Appendix A - Transport and health JSNA dataset - Peterborough

1 Executive Summary

The 2016-19 Peterborough Health and Wellbeing Strategy identifies Health and Transport Planning as a priority with a specific action of:

- Collecting further joint strategic needs assessment (JSNA) information on transport and health for Peterborough, using locally developed methodologies.

As a response, this report provides background evidence on the link between health and transport and makes use of local data to provide a Peterborough perspective. The report is divided into three sections.

- The first section focuses on active travel (walking or cycling as an alternative to motorised transport for the purpose of making every day journeys), the opportunities it offers to improving health, current levels of walking and cycling and an assessment of infrastructure in Peterborough.
- The second section considers air quality and describes the impact of air quality on health, its link with transport and currents situation in Peterborough.
- The third section briefly discusses the links between access to transport and health and provides information on access time to health services in Peterborough.

The key findings of the report are summarised below:

Active travel

'Active travel' means walking or cycling as an alternative to motorised transport (notably cars, motorbikes/mopeds etc.) for the purpose of making every day journeys. Public transport can also contribute to levels of physical activity, as people who take public transport are likely to walk further than car users – for example, by walking to and from bus stops.

Active travel has an important role to play in improving the health and wellbeing of Peterborough residents by maintaining levels of physical activity. For most people the easiest and most acceptable forms of physical activity are those that can be built into everyday life such as walking and cycling.

Studies show that people who cycle for travel purposes (as opposed to leisure purposes) are four times as likely to meet physical activity guidelines as those who do not and that active commuting confers around a 10% reduction in the risk of developing heart disease and stroke. Further, individuals who commute by bike have half the level of sickness absence (1 day less) per year compared to those who do not cycle. At a city level, only a marginal change in the levels of active commuting can have a significant impact. For example, across a town of 150,000 people, if everyone walked an extra 10 minutes a day, an estimated 30 lives would be saved each year.

There is a clear relationship between the amount of physical activity people do and health. While increasing the activity levels of all adults who are not meeting physical activity recommendations is important, targeting those adults who are significantly inactive i.e. engaging in less than 30 minutes of activity per week, will produce the greatest reduction in chronic disease.

Research indicates that a combination of distance, perceived safety of walking/cycling routes and individual characteristics such as age, gender and access to a car are the most important influences on walking and cycling behaviour.

Peterborough has higher levels of cycling for utility (commuting) and leisure compared to similar local authorities and England.

The 2011 census showed that for journeys of less than 2km (considered achievable by walking), Peterborough residents were twice as likely to cycle compared to England (11% compared to 5%) and less likely to walk (33% compared to 42%). The proportion of people who drove or were a passenger in a car or van was higher in Peterborough compared to England (48% compared to 43%).

For journeys less than 5km (considered achievable by bicycle) Peterborough residents were again more likely to cycle compared to England (9% compared to 5%) and were less likely to walk (16% compared to 24%). The proportion of people who drove or were a passenger in a car or van was again higher in Peterborough compared to England (63% compared to 56%).

Cycling rates for utility purposes in Peterborough are relatively consistent across all age bands at around 5% whereas for England the rate declines after the age of 40. Asian/Asian British residents were less likely to cycle to work (2.1%) compared to the Peterborough average and Irish and White British residents were more likely to cycle. Asian/Asian British residents and residents from other ethnic groups were more likely to travel on foot compared to the Peterborough average (8.5%) while residents from 'white other' ethnic groups were less likely to walk.

The size and layout of Peterborough provides the potential foundations for an 'active' city as at the last census 16000 or 18% of working age residents lived within 2km of their work place (higher than for England) and 40,000 or 45% lived within 5km of their work place (35% nationally).

With new town status in 1967 the city benefitted from new highway infrastructure including the Parkways, which has led to some of the fastest commuting speeds in the country. Although a benefit to Peterborough residents from a commuting and economic perspective, this may also contribute to physical inactivity through greater use of less active forms of travel.

Over the last 3 years the authority has invested in walking and cycling infrastructure with an additional 12 miles of cycle routes. However, the Peterborough City Council Local Sustainable Transport Fund (LSTF) Monitoring Report (2016) identifies further physical barriers to walking and cycling modes across Peterborough including:

- Approximately one third of all walking routes assessed were deemed to be poor. The three with the poorest scores were Fengate, A15 between Thorpe Road and Bishop's Road and St John's Street;
- Only one cycle route in the city was listed as excellent – London Road between Fletton Parkway and Cook Avenue; and
- Several cycle routes are listed as poor – Thorpe Road, Fengate and Lincoln Road.

It should be noted that many other cities would score similarly.

Air quality

As recently as the Nineties it was felt that air pollution was no longer a major health issue in the United Kingdom as legislation had made the great smog's of the Fifties a thing of the past. However, pollutants such as Particulate Matter (PM) and Nitrogen Dioxide (NO2) are still at levels which can harm health.

Stationary road transport including lorries, buses and cars/vans are the primary source of NO2 (especially emissions from diesel light duty vehicles) and PM (engine emissions, tyre and brake wear) in urban areas across the UK.

The National Air Quality Strategy sets air quality objectives or levels for pollutants such as NO2 on the basis of scientific and medical evidence on the health effects of each pollutant, and according to practicability of meeting the standards. There is no statutory requirement to review and assess fine

Particulate Matter (PM2.5) as it is recognised there are no absolute safe levels of exposure. As such any improvement in air quality will have positive health consequences.
Nitrogen Dioxide is monitored across a number site across Peterborough through diffusion tubes, with locations chosen on a risk based approach. Levels of NO2 are within prescribed levels which is likely due to the lower levels of traffic congestion in Peterborough compared to many other cities.

Modelled estimates of PM2.5 levels suggest that long term exposure to PM2.5 in Peterborough contributed to approximately 5% of deaths in 2015, this is similar to England and comparator authorities. It should be noted that in general air pollution contributes a small amount to the cause of death of a large number of exposed individuals, who also have other risk factors (heart disease, lung disease etc), rather than being the main cause of death.

The health effects of air pollution are generally distributed unequally across the population, with the heaviest burden borne by those with greatest vulnerability and/or exposure. The elderly, children and those with cardiovascular and/or respiratory disease are at greater risk from the health effects of air pollution.

Health modelling shows that interventions to increase active travel can result in significantly greater benefits from increased physical activity, compared to direct interventions targeting air quality overall – so greater health benefits will be achieved by people switching to walking and cycling than by switching to electric cars.

Access to transport

Access to transport is an important determinant of health and wellbeing as it is a fundamental enabler to access services and social opportunities.
There are multiple forms of access barriers, or issues that make it more difficult to reach and use health and other key services. The Governments 2003 Social Exclusion Unit report, identified five main barriers in accessing services:

1. The availability and physical accessibility of transport.
2. Cost of transport.
3. Services and activities located in inaccessible places.
4. Safety and security.
5. Travel horizons

Local data focuses mainly on journey times to health services. Analysis undertaken by the Department for Transport (using public transport timetables from 2015) found that the:

1. Average travel time to access a GP by walking or public transport for Peterborough was 8 minutes (range – 5 to 20 minutes). The wards with the highest average travel times were Barnack, Northborough and Bretton South which all had average travel times of just over 20 minutes.
2. Average travel time to access a Hospital by walking or public transport for Peterborough was 40 minutes. This ranged from 12 minute (Bretton North) to 65 minutes (Eye and Thorney).

It should be noted that public transport routes may have changed since this analysis was undertaken.

Local modelling using road traffic data, based on average travel times, found the majority of Peterborough population could access a pharmacy within a 20 minute car journey. A local survey of

35 pharmacies in Peterborough found that (95%) provided home delivery services, enabling those without a car or unable to use public transport access to services.

2 Active travel

2.1 What is Active travel?

'Active travel' (or active transportation or mobility) means walking or cycling as an alternative to motorised transport (notably cars, motorbikes/mopeds etc.) for the purpose of making everyday journeys[1]. Public transport can also contribute to levels of physical activity, as people who take public transport are likely to walk further than car users – for example, by walking to and from bus stops.

2.2 Why should we prioritise active travel?

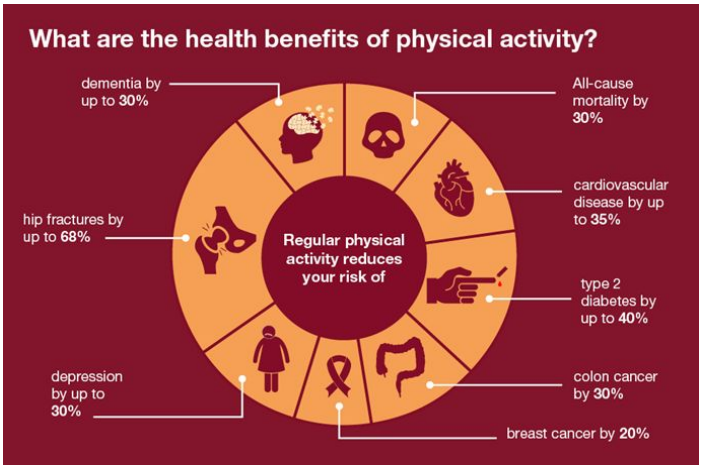
Active transport has an important role to play in improving the health and wellbeing of Peterborough residents by maintaining levels of physical activity. as for most people the easiest and most acceptable forms of physical activity are those that can be built into everyday life such as cycling and walking.

Recent analysis of data from the Active People Survey has shown that people who cycle for travel purposes (i.e. rather than simply for recreation) are four times as likely to meet physical activity guidelines as those who do not[2]

The link between physical inactivity and obesity is well established. With more than half of adults in England currently overweight or obese, everyone can benefit from being more active every day. It is important that physical activity is not, however, framed as just an option for combating obesity. Low physical activity is one of the top 10 causes of disease and disability in England.

Regular physical activity can help to prevent and manage over 20 chronic conditions and diseases, many of which are on the rise and affecting people at an earlier age; 1 in 3 of the working age population have at least 1 long term condition and 1 in 7 have more than one.

Figure 1: Summary of impact of physical activity on the risk of common disease



1 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/523460/Working_Together_to_Promote_Active_Travel_A_briefing_for_local_authorities.pdf

2 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/523460/Working_Together_to_Promote_Active_Travel_A_briefing_for_local_authorities.pdf

https://www.gov.uk/government/publications/health-matters-getting-every-adult-active-every-day/health-matters-getting-every-adult-active-every-day

2.3 Benefits of cycling and walking to health

A wealth of evidence shows walking and cycling to be excellent forms of exercise – free, convenient and beneficial to both physical and mental health.

Active commuting confers around a 10% reduction in the risk of developing heart disease and stroke[3] and people who are at least 'moderately' active have a 30%-40% lower risk of type 2 diabetes[4]. Regular physical activity also reduces the risk of depression and has positive benefits for mental health including reduced anxiety, enhanced mood and higher self-esteem[5]. Walking and cycling are also carbon-neutral methods of transport.

Analysis of the effects of different methods of transport on health conclude that:

- Each additional hour spent travelling in a car per day is associated within a 6% increase in the likelihood of becoming obese[6]
- Each additional kilometre walked per day is associated with a 4.8% reduction in the likelihood of becoming obese.[7]
- Switching from private motor transport to active travel or public transport is associated with a significant reduction in body mass index (BMI)[8]
- Those people who maintain commuting by bike have half the level of sickness absence (1 day less) per year compared to those who did not

Studies[9] examining the relationship between cycling/walking and mortality overtime show that individuals who:

- Walk 168 minutes per week (17 mins twice per day for 5 days) are 11% less likely to die compared to non-walkers.
- Cycle 100 minutes per week (10 minutes twice per day for 5 days) are 10% less likely to die compared to non-cyclists.

If the residents double the level of walking or cycling this increases the protective benefit accordingly e.g. 20 minutes twice per day reduces your risk of dying compared to non-cyclists by 20%.

What is the potential impact on health of increasing active travel at a city level?

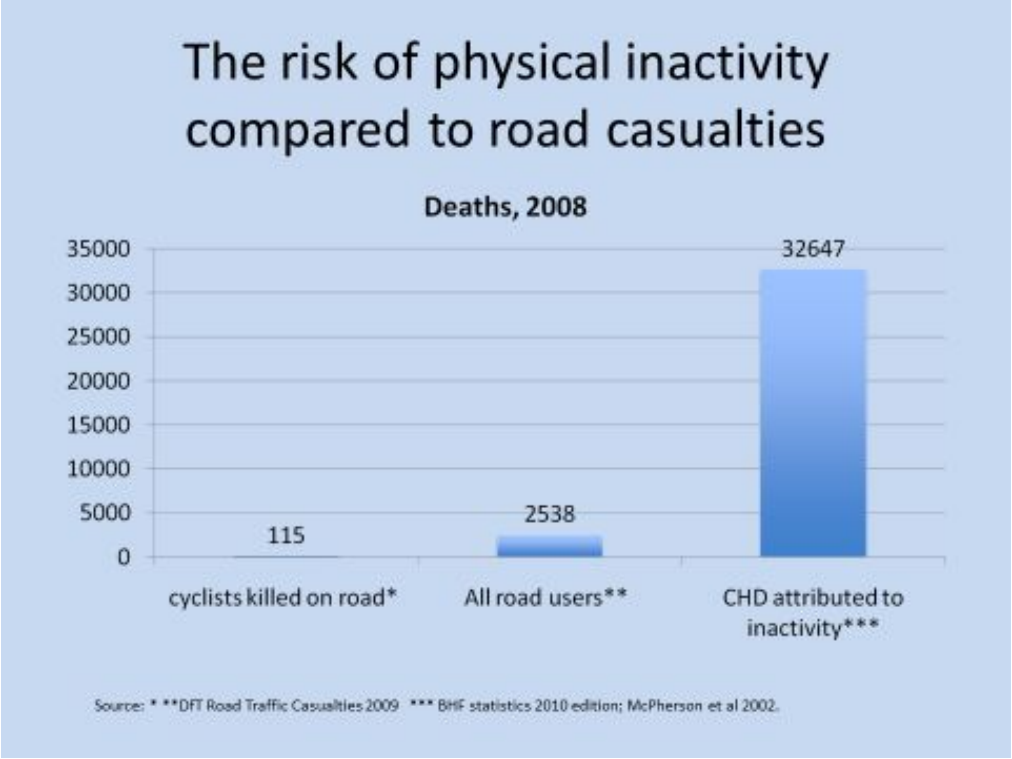
Therefore, at a city level only a marginal change in the levels of active commuting can have a significant impact. For example, across a town of 150,000 people, if everyone walked an extra 10 minutes a day, an estimated 31 lives would be saved each year.

[3] Hamer, M., & Chida, Y, *Active commuting and cardiovascular risk: a meta-analytic review*. Preventative Medicine, 2008;46(1):9-13.
[4] Department of Health, Start Active, Stay Active. 2011. Available at https://www.gov.uk/government/publications/start-active-stay-active-a-report-on-physical-activity-from-the-four-home-countries-chief-medical-officers
[5] Pucher, J., et al, *Walking and Cycling to Health: A Comparative Analysis of City, State, and International Data,* American Journal of Public Health, 2013; 100(10): 1986–1992
[6] 'Start active, stay active: a report on physical activity from the four home countries', Chief Medical Officers (2011), Department of Health.
[7] Frank LD, Andresen MA, Schmid TL Obesity relationships with community design, physical activity, and time spent in cars. (2004) Am J Prev Med 27(2):87–96
[8] Martin A, et al. Impact of changes in mode of travel to work on changes in body mass index: evidence from the British Household Panel Survey. (2015) J Epidemiol Community Health 0:1–9. doi:10.1136/jech-2014-205211
[9] http://www.euro.who.int/__data/assets/pdf_file/0010/256168/ECONOMIC-ASSESSMENT-OF-TRANSPORT-INFRASTRUCTURE-AND-POLICIES.pdf?ua=1

2.4 Risk and perception of risk from active travel

Safety is relevant to the uptake of active transport. The safety of cycling routes and perceived safety of walking/cycling routes have been positively associated with the uptake of active transport, especially in the provision of children cycling to school. In particular, vehicle speed and its effect on perceived safety of walking/cycling routes have been investigated. The actual risk of deaths from cycle related accidents is very small and in fact the benefits outweigh the risks by a ratio of at approx. 10 to 1[10]. The chart below shows the greatest risk by far, relates to heart disease due to inactivity.

Figure 2: Deaths attributable to physical inactivity and road casualties, 2008



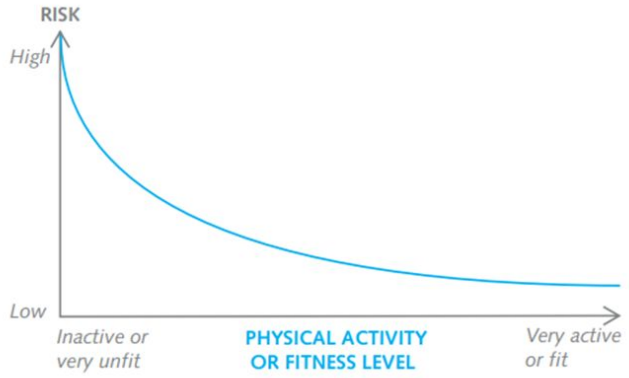
2.5 Groups that benefit the most from increased physical activity levels

Most inactive

There is a clear causal relationship between the amount of physical activity people do and health. While increasing the activity levels of all adults who are not meeting the recommendations is important, targeting those adults who are significantly inactive (i.e. engaging in less than 30 minutes of activity per week) will produce the greatest reduction in chronic disease[11].

[10] Increasing walking and cycling A briefing for Local Authority Directors of Public Health, PHE
[11] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/216370/dh_128210.pdf

Figure 3: Correlation between levels of physical activity and levels of fitness



Source: Department of Health (2004) *At least five a week: Evidence on the impact of physical activity and its relationship to health*. A report from the Chief Medical Officer

Persuading inactive people (those doing less than 30 minutes per week) to become more active could prevent one in ten cases of stroke and heart disease in the UK and one in six deaths from any cause. In fact it's often said that if physical activity was a drug it would be classed as a wonder drug[12].

In addition to those that are most inactive, the following groups also benefit the most from being more active.

Those living in areas of high deprivation: areas with higher levels of deprivation tend to have lower levels of general physical activity[13]. Cycling proficiency is also linked to where people live, with those in more deprived neighbourhoods less likely to report being able to cycle[14]. It is, therefore, important that opportunities to be physically active are provided in disadvantaged areas which are safe and free or low cost[15].

However, it is worth noting that those households in the lowest quintile for income walk the most, perhaps due to lower access to more expensive forms of travel such as a car.

Groups without a culture of active transport: white adults are more likely than those from black and minority ethnic groups to say that they can cycle[16].

Older people: walking levels tend to decrease in older age groups with levels falling after the age of 40. Increased activity amongst this group has the most immediate benefits in terms of health and well-being, as well as aiding healthy ageing, lessening the risk of trips and falls, and increasing the likelihood of independent living, bringing potential benefits to the NHS and social care provision.

[12] https://www.nhs.uk/Livewell/fitness/Pages/whybeactive.aspx 'if exercise were a pill, it would be one of the most cost-effective drugs ever invented'
[13] UKActive, *Turning the Tide of Inactivity*. 2014. Available at http://www.ukactive.com/turningthetide/
[14] Department for Culture, Media and Sport, *Taking part 2011/12 quarter 3: statistical release*, 2012. Available at https://www.gov.uk/government/statistics/taking-part-2011-12-quarter-3-statistical-release
[15] Department of Health, *Health Survey for England*, 2004. Available at http://webarchive.nationalarchives.gov.uk/+/www.dh.gov.uk/en/publicationsandstatistics/publishedsurvey/healthsurveyforengland/healthsurveyresults/index.htm
[16] Department for Culture, Media and Sport, *Taking part 2011/12 quarter 3: statistical release*, 2012. Available at https://www.gov.uk/government/statistics/taking-part-2011-12-quarter-3-statistical-release

Engaging in physical activity carries very low health and safety risks for older adults[17]. In contrast, the risk of poor health as a result of inactivity is very high[18].

2.6 What factors affect walking and cycling levels?

Travel choices are often influenced by behaviour and the environment, with home location often limiting available travel choices.

Environmental factors

Evidence shows that distance was the most consistent environmental influence on walking behaviour[19] with a similar effect for cycling[20]. Compact communities with easy access to local shops, services, and public transport stops and better street connectivity help adult residents walk more for transport[21]. This has been echoed in recent research where walking for transport was associated with a supportive infrastructure, availability of local amenities and general environment quality whereas cycling for transport was associated with street connectivity[22].

Van Dyck et al (2012)[23] produced a 'cyclability' index which examined environmental factors such as: proximity to destinations, good cycling facilities, perceiving difficulties in parking near local shopping areas, and perceived aesthetics on transport-related cycling across metropolitan areas in the USA, Australia and Belgium. The study found a consistent, positive correlation between transport-related cycling and the cyclability index with an increase of approximately 11% in transport-related cycling per unit increase.

Commute of children to school

Whether children actively commute to school may be determined by parents' perception of safety of the mode of transport, lack of time in the morning and social factors such as no other children to walk with[24]. Furthermore 'walk to school' interventions involving educational lessons and goal setting tasks aimed at eight to nine year olds have not shown to increase walking to school[25], highlighting the importance in influencing parents' behaviour and perceptions.

In summary, research indicates that the combination of distance, perceived and actual safety concerns, individual characteristics such as age, gender were the most important consistent influences on walking and cycling behaviour.

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[17] Hamer M., et al, *Taking Up Physical Activity in Later Life and Healthy Ageing: the English Longitudinal study of Ageing'*. British Journal of Sports Medicine, 2013; **48**:239-243 doi:10.1136/bjsports-2013-092993.

[18] British Heart Foundation National Centre for Physical Activity and Health. *Physical activity for older adults (65 + years) Evidence Briefing,* 2012. Available at http://www.bhfactive.org.uk/older-adults/index.html

[19] Saelens B, Handy S, *Built Environment Correlates of Walking: A Review*. Medicine and Science in Sports and Exercise. 2008;40(7S):S550-S66.

[20] Panter, J.R, Jones, A.P., van Sluijs, E.M. Griffin, S.J, *Attitudes, social support and environmental perceptions as predictors of active commuting behaviour in schoolchildren*. Journal of Epidemiology and Community Health, 2010;***64:****41-48*.

[21] T Sugiyama, E Leslie, B Giles-Corti, N Owen, *Associations of neighbourhood greenness with physical and mental health: do walking, social coherence and local social interaction explain the relationships? J Epidemiol Community Health,* 2008;**62**:e9 doi:10.1136/jech.2007.064287.

[22] Adams, E, J., et al, *Correlates of walking and cycling for transport and recreation: factor structure, reliability and behavioural associations of the perceptions of the environment in the neighbourhood scale (PENS*), *International Journal of Behavioral Nutrition and Physical Activity,* 2013, 10:87 doi:10.1186/1479-5868-10-87.

[23] Van Dyck et al, *Perceived neighborhood environmental attributes associated with adults' transport-related walking and cycling: Findings from the USA, Australia and Belgium*, *International Journal of Behavioral Nutrition and Physical Activity,* 2012, **9**:70 doi:10.1186/1479-5868-9-70.

[24] Jo Salmon, Louisa Salmon, David A. Crawford, Clare Hume, and Anna Timperio, *Associations Among Individual, Social, and Environmental Barriers and Children's Walking or Cycling to School*. American Journal of Health Promotion, 2007: November/December 2007, Vol. 22, No. 2, pp. 107-113.

[25] David McMinn et al, *Predicting active school travel: The role of planned behavior and habit strength*, International Journal of Behavioural Nutrition and Physical Activity, 2012;2012; 9: 65.

2.7 Local Data: what do we know about levels of physical activity and active travel in Peterborough?

2.7.1 Why do we need to increase the level of active travel in Peterborough

Increased levels of active travel and commuting in Peterborough would have a significant impact on health because of the poor health outcomes in the area, including the:

- Higher rate of early deaths (under 75) due to heart disease and stroke.
- Gap of 8.4 years in life expectancy for males between Peterborough's most deprived areas and least deprived; for females, this gap is 6.1 years.
- Higher rates of excess weight (overweight and obese) amongst adults.

2.7.2 General physical activity in Peterborough

Sixty percent of adult Peterborough residents in 16/17 achieved the recommended 150+ minutes of moderate intensity exercise or equivalent per week, which is similar to England and 4th highest out of comparator (similar) local authorities. Just over a quarter (26%) of all adults were deemed to be inactive (< 30 moderate intensity equivalent minutes per week) which is similar to the England average.

Figure 4: Peterborough Physical Activity Profile – Key Indicators

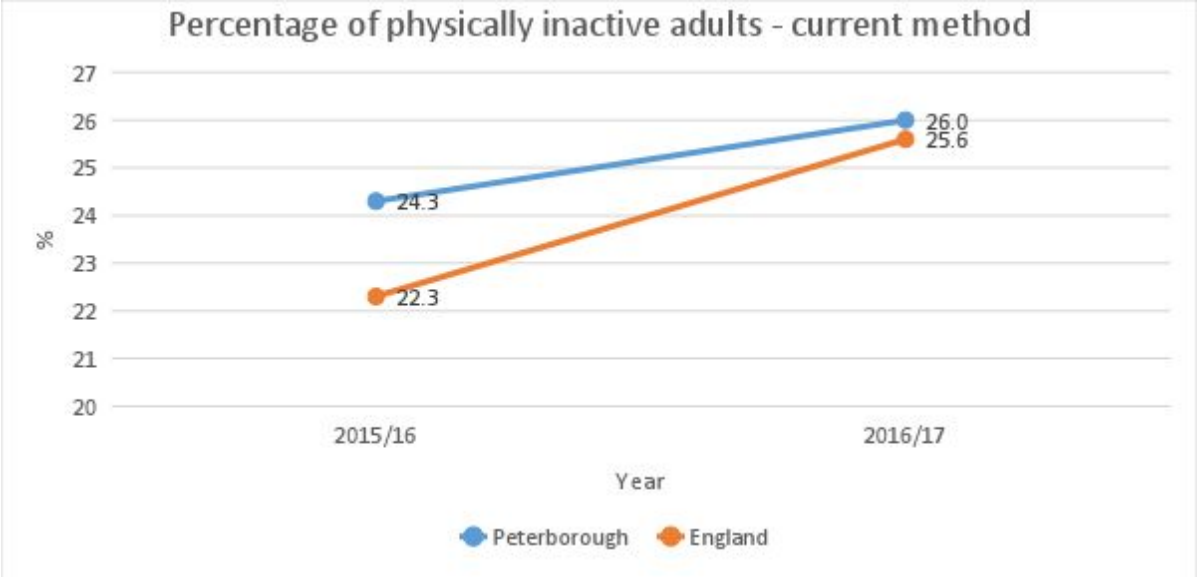
Indicator	Time Period	Peterborough Value	England Value	Peterborough Status	Peterborough Trend	Peterborough CIPFA Ranking (1=Best, 16=Worst)
Percentage of physically active adults (150+ moderate intensity equivalent minutes per week)	May 2016 - Apr 2017	59.9	60.6	Statistically similar to England	▼	4
Percentage of physically inactive adults (< 30 moderate intensity equivalent minutes per week)	May 2016 - Apr 2017	26.0	25.6	Statistically similar to England	▲	2
Percentage of 15 year olds physically active for at least one hour per day, seven days per week	2014-15	12.7	13.9	Statistically similar to England	First data point	10
Percentage of 15 year olds with a mean daily sedentary time in the last week of over 7 hours per day	2014-15	71.3	70.1	Statistically similar to England	First data point	9

Source: Public Health Outcomes Framework Physical Activity Profiles & Active Lives Survey, Sport England

Key:

In 2015/16 the percentage of inactive adults in Peterborough was statistically significantly higher (24.3%) compared to England and although it increased further in 2016/17 to 26.0%, the increase in the national rate from 22.3% to 25.6%, meant the rate is now similar to the England average (see figure 5).

Figure 5: Percentage of adults achieving less than 30 minutes of physical activity per week, Peterborough, 2015/16 – 2016/17



Source: Public Health Outcomes Framework Physical Activity Profiles & Active Lives Survey, Sport England

National data show that the rate of inactivity among adults (undertaking less than 30 minutes of physical activity per week) is higher in Black & Ethnic Minority (BME) groups than in the 'white' ethnicity group. 17.5% of the Peterborough population self-identified as being of BME ethnicity in the 2011 Census, statistically significantly higher than the England percentage of 14.6%.

Figure 6: Percentage of adults achieving less than 30 minutes of physical activity per week, England, 2015/16, split by Ethnicity

Source: Public Health Outcomes Framework Physical Activity Profiles, URL:
https://fingertips.phe.org.uk/profile/physical-activity/data#page/0

2.7.3 Levels of cycling and walking in Peterborough (all reasons for exercise)

In 2014/15 Peterborough had the highest percentages of adults who undertook any cycling once per month, once per week, three times per week or five times per week among its nearest socio-economic neighbours (similar local authorities) and was statistically significantly better than England for all of these indicators.

The rate of walking was lower compared to some of our comparator authorities and statistically similar to England average.

Figure 7: Cycling & Walking for any reason, Peterborough & Nearest Socio-Economic Neighbours

	Area						
Indicator (All Reasons for Cycling/Walking)	Peterborough	Thurrock	Swindon	Milton Keynes	Coventry	Bolton	England
Percentage of adults cycling at least once per week, 2014/15	15.2	6.8	11.3	9.0	8.2	6.5	9.5
Percentage of adults cycling at least three times per week, 2014/15	8.6	1.2	5.4	4.2	3.7	3.1	4.4
Percentage adults cycling at least five times per week, 2014/15	5.1	0.7	3.7	2.0	3.6	1.1	2.6
Percentage of adults cycling at least once per month, 2014/15	25.1	13.0	16.7	15.4	12.9	10.7	14.7
Percentages of adults walking at least once per week, 2014/15	77.7	77.5	76.8	79.4	83.3	77.4	80.6
Percentages of adults walking at least three times per week, 2014/15	59.5	58.0	55.0	61.4	67.4	61.0	61.8
Percentages of adults walking at least five times per week, 2014/15	48.8	48.8	43.1	47.7	58.0	50.1	50.6
Percentages of adults walking at least once per month, 2014/15	84.1	82.8	84.3	82.9	88.4	83.5	86.3

Source: Active people survey

2.7.4 Levels of cycling and walking for utility (commuting)

In 2014/15 Peterborough also had some of the highest percentages of adults cycling for utility (commuting) once per month, once per week, three times per week or five times among its its nearest socio-economic neighbours (similar local authorities) and was statistically significantly better than England for all of these indicators.

The rate of walking for utility was again lower compared to some our similar authorities and statistically similar to England average.

Figure 8: Cycling & Walking for utility only, Peterborough & Nearest Socio-Economic Neighbours

	Area						
Indicator (Cycling/Walking for Utility Only)	Peterborough	Thurrock	Swindon	Milton Keynes	Coventry	Bolton	England
Percentage of residents aged 16+ cycling at least once per week, 2014/15	7.4	2.6	5.0	4.1	4.2	1.9	4.5
Percentage of residents aged 16+ cycling at least three times per week, 2014/15	5.2	1.2	4.3	2.3	3.2	1.0	2.6
Percentage of residents aged 16+ cycling at least five times per week, 2014/15	2.9	0.7	2.5	1.7	2.0	0.4	1.5
Percentage of residents aged 16+ cycling at least once per month, 2014/15	12.6	5.2	7.5	6.3	8.8	2.5	6.5
Percentages of residents aged 16+ walking at least once per week, 2014/15	48.3	51.6	47.1	50.4	55.9	46.4	53.2
Percentages of residents aged 16+ walking at least three times per week, 2014/15	35.4	38.8	30.6	35.2	41.7	32.5	36.4
Percentages of residents aged 16+ walking at least five times per week, 2014/15	25.9	28.5	20.4	19.8	32.0	23.2	24.6
Percentages of residents aged 16+ walking at least once per month, 2014/15	55.8	57.6	56.8	56.5	62.9	52.9	60.4

Source: Active people survey

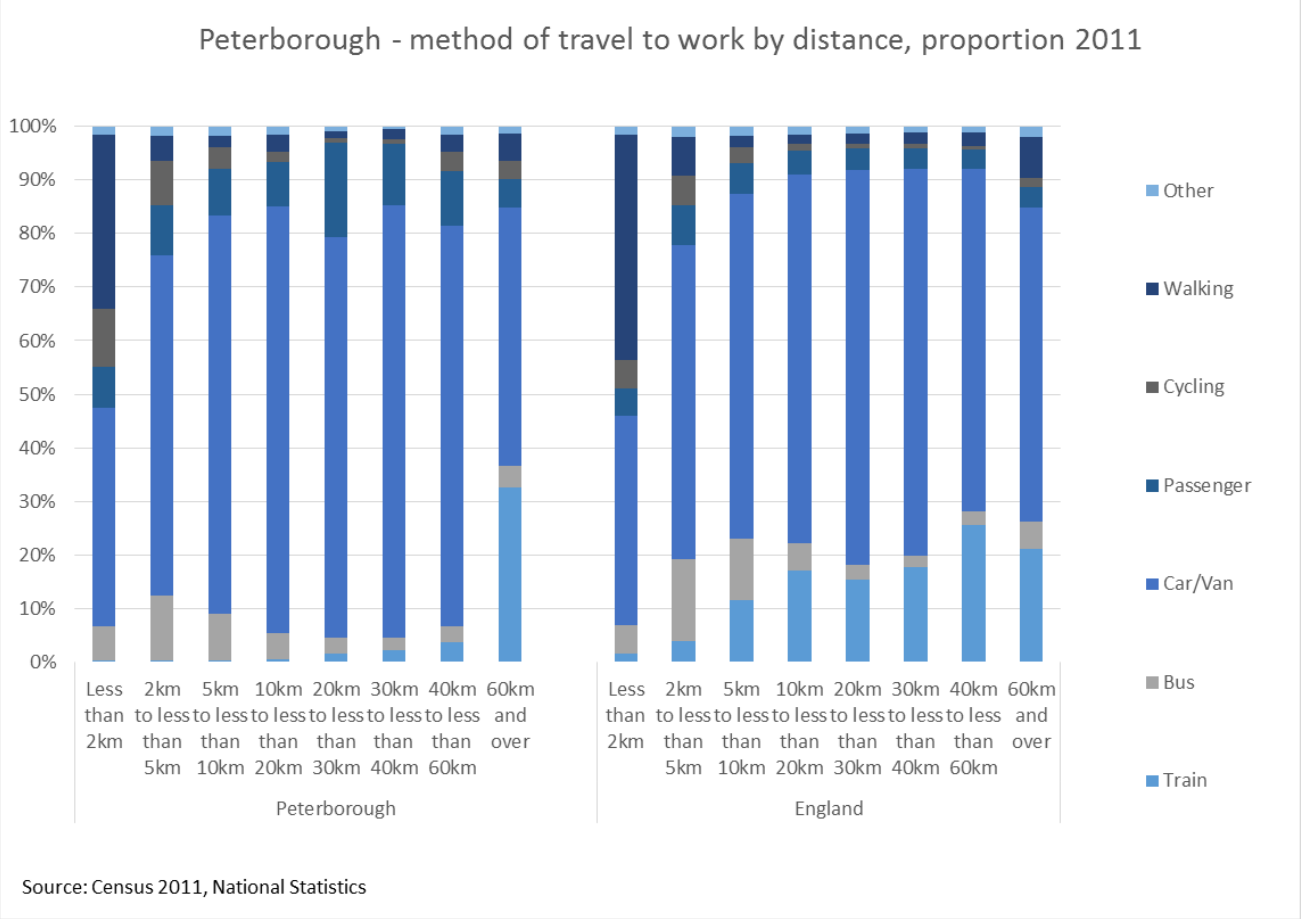
2.7.5 2011 Census – Travel to work

Travel to work data from the 2011 census provides a more detailed picture of active travel in Peterborough and takes into account the distance residents travel to work. Journeys of <2km are considered walkable (about 20 minutes at 5km per hour) while journeys up to 5km (20min at 15 km per hour) are considered achievable by bicycle.

For journeys less than 2km Peterborough residents were twice as likely to cycle compared to England (11% compared to 5%) and were less likely to walk (33% compared to 42%). The proportion of people driving or a passenger in a car or van was higher in Peterborough compared to England (48% compared to 43%).

For journeys less than 5km Peterborough residents were again more likely to cycle compared to England (9% compared to 5%) and were less likely to walk (16% compared to 24%). The proportion of people driving or a passenger in a car or van was again higher in Peterborough compared to England (63% compared to 56%).

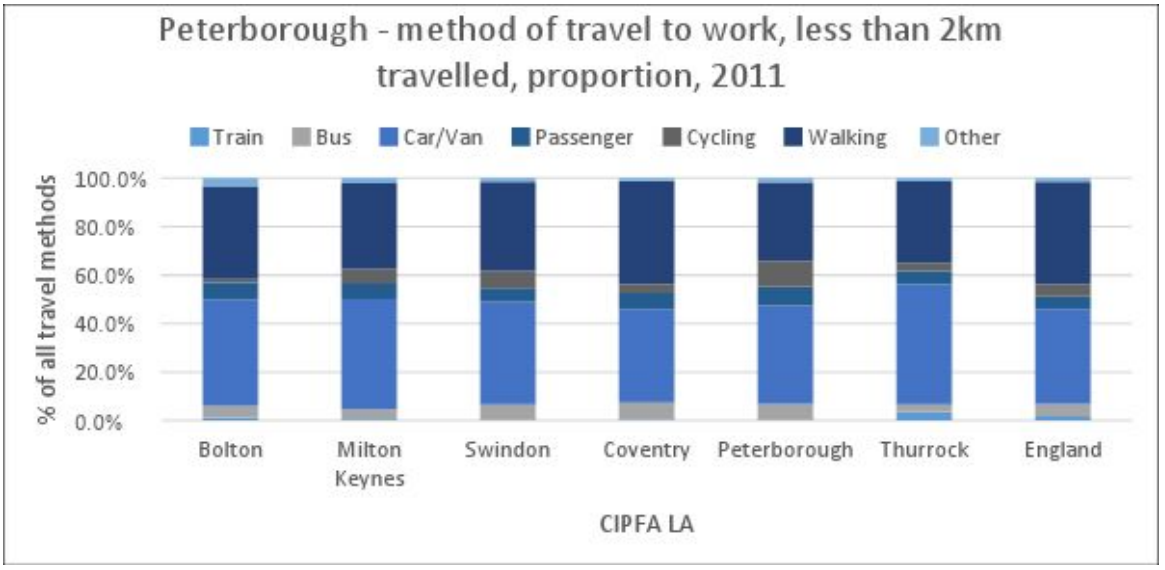
Figure 9: Peterborough – Method of Travel to Work by Distance, 2011



Source: Census 2011, National Statistics

When benchmarking against comparator authorities Peterborough had higher rates of commuting by bicycle and lower levels of walking

Figure 10: Peterborough – Method of Travel to Work, <2km, 2011



If you take all forms of travel which incorporate active element e.g. walking, cycling and public transport (this includes walking to and from stations and bus stops) then Peterborough has lower total levels of active commuting compared to England for journeys <2km (50% compared to 54%) and < 5km (35% compared to 43%).

Achieving the same levels of non-car travel as England (based on 2011 census) would lead to:

- Journeys <2km – 690 less people driving to work.
- Journeys <5km – 1770 less people driving to work.

Figure 11: Methods of Travel to Work for journeys <2km

Area	Train, underground, metro, light rail or tram	Bus, minibus or coach	Driving a car or van	Passenger in a car or van	Bicycle	On foot	All other methods of travel to work	*All active forms of travel
Peterborough	0.3%	6.4%	40.7%	7.7%	10.7%	32.5 %	1.6%	50.0%
England	1.5%	5.2%	39.2%	5.1%	5.2%	42.2 %	1.4%	54.2%

Source: 2011 Census

*Bus, train, Bicycle and on foot

Figure 12: Method of Travel to Work for journeys <5km

Area	Train, underground, metro, light rail or tram	Bus, minibus or coach	Driving a car or van	Passenger in a car or van	Bicycle	On foot	All other methods of travel to work	*All active forms of travel
Peterborough	0.3%	9.7%	54.4%	8.7%	9.3%	15.8%	1.8%	35.1%
England	2.8%	10.5%	49.4%	6.4%	5.4%	23.8%	1.7%	42.5%

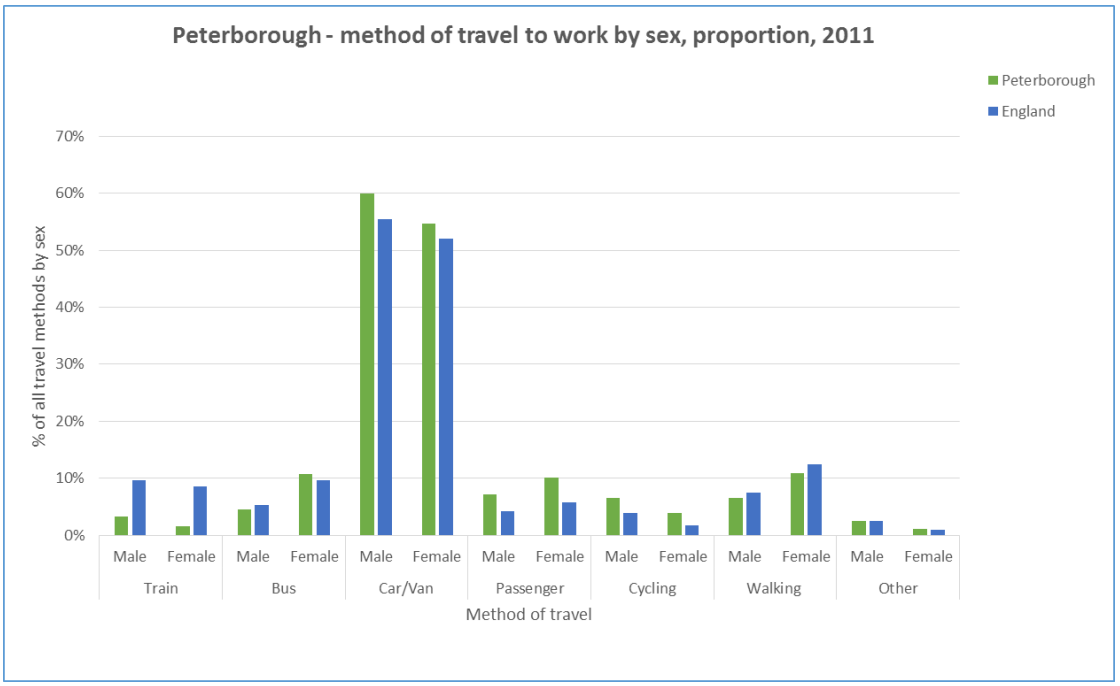
Source: 2011 Census

* Bicycle, walking and public transport

Gender

A greater percentage of females (11%) undertake journeys to work by walking in comparison to men (7%) in Peterborough, which is similar to the pattern observed nationally (12% females compared to 7% males). Whilst the percentage of males cycling is higher than for females.

Figure 13: Peterborough – Method of Travel to Work by Sex, 2011

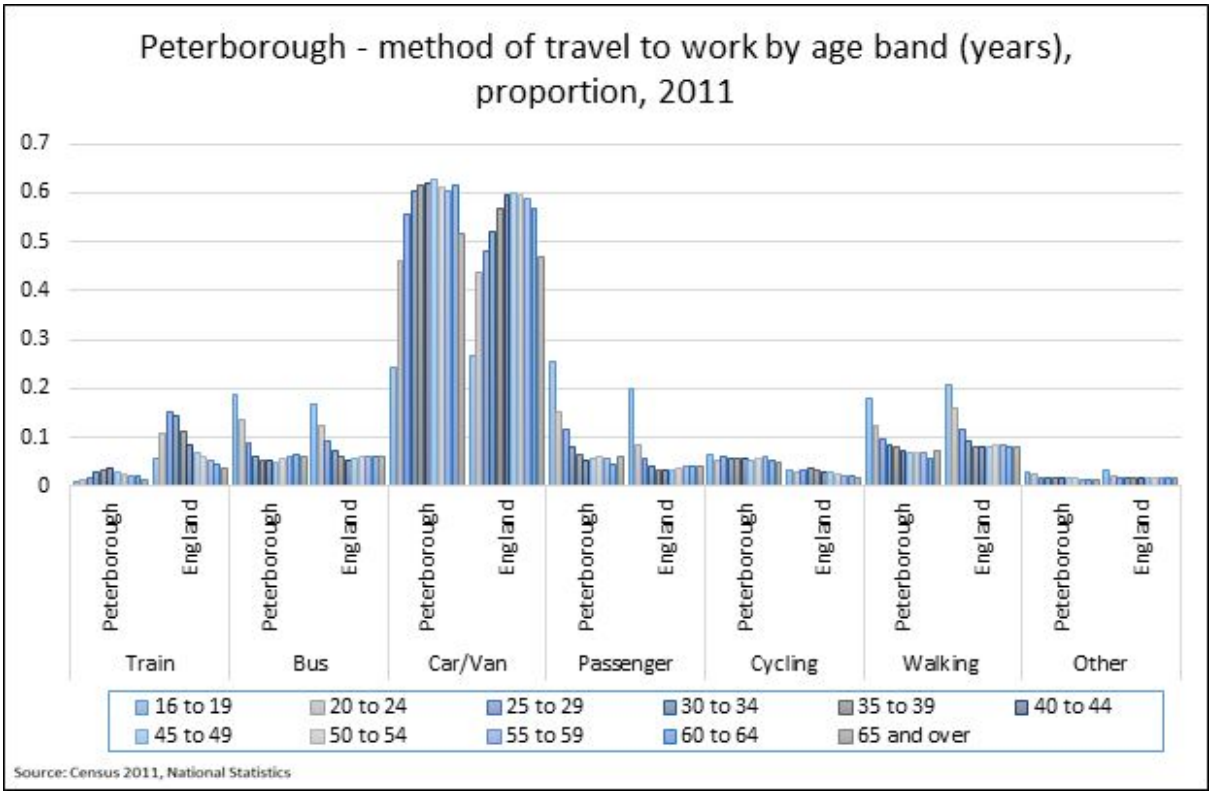


Source: Census, 2011

Age

The proportion of people that walk to work decreases between the ages of 16 and 40 years and then stays relatively stable for both Peterborough and nationally. Cycling rates in Peterborough are relatively consistent across all age bands at around 5%. However, cycling rates for England show a decline after the age of 40. Car usage increases with age, with a notable increase between 16-19 and 20-24 years, which ties in with the legal age limit for driving. Bus usage decreases with age but increases again in people aged 50 years onwards. There is an apparent pattern of young people aged 16-19 years being passengers to get to work.

Figure 14: Peterborough – Method of Travel to Work by Age Band (Years), 2011



Ethnicity

The ethnic group with the largest percentage of residents travelling less than 5km to work was Asian/Asian British (52.0%) whilst the ethnic group with the largest percentage of residents travel 10km or more to get to work was 'Other White' which includes Estonian, Latvian, Lithuanian and Polish residents (28.5%).

Figure 15: Distance travelled to work by ethnicity, percentages, Peterborough, Census 2011

	Distance Travelled (Observed Numbers)						
Ethnic Group	Less than 2km	2km to less than 5km	5km - 10km	>10km	Mainly Work From Home	Other	Total
English/Welsh/Scottish/Northern Irish/British	17.3%	28.0%	19.2%	19.9%	8.8%	6.7%	100.0%
Other White	19.3%	23.9%	12.7%	28.5%	4.6%	10.9%	100.0%
Asian/Asian British	26.2%	25.8%	11.8%	19.4%	8.7%	8.2%	100.0%
Black/African/Caribbean/Black British	15.9%	26.9%	14.3%	25.7%	8.3%	8.9%	100.0%
Mixed/multiple ethnic group	19.0%	26.3%	17.3%	21.8%	7.6%	8.1%	100.0%
Other ethnic group	21.2%	22.9%	9.2%	28.4%	6.7%	11.6%	100.0%
Irish	16.7%	27.2%	14.3%	19.5%	12.4%	9.9%	100.0%
Total	18.4%	27.2%	17.4%	21.3%	8.2%	7.5%	100.0%

Source: Nomis/Census 2011, LC7202EW- Distance travelled to work by ethnic group

There was considerable differences in travel mode by ethnic group which may reflect the distance travelled to work.

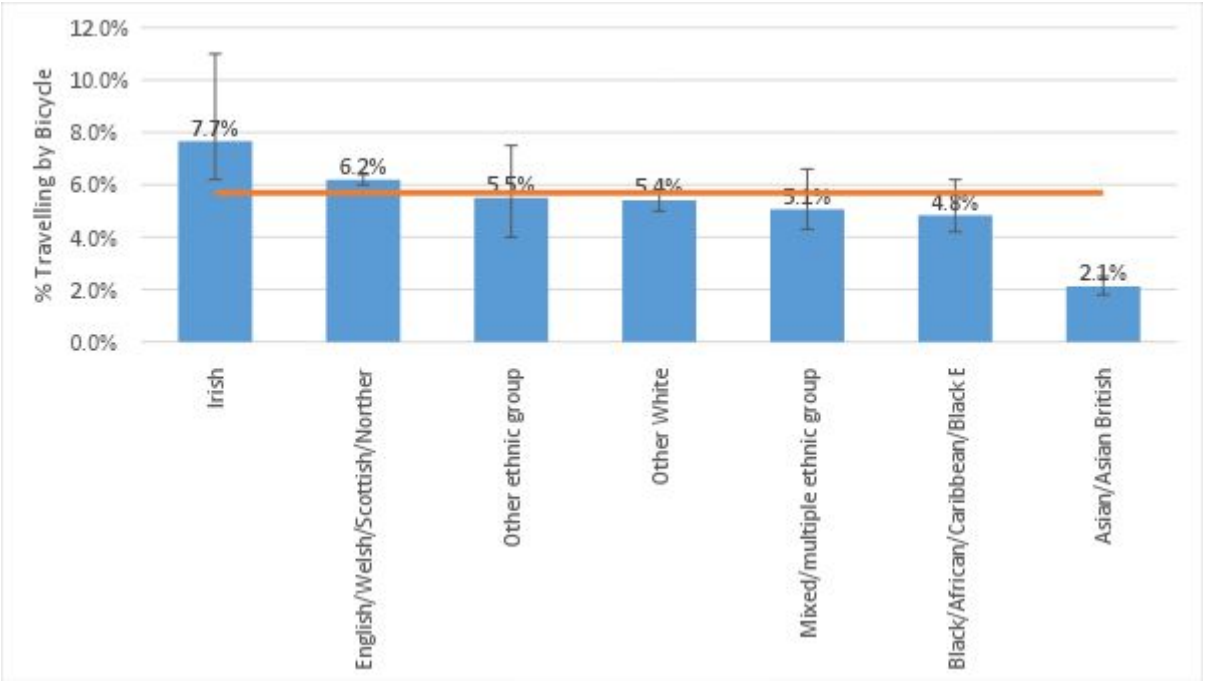
Figure 16: Method of travel to work by ethnicity, percentages, Peterborough, Census 2011

	Method of Travel to Work (Percentages)								
Ethnicity	**Driving a car or van**	**On foot**	**Passenger in a car or van**	**Work mainly at or from home**	**Bus, minibus or coach**	**Bicycle**	**Train, underground, metro, light rail or tram**	**All other methods of travel to work**	**Total**
English/Welsh/Scottish/Northern Irish/British	60.8%	8.1%	6.1%	8.8%	6.0%	6.2%	2.5%	1.5%	100.0%
Other White	46.1%	7.7%	20.2%	4.6%	13.1%	5.4%	1.1%	1.6%	100.0%
Asian/Asian British	52.3%	12.6%	10.5%	8.7%	6.4%	2.1%	2.9%	4.4%	100.0%
Black/African/Caribbean/Black British	52.4%	8.0%	6.0%	8.3%	13.4%	4.8%	5.9%	1.2%	100.0%
Mixed/multiple ethnic group	47.7%	10.1%	12.0%	7.6%	14.0%	5.1%	2.0%	1.7%	100.0%
Other ethnic group	53.9%	11.1%	8.6%	6.7%	8.2%	5.5%	3.1%	2.8%	100.0%
Irish	50.2%	10.8%	6.3%	12.4%	7.0%	7.7%	4.7%	1.0%	100.0%
Peterborough Total	**57.5%**	**8.5%**	**8.5%**	**8.2%**	**7.3%**	**5.7%**	**2.5%**	**1.8%**	**100.0%**

Source: Nomis/Census 2011, DC7201EW- Method of travel to work by ethnic group

Asian/Asian British residents were less likely to cycle to work (2.1%) compared to the Peterborough average whilst Irish and White British residents were more likely to cycle.

Figure 17: Percentages of residents travelling to work via bicycle by ethnicity, Peterborough, Census 2011

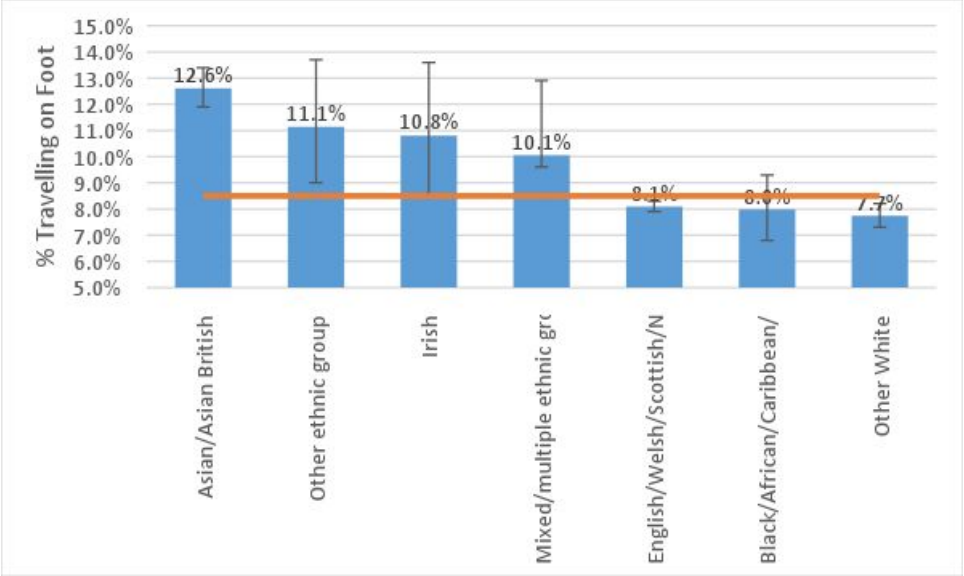


Source: Nomis/Census 2011, DC7201EW- Method of travel to work by ethnic group

Orange line = Peterborough average

Asian/Asian British residents and residents from other ethnic groups were more likely to travel on foot compared to the Peterborough average (8.5%). Conversely, residents from a white other ethnic group were less likely to travel on foot.

Figure 18: Percentage of residents travelling to work on foot by ethnicity, Peterborough, Census 2011



Source: Nomis/Census 2011, DC7201EW- Method of travel to work by ethnic group

2.8 Road Safety

Peterborough has lower rates of Killed and seriously Injured*[26] per 100 million vehicle km travelled than Great Britain, although Peterborough has a markedly higher rate of 'slight' injuries than observed nationally which contributes towards a higher overall rate of 42.5/100 million km travelled compared to 36.5/100 million km travelled across all of Great Britain (figure 19 below).

Figure 19: Casualties per 100 million Vehicle km Travelled, 2015, Peterborough, Cambridgeshire & Great Britain

Area	KSI	Slight	Total (may not sum due to rounding)
Peterborough	3.6	39.0	42.5
Cambridgeshire	3.7	20.4	24.1
Great Britain	4.7	31.9	36.5

Source: Cambridgeshire & Peterborough Road Safety Partnership, Annual Statistics Summary 2015

Data are available up to 2015 for the vehicle type involved in Peterborough KSI and 'slight' injury incidents. The strong majority (68%) of all incidents involved slight injuries within a car, with a further 13% attributable to slight injuries where the vehicle type was pedal cycle (figure 20 below). Twenty percent of KSIs were among cyclists and pedestrians.

[26] The definition of 'killed' within this context is 'a human casualty who dies within 30 days after collision due to injuries received in the crash' whereas the definition of 'seriously injured' in the UK covers injury resulting in a person being detained in hospital as an in-patient, as well as all injuries causing fractures, concussion, internal injuries, crushing, burns, severe cuts, and severe general shock. 'Slight injury' refers to sprains (including neck whiplash injuries), bruising, minor cuts and mild shock requiring roadside assistance.

Figure 20: KSI & Slight Injury Observed Incidents in Peterborough by Vehicle Type, 2015

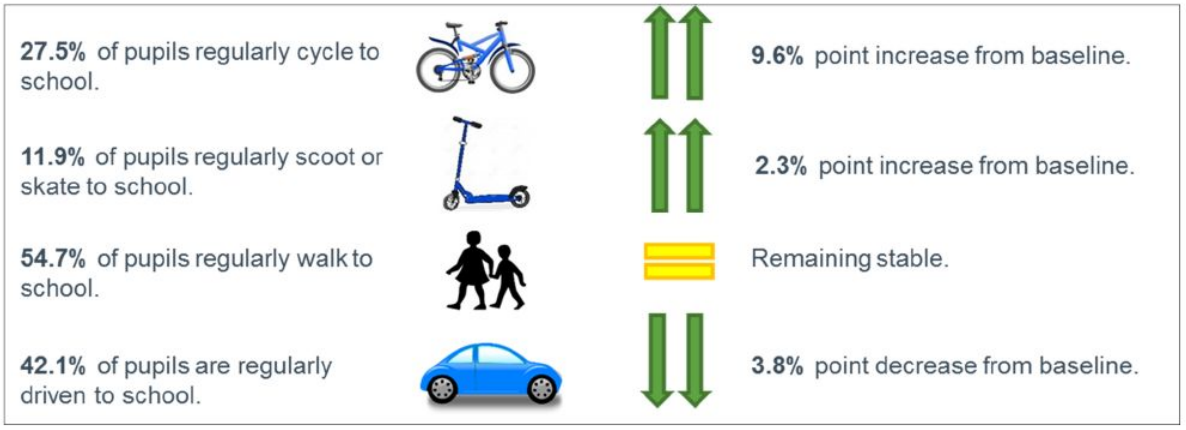
Vehicle Type	Fatal	Serious	Slight	Total	% of Total
Pedal Cycle	1	12	86	99	13%
Car	3	27	506	536	68%
Motorcycle	0	12	38	50	6%
Goods Vehicle	0	1	27	28	4%
Pedestrian	0	7	45	52	7%
Other	0	3	19	22	3%
Total	4	62	721	787	100%

Source: Cambridgeshire & Peterborough Road Safety Partnership, Annual Statistics Summary 2015

2.9 Travel to School

Peterborough City Council has been operating the Bike It Programme for schools which works alongside schools to increase the number of young people travelling to school actively and / or sustainably with an emphasis on increasing cycling levels, reducing car travel and creating a culture of active travel within school which can be sustained. Between 2014 and 2015, the Bike It officers in Peterborough have delivered approximately 200 activities across all schools in the city, resulting in them engaging with 14,907 attendees. Figure 21 below shows the key outcomes of the Bike It programme.

Figure 21: Key Outcomes of PCC Bike It Programme



Data from a number of schools which submitted Travel Plans to PCC between 2006 and 2015 has also been analysed to obtain average mode share change across schools in the city. The results of this analysis are presented in figure 22.

Figure 22: School Travel Plan Mode Data

Mode	Average Mode Share Change (%)
Cycling	7.5
Walking	-10.8
Scoot / Skate	7.7
Park & Stride	4.5
Bus	-1.0
Train	0.1
Car	-7.6

Source: LSTF Data Monitoring Report, Peterborough City Council, 24 February 2016

2.10 Travel to work

Feedback from workplace travel surveys indicates a prevalent perception that active travel and other sustainable transport alternatives are intimidating, impractical or inconvenient. Previous experience shows that, by addressing these concerns, travel behaviour change programmes have the potential to inspire people to use sustainable transport and create measurable change in local transport patterns, as illustrated during our 2014/15 programme, where specific bespoke workplace interventions were deployed (e.g. my Personal Travel Plan (myPTP)) and as a result employees reduced their overall single occupancy vehicle (SOV) car mode share by nearly 6%, yielding a Benefit Cost Ratio (BCR) of 9.87. This has also potentially helped to reduce the overall mortality rate by 2% attributed to increased cycling and an 11% reduced risk of mortality for walker's vs non-walker's, calculated using the WHO HEAT assessment tool.

Peterborough has been delivering a programme to encourage smarter travel choices for over 10 years. In 2004, as one of three Sustainable Travel Demonstration Towns, Peterborough was awarded £5m to fund measures to encourage behavioural change towards sustainable modes of travel. Over a five year period, the Travelchoice project achieved:

- 9% reduction in car journeys
- 12% increase in cycling
- 35% increase in public transport
- 14% increase in walking

2.11 Peterborough walking and cycling environment

2.11.1 Size of city and proximity to workplace

The size of Peterborough means there is substantial potential for active travel as at the last census (2011):

- 16,000 or 18% of working age residents lived within 2km of their work place, which is higher than for England (16.6%).
- 40,000 people or 45% of working age residents lived within 5km of their work place compared to 35% nationally.

This provides the basic building blocks for creating a city where active forms of transport could be the default.

2.11.2 The environment

Peterborough was ranked by the Campaign for Better Transport's 2014 'Car Dependency Scorecard 2014' (the most recent such analysis) as the most car-dependent city in the UK[27]. This likely reflects the fact that In 1967 Peterborough was declared a new town which benefitted with highways infrastructure including the Parkway. As a result, Peterborough is recognised as having some of the fastest commuting speeds in the country.

As noted in Figure 23 below, Peterborough scored poorly for all four assessed criteria; accessibility and planning (ranked 27th/29), cycling and walking as alternatives to driving (28th/29), bus/train quality and uptake (28th/29) and driving and car use (28th/29).

Figure 23: Car Dependency Analysis, Campaign for Better Transport, 2014

Source: 'Car Dependency Scorecard 2014', Campaign for Better Transport, 2014, URL:
http://www.bettertransport.org.uk/sites/default/files/pdfs/Car_Dep_Scorecard_2014_LOW_RES.pdf

[27] http://www.bettertransport.org.uk/sites/default/files/pdfs/Car_Dep_Scorecard_2014_LOW_RES.pdf

Barriers to increasing levels of walking and cycling in Peterborough

There are a number of potential barriers to active travel in Peterborough that prevent individuals from travelling sustainably. The Peterborough Council Local Sustainable Transport Fund (LSTF) Monitoring Report (2016) focuses on the barriers which need to be overcome in order to promote sustainable travel. Walk and Cycle friendly mapping outputs were analysed to assess the quality of on-road cycling and walking routes in Peterborough, as shown in Figure 24 & Figure 25. The Walk and Cycle friendly projects were carried out to consider specifically the level of service quality along key commuting corridors into and out of the city. The studies evaluated particular physical barriers to walking and cycling modes and developed practical action plans to prioritise future capital spending on infrastructure.

In summary the outputs showed that:

- Approximately one third of all walking routes assessed are deemed to be poor. The three with the poorest score are Fengate, A15 between Thorpe Road and Bishop's Road and St John's Street;
- Only one cycle route in the city is listed as excellent – London Road between Fletton Parkway and Cook Avenue; and
- Several are listed as poor – Thorpe Road, Fengate and Lincoln Road.
- Although it should be noted that many other cities would score similarly.

The areas with the most barriers from this analysis broadly correlate with PCC's areas for investment for Travel choice programmes. These include Fengate where extensive business travel planning was recently undertaken and future plans for Lynchwood.

Barriers to travel that could be alleviated in the future were also included in PCC's Draft Local Plan 4. There are barriers impacting all modes of travel walking, cycling, public transport and cars. The key barriers in Peterborough are;

- Walking – physical features restricting the permeability of the walking routes in Peterborough, individuals face health related problems due to inactivity restricting their mobility;
- Cycling – cycling network has some missing links and focused on radial routes, individuals face health related problems due to inactivity restricting their mobility;
- Challenges with public transport information, interchanges and integration between different modes of public transport, some issues with bus punctuality and frequency, congestion at times impacting on bus reliability; and Car Use – congestion impacting on journey times and reliability, air pollution and noise issues, safety concerns, parkway reaching capacity, growth agenda will further accelerate traffic growth into the city.

Figure 24: Walk friendly Mapping Output

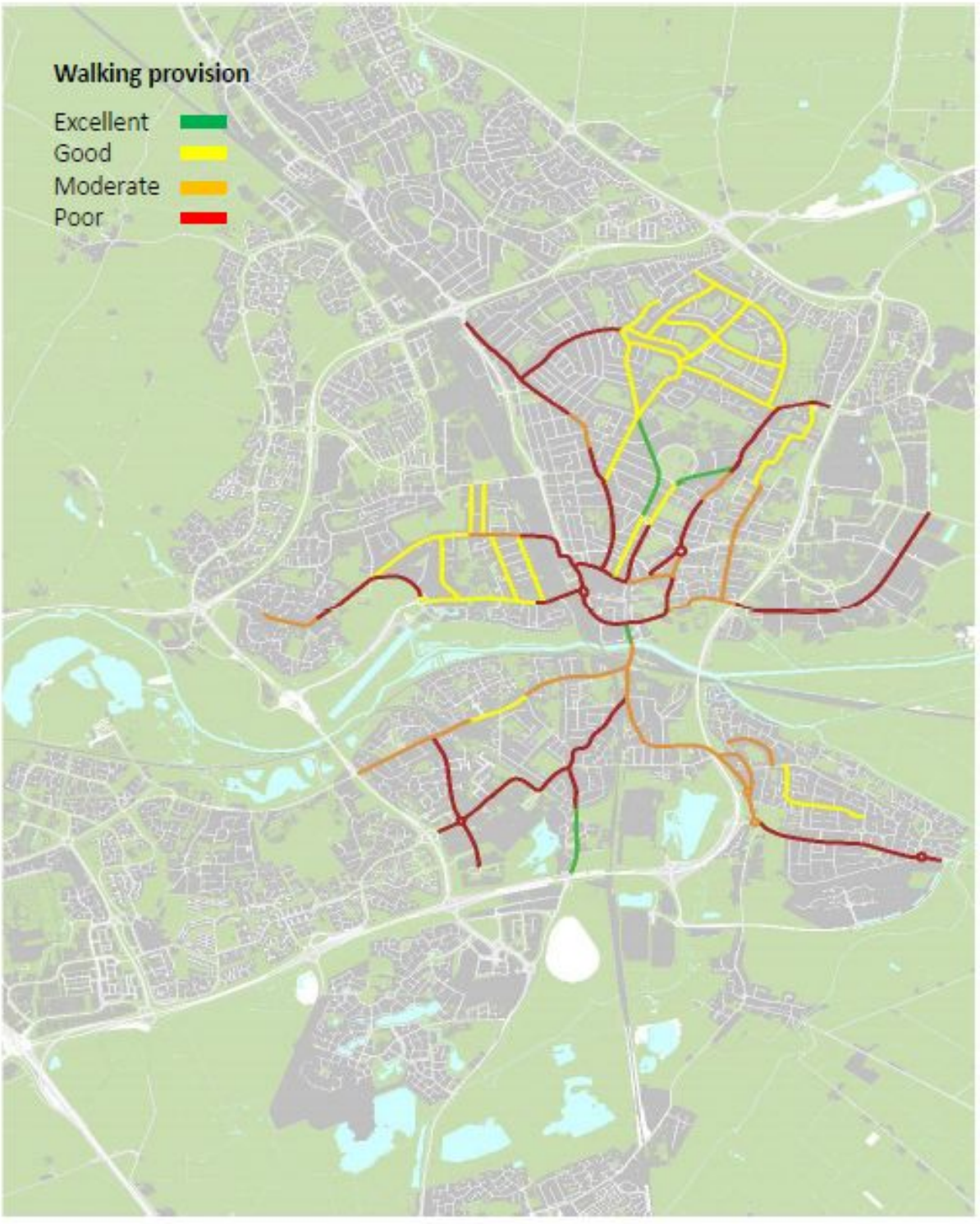
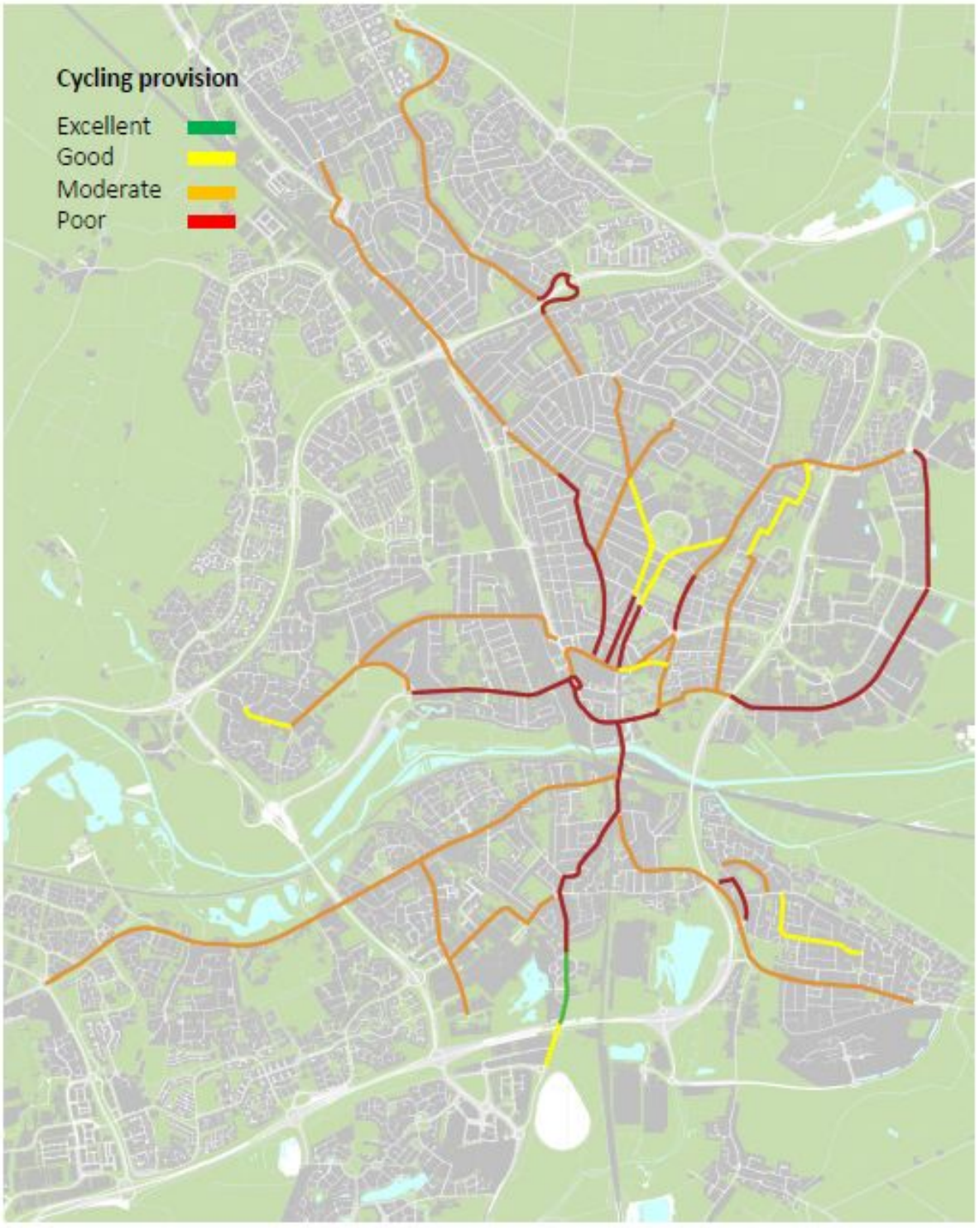


Figure 25: Cycle friendly Mapping Output



3 Air pollution

3.1 Why is air pollution important?

As recently as the Nineties it was felt that air pollution was no longer a major health issue in the United Kingdom as legislation had made the great smog's of the Fifties a thing of the past.

However, evidence started to emerge that small particles emitted to the air from various sources, such as road transport, industry, agriculture and domestic fires, were still having a considerable effect on health. This type of air pollution is so small that it can't be seen by the naked eye, but can get into our respiratory system[28].

Other air pollutants, such as nitrogen dioxide and ozone, can also affect our health. Nitrogen dioxide is produced by burning fuel, whilst ozone is formed by chemical reactions in the air.

It is estimated that long term exposure to particulate matter alone has an effect equivalent to 25,000 deaths a year in England by increasing the risk of diseases such as heart disease, stroke, respiratory disease and cancers[29] and was one of the 20 leading risk factors to health in 2013[30].

3.2 What is air pollution?

Air pollutants are generated by a mixture of natural and man-made processes (see below) and are released into the air, often reacting with other chemicals. The distribution of these pollutants will depend on the size of the molecule and weather patterns, with some pollutants being mainly deposited locally and some affecting sites in other world regions eg ozone.

There are many pollutants that impact health and the UK Air Quality Standards Regulations 2000[31] which sets standards for:

- Particulate matter (PM_{10} and $PM_{2.5}$)
- Nitrogen dioxide (NO_2)
- Ozone (O_3)
- Sulphur dioxide (SO_2)
- Lead
- Benzene and Benzo(a)pyrene
- Carbon monoxide (CO)

The majority of air pollutants have declined over time in the UK but particulates, nitrogen dioxide and ozone are still at levels that can harm health. Ozone is not deemed to be a local pollutant, as formation takes place over some time, and may be a result of emissions from thousands of kilometres away.

[28] Air Quality A Briefing for Directors of Public Health March 2017
[29] https://publichealthmatters.blog.gov.uk/2017/06/15/clean-air-day-taking-steps-to-reduce-air-pollution/
[30] https://vizhub.healthdata.org/gbd-compare/england/
[31] Statutory Instruments, *2010 No 1001, Environmental Protection, The Air Quality Standards Regulations 2010*

http://www.legislation.gov.uk/uksi/2010/1001/pdfs/uksi_20101001_en.pdf

3.2.1 Particulate matter (PM)

PM has three sizes that are commonly used as indicators PM10, PM2.5 and PM0.1. PM is made up of a wide range of materials and arise from a variety of sources including.

- Primary particles emitted directly into the atmosphere from combustion sources, and
- Secondary particles formed by chemical reactions in the air.

Road transport gives rise to primary particles from engine emissions, tyre and brake wear and other non-exhaust emissions and make a significant (about 30-50%) contribution to the urban background levels. Other primary sources include quarrying, construction and non-road mobile sources[32].

Secondary particles dominate urban background PM2.5 in the UK, accounting for some 30-50% of the PM2.5 in urban areas. A significant proportion of secondary PM2.5 is imported into the UK, having been formed from precursor emissions in continental Europe.

Due to much of the ambient (outdoor) $PM_{2.5}$ coming from non-local sources in order to achieve a reduction of 15% (1.5 - 2µg/m3) of the total urban background concentration PM2.5, using local measures, would require a very challenging reduction of local sources of 25-67% or a reduction of secondary sources of 25-50%[33].

3.2.2 Nitrogen Dioxide

The gaseous pollutant nitrogen dioxide (NO2) is a gas produced along with nitric oxide (NO) by combustion processes and together they are often referred to as oxides of nitrogen (NOx). On average around 80% of oxides of nitrogen (NOx) emissions in areas where the UK is exceeding NO2 limit values is due to transport, although urban and regional background non-transport sources are still considerable. The largest source is emissions from diesel light duty vehicles (cars and vans) and there has been significant growth in these vehicle numbers over the last ten years in the UK.

3.3 National and local policies to lower emissions

The UK Air Quality Strategy[34] established objectives for eight key air pollutants, based on the best available medical and scientific understanding of their effects on health. These Air Quality Objectives are at least as stringent as the limit values of the relevant EU Directives – in some cases, more so.

The current Government policy framework, and the legislative requirement to meet EU air quality limit values everywhere in the UK, tends to direct attention to localised hotspot areas of pollution (where the objectives are not met). Monitoring of Nitrogen Dioxide by screening using diffusion tubes has been happening in Peterborough since 1994. With respect to Particulate Matter (PM) it is recognised that there are no absolute safe levels of exposure. As such any improvement in air quality will have positive health consequences, although $PM_{2.5}$ is still not incorporated into the LAQM Regulations, and therefore there is no statutory requirement to review and assess $PM_{2.5}$ for LAQM purposes.

Local Authority Air Quality Management Areas are declared when the local authority review and assessment process identifies an exceedance of an Air Quality Strategy objective. The local authority

[32] http://www.aqconsultants.co.uk/AQC/media/Reports/SNIFFER-PM25-Rept-Final-201210.pdf
[33] http://www.aqconsultants.co.uk/AQC/media/Reports/SNIFFER-PM25-Rept-Final-201210.pdf
[34] Department for Environment, Food and Rural Affairs (Defra*), The air quality strategy for England, Scotland, Wales and Northern Ireland*, 2011. Available at https://www.gov.uk/government/publications/the-air-quality-strategy-for-england-scotland-wales-and-northern-ireland-volume-1

must declare an 'Air Quality Management Area' (AQMA) and develop an Action Plan to tackle problems in the affected areas. Peterborough City has not declared any AQMAs, however Hanson Building Products Limited carry out monitoring of their Whittlesey brickworks in relation to the Air Quality Management Area.

3.4 What impact does air pollution have on health?

Numerous studies have found an association between air pollution and a wide range of adverse health effects in the general population; the effects can range from subtle subclinical effects to early death[35]. When talking about the contribution of air pollution to deaths it is most appropriate to speak in terms of lives shortened, rather than deaths caused; as while a car crash can be said to be the exclusive cause of an individual's death, nobody is dying purely as a result of air pollution[36]. Pollutants such as particulates could well have had a significant impact on somebody who died from heart disease, but it's likely that other factors, such as diet or exercise, played a part too. Instead, the toxic pollutants in our air affect everybody a little bit, and some people – the young, elderly and those with respiratory and cardiac conditions – significantly more.

3.4.1 Health impact PM2.5

PM2.5 has the strongest link to health outcomes and at this size the particles can be inhaled deep into the lungs. The very smallest particles, ultrafine PM0.1 are thought, once inhaled, to be able to pass directly into the bloodstream[37].

Long-term exposure to $PM_{2.5}$ is the key air pollution contributor to excess deaths. The relative risk of death attributable to PM2.5 is 6.6% per 10µg/m^3 increase in $PM_{2.5}$[38], in other words if there was no PM2.5 there would be 6.6% less mortality). It also increases mortality for cardiovascular and respiratory diseases such as stroke, ischaemic heart disease, lung disease and lung cancer.

Short-term exposure to $PM_{2.5}$ is also associated with small increases in hospital admissions for cardiovascular and respiratory conditions and reduction in activity levels - resulting in days of missed work, absences from school and other more minor reductions in daily activity.

3.4.2 Health impact of PM_{10}

Larger PM_{10} particles tends to have a more direct, short-term impact on people's respiratory symptoms and health as they are more likely to be deposited in the upper airways and normally cleared rapidly through mucus and other mechanisms. A review of the evidence produced by the WHO[39] summarised evidence on the link between PM_{10} and health (see opposite). Due to variability in the underlying studies, there is uncertainty surrounding the precise estimates.

PM10 increases:

- Post neonatal (1- 12 months) all-cause infant mortality (long-term exposure).
- Prevalence of bronchitis in children 6-12 years (long-term exposure).
- Incidence of chronic bronchitis in adults (long-term exposure).
- Incidence of asthma symptoms in children with asthma (short-term exposure).

3.4.3 Health impact of NO_2

Unlike particulates, NO_2 is a gas and therefore disperses differently from traffic sources and can be inhaled deep into the lungs. In recent years the evidence[40] associating NO_2 with health effects has

[35] Health-risk-assessment-air-pollution-General-principles-en
[36] http://energydesk.greenpeace.org/2017/03/06/air-pollution-cause-40000-deaths-every-year-fact-check-linked/
[37] Air Quality A Briefing for Directors of Public Health March 2017
[38] http://www.euro.who.int/__data/assets/pdf_file/0010/263629/WHO-Expert-Meeting-Methods-and-tools-for-assessing-the-health-risks-of-air-pollution-at-local,-national-and-international-level.pdf?ua=1
[39] HRAPIE
[40] Committee on the Medical Effects of Air Pollutants (COMEAP), *Statement on the evidence for the effects of nitrogen dioxide on health*, March 2015. Available at https://www.gov.uk/government/publications/nitrogen-dioxide-health-effects-of-exposure

strengthened substantially with scientist believing that NO_2 itself is responsible for some of the health impact found to be associated with it in epidemiological studies.

A Department of Health[41] study found that a 10µg/m^3 increase in 24 hour average NO_2 was associated with increases in:

- Mortality
    - All age, all-cause mortality: 0.71%
    - Cardiovascular mortality: 0.94%
    - Respiratory mortality: 1.09%
- Hospital admissions
    - Respiratory: 0.57%
    - Cardiovascular disease: 0.66%
- Incidence of asthma in children – 6% based on 18 studies.

However, although epidemiological evidence associates exposure to NO_2 with adverse effects on health, there is some discussion as to whether NO_2 is just a marker for other toxic elements of vehicle pollution with potential overlap with PM 2.5.

3.5 Who is most impacted by air pollution and when?

The health effects of air pollution are distributed unequally across the population, with the heaviest burden borne by those with greatest vulnerability and/or exposure. The elderly, children and those with cardiovascular and/or respiratory disease are at greater risk from the health effects of air pollution.

Those who spend more time in highly polluted locations will be affected more. Since air pollution levels are typically as high within vehicles as just outside, this is likely to include not only those who live and work near busy roads, but also those who drive for a living.

Deprived communities are more likely to be situated near polluted busy roads, and are more likely to experience adverse health impacts. Analysis of environmental quality and social deprivation carried out for the Environment Agency (2003) looked at the social distribution of the wards with the highest pollutant concentrations, and concluded that more than half of the most exposed 5% of the population (2.5 million people) were resident in the 20% most deprived wards.

For $PM_{2.5}$, the particle is so small that 40-70% of it can penetrate into indoor spaces where people are working, and provides much of the exposure to particulate matter[5]. Active urban adults in Europe spend an average of 85-90% of their time indoors, 7-9% in traffic and only 2-5% outdoors, with very vulnerable groups, such as infants and the elderly, spending nearly all their time indoors. Therefore, due to time, exposures indoors dominate overall air pollution exposures[5].

3.6 What do we know about air pollution levels in Peterborough?

3.6.1 Peterborough infrastructure

In 1967 Peterborough was declared a new town. This benefitted the City with highways infrastructure including the Parkway and cycleway systems. As a result, Peterborough is recognised as having some of the fastest commuting speeds in the country. However as one of the fastest growing cities in the country the greater volumes of traffic will place increased pressures on the road

[41] Department of Health, Policy Research Programme, *Systematic review and qualitative meta-analysis of the evidence for associations between chronic and short-term exposure to outdoor air pollutants and health*, January 2012 Available at http://www.prp-ccf.org.uk/PRPFiles/SFR_April_2011/0020037%20SFR_Atkinson.pdf

system and potentially reduce speeds. This could lead to increased levels of transport related air pollution in the future.

Fig 27: Nitrogen dioxide monitoring sites across Peterborough

3.6.2 Local monitoring

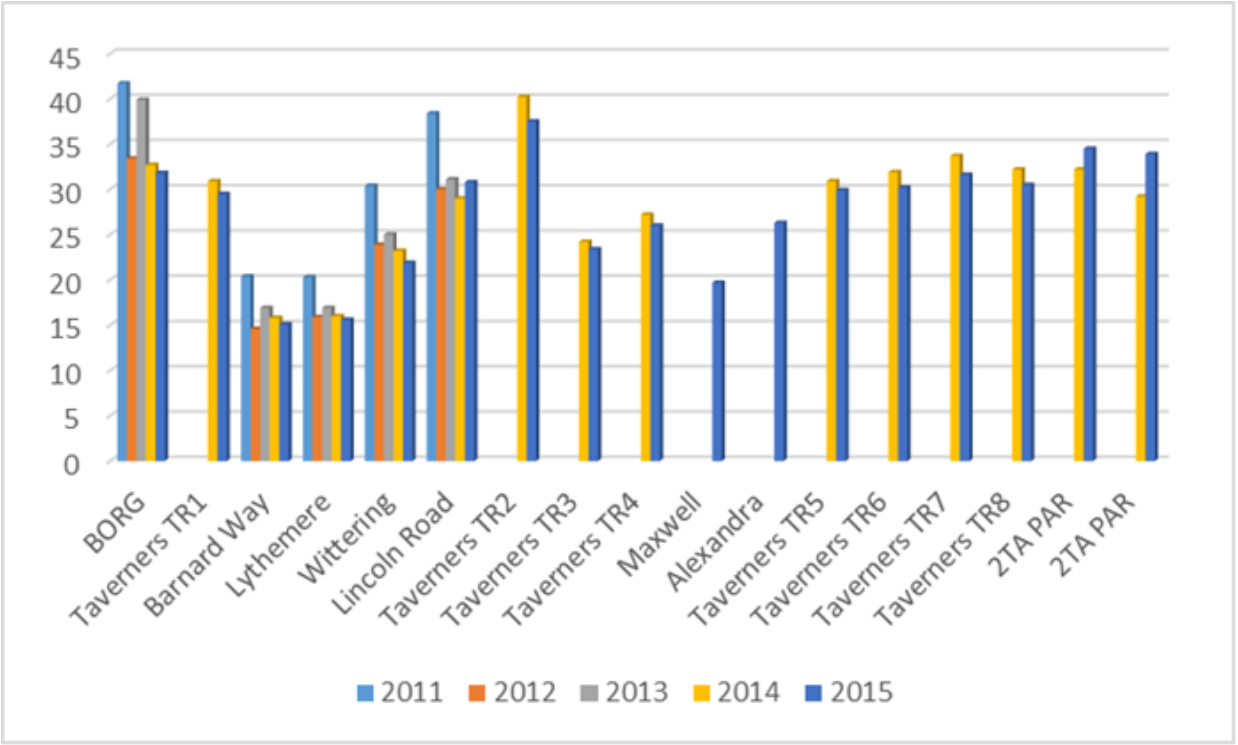
Peterborough City Council undertook monitoring of NO_2 at 16 sites within the Local Authority Area during 2015. These sites are a mixture of urban background, roadside and kerbside. The map opposite shows the site of the NO2 monitors.

Other sites have been monitored around Peterborough in previous years, however monitoring at these sites ceased following the completion of planned monitoring programmes for these locations.

3.6.3 NO2

There are no Air Quality Management Areas (AQMA) for N02 in Peterborough. The results of monitoring for sites across Peterborough are presented below. They show that no areas in the last couple of years have exceeded air quality objectives for NO2 of 40µg/m3.

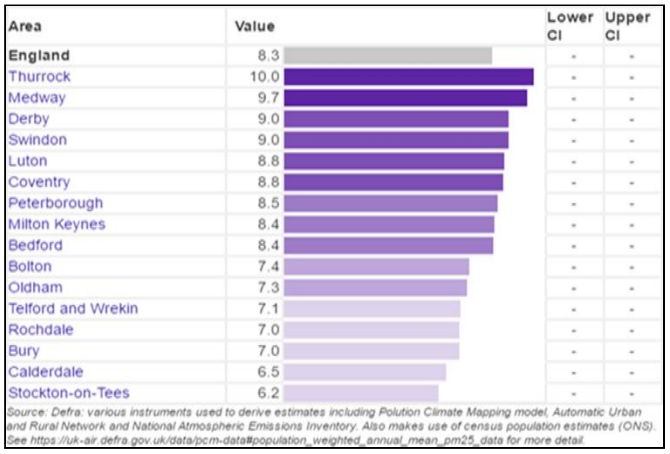
Fig 26: Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites



3.6.4 PM2.5

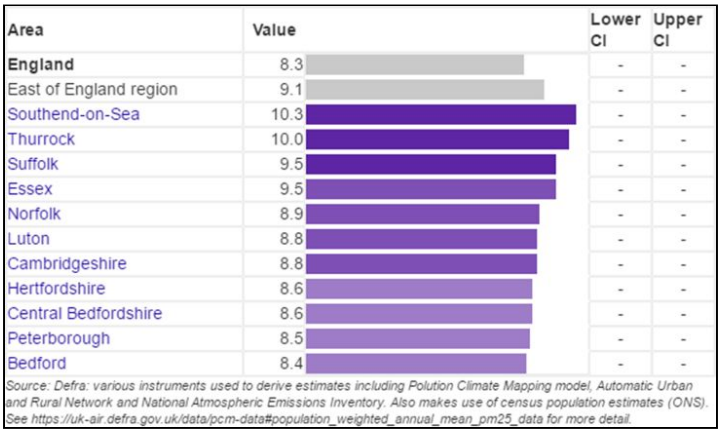
Local data on PM2.5 is modelled and comes from the pollution climate mapping (PCM) model[42]. The charts below show that in 2015 the estimated background level of manmade PM2.5 across Peterborough was 8.5ugm3 which is below the Air Quality Objectives. However, as noted previously, we now know that significant harm to health results from exposure to current concentrations of particulate air pollution, even though target and limit values are being met. The level is slightly higher than the England average, similar to our statistical neighbours and lower compared to East of England authorities. This is likely due to authorities further east receiving a larger contribution of particulate pollution from mainland Europe.

Figure 28: Estimated background rate of PM2.5 compared to statistical neighbours and EOE LA's



Area	Value	Lower CI	Upper CI
England	8.3	-	-
Thurrock	10.0	-	-
Medway	9.7	-	-
Derby	9.0	-	-
Swindon	9.0	-	-
Luton	8.8	-	-
Coventry	8.8	-	-
Peterborough	8.5	-	-
Milton Keynes	8.4	-	-
Bedford	8.4	-	-
Bolton	7.4	-	-
Oldham	7.3	-	-
Telford and Wrekin	7.1	-	-
Rochdale	7.0	-	-
Bury	7.0	-	-
Calderdale	6.5	-	-
Stockton-on-Tees	6.2	-	-

Source: Defra: various instruments used to derive estimates including Polution Climate Mapping model, Automatic Urban and Rural Network and National Atmospheric Emissions Inventory. Also makes use of census population estimates (ONS). See https://uk-air.defra.gov.uk/data/pcm-data#population_weighted_annual_mean_pm25_data for more detail.

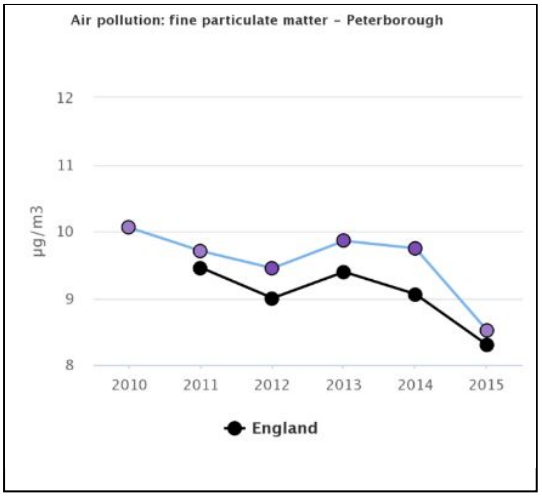


Area	Value	Lower CI	Upper CI
England	8.3	-	-
East of England region	9.1	-	-
Southend-on-Sea	10.3	-	-
Thurrock	10.0	-	-
Suffolk	9.5	-	-
Essex	9.5	-	-
Norfolk	8.9	-	-
Luton	8.8	-	-
Cambridgeshire	8.8	-	-
Hertfordshire	8.6	-	-
Central Bedfordshire	8.6	-	-
Peterborough	8.5	-	-
Bedford	8.4	-	-

Source: Defra: various instruments used to derive estimates including Polution Climate Mapping model, Automatic Urban and Rural Network and National Atmospheric Emissions Inventory. Also makes use of census population estimates (ONS). See https://uk-air.defra.gov.uk/data/pcm-data#population_weighted_annual_mean_pm25_data for more detail.

Fig 29: Trend in modelled PM 2.5 for Peterborough

The modelled PM 2.5 levels in Peterborough have been decreasing at a similar rate to England. Trends in modelled data need to be treated with caution as data is modelled and changes in assumptions can change estimated levels, further pollution levels can be heavily influenced by weather.



3.6.5 Sulphur Dioxide (SO_2)

Sulphur Dioxide is not monitored at any location by Peterborough City Council, however, Hanson Building Products Limited carry out monitoring of their Whittlesey brickworks in relation to the Air Quality Management Area.

[42] Estimated local mortality burdens associated with particulate air pollution – PHE

3.7 Impact of air quality on the health of Peterborough residents

3.7.1 Mortality

As long term exposure to air pollution is considered a contributory factor to deaths e.g. unlikely to be sole cause of death and not on death certificates[43], it is necessary to estimate mortality attributable to air pollution using modelled background levels of pollutants and estimates of mortality from the academic literature.

With long term exposure to PM2.5 associated with an increase in deaths of 6.6% for every 10Ug/m3 increase in PM2.5[44] and modelled background levels of PM2.5 in Peterborough of 8.5 Ug/m3 particulate matter was estimated to contribute to 5.3% of all deaths in 2015.

The rate of deaths attributable to PM2.5 in Peterborough's is comparable to our similar local authorities and lower compared to other LAs in the East of England (reflecting patterns of background rates).

In 2010 Public Health England estimated that long term exposure to PM2.5 in Peterborough accounted for 829 years of life lost due to PM2.5. Recognising that air pollution is not a direct cause of death this could mean that:

- 9948 people lived 1 month less,
- 1658 people lived 6 months less life or
- 41 people died 20 years early etc.

Figure 30: Rate of attributable mortality in Peterborough compared to compared to statistical neighbours and EOE LA's

Area	Value	Lower CI	Upper CI
England	4.7	-	-
East of England region	5.1	-	-
Southend-on-Sea	5.8	-	-
Thurrock	5.6	-	-
Suffolk	5.4	-	-
Essex	5.4	-	-
Norfolk	5.0	-	-
Luton	5.0	-	-
Cambridgeshire	5.0	-	-
Hertfordshire	4.9	-	-
Central Bedfordshire	4.9	-	-
Peterborough	4.8	-	-
Bedford	4.8	-	-

Area	Value	Lower CI	Upper CI
England	4.7	-	-
Thurrock	5.6	-	-
Medway	5.5	-	-
Derby	5.1	-	-
Swindon	5.1	-	-
Luton	5.0	-	-
Coventry	5.0	-	-
Peterborough	4.8	-	-
Milton Keynes	4.8	-	-
Bedford	4.8	-	-
Bolton	4.2	-	-
Oldham	4.2	-	-
Telford and Wrekin	4.0	-	-
Rochdale	4.0	-	-
Bury	4.0	-	-
Calderdale	3.7	-	-
Stockton-on-Tees	3.5	-	-

3.7.2 Impact on disease prevalence and health care utilisation

At present, Peterborough does not have specific estimates for the impact of air pollution on disease prevalence and health care utilisation. Therefore, the health impact on hospital admissions for respiratory and cardiovascular admissions needs to be based on the general estimates[45].

[43] Estimating the local mortality burden associated with particulate air pollution PHE 2014

[44] http://www.euro.who.int/__data/assets/pdf_file/0010/263629/WHO-Expert-Meeting-Methods-and-tools-for-assessing-the-health-risks-of-air-pollution-at-local,-national-and-international-level.pdf?ua=1

[45] World Health Organisation, 2013. Review of Evidence on Health Aspects of Air Pollution – REVIHAAP Project – Technical Report [online] Available At: http://www.euro.who.int/__data/assets/pdf_file/0004/193108/REVIHAAP-Final-technical-report-final-version.pdf?ua=1

3.8 Susceptible populations in Peterborough

Individuals with conditions such as lung disease, heart disease and stroke are at greater risk of worsening symptoms due to air pollution compared to the rest of the population.

Hospital activity data suggests Peterborough already has higher rates of susceptible individuals as there are:

- higher rates of emergency hospital admissions due to COPD and Asthma (under 19s).
- higher rates of hospital admissions and premature deaths due to heart disease and stroke.

This is not suggesting the higher rates of admission are due to poor air quality but rather Peterborough residents could be at greater risk if air pollution increased in the future.

4 Access to transport

4.1 Transport links as a wider determinant of health

Access to transport is an important determinant of health and wellbeing as it is a fundamental enabler to access services and social opportunities. Nonetheless, even when transport is available and accessible, there may be other important access barriers that limit travel and mobility, and limit social participation.

Figure 31: Model of Wider Determinants of Health and Wellbeing

4.2 What factors make people vulnerable to transport barriers?

There are multiple forms of access barriers, or issues that make it more difficult to reach and use health and other key services. The Governments 2003 Social Exclusion Unit report,[46] identified five main barriers in accessing services:

1. The availability and physical accessibility of transport.
2. Cost of transport.
3. Services and activities located in inaccessible places.
4. Safety and security.
5. Travel horizons.

4.2.1 Rurality

There are particular challenges to transport provision in rural areas due to the dispersed population and the reduced cost effectiveness of public transport options. Although car ownership levels are higher in rural areas, there are a significant proportion of households without access to a car. Those living in rural areas without a car face particularly acute problems because the high level of car use means, demand for public transport services has declined.[47]

The report on Rural Communities from the UK Government Environment, Food and Rural Affairs Committee, published in July 2013 addressed rural transport[48], noting that:

- People living in villages and dispersed areas travel 10,000 miles per year on average, compared to 6,400 miles per year in urban areas.
- On average, expenditure on transport accounts for 17.7% of total expenditure for rural residents compared with 14.5% for urban residents.

The number of households with good transport access to key services or work has declined for town/fringe areas from 86% of households in 2007 to 83% in 2011; over the same period the figures for villages decreased from 52% to 27% and for hamlet/isolated dwellings decreased from 41% to 29%.[49]

Community transport has expanded in recent years for a number of reasons including cutbacks in mainstream public transport because of budget reductions in local government, a reduced commitment by the Health Service to provide non-emergency transport, an increased recognition of the role community transport can play, and changing demographics.

4.2.2 Car Dependency and Driving Cessation

Car and van ownership offer significant opportunity and flexibility for travel for individuals and households across England. The National Travel Survey for 2016 found that 62% of all trips in England were made by car (as a driver or passenger).

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[46] Social Exclusion Unit: Office of the Deputy Prime Minister, *Making the connections: final report on Transport and Social Exclusion*, 2003.

[47] Social Exclusion Unit: Office of the Deputy Prime Minister, *Making the connections: final report on Transport and Social Exclusion*, 2003.

[48] House of Commons Environment, Food and Rural Affairs Committee. *Rural Communities*, Sixth Report of Session 2013–14. Available at: http://www.publications.parliament.uk/pa/cm201314/cmselect/cmenvfru/602/602.pdf

[49] Department for Transport, *Households with good transport access to key services or work*, *England,* 2013. Cited in House of Commons Environment, Food and Rural Affairs Committee. *Rural Communities*, Sixth Report of Session 2013–14

There are increasing numbers of older drivers due to ageing of existing licence holders rather than large numbers of newly qualified drivers in older age groups.[50] It is acknowledged that for the majority of older drivers, driving cessation is a process, with an element of self-regulation including reducing distance travelled and driving journeys undertaken in adverse conditions or in the dark, before complete cessation.

The UK Driving and Vehicle Licensing Authority issue medical standards of fitness to drive, most recently updated in November 2014.[51] DVLA requires confirmation at the age of 70 that no medical disability is present, and thereafter licences are granted for three years. Some health conditions or change in health status may result in a driving licence being suddenly revoked. For example, a person must not drive for one month following a transient ischaemic attack (TIA).[52]

Conditions that may preclude people of all ages from driving include:

- Neurological disorders
- Cardiovascular disorders
- Diabetes Mellitus
- Psychiatric Disorders
- Drug and Alcohol misuse and dependence
- Visual disorders
- Renal and Respiratory disorders

There is research evidence that those who anticipate, plan and give-up driving on a gradual basis experience less negative transitional effects than those who have to be told to give-up driving or do so on the spur of the moment. This transition will necessitate learning alternative ways of travelling. Expert opinion suggests that support for life beyond the car is needed at a younger age (while older people are driving) to help build solutions and confidence in transport use beyond the car and should involve emotional support, as well as practical support.[53]

The evidence from driving cessation indicates that some journeys eg those that allow engagement in social activities, and with social networks, are potentially affected differently and more detrimentally by transportation barriers than travel to access key services[5455].

4.2.3 Transport knowledge and skills

Making use of public and community transport infrastructure requires knowledge and skills of finding information about the services that are available, and how to access and use them. Particular vulnerable groups have been identified by the Department for Transport who may benefit from 'travel training': training that aims to help people travel independently and without fear to work, to education, to other key services, or simply for leisure:

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50 Department for Transport. *National Travel Survey Statistical Release*, July 2013. Available at: https://www.gov.uk/government/statistics/national-travel-survey-2013

51 DVLA Medical Standards of fitness to drive, 2014. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/390134/aagv1.pdf

52 Details on current medical guidelines are available for a range of conditions at: https://www.gov.uk/current-medical-guidelines-dvla-guidance-for-professionals-conditions-s-to-u#stroketia

53 Travelwest evidence briefing drawing from: 1 Musselwhite, C. and Haddad, H. *Mobility, accessibility and quality of later life.* Quality in Ageing and Older Adults, 2010. 11(1), 25-37. Musselwhite, C. *The importance of driving for older people and how the pain of driving cessation can be reduced*. Signpost: Journal of Dementia and Mental Health Care of Older People, 2011. 15 (3). 22-26.

54 Davey, J.A., *Older people and transport: Coping without a Car.* Ageing & Society. 2007. 27:49-65

55 Azad N., et al. *A survey of the impact of driving cessation on older drivers.* Geriatrics Today. 2002. 5/4: 170-174.

- People with learning difficulties of all ages, requiring individualised training appropriate to their situation for specific journeys or the whole network.
- People with disabilities, ranging from physical or cognitive disabilities to mental impairments, reduced sensorial abilities, again people of all ages.
- Children and young adults with Special Educational Needs (SEN).
- Children (often at/or approaching transitional stages).
- People who do not know how to and/or do not feel safe or confident using public transport.
- Older people who find themselves without the use of a car for the first time in many years, either through their own deteriorating health or the death of a spouse/partner that drove them.
- Ethnic minority groups, particularly when English is not the first language.
- Unemployed people who might not, for a number of reasons, be able to access and/or remain in employment.
- People who have started to use specialist transport services such as dial-a-ride.

By contrast, taxis offer a higher level of convenience and flexibility. However, those in lower socioeconomic groups use taxis more frequently, and spend a higher proportion of their budget on taxi journeys.[56]

As noted in the known transport barriers above, 'travel horizons' or willingness to travel is also a component of access. There is evidence that narrower travel horizons may limit social and employment opportunities, due to a lack of information or confidence about travelling a further distance, even where the services are available and affordable.[57]

One of the proposed solutions to supporting individuals with their transport needs is providing information, support and the opportunity to make arrangements online.

These examples both require sufficient digital literacy to benefit from the opportunities. Local residents will need to have access to appropriate equipment such as a smart phone, tablet, or computer, and have the skills and confidence to benefit from them. There is, therefore, a risk that those who are most vulnerable do not benefit from these approaches.

4.3 What are the health impacts of transport barriers to health services?

4.3.1 Impacts of transport barriers on quality of life for patients and carers

Transport barriers may have a detrimental impact on quality of life for patients and carers, and wider wellbeing indicators for a range of reasons, including:

- Time and stress involved in arranging transport.
- Time and stress involved in making the journey.
- Cost implications of travel as a proportion of the household budget.
- Impact of transport barriers on wider wellbeing including as a factor in social isolation.

[56] Social Exclusion Unit: Office of the Deputy Prime Minister, *Making the connections: final report on Transport and Social Exclusion*, 2003.
[57] Social Exclusion Unit: Office of the Deputy Prime Minister, *Making the connections: final report on Transport and Social Exclusion*, 2003.

A Centre for Health Economics study from 2010 considered hospital car parking and the impact of access costs.[58] Travel costs (including parking charges) for a course of treatment ranged from £60 to £400. Although there was a variety of methodologies in estimating time costs, four to five hours was often cited as the overall time involved in attending an outpatient appointment. The highest costs were incurred by those attending regularly for courses of treatment, and those living furthest from the health care setting. For patients with chronic conditions that affected their ability to work, their reduced income amplified the burden of access costs. Of note, is the burden of stress and anxiety that was associated with using the hospital car park. Difficulties with parking – time spent queuing for a space, finding the correct change – were commonly cited as stressful and negative events for patients. The study concluded that the stress caused by hospital parking is largely avoidable.

4.4 Local data

4.4.1 Distance to key health services by public transport and car

The Department for Transport provides estimates of travel time to key services by public transport and walking. The statistics are based on the calculation of theoretical journey times, they are not based on real journeys. They are, however, based on actual public transport times, and average traffic speeds on the road network. It should be noted that public transport routes may have changed over time.

The most recent statistics are based on a snapshop of public transport timetable for 2015 and shows the average length of time to access a GP by walking or public transport for Peterborough was 8 minutes (range - 5 minute to 20 minutes). The wards with the highest average travel times were Barnack, Northborough and Bretton South which all experienced average travel times over just over 20 minutes (see figure 33).

The average length of time to access a Hospital by walking or public transport for Peterborough was 40 minutes with journeys ranging from 12 minute (Bretton North) to 65 minutes (Eye and Thorney); see figure 34.

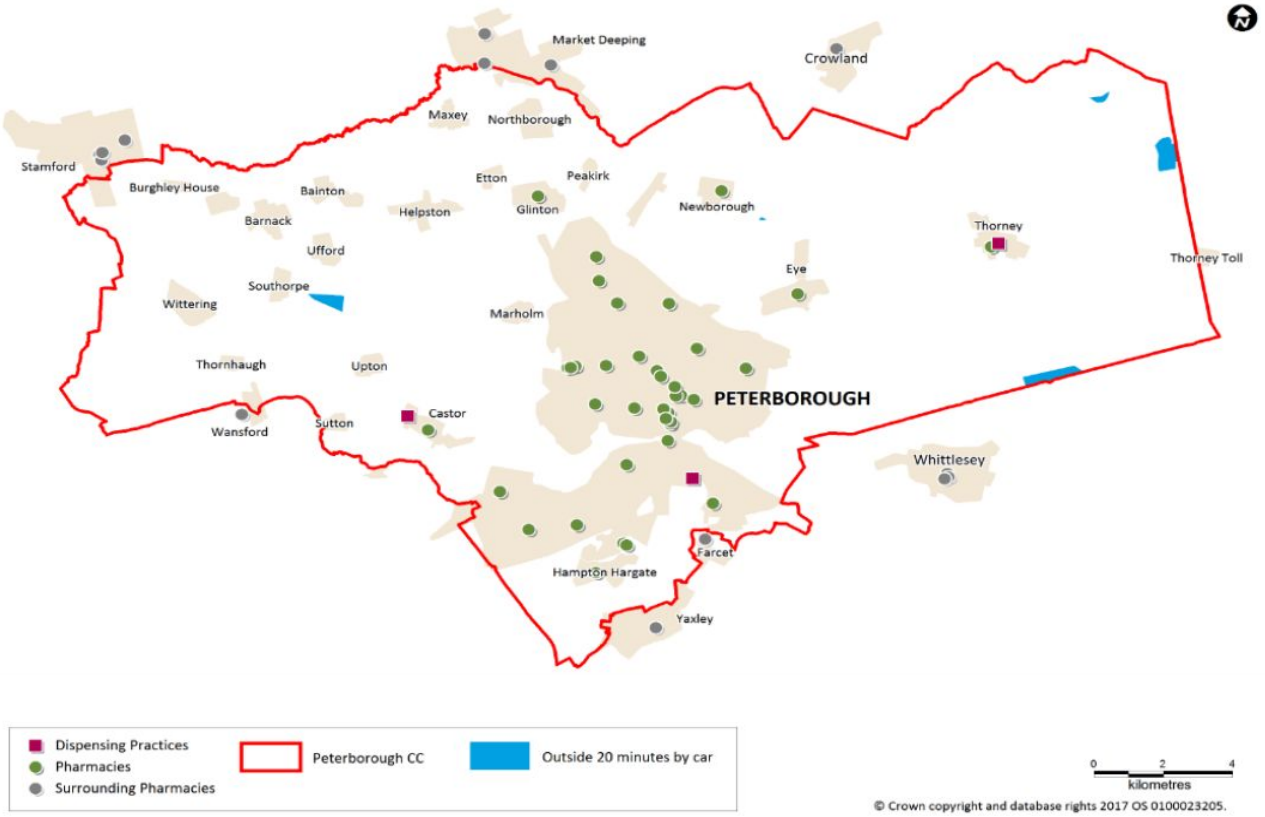
[58] Mason, A. *Hospital Car Parking: The Impact of Access Costs.* CHE Research Paper 59, Centre for Health Economics, the University of York. 2010.

4.4.2 Access to pharmacies

The 2008 White Paper 'Pharmacy in England: Building on Strengths, Delivering the Future' states that it is a strength of the current system that community pharmacies are easily accessible and that 99% of the population – even those living in the most deprived areas – can get to a pharmacy within 20 minutes by car and 96% by walking or using public transport. 31

Figure 34 was created to identify which areas in Peterborough were within and which were not within a 20 minute driving distance of either a pharmacy or a dispensing practice as of July 2017. For this map, pharmacies and dispensing practices could be located either within the boundaries of Peterborough Unitary Authority or outside of the boundaries. Road speed assumptions were made dependent on road type and ranged up to 65mph (for motorways) but down to 20mph in urban areas. The map shows that the vast majority of the Peterborough population can access a Pharmacy within 20 minutes.

Fig 32: Access to Pharmacies and Dispensing GPs within 20 min



Home delivery services can help to provide medications to those who do not have access to a car or who are unable to use public transport. Of the pharmaceutical providers who completed a survey questionnaire in 2017, 35 out of 37 pharmacies (95%) and 1 of 1 dispensing GP practices (100%) reported that they provide free delivery services to their patients. In addition, some providers deliver to specific patient groups and/or specific regions, some for free and others for a charge. Pharmaceutical services are also available from internet pharmacies (located inside or outside of Peterborough) that could make deliveries to individual homes. Finally, in addition to delivery services, community transport schemes (e.g. car clubs, minibuses) can potentially improve access to both pharmaceutical services and other services.