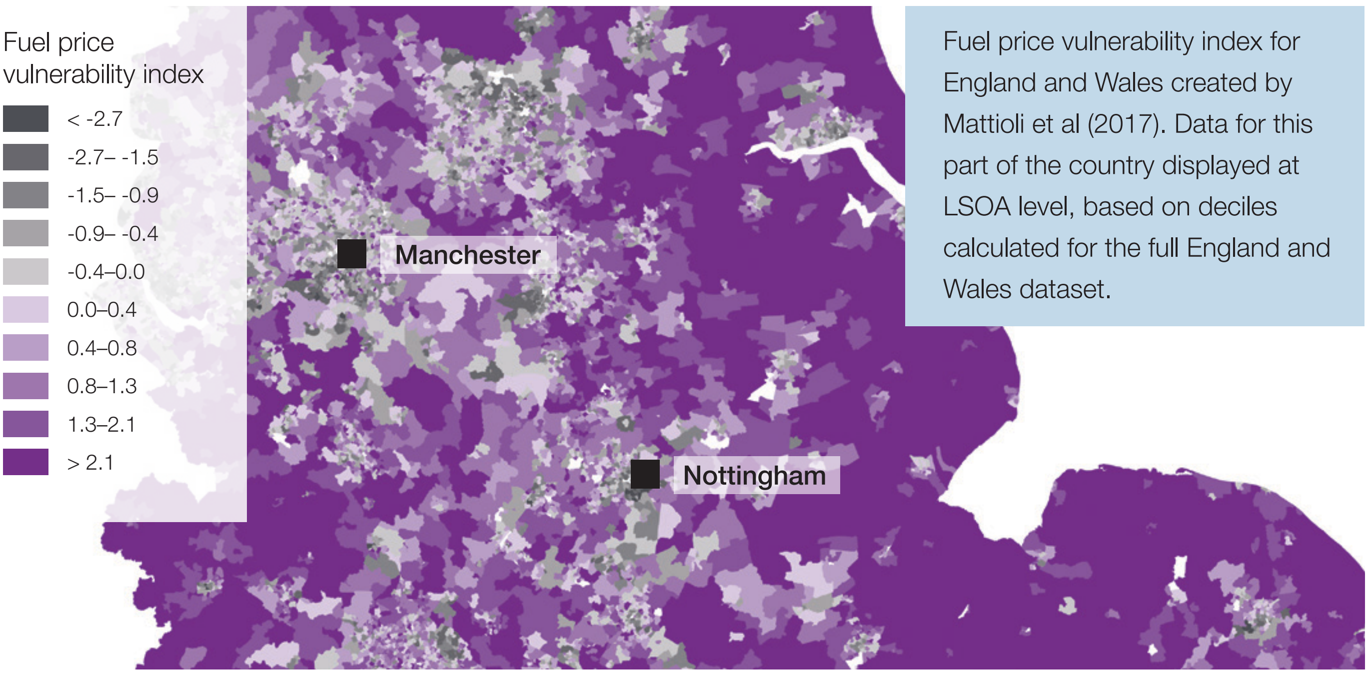
To understand the social significance of fuel costs in different areas, as explored in Mattioli et al. (2017), it is helpful to consider typical incomes, spending on fuel, and whether people have alternative transport options. For part of England, Figure 13 shows data taken from the Department for Transport's accessibility statistics, which give a measure of access to food stores and services such as education and health by means other than by car (specifically by public transport, or, if quicker, by foot[21]). Meanwhile, Figure 14 shows results for a fuel price vulnerability index that has been created by combining data about spending on fuel (from the MOT dataset), typical incomes and other transport choices. Although there is a general urban/rural pattern, at a fine level of detail, there is a considerable amount of variation. For example, there is contrast in how areas are classified on the corridor between Manchester and Nottingham in Figures 12, 13 and 14.

21 Measures of access by bicycle are also available, but are not displayed here. Accessibility data is taken from https://www.gov.uk/government/collections/journey-time-statistics

Figure 13: Accessibility

Total journey time to 8 key shops and services in 2011 (in minutes), taken from Department for Transport accessibility statistics[22]. Data for this part of the country displayed at LSOA level, based on deciles calculated for the full England and Wales dataset.

Figure 14: Fuel price vulnerability index



Fuel price vulnerability index for England and Wales created by Mattioli et al (2017). Data for this part of the country displayed at LSOA level, based on deciles calculated for the full England and Wales dataset.

22 Data derived from the ACS05 tables series, https://www.gov.uk/government/statistical-data-sets/acs05-travel-time-destination-and-origin-indicators-to-key-sites-and-services-by-lower-super-output-area-lsoa

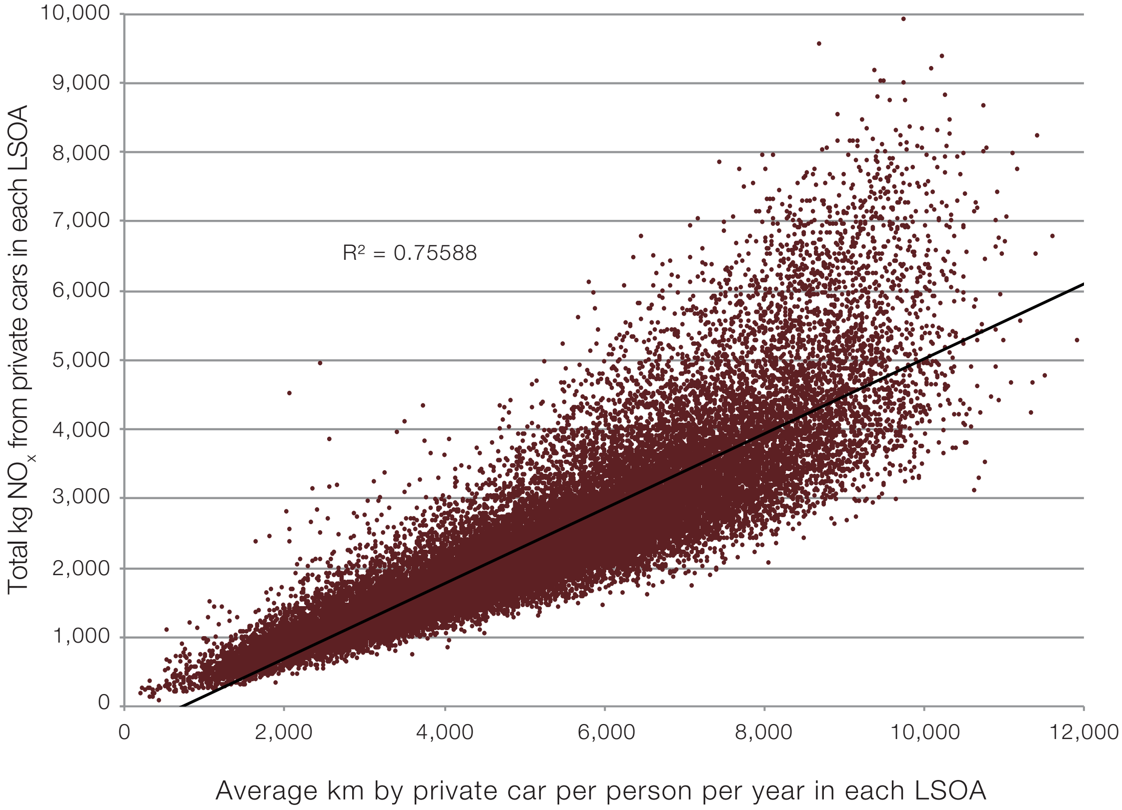
10. Air Pollution – The Role of Mileage

Total emissions from cars, or any other vehicles, created by residents in each area are determined both by the distance that people from that area drive, and the emissions per mile of each vehicle. Emissions are, in turn, a factor of various vehicle characteristics such as vehicle age, fuel type and engine size. Investigation of the factors determining total emissions and how these vary in different areas provides important insights for emission reduction policies.

A key finding from our work is that the total amount of pollution emitted from vehicles is more closely related to the average distance driven per person, than to the particular characteristics of those vehicles. This suggests that measures to reduce distances driven will have a greater impact on reducing emissions than attempts to improve emissions performance of vehicles, whether or not tighter emissions standards are actually achieved.

One way of demonstrating the strength of the relationship is by plotting the average distance driven by private car per person against the total nitrogen oxides (NO_x) generated from private cars in each area (Figure 15). Over 75% of the variation in emissions can be calculated purely from the average amount that people are driving (the R^2 value on the graph), regardless of vehicle type. The same is true if looking at emissions of particulates (PM), or CO_2.

Figure 15: Relationship between the average distance driven and total emissions of nitrogen oxides[23]

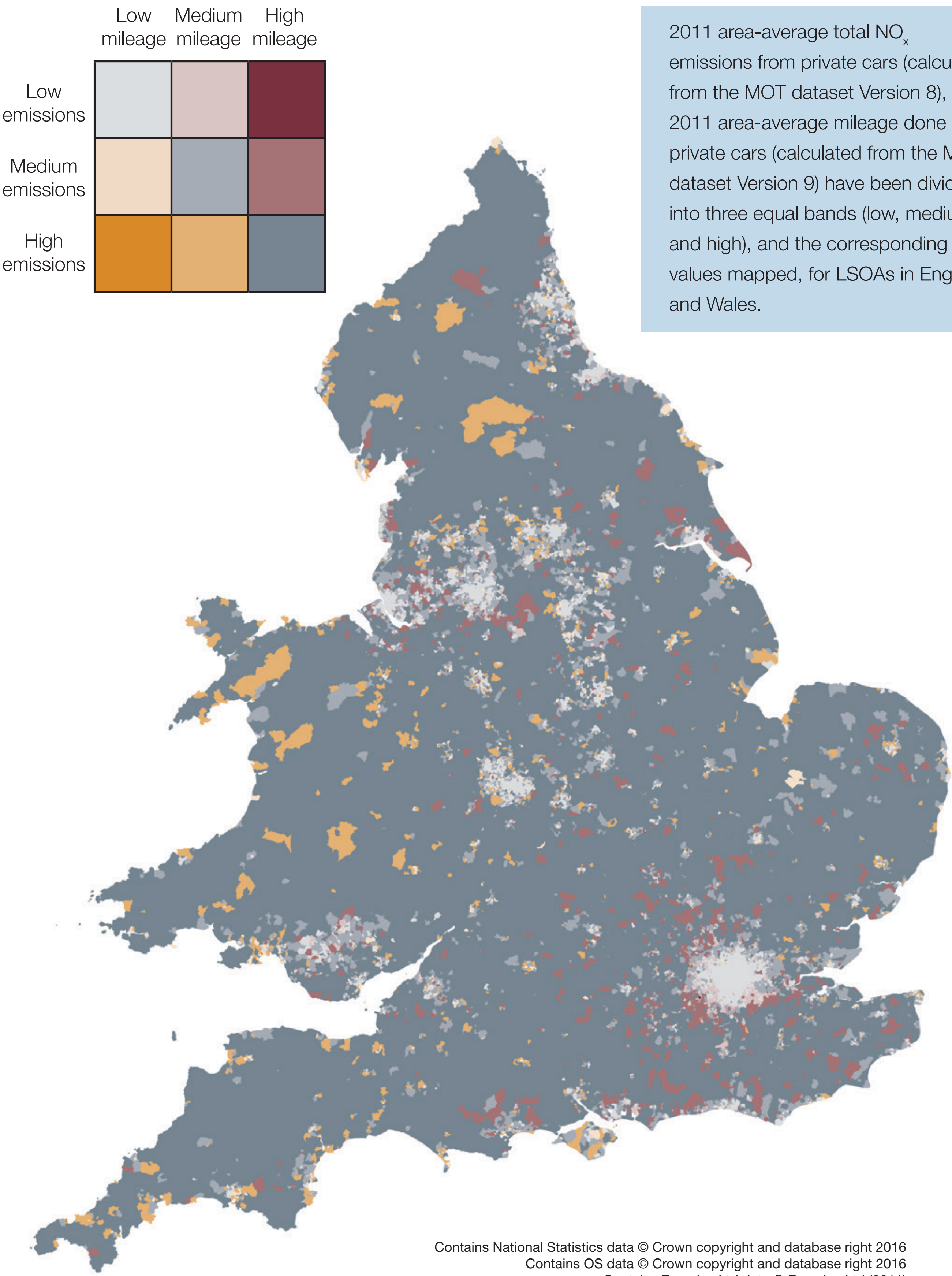


Source: MOT project dataset (Version 8)

Another way is to depict the values using a bivariate map, comparing levels of NO_x emissions with levels of mileage (Figure 16, next page). In most cases, areas are a shade of grey, indicating a strong correspondence between the two (whether that be low–low, medium–medium or high–high).[24] Interestingly, orange areas indicate places where emissions are higher than might be expected from the mileages driven, whilst the red areas indicate areas where mileages are relatively high but emissions are lower than expected – in both instances, this indicates scope for useful further research about what is happening in those places.

23 Data is for privately owned Class 4/4A vehicles in Lower Layer Super Output Areas (LSOAs) in England and Wales in 2011.
24 For both emissions and mileage, the individual LSOA values have been divided into 3 equal sized bands, which have then been categorized as ‘low’, ‘medium’ or ‘high’.

Figure 16: Total emissions of nitrogen oxides by mileage for private cars



2011 area-average total NO_x emissions from private cars (calculated from the MOT dataset Version 8), and 2011 area-average mileage done by private cars (calculated from the MOT dataset Version 9) have been divided into three equal bands (low, medium and high), and the corresponding values mapped, for LSOAs in England and Wales.

11. Air Pollution – The Role of Vehicle Type

In contrast to the analysis presented on previous pages, some of our work on emissions has looked at data for *all* privately registered vehicles (meaning, of course, vehicles up to 3.5 tonnes only). Figure 17 (page 37) shows the emissions of NO_x from all private vehicles in the MOT dataset based on the location of the registered keeper. Again, areas are displayed according to their population size rather than their geographical size. Figure 18 uses the same perspective but gives data from Defra[25] about ambient concentrations of NO_2 at background locations.[26]

By contrasting these two maps, we are able to see that *polluters* (those responsible for emitting high amounts of pollutants) are generally not co-located with the *polluted* (those exposed to high total ambient concentrations). This starkly highlights the fact that the air pollution experienced in any given area is likely to be at least partially generated by vehicles from other areas. Whilst the MOT dataset does not allow identification of where vehicles are

25 https://uk-air.defra.gov.uk/data/pcm-data
26 Vehicles emit both NO and NO_2, (collectively called NO_x). However, the NO is rapidly oxidised to form NO_2, and the NO_2 also represents the main health risk.

being driven, these maps do suggest that for proposed Clean Air Zones to work within our most-polluted cities, vehicle owners well outside those urban areas may be the ones most affected by any driving charges or restrictions in the polluted zones, or will have to be targeted by policy initiatives to encourage the uptake of cleaner cars.

Further analysis was done to discover more about which vehicle characteristics have the greatest influence on emissions. Whilst mileage is the strongest determining factor in most areas, there are clearly many other contributory factors. Interestingly, the relationships are not always as anticipated, as shown in Box 2. For example, in more-polluted areas, the car fleet is older, on average, but is likely to contain a higher proportion of smaller petrol cars, with lower average emission factors, and which are often driven fewer miles – i.e. the most-polluted areas do not house the dirtiest cars.

Box 2: Links between emissions and vehicles

Where mean ambient NO_2 concentrations are **higher**:

- the mean **age** of vehicles is **higher**;
- the proportion of **diesels** is **lower**;
- the average NO_x **emission factor** is **lower**; and
- the average **distance** per vehicle driven is **lower**.

In further research, we could link the vehicles in the MOT database with emerging sources which provide actual or inferred origin/destination points and journey purposes for vehicles (such as Automatic Number Plate Recognition cameras, telematics or modelled origin–destination data). This would allow annual vehicle mileages from the MOT dataset to be attributed to parts of the road network, and provide local authorities with the ability to understand more about the usage of the vehicle fleet in their areas, to track changes over time and to understand more about who would be most affected by measures to restrict vehicle use. However, linking the MOT dataset with other datasets presents many challenges which need to be worked through in terms of data availability, access and anonymisation.

Figure 17: Emissions of nitrogen oxides from all private vehicles by registered keeper location (cartogram)

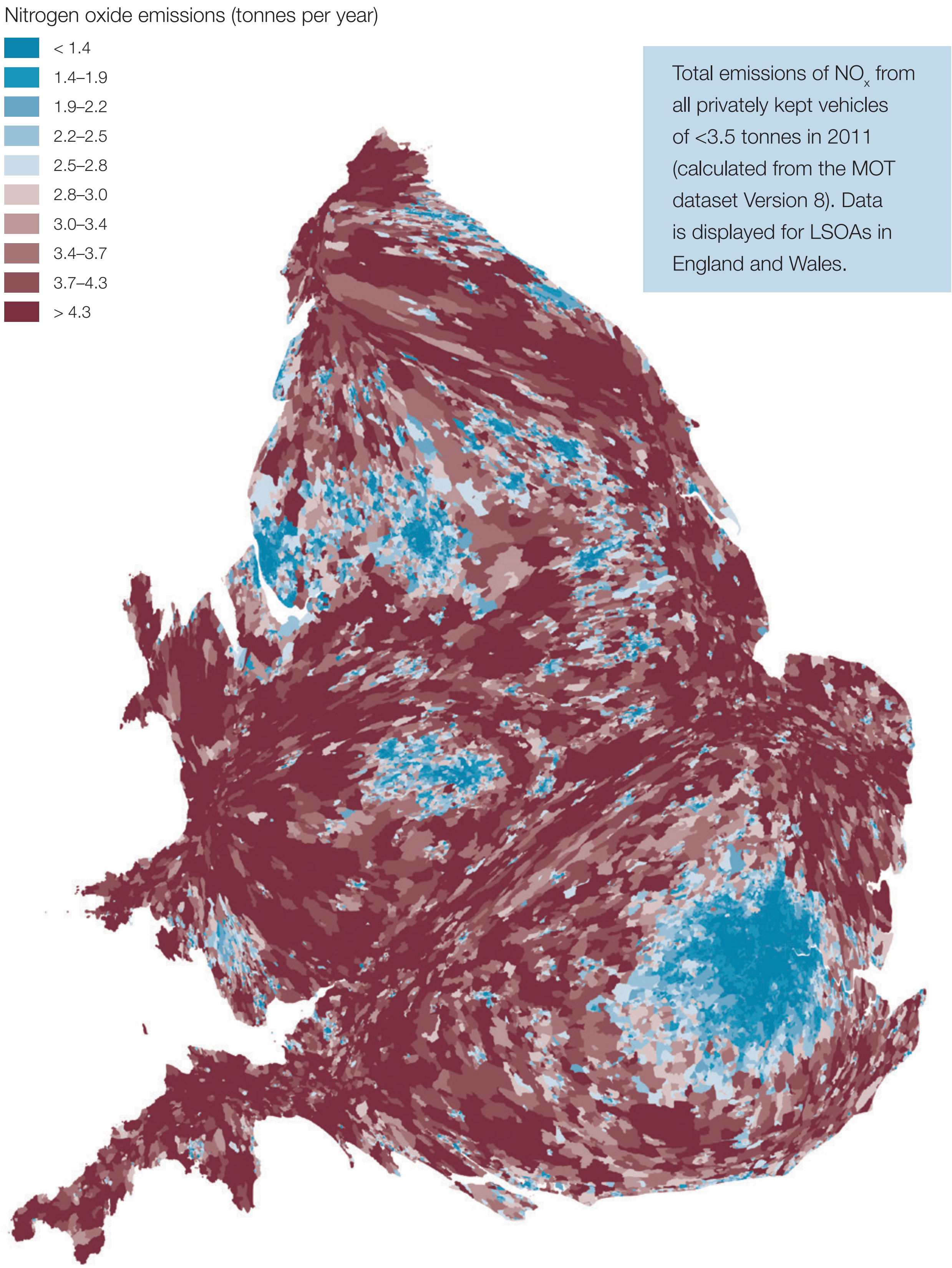
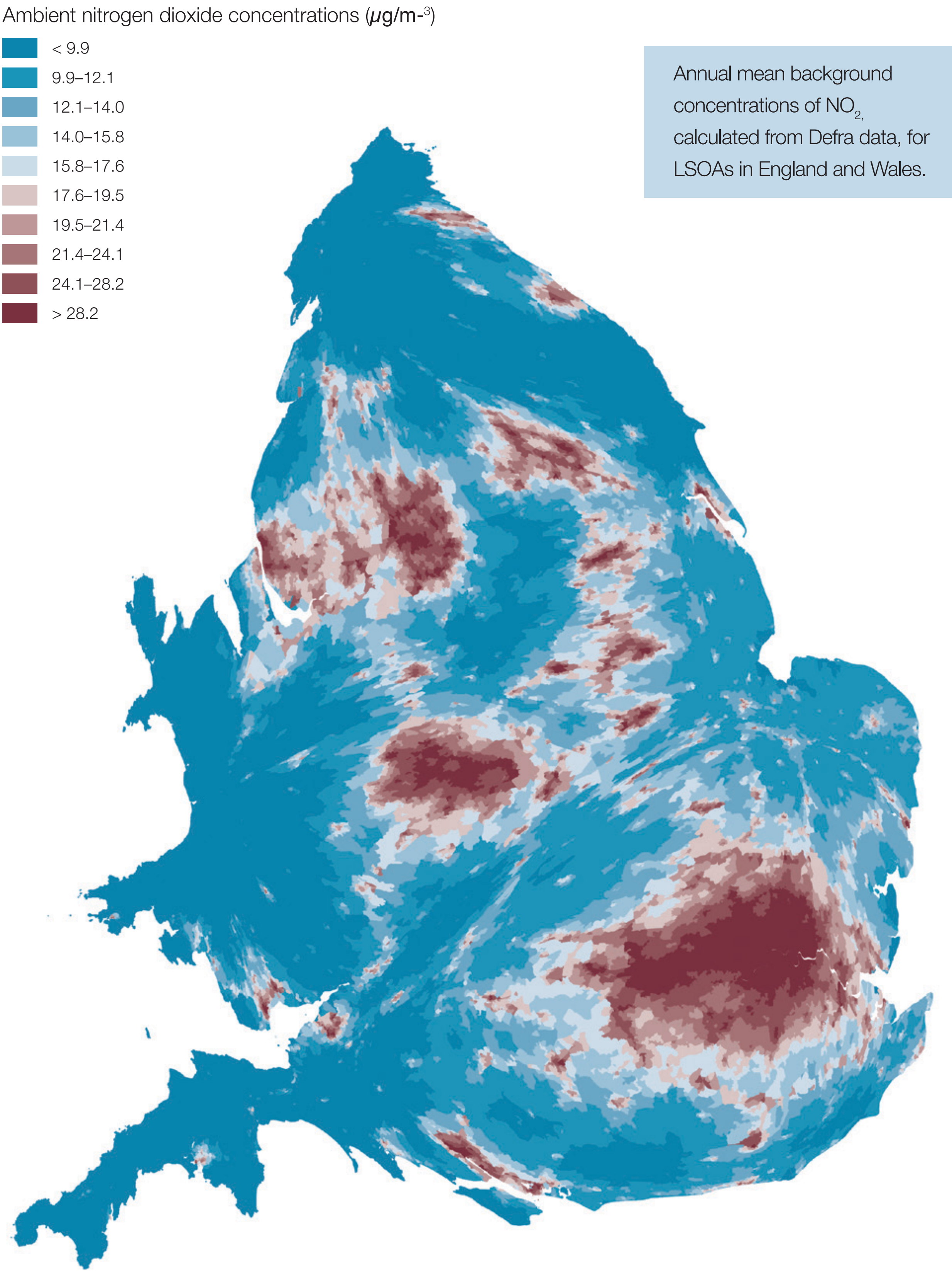


Figure 18: Ambient concentrations of nitrogen dioxide (cartogram)



12. The Relationship between Poverty and Emissions

Previous pages have explored motoring costs and vulnerability related to income and accessibility. We have also determined that the most-polluted areas do not contain the most-polluting cars. Bringing these two elements together, emissions data can also be examined in relation to income, deprivation and poverty, as explored in Barnes and Chatterton (2017). As background, Figure 19 shows how household income varies across the country. Figures 20, 21 and 22 all show how measures vary according to the proportion of households in poverty[27] in an area. Specifically, the LSOAs in England and Wales have been split into ten deciles, with average values calculated for: mean ambient NO_2 concentrations; total private vehicle emissions of NO_x; and mean NO_x vehicle emission factors. Similar graphs have been generated (but are not shown here) for CO_2 and PM. In all cases, areas with a higher proportion of households in poverty experience higher than average levels of pollution, but are responsible for emitting lower than average amounts of pollution. This is partly because, as suggested by the previous analysis, areas with a higher proportion of households in poverty also typically own cleaner vehicles in terms of NO_x and PM as, even though, on average, the vehicles are older, a lower proportion tend to be diesel.

27 This measure was developed from the Breadline Britain Index by the Poverty and Social Exclusion (PSE) Unit at the University of Bristol (www.poverty.ac.uk).

Figure 19: Median household income for England and Wales (2011)

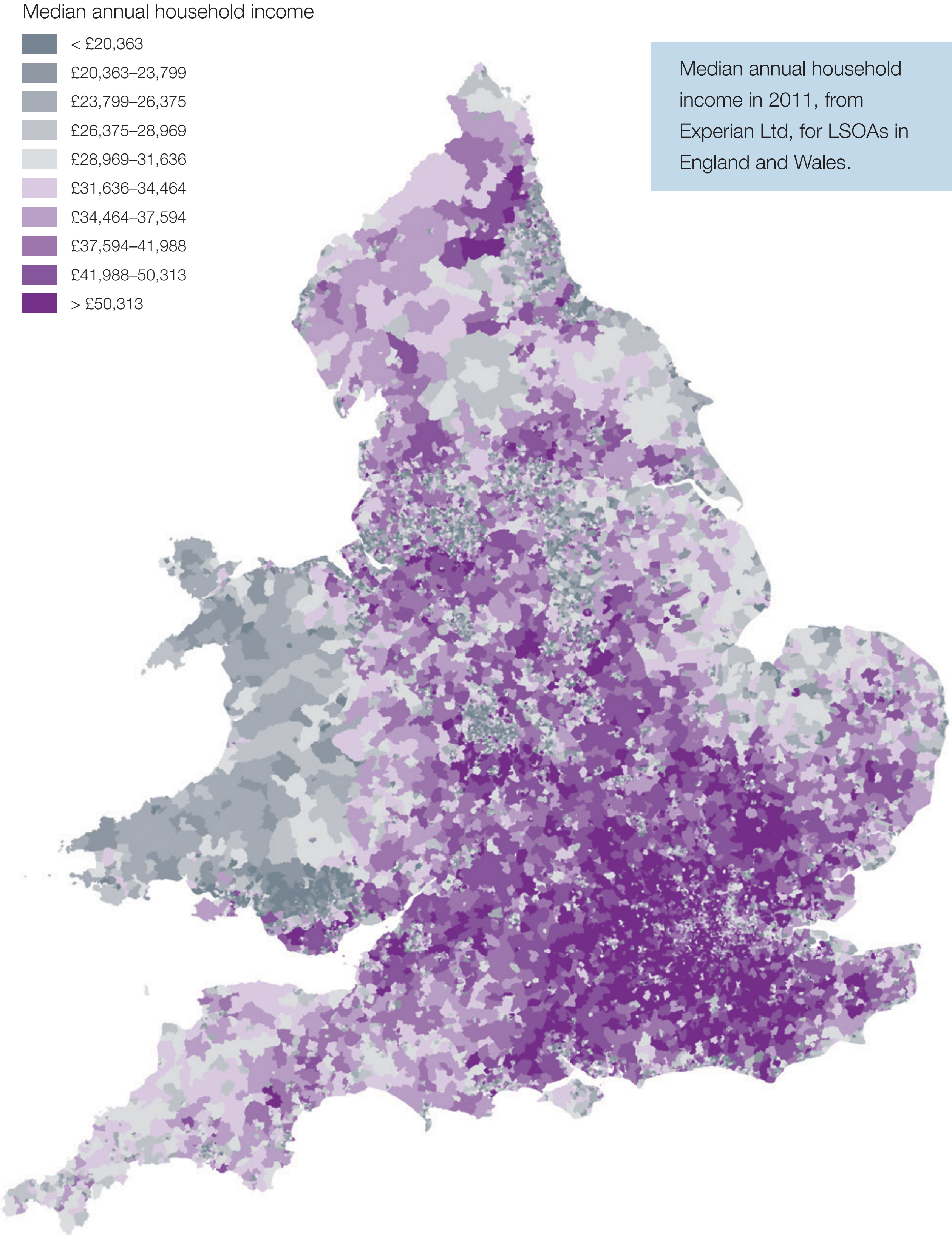


Figure 20: Average ambient NO_2 concentration, depending on the percentage of households in poverty in the area.

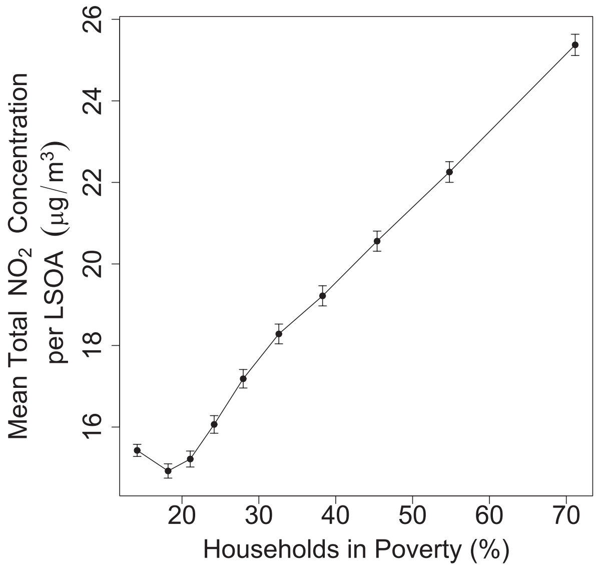


Figure 21: Total private vehicle emissions of NO_x per year per LSOA, depending on the percentage of households in poverty in the area.

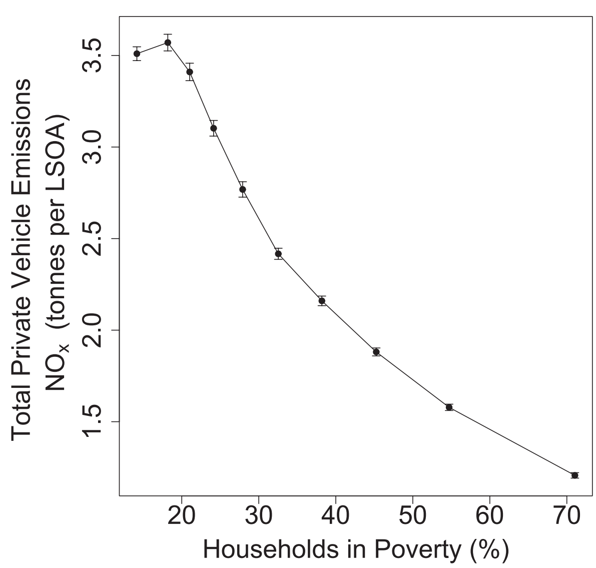
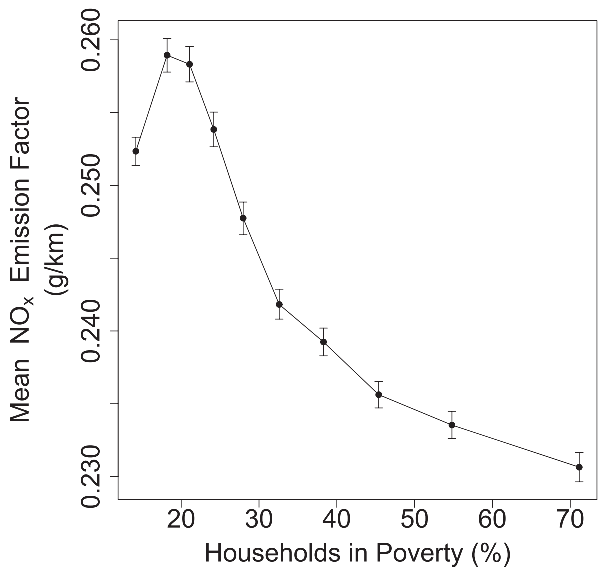


Figure 22: Average NO_x emission factors for private vehicles, depending on the percentage of households in poverty in the area.



Data have been calculated for LSOAs in England and Wales in 2011. Error bars indicate 95% confidence intervals. Graphs were created using Version 8 of the MOT dataset.

Source: MOT project dataset (Version 8). See Barnes and Chatterton (2017).

13. Driver Collision Involvement

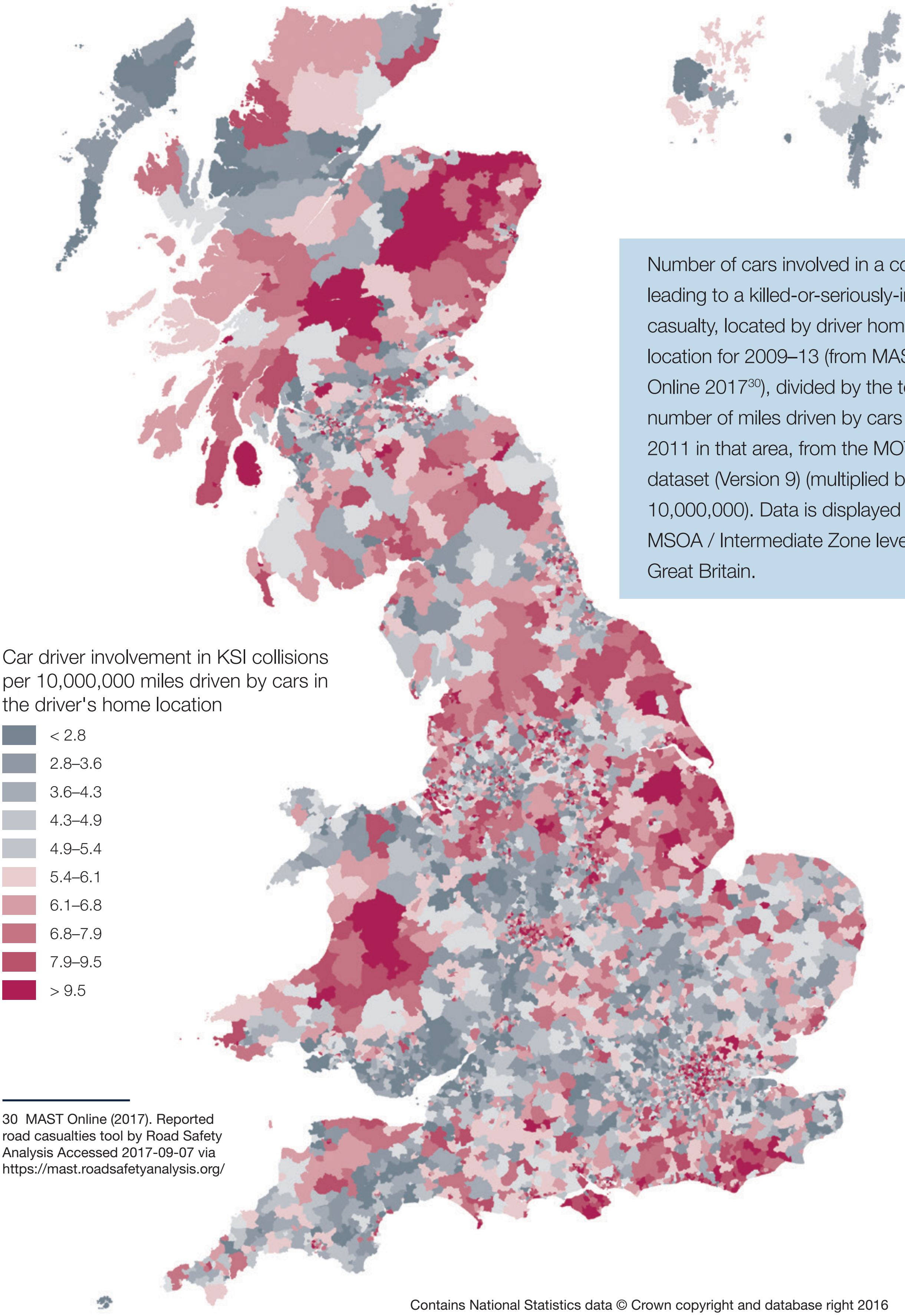
In 2011, 204,720 car drivers were involved in a reported road traffic collision involving injury, of whom 24,511 were involved in a collision involving someone being killed or seriously injured.[28]

Figure 23 uses combined data from the national database of police-reported injury road collisions in Great Britain[29] for 2009–13 to show the distribution of home locations of car drivers for vehicles involved in collisions that resulted in death or serious injury, based on a rate *per 10,000,000 car-miles driven* by cars in those locations.

Our analysis of this data shows that, in absolute numbers, more drivers from urban areas are involved in collisions resulting in death or serious injury than elsewhere. However, the first column in Table 7 shows that when population density is taken into account, the reverse pattern emerges – per adult, drivers from more-rural areas are more likely to be involved. This will partly reflect the higher proportion of adults who drive in rural areas. The second column uses the MOT dataset to take levels of car driving into account and this highlights the importance of context. Comparing the figure in the second column for, say, 'cities and towns' with the figure for 'cities and towns in a sparse setting', the risk of driver involvement in a collision is higher (per 10 million miles driven) in the more isolated locations. The same is true for the other two types of areas which have a comparable area 'in a sparse setting'. Figure 23 also suggests that there may be particular pockets of collision involvement (when taking exposure into account) which require further investigation.

28 Data taken from Department for Transport road accident statistics table RAS20003 and RAS20002.
29 MAST Online (2017). Reported road casualties tool by Road Safety Analysis Accessed 2017-09-07 via https://mast.roadsafetyanalysis.org/

Figure 23: Car driver involvement in KSI collisions (2009-13) per 10,000,000 miles driven by cars in the driver's home location



Number of cars involved in a collision leading to a killed-or-seriously-injured casualty, located by driver home location for 2009–13 (from MAST Online 2017[30]), divided by the total number of miles driven by cars in 2011 in that area, from the MOT dataset (Version 9) (multiplied by 10,000,000). Data is displayed at MSOA / Intermediate Zone level for Great Britain.

30 MAST Online (2017). Reported road casualties tool by Road Safety Analysis Accessed 2017-09-07 via https://mast.roadsafetyanalysis.org/

Table 7: How location affects the likelihood of KSI collision involvement

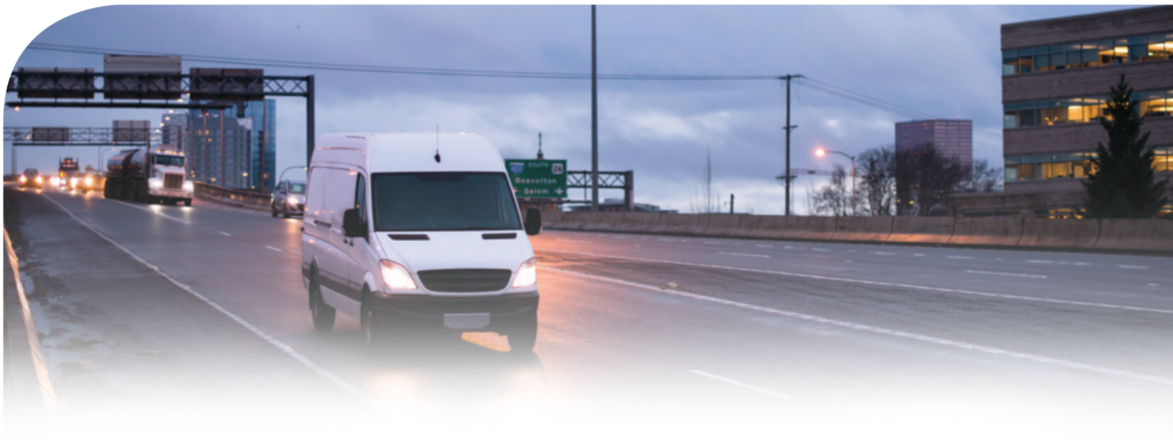
Type of area where the drivers' home is located[31]	Average number of crashed cars (KSI), per 1,000 adults in the car driver's home location	Average number of crashed cars (KSI), per 10,000,000 miles driven by cars in the car driver's home location
Major conurbation	1.7	6.4
Minor conurbation	2.0	6.6
City and town	2.1	5.7
City and town in a sparse setting	2.2	6.7
Town and fringe	2.6	5.3
Town and fringe in a sparse setting	2.6	6.0
Village and dispersed	3.0	5.3
Village and dispersed in a sparse setting	3.2	6.2

Source: MOT project dataset (Version 9), MAST Online

In further research, use of the MOT data will also make it possible to look at how the characteristics of vehicles from an area affect the likelihood of collision involvement. Initial investigation suggests that vehicle age may be relatively unimportant, compared with fuel type or vehicle mass. However, considerably more investigation is needed. MOT data can also provide evidence about the significance of MOT test failure rates to general collision involvement.

31 Area type defined according to the Office of National Statistics urban/rural classification. 2011 data, analysed for England and Wales only.

14. Light Goods Vehicles



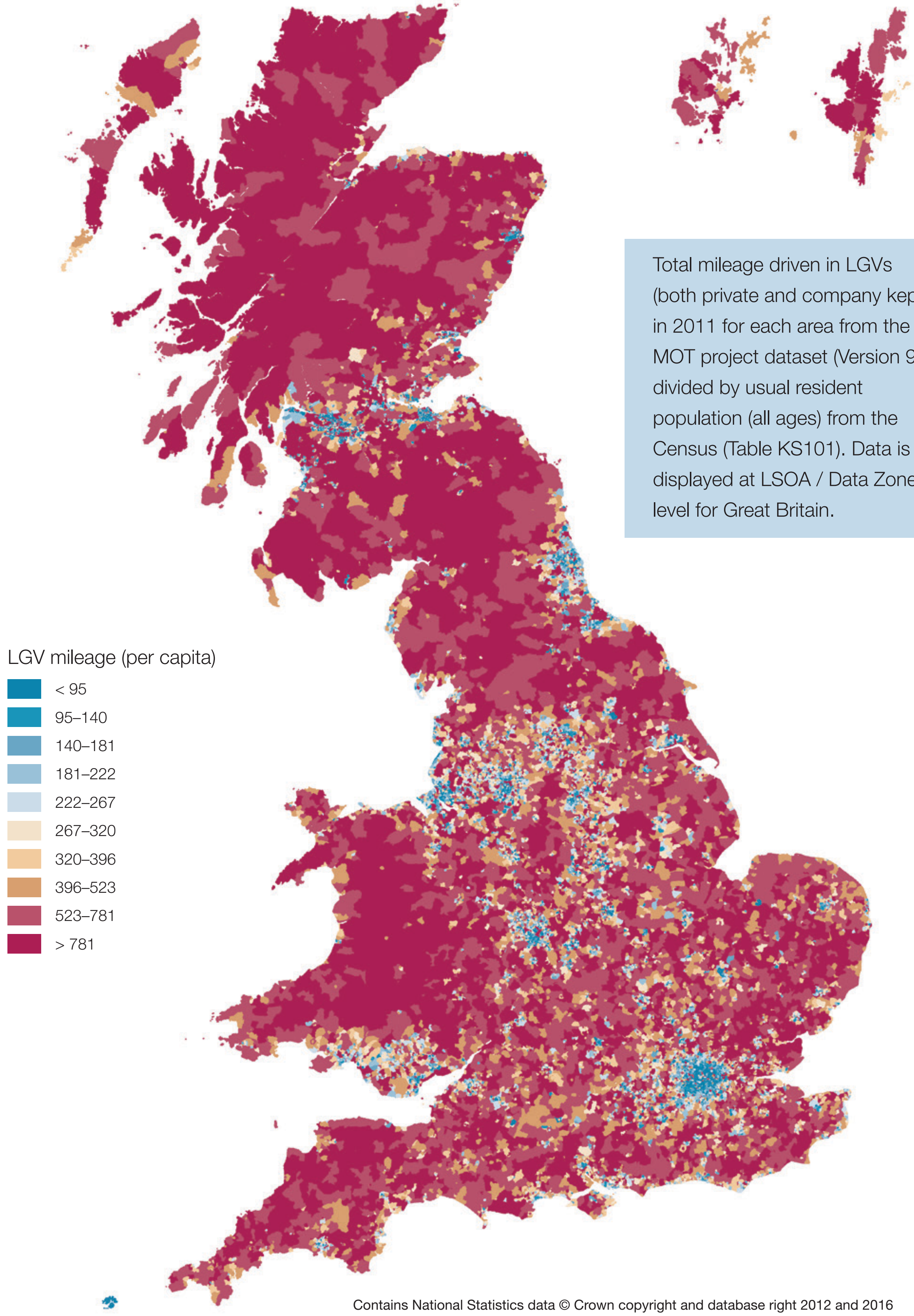
In the MOT dataset, all LGVs (i.e. private and company owned) accounted for 9% of vehicles in 2011, but were responsible for 13% of all mileage. Average mileage per LGV was 10,844 miles per year, with 8,043 miles per year for those in private ownership, compared with 14,361 miles per year for those in company ownership. Figure 24 indicates how LGV mileage (for vehicles in both private and company ownership) is distributed across the country (displayed on a per-capita basis, to even out differences in population density). One notable finding is that the band of high mileage between Bristol and the Wash, which characterises the maps of private car mileage (Figure 6), is not nearly so dominant here.

Understanding much more about LGVs, their usage patterns in different parts of the country, and the potential for increasing the number of electric vehicles in the fleet is a policy imperative given the fact that LGVs are the fastest-growing category of licensed vehicles, as shown in Figure 25. According to vehicle licensing data, in 2011, there were 3,184,547 licensed LGVs in Great Britain, of which 95% were diesel-fuelled, and 52% were in private ownership.[32] By 2016, this had risen to 3,781,984, an increase of 16%, but only 5,267 (0.1%) were anything other than fossil-fuelled.

In further research, the MOT dataset can be used to look at whether growth rates for LGVs are consistent across the country, or particularly marked in certain locations. The interrelationship between private and company vehicles, and transitions in ownership, can be further unpicked, together with how that affects subsequent usage. Given the growth of shopping home deliveries[33], and of small and medium businesses offering local services, it is vital to understand more about this sector, and how it is intersecting with personal car ownership and use.

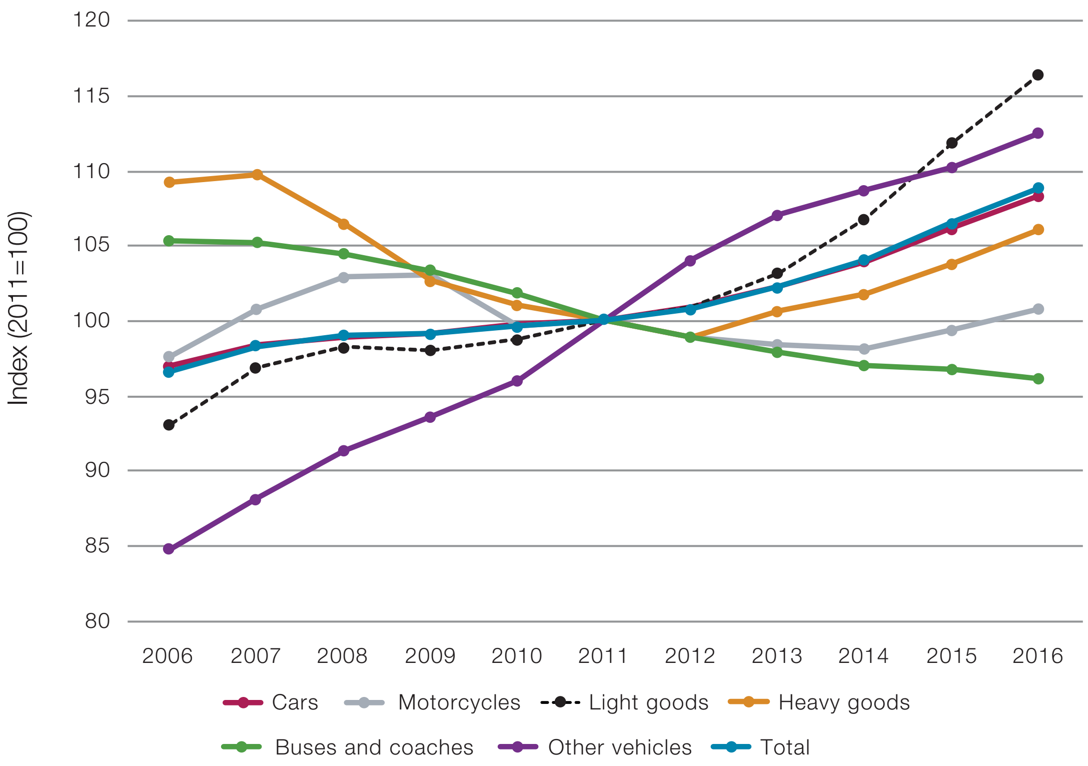
32 Vehicle licensing statistics (2017) tables VEH0102 (*DfT All vehicles (VEH01)*, https://www.gov.uk/government/statistical-data-sets/veh02-licensed-cars), VEH0402 and VEH0403 (*DfT Light Goods Vehicles (VEH04*), https://www.gov.uk/government/statistical-data-sets/veh04-licensed-light-goods-vehicles).
33 See Braithwaite, A. (2017) *The implications of internet shopping on the growth of the van fleet and traffic activity*. Report for the RAC Foundation, May 2017.

Figure 24: Average mileage driven in LGVs per capita (2011)



Total mileage driven in LGVs (both private and company kept) in 2011 for each area from the MOT project dataset (Version 9), divided by usual resident population (all ages) from the Census (Table KS101). Data is displayed at LSOA / Data Zone level for Great Britain.

Figure 25: Index of the numbers of different types of vehicle licensed in Great Britain relative to 2011



Source: Vehicle Licensing Statistics (2017) table VEH0102[34]

34 DfT All vehicles *(VEH01)*, table VEH0102, https://www.gov.uk/government/statistical-data-sets/all-vehicles-veh01

15. Final Remarks

This report has highlighted a selection of results from a research project aiming to both broaden and deepen our understanding of car ownership and usage patterns in the UK. The motivation for what is termed the 'MOT project' was provided by the first public release, in November 2010, of an anonymised database providing the results for all vehicles of less than 3.5 tonnes taking their MOT test each year. However, this regularly released public dataset, whilst very useful, is limited in that it lacks a precise geographical identifier for each vehicle and contains only certain vehicle characteristics. Also, whilst it provides an odometer reading for each vehicle, using this to calculate annual vehicle mileages presents a complex mathematical challenge. This is due to various issues such as the lack of an MOT test for newer vehicles, inconsistent time intervals between MOT tests, the need to resolve inconsistencies and inaccuracies in the vehicle data, and other challenges involved in tracking individual vehicles through their lifetime.

As part of the MOT project, with the assistance of the Department for Transport (DfT), a privileged data licence was therefore obtained, which enabled the project team to obtain a 'Lower Layer Super Output Area' identifier for each vehicle and a suite of additional vehicle characteristics from the Driver and Vehicle Licensing Agency (DVLA) registered keeper database. Work on this project has also led to the development of a range of techniques for linking the data, cleaning the data and calculating annual mileages. The results in this report demonstrate the power and utility of the subsequent dataset, particularly when linked to other area-level data.

In particular, it has been possible to provide vignettes on spatial variations; to examine differences in patterns according to mileage apportionment across vehicles or people; to demonstrate the importance of using a variety of mileage metrics, each with its own particular usefulness; to show the potential for a better understanding of the differences between private as opposed to company keepership; and to gain a wide variety of insights by examining the car-related data in relation to other variables of interest such as exposure to local pollutants, fuel costs, and income and poverty indicators.

The possibility for further analyses with this data are enormous. This report only scratches the surface of what has already been analysed and what could be explored in further work. Our conclusion from outcomes of the project to date is that the most underexploited potential of this data lies in its ability to offer longitudinal insights into the UK light duty vehicle fleet. As just one example, this could include in-depth analysis of the patterns of uptake of electric vehicles, including their spread through the second-hand market both spatially and over time, and the way in which they are being used.

The ability to study the diffusion of technology, the intensity with which cars are being used, and the relationships between key vehicle parameters such as age, number of keepers, type of keeper, mileage, technology and external factors such as fuel prices and incomes should all lead to more accurate modelling and forecasting of the car market, and of related issues such as traffic, social inclusion and emissions. There is much work to be done in applying sophisticated spatial statistical methods, modelling and visualisation to investigate the underlying causes of the trends observed.

In partnership with the DfT, much progress has also been made to explore options for generating useful mileage estimates and for future releases of an enhanced public dataset. Nevertheless, there are still many challenges to overcome before this becomes a reality. In the meantime, the need for such data has never been greater, given that the car market is currently in a state of flux, with depressed new vehicle sales, uncertainty over the future of diesel, and high environmental stakes placed on the uptake of alternatively fuelled vehicles. As a project team, we will continue to apply our efforts to innovating with this dataset, to finding ways to make it more widely available, and to producing further, hopefully interesting, reports in years to come!

Appendix A: More Details of the Dataset

There have been a number of variants of the MOT project dataset.

In the **Version 8** dataset, vehicle body type was not available, so vehicles were classified according to their test class. Vehicle test classes are shown in Table A.1. Analysis of Class 4/4A vehicles was used as a proxy for analysis of cars. Vehicles were originally included in the dataset if they were recorded as being present in the licensing data for all four quarters from the end of Q2 2010 to the end of Q2 2011. In total, data for 33,528,642 vehicles was extracted. Of these, 29,839,689 had a valid British geographical location and a valid keeper type, so were included in analysis; 25,418,355 were privately owned Class 4/4A vehicles.

Table A.1: Vehicle classes recorded in the MOT test data

Test class	Vehicle description	First test	Required driving licence
Class 1	Motorcycle (engine size up to 200 cm^3)	3 years	AM, P, Q, A1, A2, A
	Motorcycle with sidecar (engine size up to 200 cm^3)	3 years	A1 (no passengers), A2, A
Class 2	Motorcycle (engine size over 200 cm^3)	3 years	A2, A
	Motorcycle with sidecar (engine size over 200 cm^3)	3 years	A2, A
Class 3	Three-wheeled vehicles (up to 450 kg unladen weight)	3 years	AM, A1, A, B1(pre-2013)
	Three -wheeled vehicles (over 450 kg unladen weight)	4 years	A, B1
Class 4	Cars (up to eight passenger seats)	3 years	B
	Motor caravans	3 years	C1, C
	Quads (max unladen weight 400 kg – for goods vehicles 550 kg and max net power of 15 kW)	3 years	AM, B1
	Dual purpose vehicles	3 years	B
	Private hire and public service vehicles (up to eight seats)	3 years	B, C, D1
	Ambulances and taxis	1 year	B, C1
	Private passenger vehicles and ambulances (9 to 12 passenger seats)	1 year	D1, D, C1
	Goods vehicles (up to 3,000 kg design gross weight)	3 years	C1, C, BE
Class 4A	Class 4 vehicles (9 to 12 passenger seats) with a seat belt installation check	n/a	D1, D

Test class	Vehicle description	First test	Required driving licence
Class 5	Private passenger vehicles and ambulances (13 to 16 passenger seats)	1 years	D
	Private passenger vehicles and ambulances (more than 16 passenger seats)	1 years	D
	Playbuses	1 years	D
Class 5A	Class 5 vehicles (13 to 16 passenger seats) with a seatbelt installation check	n/a	D
	Class 5 vehicles (more than 16 passenger seats) with a seatbelt installation check	n/a	D
Class 7	Goods vehicles (over 3,000 kg up to 3,500 kg design gross weight)	3 years	C1, C, BE

Source: https://www.gov.uk/getting-an-mot/mot-test-fees
Note: n/a means not applicable

In the **Version 9** dataset, body type has been used as the primary means of classifying vehicles. Vehicle test class has been used as a secondary classifier for vehicles without a body type field. Vehicles have been included for analysis if they were licensed on 31st December 2010, with a British keeper address and with a calculable annual mileage for 2011 – i.e. excluding vehicles only used for part of 2011.

In total, this dataset comprises 30,245,330 vehicles. 22,909,764 of these were privately-kept cars, with an annual mileage of less than 55,000 miles per year.

In the **Version 10** dataset, vehicles that are in use for part of the year will be included. This will considerably increase the total number of vehicles included in the dataset, and create new challenges for calculating, for example, average annual mileages.

Other Project Publications

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These publications and others are available on the project website: www.MOTproject.net

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