

Moving forwards: Healthy travel for all in Cardiff and the Vale of Glamorgan



Annual Report of the Director of Public Health
for Cardiff and Vale of Glamorgan 2017

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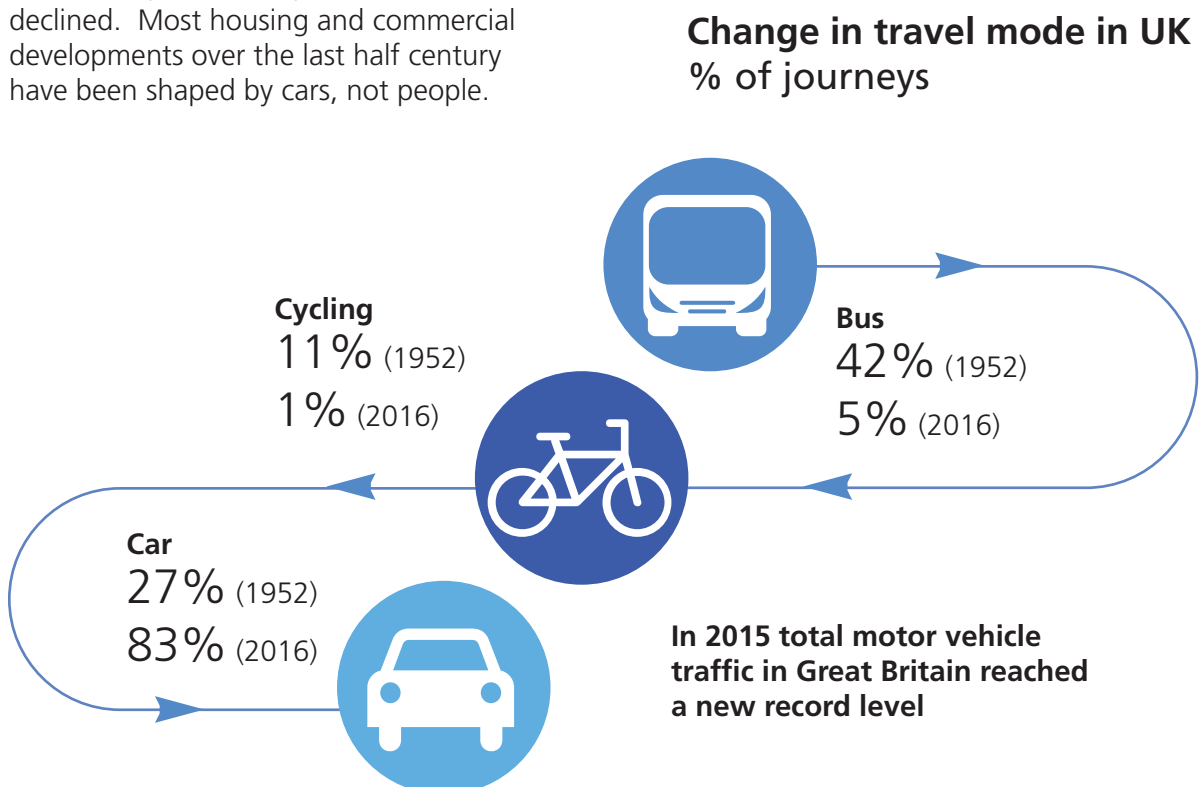
Executive summary

Declining levels of physical activity, increasing levels of obesity and diabetes, widespread air pollution, social isolation, and worsening health inequalities are all pressing public health issues in our area. Climate change is a severe threat which is already being felt in the UK and across the world.

Changing patterns in the way we travel and how we design our environments for travel have played a significant role in these issues. Bold action is required locally if we are to reverse these trends in population and global health, and create a healthier more sustainable future for our residents.

How did we get here?

While car use has sharply increased over the last 50 years, walking and cycling levels, and public transport use, have declined. Most housing and commercial developments over the last half century have been shaped by cars, not people.





The effects on health and well-being

This shift in travel mode has contributed to a significant decrease in physical activity, which in turn is associated with an increased risk of ill health, including cardiovascular disease, cancer and diabetes.

Road transport is a major contributor to harmful air pollution, and is responsible for nearly 1000 accidents causing injury or death each year in Wales. As our environments have been shaped around the car, interactions within and between communities have dropped. Many of the adverse impacts of road transport are felt more in more deprived communities, contributing to worsening health inequalities.

Climate change increases the risk of severe weather events including flooding which will increasingly affect our communities and our infrastructure.

- Over half (54%) of adults in Cardiff and Vale are overweight or obese, and are classed as 'inactive' because they do less than half an hour of physical activity in an entire week
- An estimated 5% of deaths in Cardiff and Vale are due to particulate matter air pollution
- Nearly 1 in 4 vulnerable people in Cardiff and Vale report being lonely some or all of the time
- A man living in one of our most deprived communities in Cardiff can expect to live 11 years fewer than someone in the least deprived areas
- Flood-related displacement of communities has been found in the UK to cause significant and enduring mental health issues



We could do things differently

Health and well-being in our communities could be significantly improved if active travel becomes the norm for short journeys, public transport is used for longer journeys, and air quality improves.

- Daytime journeys of less than 2km should be walkable for individuals aged 5 to 74 without a disability
- For many people the trigger to take up active travel is a significant life event
- People who walk and cycle in a neighbourhood are more likely to spend money in local shops
- Public transport use is facilitated by affordable ticket prices, flexibility in stops, high quality travel information and regular services
- Clean Air Zones deliver benefits worth £29 for every £1 spent
- The NHS should set the benchmark for clean air and safe workplaces
- The London congestion charge resulted in an 80% increase in cycling



The time is right for change

A number of opportunities exist through legislation, national and local policy, and a gradually changing culture around the use of cars, which make now the time to act.

- Four recent major pieces of legislation support active travel in Wales
- Driving a car has become less popular among young people
- Examples of good practice in Cardiff and the Vale of Glamorgan include support to residents to encourage children's street play, helping Vale Council staff travel sustainably, and the UHW Park and Ride scheme.



Seizing the day: a vision for Cardiff and the Vale

This report sets out a vision based on five key themes, showing what we could achieve in Cardiff and Vale.

- Active travel is the default for short journeys
- There is a well used, fully integrated transport system
- We have well connected, active and social communities
- Transport emissions are significantly reduced
- Cardiff and Vale are leaders in this field

If we get this right, potential benefits include reduced rates of cardiovascular disease, cancer, obesity and diabetes; improvements in mental well-being; and reduced sickness absence.

- Reduced illness and deaths from cancer (20-30% lower risk of colon and breast cancer)
- Reduced illness and deaths from cardiovascular disease and stroke (20-35% fewer cases)
- Reduced type 2 diabetes (30-40% fewer cases)
- Reduced risk of depression and dementia (20-30% lower risk)

- Reduced inequality in life expectancy between most and least deprived areas
- More cohesive communities and reduced loneliness
- Reduced air pollution and lower carbon emissions contributing to global warming
- Reduce demand for health and social care services



Everyone playing their part: what we need to do together

To make a significant and sustained improvement in our health and well-being we need to take decisive action now and over the next 5-10 years, in four main areas.

- Accelerate improvements to infrastructure to support active travel and low emission transport
- Support staff to choose active travel
- Engage with the local communities and businesses on the benefits of active travel
- Discourage unhealthy and polluting travel

Foreword



We all want the best health and well-being we can have for our population. To achieve that the inequalities gap between our most and least deprived communities has to narrow. To achieve that we need to take every

opportunity we can, working together as individuals and communities with all of our partners in public health.

Frequently, taking opportunities will mean embracing change, doing things differently, driving continuous improvement as hard as we can and telling the story about why health and well-being should be important for each and every one of us. Opportunities to improve health and well-being will always involve behavioural change at population, individual and organisational levels. This is tricky as most of us will say 'I support change but I don't want to change,' but we, each of us, have to become the change we need to see if we are to achieve sustainable improvement in our health and well-being.

Some of the opportunities we have open to us today have not been fully exploited by us as individuals, collectively as leaders or as organisations. This probably isn't surprising as change and continuous improvement are challenging and often question our current beliefs, practices and systems. Yet today across our public sector and third sector organisations we are better placed than ever before to take up those opportunities. In Cardiff and Vale excellent partnership working has led to a common understanding of the needs of the population we serve and what we need to do, to enable better health and well-being. This has been hugely strengthened by the recent Well-being of Future Generations (Wales) Act

2015,¹³⁴ the Social Services and Well-being (Wales) Act 2014²⁴ and the Public Health (Wales) Act 2017.¹³⁷ These put our health and well-being firmly at the top of the agenda.

Added to this we know that as a Cardiff and Vale population, people want better health and well-being and the understanding that this will involve change, including behaviour change,¹⁶⁸ is evident. This was evidenced in the surveys and discussions which have taken place to inform our most recent needs assessments in Cardiff and Vale.^{11,48,161} Added to that we have some emerging examples of positive change in two of our biggest causes of poor health and well-being. The numbers of people smoking tobacco in Cardiff and Vale is lower than it has ever been and is continuing to decrease and the rate of obesity in our children is slowly decreasing.

This report looks at one of the opportunities that we haven't yet fully exploited, active travel. It is an issue that affects every single person in our population as well as every single organisation operating within our communities. It is an issue which demands an understanding of the past, an understanding of the disruptive technologies which our younger generations are rapidly embracing, an understanding of what the evidence is telling us, and most importantly a willingness to seriously drive rapid continuous improvement which utilises the evidence and new technologies. Inevitably it demands that we ourselves begin to adopt and adapt to active travel as part of how we live each and every day.

I hope you will enjoy reading the report and that it will stimulate you to think about your role in making active travel a part of achieving sustainable improvements in our health and well-being.

Dr Sharon Hopkins, Executive Director of Public Health

What is at stake?



Our health and well-being: local and global

Declining levels of physical activity, increasing levels of obesity and diabetes, widespread air pollution, social isolation, and worsening health inequalities: these are all pressing public health issues in Cardiff and the Vale of Glamorgan.

Globally, climate change is a severe threat which is already being felt in the UK and across the world in extreme weather events such as flooding and heatwaves, with impacts increasing every year as the earth warms.

These issues all have something in common: changing patterns in the way we travel over the last half century, along with how we design our environments for travel, have played a significant role.



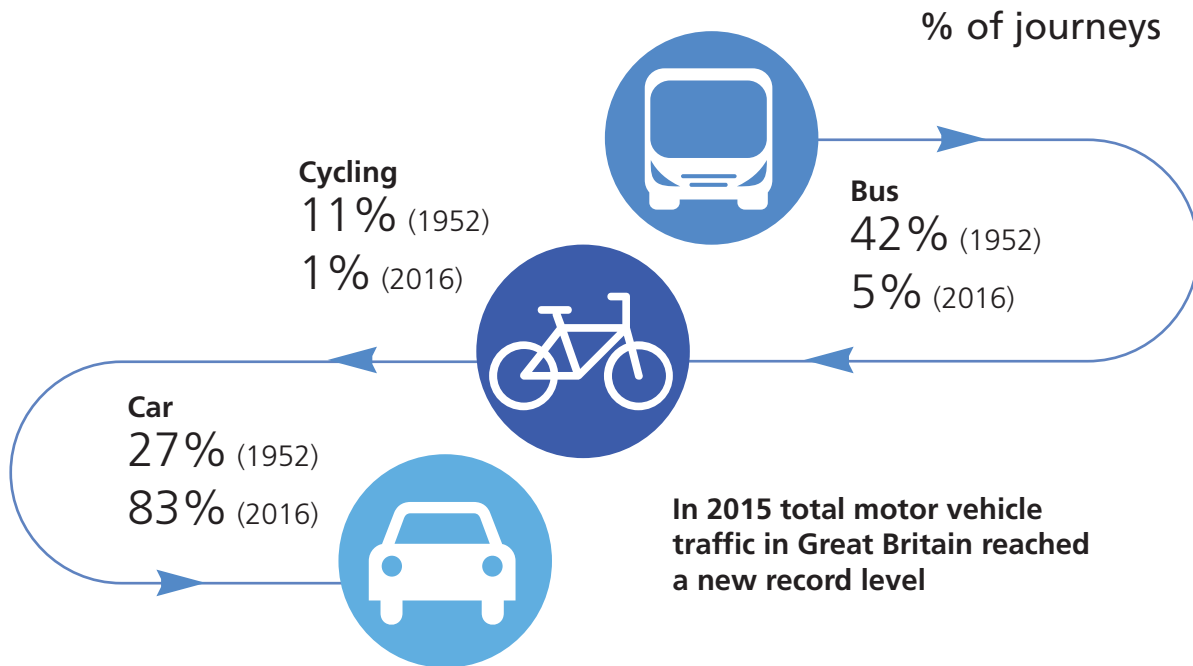
We need to take positive action now

Bold action is required locally if we are to reverse these trends in population and global health, and create a healthier more sustainable future for our residents.

A slew of evidence available now suggests a brighter future is possible, with positive impacts on health, well-being and community cohesion, as well as reducing our reliance on fossil fuels and their impact on climate change.

The intention of this report is to stimulate thinking and discussion locally about the issues described and encourage co-ordinated and decisive action to address them.

How did we get here?



Changing patterns of travel

A dramatic transformation has taken place over the last century in how people in the UK travel for work and leisure.

Until the 1950s, most people got around on foot or by public transport. Since then car ownership has increased rapidly, and the last fifty years has seen a huge shift to journeys by car, with public transport use dropping precipitously. For example, in 1952, 42% of journeys in the UK were by bus, but by 2016 this figure had dropped to just 5%. Car journeys rocketed from 27% to 83% over the same period.¹

Locally we don't have to go far back to see this stark transition. In the 1920s trams were at their peak in Cardiff, with an extensive network throughout the city and a staggering

42 million passenger journeys taken in the city each year, or around 180 journeys per resident each year.² The tram system closed in Cardiff in 1950, but trolleybuses – a form of electric bus – were a common sight after this, until the network closed in 1970.³

Figure 1. A tram running along Newport Road in Cardiff²



42 million journeys were taken by tram in Cardiff in 1928. The tram closed in 1950

The railway line in the Vale between Barry and Bridgend was closed with the Beeching programme in the 1960s, and only re-opened in 2005. However, over the previous century there had been a much more extensive rail network in the Vale including a Cowbridge Railway line, which opened in 1865.

Figure 2. Cowbridge railway station¹³



Initially the car brought with it a sense of new-found freedom, and the ability for people to keep in touch more easily with friends and family, facilitating further geographic spread of these important social networks.

But this transformation in transportation came with a price: a steep decline in physical activity levels, with many adults now routinely spending their waking life sitting in the car, at the office desk, or on the sofa, with little meaningful physical activity in between. Indeed a quarter of adults in Cardiff and the Vale of Glamorgan are now classed as 'inactive' because they do less than half an hour of physical activity in an entire week.⁴

Effects on health are not limited to changes in physical activity: air pollution, social isolation, noise pollution, access to green space and health inequalities have also been impacted on by car use.

The surge in car use has reduced demand for public transport, resulting in a decline in frequency and routes. Fewer services has made public transport a less viable option for some journeys, further reducing demand. Between 2007 and 2014, bus use declined by 4% in Cardiff,⁵ and yet a third of residents (35%) in Cardiff cite frequency and availability of public transport as a major issue.⁵ Although 90% of residents say they are satisfied with public transport in the Vale, rates of use are much lower.⁶

Over the last five years the cost of rail fares have increased by 15%, and bus/taxi costs have increased by 14%, while the cost of running a car has decreased by 5%.⁷ Over 1 in 10 (11%) journeys in the UK in the 1950s were made by bicycle, but that figure now stands at just 1%. Increasing motorised transport on the roads, both rural and urban, has also had an impact on how safe people feel cycling.



Over the last five years
the cost of running a car
has decreased by 5%



while the cost of the bus
has increased by 14%

The UK still loves its cars. In 2015, total motor vehicle traffic in Great Britain reached a new record, of 317 billion miles travelled in one year, the majority travelled by cars and taxis.⁸ Growth in traffic levels over the last 10 years has been higher in Wales (5.9%) than the other home countries.⁹ There are currently 206,000 licensed cars in Cardiff and Vale.¹⁰ Population growth in the region, particularly in Cardiff, will put an increasing strain on the road network without a change in approach.⁵

In 2015 total motor vehicle traffic in Great Britain reached a new record level

Commuting into Cardiff is a snapshot of this: each day over 80,000 people travel to Cardiff for work from neighbouring local authorities, including 20,000 from the Vale.⁵ This makes up around a third of people working in Cardiff. The vast majority (about 80%) of those travelling in from neighbouring local authority areas currently do so by car.⁵ There are around 59,000 working residents in the Vale, of whom around half (28,500) work in the area and half (30,300) commute out of the area; around 14,000 people commute into the Vale. The majority commuting out work in Cardiff, with smaller numbers commuting to Bridgend and Rhondda Cynon Taf.¹¹

Among staff working in the Cardiff and Vale UHB, over 1 in 6 (17%) report walking or cycling to work, 8% take public transport, and 8% share their car journey with a colleague, with the remainder travelling alone by car.¹²

One bright spot is that while overall rail use remains lower than the 1950s (10% of journeys now compared with 17% previously) this has been steadily increasing following a low of 5% in the mid-1990s.¹

Our built environment

As our transport modes have changed over the past century, our built environment has followed. As well as a decline in the previously extensive public transport infrastructure for trams, buses and railways, our rural and urban

environments have been indelibly shaped by the car. Reversing this long-standing trend will take significant effort.¹⁴

Unused, parked vehicles take up a significant part of our urban space - on roads and outside houses, shops and work. Despite encouraging efforts to reverse the trend in recent years, our road network is designed to facilitate the movement of cars, rather than meeting the needs of pedestrians or cyclists. Road junctions frequently prioritise cars over cyclists and pedestrians.

While there are some examples of excellent cycling infrastructure locally, there are still too many examples of cycle lanes which start and stop inconsistently, with little in the way of continuity of flow car drivers have come to expect.

Most housing and commercial developments over the last 50 years have been shaped by cars, not people



Most housing and commercial developments over the last 50 years have been shaped by cars, not people. The rise in out-of-town shopping centres and offices has necessitated car travel (and ownership) for many people.

At the same time, increasing traffic on the road has led to a progressive reduction in urban green space, and in uninterrupted peaceful green spaces in rural areas.

The effects on health and well-being

The profound shift in how people get around, and the built environment changes which accompanied this, are exposing us to a combination of risk factors which we now know lead directly to serious illness and reduced life expectancy.



Physical inactivity and sedentary lifestyles

Health impacts: increased risk of death from any cause; increase in risk of cardiovascular disease, cancer, and type 2 diabetes; adverse impacts on mental well-being



Over half (54%) of adults in Cardiff and Vale are overweight or obese

Over half (54%) of adults, and a fifth (21.5%) of 4-5 year olds in Cardiff and Vale are overweight or obese,⁴ with the rates higher in more deprived areas. Obesity is a complex issue which has been discussed in previous annual reports, but we know that changes in physical activity levels are a key driver of the current epidemic.¹⁵ Physical activity levels for many people are insufficient to maintain good health: two in five (41%) of adults in our area don't do sufficient physical activity, with over a quarter (27%) classed as being inactive (less than 30 minutes physical activity in a week).⁴

While physical activity levels across Wales are broadly static, this masks a recent increase in activity among the least deprived communities.

This hasn't been seen among the most deprived, leading to worsening health inequalities.¹⁶ Teenage girls have the lowest physical activity levels out of the UK countries, with only 8% of Welsh teenage girls meeting the physical activity guidelines.¹⁶

Fewer than 1 in 10 (8%) of teenage girls in Wales meet the physical activity guidelines.

Car ownership is linked to how much walking and cycling people do, with a perception that car journeys are invariably quicker and easier than active travel. You are much less likely to undertake active travel if you have a car (37% with a car, compared to 71% without).¹⁷ Use of a car is associated with an increased risk of obesity, while walking and use of public transport is associated with not being overweight or obese.¹⁸ Active travel is less common in rural compared with urban environments in the UK, and becomes less common as people age.¹⁷

You are much less likely to undertake active travel if you have a car

We now know that insufficient physical activity and being sedentary are dangerous to our health.^{19,20} Being sedentary is associated with an increase in death from any cause of over a fifth (22%), and an increase of around one in seven in the risk of death from cardiovascular disease (15%) and cancer (13%). There is a staggering near doubling (91%) of the risk of acquiring type 2 diabetes. These effects are even more pronounced if sedentary activity is not offset by regular physical activity.¹⁹ Over 24,000 people are currently recorded as having diabetes in Cardiff and Vale.²¹



The Academy of Medical Royal Colleges has recommended that “a change in culture is needed so that it is no longer considered ‘normal’ to spend a large amount of time sitting in cars.”²²

Sedentary lifestyles are associated with a 91% increase in risk of type 2 diabetes



Air pollution

Health impacts: associated with cardiovascular and respiratory disease, stroke, cancer, diabetes, low birth weight, dementia

The nature of air pollution

Great progress was made in environmental protection in the 1950s with the introduction of the Clean Air Act, which enforced smoke control areas in some cities to reduce smog and air pollution from sulphur dioxide.²³

The main pollutants of concern today are nitrogen dioxide (NO₂), and particulate matter (PM_{2.5} and PM₁₀). The primary source of both pollutants are vehicle emissions, especially those from diesel vehicles, although there are industrial, agricultural and domestic sources too. Exhaust emissions continue to be produced when diesel or petrol vehicles are stationary and the engine is on, and traffic congestion tends to worsen emissions.

Deaths from particulates increase steadily with exposure for over 65s, even at concentrations below the current WHO guidelines and EU legal levels, for both short-term and long-term exposure.²⁵

Benzo(a)pyrene (BaP) is a component of PM10 generated by diesels; maternal exposure to BaP has been linked to mental health problems in childhood and neurocognitive delay.²⁶ BaP emissions rose by 52% in the EU between 2000 and 2014, with 80% of the urban population exposed to levels above WHO limits.²⁶

Roadside concentrations of NO₂, which are mainly emitted by diesel vehicles, has been above the legal limit in nearly 90% of urban areas of the UK since 2010.²⁷ HGVs, LGVs and buses make up just over half of the emissions, with private cars and taxis the remainder.²⁸ Levels of NO₂ in Cardiff and Vale residential areas are the highest in Wales.²⁹

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Box 1. Air quality management areas in Cardiff and the Vale³⁰

Cardiff City Centre, Cardiff
Llandaff, Cardiff
Stephenson Court, Cardiff
Ely Bridge, Cardiff
Cogan, Penarth

Transport pollution isn't just from cars: diesel buses and trains can also be significant contributors and any plan to reduce air pollution needs to address this as well.^{31,32} A recent study found air pollution levels in a large railway station in London exceeded those on a busy road outside.³¹

The general trend for air pollution from transport is a reduction over the last two decades,⁸ but it remains much higher than it should be for good health.



Exposure to air pollution

The relationship between exposure to air pollution and mode of transport is complex.^{27,33-35}

Exposure to air pollution is generally higher sitting inside a vehicle than outside on the road itself, because vehicle ventilation systems suck in polluted air from the vehicle in front and recirculate and concentrate it in a small area. However, because active travel increases the breathing rate, the amount of inhaled pollutant is generally higher for active travel modes. In spite of this, because of the overwhelming benefits of physical activity on cardiovascular and general health, people who travel in motorised transport still reduce their life expectancy by a year on average compared with people who actively travel.³⁶ When active travel routes are built away from busy roads, and less polluting vehicles become more common, the benefits of active travel increase further.



“Children sitting in the backseat of vehicles are likely to be exposed to dangerous levels of air pollution. If more drivers knew the damage they could be doing to their children, they’d think twice about getting in the car.”

Prof Sir David King, former government Chief Scientific Adviser²⁷

High levels of air pollution aren’t confined to main roads. A recent study of estimated air pollution around health facilities in London found that over half of the NHS sites in the capital exceeded legal limits.³⁷ The authors recommend that organisations across the UK review air pollution levels around health facilities as a matter of urgency.



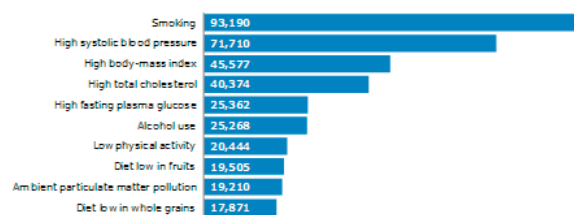
Health impacts of air pollution

Using international modelling, it has been estimated that across the UK around 40,000 deaths each year are due to air pollution (PM_{2.5} and NO₂).³⁸ In Wales, an equivalent of around 1,600 avoidable deaths are estimated each year due to particulate matter, and 1,100 due to NO₂ exposure.²⁹

It is estimated 143 deaths each year in Cardiff and 53 each year in the Vale among over 25s are due to air pollution caused by particulate matter, and 2,100 life years are lost each year.³⁹ Long-term exposure to particulates is

estimated to be responsible for 5.1% of all deaths in Cardiff and Vale.^{29,39} Across Wales, the years of life lost due to air pollution puts it ninth out of the top 10 modifiable risk factors, but three other risk factors associated with a car-dependent environment, namely high blood pressure, high body mass index, and low physical activity are also in the top 10 (see Figure).¹⁶

Figure 3. Top 10 risk factors for years of life lost (YLL) in Wales (2015). Four of the top ten are impacted by car use.¹⁶




An estimated 5% of deaths in Cardiff and Vale are due to particulate matter air pollution

Air pollution has been linked to cancer, asthma, COPD, pneumonia, stroke and heart disease, diabetes, obesity and changes linked to dementia.^{38,40} Long-term exposure reduces life expectancy, principally due to increases in cardiovascular disease, respiratory disease and lung cancer.^{40,41}

Children are four times more likely to have significantly reduced lung function in adulthood if they live in highly polluted areas.⁴⁰ The risk of adults developing type 2 diabetes has been found in large prospective studies to increase by up to 10% for every 10µgm⁻³ increase in exposure to pollutants.⁴⁰

Dirty air has also been associated with premature birth, and low birth weight. It is estimated that one fifth of cases of low birth weight are due to traffic-related air pollution, with the greatest harm occurring with exposure in early pregnancy.⁴⁰ NO₂ exposure has been linked to neurodevelopmental impairment, and increased risk of attention deficit hyperactivity disorder (ADHD) in children.⁴⁰



It is estimated that one fifth of cases of low birth weight are due to traffic-related air pollution.

Short-term exposure to air pollution can lead to negative effects on lung function, exacerbation of conditions such as asthma, and increases in hospital admissions and deaths.⁴¹

Health problems from air pollution in the UK have been estimated to cost society, businesses and the NHS over £20bn per year (Box 2).⁴⁰



Box 2. The health impacts of air pollution

“Damage [caused by air pollution] occurs across a lifetime, from a baby’s first weeks in the womb all the way through to the years of old age.... Harm to babies and children will have an impact that lasts far into the future. For the same reason, any air quality improvements we make now will have long-lasting benefits. Older people, and adults with long-term conditions are also vulnerable to the effects of air pollution. Improving air quality will help them to stay independent and well, benefiting individuals and easing the pressure on our NHS and social services.” Every breath we take: the lifelong impact of air pollution. Royal College of Physicians and Royal College of Paediatrics and Child Health (2016)⁴⁰



Road traffic injuries and deaths

Health impacts: serious injuries and deaths due to physical trauma; knock-on impact on active travel levels in population; reduced outdoor play by children

Even with significant improvements in road safety over the last 30 years, with progressive advances in car safety equipment, a change in drink-driving culture, and speed limit enforcement, deaths and injuries associated with cars remain common.

There are 20 road accidents causing death or serious injury each week in Wales

In Wales there were 975 road accidents which caused death or serious injury in 2016, or nearly 20 serious accidents each week. 103 people died last year in road accidents in Wales, or two people each week. Such statistics are unfortunately so common and an accepted part of driving that they no longer cause public concern – but if there were that number of incidents or deaths on the railways in Wales each year there would be a public outcry.



Half of car drivers in 30mph zones routinely exceed the speed limit

Enforcement of speed limits is important, with half (52%) of car drivers in 30mph zones routinely exceeding the speed limit.⁸ Figures for Great Britain found that a quarter (24%) of road fatalities were pedestrians.⁴² The number of incidents and casualties is highly sensitive to speed. A drop of just 1mph in average speed is estimated to reduce incidents by 5-6% on urban roads.⁴³

The most common cause of death for children aged 5-14 years is being hit by a vehicle.⁴⁴ Those aged over 60 are seven times more likely to die from being hit by a car at 30mph compared with other age groups; 44 over a third (35%) of all pedestrian fatalities are people aged 70 or over.

The most common cause of death for children aged 5-14 years is being hit by a vehicle.

The perception of road safety has also had a significant impact on people's willingness to cycle for work and leisure, as well as parents'

willingness to let their children play outdoors in the street. This coincides with an increase in children's 'screen time', the amount of time spent by children and young people on electronic devices.⁴⁵ Play, including outdoor play, is incredibly important to children's physical development and mental well-being.⁴⁶



Increase in loneliness and social isolation

Health impacts: Reduced mental well-being and lower life expectancy

Seventeen percent of people in Wales report being lonely,⁴⁷ with results from a recent local survey in Cardiff and Vale putting the figure at nearly 1 in 4 (23.3%) among people in more vulnerable groups.⁴⁸ As car use has become more prevalent, people's social and support networks have also become more geographically dispersed.



Nearly 1 in 4 vulnerable people in Cardiff and Vale report being lonely some or all of the time

How well people are connected to their neighbours, and how many they count as friends, has been found to be directly associated in the UK and internationally with the traffic volume in their street.

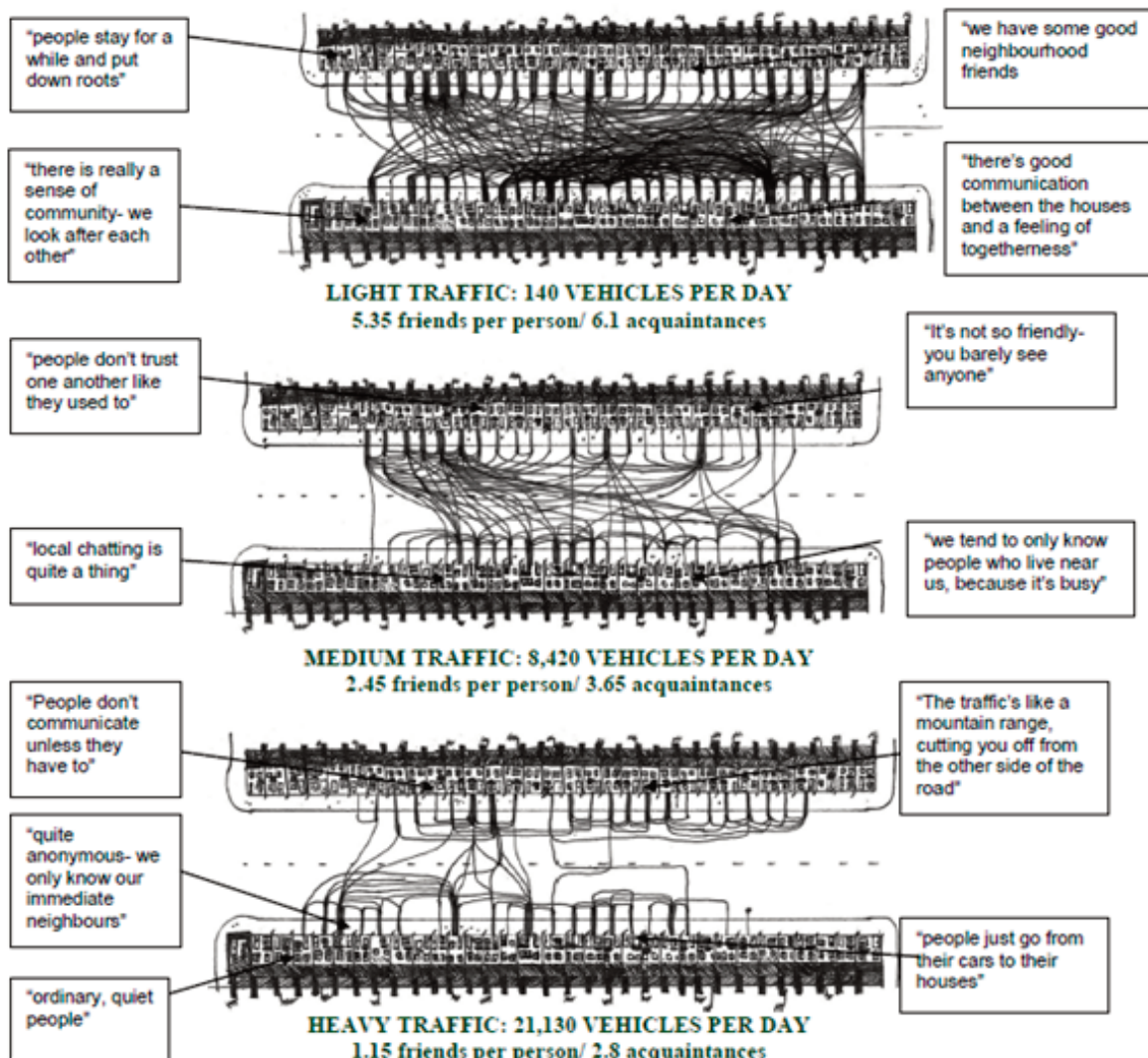
Replicating a classic US study from the 1960s, a study in Bristol in 2008 found that the number of friends and acquaintances reported by residents was significantly lower on streets with higher volumes of motorised vehicles.⁴⁹ The study asked residents on quiet, medium

and busy traffic streets to draw lines on a map of their street representing where their friends and acquaintances were on the street (see Figure 4). The average number of friends of each resident on the light traffic street was 5.35, compared to 2.45 on the medium traffic street and 1.15 on the heavy traffic street. Residents on the light traffic street also reported more of a sense of community and togetherness.

Residents on the light traffic street reported more of a sense of community and togetherness

The increasing reliance on the use of a car to reach shops, banks and community facilities has had a particular impact in rural

Figure 4. How community interactions vary by traffic volume.⁴⁹



communities. While a minor inconvenience for people with a car, those without become reliant on easily accessible and frequent public transport to access facilities and maintain their social networks and independence.

Increased car use has been associated with 'severance', the isolation of individuals and communities for example where a wide, busy road makes short local walks difficult.¹⁸

Loneliness and social isolation has a direct impact on length, as well as quality, of life. Studies have found that low levels of social integration, and isolation, significantly increase mortality. One study found social isolation increased the risk of death by a quarter (26%), partly but not wholly mediated by long-term illness and social deprivation.⁵⁰ Social participation acts as a protective factor against dementia and cognitive decline in the over 65s.⁵¹

Reducing car use and traffic speeds, and increasing access to public transport and active travel have been highlighted as priorities in an international report looking at healthy ageing in cities.⁵²

Reducing car use and increasing access to public transport support healthy ageing in urban environments



Transport noise

Health impacts: associated with high blood pressure

There is evidence that road transport produces noise pollution resulting in noise levels in excess of WHO guidelines for over 200,000 people in Wales.⁵³ The majority of these are in South Wales; in our area they are focused around key trunk roads including the M4, A4232, A48 and key routes in Cardiff.⁵⁴ Although transport noise may be seen as an inevitable consequence of living in an urban area, or near a large road, it has a long-term adverse impact on cardiovascular health, being associated with a small but significant increase in blood pressure.⁵⁵ In addition it has been associated with impaired intellectual development in children, sleep disturbance and reduced well-being.^{18,56}

Traffic noise is associated with high blood pressure, impaired intellectual development in children, and sleep disturbance

Traffic noise should not be inevitable: it is possible to reduce the volume of traffic by encouraging healthier forms of travel. Reducing speeds, and moving away from petrol and diesel powered trains and motor vehicles, also have the potential to reduce noise pollution.



Reduction in green space

Health impacts: associated with reduced physical activity, reduced mental well-being, increased mortality

Across the UK there has been a historic and ongoing steady decline in green spaces, due to net deforestation and urbanisation.⁵⁷ At the same time there is a growing evidence base on the positive effect on mental health and well-being of living near and visiting green spaces.^{51,58,59}



The rise in cars has led to increasing areas of our rural and urban landscape being concreted over, including the trend of paving over gardens to allow cars to be parked outside homes.⁶⁰ As well as reducing the space for nature to thrive, this impacts on the ability of urban areas to soak up rain and reduce flooding naturally.

A recent World Health Organisation (WHO) review of the health benefits of urban green spaces found multiple impacts,⁶¹ including improved social interactions and social capital, positive effects on the immune system, enhanced physical activity and reduced obesity, reduced exposure to air pollution, noise buffering, improved cardiovascular health,

reduced prevalence of type 2 diabetes, improved cognitive functioning, and reduced mortality.

Green spaces are associated with improved social interactions, increased physical activity and cardiovascular health, and reduced mortality



Exacerbating health inequalities

Health impacts: gap in life expectancy of around 11 years (Cardiff) and 8 years (Vale) between least and most deprived areas; pollution tends to be worse in more deprived areas; higher incidence and poorer outcomes across a wide range of health conditions

There are significant and persistent health inequalities in Cardiff and the Vale of Glamorgan. This is most clearly illustrated by the dramatic difference in life expectancy depending on where people live. A man living in one of our most deprived communities in Cardiff can expect to live 11 years fewer than someone in the least deprived areas. A similar gradient exists for women and for people in the Vale.

A man living in one of our most deprived communities in Cardiff can expect to live 11 years fewer than someone in the least deprived areas.

The rise in car use has exacerbated health inequalities. On the one hand, people in the least deprived communities are more likely to have a car than those in the most deprived areas. On the other, the impact of pollution (particularly NO₂)⁶² is felt more in deprived areas, which tend to be located closer to main highways, have a higher proportion of 'imported' traffic (from less deprived areas), and have a higher proportion of people with chronic illness which makes them more vulnerable to air pollution exposure.^{51,63}

Carbon dioxide (CO₂) emissions due to transport are significantly higher from the 10% least deprived households than the 10% most deprived, with the least deprived contributing to 17% of CO₂ emissions and the most deprived 2%.⁶⁴

Road traffic injuries and deaths are also higher in more deprived areas. Children in more deprived wards are four times more likely to be hit by a car compared with the least deprived wards.⁵¹ Fatal accidents on the road are also particularly high among children of unemployed parents.⁵¹

Children in more deprived wards are four times more likely to be hit by a car compared with the least deprived wards



good public transport networks. Young people, and older people who can't drive, are particularly affected.

UK public spending to support transportation is nearly four times higher for the richest 10% (who primarily use a car or the train) than for the most deprived 10% (who primarily use the bus).⁴⁴

Access and visits to green space, often curtailed by highway expansion and an important contributor to physical activity, obesity and well-being levels, are also lower in more deprived areas.⁵¹

Thus there is a double-whammy on health inequalities: cars are owned and used more by the least deprived, but the negative consequences from car use impact most on the most deprived.

Cars are owned and used more by the least deprived, but adverse impacts are felt most by the most deprived

Car-dependent environments isolate people without a car, making it difficult for them to access employment and education opportunities, further exacerbating and embedding inequalities.^{65,66} This is a particular issue in rural areas which are more reliant on

We could do things differently

What we need to do

A growing body of evidence describes the positive impacts on health and well-being across society which are possible if we increase our active travel rates, reduce air pollution, and prioritise designing well-connected and attractive urban and rural communities. Recent technological advances may also help with this.



Support active travel and public transport

Reduce car use

In order to increase physical activity it is necessary to reduce use of the car.⁶⁶ Many of the journeys which are currently made by car in Cardiff and the Vale could be made by walking, cycling or public transport. Daytime journeys of less than 2km, which do not involve carrying bulky loads, should generally be walkable for individuals aged 5 to 74 without a disability.⁸¹ When combined with public transport as part of an integrated transport system, active travel can also be a sustainable and healthy alternative to car-based travel for longer journeys.⁶⁵



Daytime journeys of less than 2km should be walkable for individuals aged 5 to 74 without a disability

Over half of residents in Toronto (54%) and Copenhagen (63%) cycle regularly.⁵ A similar proportion in Cardiff (56%) say they would like to ride a bike more, and three quarters (74%) think it would be better if there was more

cycling.⁵ Furthermore, over half of Cardiff residents (57%) travel less than 5km to work.⁵ 84% of residents in the Vale use a car once a week or more, compared to 7% who cycle weekly.⁶

Because lifestyles have developed around near-universal car use, alternatives to the car must provide a level of accessibility similar to the car to be widely adopted.⁶⁶ In Cardiff, use of the car for commuting is only one quarter of journeys, with a similar proportion due to each of leisure, shopping, and other purposes.⁵

NICE recommends the use of car-free days to raise awareness and interest in active travel,⁴¹ and has published evidence-based guidance on increasing walking and cycling levels.⁸²

'Designed to move: Active Cities' cites an extensive evidence base on the economic, well-being and environmental benefits of cities becoming more active.⁸³ Examples include significant increases in employment and visitors and community involvement; and falls in crime (74%), pollution and stress.

Improve infrastructure to support active travel

Well-designed infrastructure to support active travel, as well as frequent, reliable public

transport which covers all major local destinations, are essential elements in increasing take up of these travel modes.⁵¹ Eight in ten Cardiff residents think that safety for cycling needs to improve.⁵

Historically, investment in infrastructure for cars has dwarfed that of walking and cycling routes. The UK Faculty of Public Health has called for 10% of transport budgets to be committed to walking and cycling.⁸⁴ NICE found that off-road cycle routes were good value for money, with every £1 investment in off-road routes returning around £14 in benefits.⁴¹ They advise that cycle routes should ideally be on quiet streets or segregated, in order to minimise exposure to air pollution. Investments in walking infrastructure return £37 for every £1 invested.⁸⁵



NICE found that off-road cycle routes were good value for money, with every £1 investment in off-road routes returning around £14 in benefits



Road space should be progressively reallocated to active travel modes as their share of journeys increases;^{22,66} this prevents car use

from increasing again as congestion starts to fall, and is also highly efficient, especially for a growing population: 12 bicycles can be stored in a single car parking space.⁸⁶ Road crossings should be modelled around pedestrians and follow their 'desire' lines.⁵¹

12 bicycles can be stored in a single car parking space

In designing environments to encourage active travel, evaluation of success may include the use of data from smartphone apps, for example cycle app data which can reveal changing patterns of local travel.⁸⁷

Box 2. Road design in Europe

The Netherlands adopted five principles of **sustainable safety** in 1992, to prevent severe crashes and reduce the severity of injuries when crashes do occur.⁸⁸ The principles include clearly defined road categorisations which separate road users according to speed and purpose, and segregating traffic where speed differences cannot be eliminated. Motorized vehicles are considered as 'guests' in residential areas, with pedestrians and cyclists prioritised.⁸⁹ Predictable road layout is encouraged, with a 'forgiving' environment should errors occur (e.g. 45° rather than 90° pavement edges to reduce the likelihood of a cyclist falling if they hit the kerb edge). Sustainable safety has been found to contribute to a significant reduction in fatalities.⁹⁰ **Filtered permeability** is another concept common in European transport planning, with pedestrians and cyclists given an advantage, in terms of speed and convenience, compared to motor traffic – for example, a two-way cycle route but one-way car traffic.⁸⁴

Support people to take up active travel at trigger points in their life

Suitable active travel infrastructure is necessary to enable a modal shift, although not sufficient in itself.⁹¹ In addition to investing in infrastructure, for many people the trigger to take up active travel is a significant life event.⁹² For example, starting a new job or moving to a new workplace location, becoming a parent, people recovering from ill health, and people retiring, have all been found to be triggers which make people more likely to review their travel options and switch to active travel. Raising the topic of active travel at these critical points is something which could be done systematically throughout the public sector locally, which will be involved in these events for many people.

For many people the trigger to take up active travel is a significant life event

Provide high quality, flexible public transport

Public transport use is facilitated by affordable ticket prices, flexibility in stops, high quality travel information and regular services.^{22,93} Modelling in Australia found that there was significant potential to increase the number of adults physically active by encouraging people to take public transport.⁹⁴ The study reviewed international evidence and found that on average around 15 minutes' walking time was associated with public transport use each day. Mixed mode travel, especially important in rural areas where combined active travel and public transport is the most pragmatic approach for many journeys, can be enabled by allowing easy transport of bicycles on buses and trains.⁹³ In Germany a controlled study

which gave free public transport tickets and a personal schedule to people who had recently moved house resulted in a doubling of public transport use (18% to 36%) and a decline in car use (53% to 39%).⁶⁶

Public transport use is facilitated by affordable ticket prices, flexibility in stops, high quality travel information and regular services



Reduce air pollution and carbon emissions

National Institute for Health and Care Excellence (NICE) recently issued detailed guidance on improving air quality and health. Recommendations include supporting active travel, providing infrastructure for electric vehicle charging, introducing clean air zones, and bringing in 'no idling' bylaws outside schools (see Box).⁴¹

NICE recommends the introduction of Clean Air Zones which support low-emission travel

NICE found that clean air zones cost around £2 per head annually (based on Amsterdam costs), but deliver benefits which far exceed this, of around £29 benefit for every £1 spent.⁴¹ Low emissions zones should ideally cover all motor traffic, including cars and vans, to be effective at improving air quality.²⁶

No idling zones outside schools were estimated to have a return on investment of up to £44 for every £1 spent.⁴¹



Clean Air Zones deliver benefits worth £29 for every £1 spent

Box 3. Selected recommendations from NICE guidelines on improving air quality.⁴¹

Support active travel. There should be a choice of cycle routes, including routes avoiding highly polluted roads

Support car sharing schemes and car clubs

Provide electric vehicle (EV) charging points in workplaces, commercial developments and residential areas

Consider introducing a clean air zone that introduces restrictions or charges on certain classes of vehicle, and supports zero- and low-emission travel (including active travel)

Where traffic congestion is contributing to poor air quality, consider incorporating a congestion charging zone within the clean air zone

Introduce bylaws to support 'no idling' areas where vulnerable groups congregate such as outside schools, hospitals and care homes

Specify emission standards for private hire and other licensed vehicles

Address emissions from public sector transport

Introduce 20mph zones without physical measures, to avoid unnecessary accelerations and decelerations which contribute to air pollution

Many of the NICE guidelines are echoed by a major joint Royal College report into air pollution,⁹⁵ which also recommends promoting safer 'school runs' which avoid using the car, encouraging employers to support alternatives to commuting by car, promoting leisure cycling, and monitoring and displaying air pollution around schools. They also recommend local authorities should publish serious incident alerts when levels exceed WHO and EU limits.⁴⁰ The report calls on the NHS to lead by example and set the benchmark for clean air and safe workplaces.



The NHS should set the benchmark for clean air and safe workplaces

While electric vehicles are preferable to petrol and diesel-fuelled vehicles in terms of air pollution, it is important to note that EVs still produce particulate matter, albeit at lower levels than diesel vehicles especially. Therefore strategies to improve air quality and health should still focus primarily on active travel and low emission public transport. Where vehicles are still required, EVs (and other ultra low emission technologies) should be prioritised over internal combustion engine (ICE) vehicles.

Shifting the model of car ownership to a shared or rental model would change the cost profile of driving; instead of a large up-front investment (buying a car) with individual journeys relatively cheap to make after that (thus encouraging them), the costs would be more evenly distributed. This would not only lower the barrier to use of car when required (e.g. carrying bulky goods) but also discourage use of the car when public transport or active travel may be as easy. This would also potentially be cost-saving for more deprived households, reducing inequalities.⁶⁶

Case studies demonstrating systematic approaches to improving air quality are available on Defra's website,⁹⁶ and guidance to local areas in Wales from Welsh Government and Public Health Wales is due shortly.

Design well-connected and attractive communities

Street layout and proximity to other routes has been found to relate to active travel behaviour, with more active travel and less car use in more 'integrated' streets (those linking better to other streets).^{97,98} Streets with lower traffic volumes have also been found to have stronger social networks between neighbours,⁴⁹ reducing social isolation.

Walking is encouraged by safe, traffic free walking routes and large public open spaces.⁵¹ A UK survey on walkability in large cities found Cardiff had a lower score for accessing green spaces (50%) compared with the UK mean (54%), but did score well for safety of walking.⁹⁹ The Faculty of Public Health suggests transport and land use proposals with a negative impact on walking and cycling should routinely be rejected, and towns and cities should be 'people friendly' rather than car-friendly.⁸⁴ Higher density development should be encouraged near public transport hubs,²² and commercial developments should have zero car parking except for blue-badge users.²²

Reducing traffic speed with 20mph limits make streets more inviting for walking, socialising and cycling. Published modelling for Wales has estimated that if all 30mph roads were reduced to 20mph in Wales, between 1,200-2,000 casualties would be avoided each year, along with a net reduction in deaths and years of life

lost due to air pollution.¹⁰⁰ The Faculty of Public Health has called for 20mph limits to be the norm for residential streets, with higher limits only on strategic traffic routes.⁸⁴

Reducing traffic speed with 20mph limits make streets more inviting for walking, socialising and cycling

People who walk and cycle in a neighbourhood are more likely to spend money in local shops than people in cars who are more likely to drive through.^{51,65} Retail sales have been found to increase by around 30% where walking and cycling projects have been undertaken.¹⁰¹ It is therefore important to engage with local business communities to raise awareness of the financial benefits associated with prioritising walkability, active travel and public transport access.⁹³



People who walk and cycle in a neighbourhood are more likely to spend money in local shops

Tools to help people moving to an area identify neighbourhoods which are more walkable are becoming available, such as Walk Score in the US.¹⁰² A newly devised walkability score for London was tested against walking behaviour in a large cohort study, and found that people in more walkable areas were – unsurprisingly – more likely to walk.¹⁰³ Understanding the key characteristics of walkable neighbourhoods and incorporating these into future developments and works is therefore important in improving physical activity.

In some areas of the UK residents are working with local authorities to allow children to safely play in the streets outside their houses, by temporarily closing the street.¹⁰⁴ Many examples are in England, but there have also been recent examples in Cardiff (see Good practice locally, below) which have been well received and demonstrate this approach can work in a local context.

Protect and enhance our green space

Ensuring everyone has access to good quality open and green spaces is a key recommendation of the Marmot report on spatial planning and health inequalities.⁵¹ Green space encourages physical activity and play, and should be accessible for those walking, cycling and using public transport, and have sufficient cycle parking.⁵¹ In a rural context, outdoor recreation and activities are a key driver of the economy.⁵³

Trees naturally absorb air pollution and improve air quality,⁶⁰ reducing particulate matter by up to a quarter (24%) in their vicinity.¹⁰⁵ Furthermore, trees sequester carbon (mitigating climate change), reduce summer air temperatures by 0.5 to 2.0°C (for example during heatwaves), and reduce noise pollution.¹⁰⁵

Provide leadership

Senior, visible leadership and role-modelling on these issues is essential, in order to raise awareness and knowledge and build a broad consensus on action required. Engagement with local residents and organisations is a key part of this.⁶⁵ Active travel should be prioritised

in urban planning and infrastructure development.⁶⁵

A passionate call has been made in the British Medical Journal (BMJ) for healthcare professionals to lead by example on this, reducing their own car use and providing leadership to help others do so.¹⁰⁶

Moves such as the introduction of the London congestion charge, which resulted in an 80% increase in cycling in central London since its inception in 2000,⁸⁴ and the UK government's timetable for phasing out fossil-fuelled cars by 2040,²⁸ have both reset expectations of what is possible, and the terms of public debate around travel and transport.

This is important: we are currently working from a 'norm' of routine petrol and diesel car use and this will only shift if leadership continues to be shown in this area.



The London congestion charge resulted in an 80% increase in cycling

Recent technological progress

The evidence of how we could make positive changes is supported by, and in some cases being overtaken by, significant progress in a number of different technologies over the last decade.

Being able to understand and respond to disruptive technologies will be an essential part of future strategy.



Bicycles

Dockless bike hire

Bike hire schemes have been around for a long time, and have increased in popularity and visibility in the last decade with schemes such as 'Boris bikes' in London. However, the cost to set up such schemes are high, and they rely on people finding docks near the start and end of their journey.

More recently 'dockless' bike schemes have started to appear, firstly in South East Asia and now in Europe.^{107,108} These schemes do not require docks, with users finding the nearest available bicycle through a smartphone app, and leaving the bike at any convenient location near their destination. The schemes are run directly by the bicycle hire company, with no investment required by the host city. While promising increased convenience for residents with no startup cost for the city, there have been concerns voiced by city authorities, principally where large numbers of bicycles have been discarded or left in inappropriate locations. Working with scheme operators to agree an approach which benefits local residents and addresses concerns would be a win-win for local authorities and the private firms.

Bicycle sharing schemes including bike hire and pooled bicycles increase the availability of bicycles

More broadly, other bicycle schemes such as pooled bicycles at workplaces, peer-to-peer sharing of bicycles, and workplace bicycle purchase schemes also offer ways to increase the availability of bicycles.¹⁰⁹

E-bikes

One of the barriers for people taking up cycling, especially in more rural areas where journeys may be longer and hilly, is the physical effort required to cycle. E-bikes offer power assisted cycling with power provided by a rechargeable battery integrated into the bike. Pedalling is still required to move the bicycle, but the motor assists when there is significant resistance such as a hill.

E-bike technology is improving and coming down in price rapidly, and is a price-competitive option for personal ownership, bicycle hire or shared bike schemes.

Car pooling and sharing

Car pooling, where individuals use a shared car (e.g. operated at their workplace, or with other residents in a local area), aims to reduce the number of journeys made by car while maintaining access when required. For example, if staff in an office need to make house visits or journeys for meetings during the day by car, a car pool would enable them to commute to work by public transport, then use a pooled car when required during the day.

Pool car systems can be locally organised, or large providers including some car hire firms offer this service. Prioritising parking for pooled cars encourages their use. Smartphones have enabled car pool systems to be used in residential areas, with residents locating the nearest pool car through an app when they make a journey for which they need a car.

Car sharing schemes aim to put co-workers in touch who live near each other, to help them save fuel and reduce emissions by sharing journeys on the same route.²²

Real-time pollution monitoring

Technology to monitor pollution is becoming cheaper and more portable. A personal monitoring device is already available which costs less than £50, CleanSpace.¹¹⁰ An accompanying app tracks your exposure to carbon monoxide during your daily journeys (a measure of vehicle exhaust exposure), presenting you with a summary of your journey on a map. This allows people travelling by foot or bicycle to avoid particularly polluted areas for future journeys.

Although delayed in its development and implementation, a system is due to start imminently in Swansea (Nowcaster) which will monitor air quality and divert drivers via electronic signs when pollution is above a certain level.¹¹¹



Ultra low emissions vehicles

Cars

Reducing emissions from vehicles is important to improve air quality and reduce harmful greenhouse gas production.

The most developed ultra low emission technology currently available is the battery electric vehicle (EV), with charging infrastructure and vehicle ranges improving rapidly. The car industry is undergoing rapid change, with the number of manufacturers launching pure EVs rapidly increasing, and Volvo recently committing to all new models being hybrid or pure electric from 2019.¹¹²

The car industry is undergoing rapid change, with the number of manufacturers launching pure EVs rapidly increasing

To further stimulate a transition to EVs, the rollout of charging facilities needs to continue, and particularly address charging where off-road parking isn't available. For example, there are now trials in London and elsewhere in the UK of EV charging from streetlamps.¹¹³ For transitional uses where current driving range and charging infrastructure is insufficient, plug-in hybrid models offer significantly lower emissions and fuel consumption than pure ICE vehicles.

Did you know...?

Electric vehicles aren't new. The first production electric vehicle was built in 1884, over 20 years before the Ford Model T started production in 1908

A number of cities across the UK are now incentivising or mandating taxis to be plug-in hybrids or pure electric vehicles, including London where all new taxis presented for licensing from 1 January 2018 will need to be able to travel at least 30 miles with zero emissions.¹¹⁴ A UK Government plug-in taxi grant has also been introduced to incentivise electric taxis, and taxi charging infrastructure is being subsidised in 10 cities.¹¹⁵ Fleet-owned vehicles are another opportunity for

introducing ultra low emission vehicles. A number of NHS organisations in the UK including acute trusts and ambulance services have already started introducing electric vehicles to their fleets,^{116,117} and Royal Mail has started trialling electric delivery vans.¹¹⁸

Box 4. Moving to cleaner energy sources

Switching to zero emissions vehicles is an important contribution to reducing local air pollution. Electric vehicles are inherently 3-5 times more efficient in their use of energy than internal combustion engine (ICE) vehicles.¹²⁰ However, to reduce wider air pollution and carbon emissions, it is important that the transition to EVs is accompanied by the continuing decarbonisation of the UK electricity grid, through increasing use of renewable energy sources.^{53,95}

There is an opportunity to marry some new demands for energy with generation at the point of use, such as through solar car parks,¹²¹ or e-bike charging stations. Wales is currently generating around 9,000 gigawatt hours of energy from renewable resources, with this figure rising.⁶⁰



A number of cities across the UK are now incentivising or mandating new taxis to be electric

While EVs certainly help in reducing local air pollution, they do not eliminate it altogether (due to particulates produced from tyre wear), and do nothing to improve physical activity rates, so measures to move people to active travel and public transport are still essential.¹¹⁹

Buses

Buses are a major source of pollution, particularly older diesel vehicles. Newer technology (such as Euro VI diesels) have much lower NOx emissions than previous generations of engines. Cardiff Bus has recently purchased ten Euro VI models.¹²² Bus fleets elsewhere in the UK have also introduced hybrid, plug-in hybrid and full electric buses into their fleets.³² While converting an entire fleet may be expensive, this could be done over time, with the busiest routes converted first; and with costs of conversion being directly subsidised by levies on polluting vehicles.

Retrofit technology for buses has been taken up extensively across the UK, with around 3,000 older diesel buses retrofitted with selective catalytic reduction (SCR) to reduce NOx emissions by over 90%, reductions which have been confirmed in real-life testing by Transport for London (TfL).³² TfL alone have retrofitted over 2,100 buses with SCR.

Retrofitting buses can reduce NOx emissions by 90%

Another option in some cases would be to replace bus routes served by polluting buses with electrified light rail services.

Box 5. Cardiff Capital Region Metro proposals

A £1.2bn City Deal was agreed in March 2016 covering ten South East Wales local authorities, including a substantial investment in a Cardiff Capital Region Metro integrated public transport system. The details of the Metro are still being worked through, but the proposal includes electrified rail; integrated transport hubs; park and ride facilities; light rail and/or bus rapid transit routes; better integration across modes and operators; and active travel interventions.¹²³ The City Deal also included a commitment to electrification of the Valley Lines rail network by 2023.⁵

Trains

Diesel trains are also responsible for high levels of pollutants. Electrification of lines will reduce the use of diesel locomotives, but can be very expensive to roll out. This is planned already for the main line to Cardiff,¹²⁴ although a previous policy to extend electrification further west has recently been cancelled. Trials have suggested that battery-operated locomotives may be able to provide a solution for areas where electrification is too costly.³¹

Home working and remote meeting technology

A further alternative to car-based travel to work or during work time is avoiding travel altogether by making use of remote technologies. This includes home working but also a reduction in travelling during work hours by substituting face-to-face meetings with teleconferences or videoconferences.

While homeworking and remote meetings are only suitable for some roles, some of the time,

they are nonetheless important options as part of an overall solution. Homeworking one day a week, for example, is likely to reduce transported-related air pollution and carbon emissions for an employee by one fifth.

Using data to analyse gaps in public transport

There is now a huge amount of anonymised data collected at a population level on people's movements, using information from smartphones. This data can be used to improve public transport. The makers of a popular transport app, CityMapper, used data in London to identify gaps in existing routes and have now set up a night bus route to meet this need.¹²⁵

Technology on the horizon

Improvements in electric vehicle technology

The range and affordability of electric vehicles is increasing rapidly, with most major manufacturers now planning to release EVs within the next 1-2 years. Prices of EVs are expected to fall progressively.

Increases in EV uptake rates will require the introduction of smart charging technology to avoid overloading the electricity grid, for example by scheduling charging at various points overnight to even out demand.

Technology to allow on-the-go charging of vehicles ('dynamic charging') through the road surface, is already being trialled in South Korea and the US.¹²⁶ This has the potential to allow public transport vehicles to stay in service while charging.

Autonomous and connected vehicles

While some vehicles already available connect to the internet, the scope and nature of this connectivity has the potential to evolve further over the coming years, with cars communicating with traffic lights or other cars, to better understand local traffic conditions, pollution levels, and to avoid collisions.¹²⁷

Self-driving cars are on the verge of becoming a reality due to improvements in sensors and advances in artificial intelligence. Cars are already on the market which can brake by themselves to avoid collisions, park themselves, and drive autonomously on motorways. Major manufacturers plan to have almost fully autonomous cars on the road within the next 4 years.¹²⁸ Autonomous freight vehicles are also planned.

Major manufacturers plan to have high automation cars on the road in the next 4 years

The potential impact of autonomous or driverless vehicles within the next 10-15 years is noted in the Welsh Government Future Trends report.⁷¹

Within the context of an integrated transport system, perhaps the biggest potential for autonomous vehicles is a role in 'mobility as a service'. This would see autonomous vehicles running a fixed route, or being summoned on demand (essentially a driverless taxi), and could help plug holes in public transport coverage. Driverless pods have been used at London Heathrow airport for over 5 years now, and are now being trialled in Greenwich.¹²⁹ Car-sharing technology firms such as Uber, which are already having a disruptive impact on the transport sector, are also trialling autonomous technology.¹³⁰

As the technology matures, autonomous vehicles have the potential to have a broad range of impacts, from improvements in road safety, to reducing personal car ownership, and impacts on jobs in the transport industry.



How health and well-being could improve

Encouraging walking and cycling, and reducing air pollution, should result in significant improvements in cardiovascular health, rates of diabetes, overweight and obesity, falls, cancer and mental health, as well as overall increases in life expectancy.

For example, increases in physical activity result in a reduction in the overall death rate by up to 30%, a 20% to 35% lower risk of cardiovascular disease and stroke, a 30% to 40% reduction in type 2 diabetes, a 30% lower risk of falling among older adults, a 30% lower risk of colon cancer and 20% lower risk of breast cancer, and a 20-30% lower risk of depression and dementia among adults.^{93,131-133}

Other benefits include reductions in low birth weight babies, reduced staff sickness absence and improved productivity, and increased time children spend playing outdoors.



The time is right for change

A number of opportunities exist through legislation, national and local policy, and a gradually changing culture around the use of cars, which make now the time to act. This chapter describes the main opportunities we need to seize.

Bringing about cultural change in our communities and large organisations will not take place overnight. Using existing tried and tested approaches to change such as continuous improvement methodology, and making the most of the opportunities posed by disruptive technologies, will need to be fundamental to our approach.

Legislation

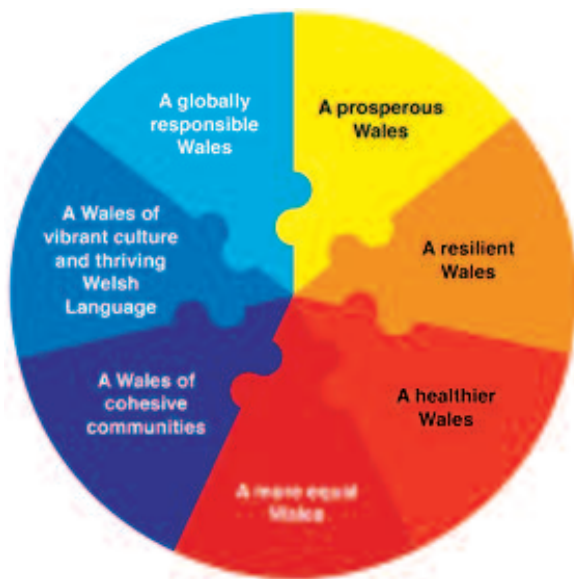
National

Four key pieces of legislation have recently been passed in Wales which pertain to improving health, well-being and environmental sustainability (see Box 6).

Box 6. Recent Welsh legislation relevant to sustainable travel, health and well-being

Well-being of Future Generations (WFG) (Wales) Act 2015 ¹³⁴	Introduces duties on public sector organisations in Wales to take into account future generations when planning services and making decisions
Active Travel (Wales) Act 2013 ¹³⁵	Makes it a legal requirement for local authorities in Wales to map and plan for suitable routes for active travel, and to build and improve their infrastructure for walking and cycling every year.
Environment (Wales) Act 2016 ¹³⁶	Places a duty on Welsh Ministers to ensure that the net Welsh emissions account in 2050 is at least 80% lower than the baseline. ^{a55}
Public Health (Wales) Act 2017 ¹³⁷	Introduces a duty to carry out Health Impact Assessments

Figure 5. Well-being goals established under the Well-being of Future Generations Act



The WFG Act set up public services boards (PSBs) in each local authority area with a duty for members to act together and individually to meet challenges in the area identified through a well-being assessment. The WFG Act, and its implementation presents a significant opportunity in addressing the issues highlighted in this report.

The Future Generations Commissioner (FGC) role is to act as an advocate for future generations and guide implementation of the WFG Act. Of the top seven priorities listed by the Commissioner in office, five are directly related to the issues discussed here: City Region Deals, integrated transport systems including South Wales Metro, prevention, early years, and climate change.¹³⁸ Separately, the FGC has reiterated the requirement for urgent action on climate change.^{139,140}

International

Internationally, the UK is a signatory to the 2015 Paris Agreement on climate change. This legally binding agreement commits the UK to take significant steps to reduce greenhouse gas emissions to restrict global warming to less than 2°C, with an aim of 1.5°C maximum warming.¹⁴¹ For the UK to meet its obligations under the Paris Agreement a significant reduction in emissions from road transport will be required.

Strategy and policy

There are a number of strategies and policies relevant to the issues described here. International and national strategies are listed in Box 7, and local strategies in Box 8. A description and reference for each is given in the Appendix.

In addition to the local strategies shown, each public sector organisation has an active travel strategy; and an air quality strategy is currently being developed for Cardiff.

Box 7. Key international and national strategy and policy

UK plan for tackling roadside nitrogen dioxide concentrations
Real Driving Emissions (RDE) regulations Office for Low Emission Vehicles (OLEV) grants
Town & Country Planning Association (TCPA) guidance: Planning for better health and well-being in Wales
Royal Town Planning Institute (RTPI) policy Local air quality management (LAQM) Wales guidance 2017
Manual for Streets
UN Convention on the Rights of the Child (UNCRC) and Rights of Children and Young Persons (Wales) Measure 2011
Public Health Wales (PHW) Well-being Objectives
Future Generations Commissioner for Wales – Draft strategic plan 2017-23

Box 8. Key local and regional strategy

Public Services Boards – Well-being objectives and plans
Regional Partnership Board – Area plan (in development)
Local Development Plans (LDPs)
Local Transport Plans (LTPs)
Shaping our Future Well-being
Cardiff Transport Strategy
Cardiff Cycling Strategy
City Region Deal

Culture change

The green shoots of a shift away from cars are starting to be seen. Residents in our area are keen to cycle more, take more physical activity, and want to see improvements in public transport.

Driving a car has become less popular among young people over the last few years, partly as a result of large increases in insurance costs, as well as the availability of ride-sharing apps such as Uber.⁸ There has also been an increase in shoppers visiting high streets rather than out of town sites in Wales.¹⁴²

Driving a car has become less popular among young people

While the car used to be an essential means to keep in touch with friends and relatives, the recent explosion in the use of social media, video calls and instant messaging, has made many of these journeys unnecessary.

Public transport accessibility for people with mobility difficulties has increased significantly over the last 10 years, with nearly all (94%) of buses now accessible in England, up 65% since 2005.⁸ (comparative figures for Wales are not available).

Although petrol and diesel cars still dominate sales, ultra low emission vehicle sales are rising rapidly in our area, from below 20 vehicles sold in Cardiff and Vale each quarter three years ago, to over 300 now.¹⁴³

Good practice locally

There are already some fantastic examples of projects which are paving the way for a brighter future in our area.

Cardiff and Vale University Health Board

There are a number of examples of good practice across the Health Board, including a new Park and Ride scheme for the Heath site (see Box 9); development of the Orchard at University Hospital Llandough, to encourage physical activity in a nearby green space; a bicycle purchase scheme; the establishment of a 'Park and Stride' scheme at Severn Road Primary School in North Cardiff, to reduce car emissions and hazards outside school gates; plans for an integrated bus hub at the UHW site, working with the local authorities; including ease of access by public transport and active travel in decisions around developing new health and well-being centres across the area; and the establishment of a group to review air quality data for schools to help promote active travel.

Box 9. Park and ride service for University Hospital of Wales

Park and Ride Service for UHW



A new Park and Ride bus service has been introduced for the University Hospital of Wales, in conjunction with Cardiff Bus and the City of Cardiff Council. The regular bus service reduces traffic-related congestion and emissions on-site, helping to make the environment more conducive over time for active travel and pedestrians. Using the Park and Ride is cheaper for staff and visitors than parking on site.

Vale of Glamorgan Council

Vale of Glamorgan Council are keen to see their staff travel sustainably (see Box 10). The Greenlinks scheme in the Vale is a form of on-demand transport, enabling people without regular access to a car to make ad hoc journeys which are not served by the public transport network.¹⁴⁴

Box 10. Helping staff travel sustainably

Vale of Glamorgan Council are taking the lead in encouraging their staff to travel sustainably. Their approach includes provision of pool bikes to get between nearby offices; pool cars; and a travel expenses policy which encourages short journeys to be made actively.



City of Cardiff Council

In addition to the ambitious Cardiff Transport Strategy,⁵ there are a number of projects encouraging people to ditch their cars in Cardiff. These include street play (see Box 11); a programme to encourage active travel among staff who work at County Hall; Cardiff shared car scheme; and the ongoing development of a local air quality strategy.

Box 11. Encouraging street play

Ely and Whitchurch in Cardiff saw streets closed on 2 August 2017 to allow safe play for children in a residential area. The events, organised by Play Wales and following the 'Playing Out' model, with the support of the City of Cardiff Council, are hoped to be the first of many such examples, allowing children to get outdoors and get active, reducing screen time and increasing physical activity. Children were encouraged to come together to play on the street along with their families and bring their scooters, footballs, chalk and skipping ropes.

Cardiff resident and mother of two, Toni Morgan said 'I wanted to kick start the project in my street as I was aware of the many families living in the street, however I had never actually encountered any children at any time playing outside in the three years of living here.'



Other examples

Public Health Wales Environmental Health is working closely with public health teams and councils across Wales to foster closer collaboration between local specialists to improve local air quality, and has played a key role in raising the profile and awareness of air pollution as a health issue in Wales. Information on air pollution for primary and secondary schools in Wales is being developed,¹⁴⁵ based on experiences in Scotland and Northern Ireland.

Seizing the day: a vision for Cardiff and the Vale

What future do we want for ourselves and our communities? A vision is presented here around five key themes, showing what we could achieve in Cardiff and Vale.

 <p>Active travel is the default for short journeys</p>	Built infrastructure consistently enables and promotes walking and cycling as the default for short journeys
	Residents including schoolchildren routinely travel by active means for short journeys
	Active travel is routinely raised and promoted at key life points for residents and staff in Cardiff and Vale
	Employers positively encourage active travel, recognising benefits in staff well-being, sickness absence, and productivity
	Infrastructure developments for active and sustainable travel are funded through ring-fenced charges on polluting transport
	Local businesses support active travel by customers
	There are one or more annual car-free days co-ordinated across Cardiff city centre and Vale towns
	Some journeys for work are avoided by using remote technologies
 <p>There is a well used, fully integrated transport system</p>	There is a comprehensive public transport system with timetables and ticketing integrated across travel modes
	Residents routinely travel by public transport (and/or active travel) for journeys over 2km within the region
	There is a steady decline in private car use for commuting and leisure
 <p>Well connected, active and social communities</p>	20mph town and city-wide speed limits are introduced throughout the region
	The planning system and people moving into the area recognise the importance of walkability of residential and mixed use areas
	Children regularly play safely in residential streets
	Green space (including trees) is protected and enhanced, with good access to areas by active travel and public transport
	Communities are more cohesive, with increased social networks on streets
	Improvements in active travel and air pollution are seen first in our most deprived communities
	There is an ongoing re-vitalisation of local high streets for shopping and leisure, with these locations chosen by local shops and national chains in preference to 'out of town' areas

 Transport emissions are significantly reduced	Low emission buses, trains, taxis and public sector fleets
	There are one or more low emission zone(s) in Cardiff
	There is a comprehensive charging infrastructure for electric vehicles
	Public awareness of local air pollution is high
	'No idling' zones are introduced around all schools and health facilities in Cardiff and Vale
	Local planning principles include expectations around reducing private vehicle use and ownership, and promoting ultra low emission vehicles
	Decarbonising transport is accompanied by an increase in locally generated renewable energy
 Cardiff and Vale are leaders in this field	Cardiff and Vale is recognised as an exemplar for active travel and reducing car use within the UK and internationally

This is a summary of a more detailed vision which has been prepared for this report.

The potential impact...

The impact of achieving our vision	What this could mean for us...
Reduced illness and deaths from cancer	30% lower risk of colon cancer & 20% lower risk of breast cancer
Reduced illness and deaths from cardiovascular disease and stroke	20-35% fewer cases
Reduced rates of overweight and obesity	Decrease in BMI of 0.3-0.45kg/m ²
Reduced type 2 diabetes	30-40% fewer cases
Improved mental well-being	20-30% lower risk of depression and dementia
Reduced rates of falls among older adults	30% less risk
Reduced sickness absence	46% reduction if people cycle to work
Improved employee productivity	15% increase in concentration, reductions in stress
Increased retail sales	30% increase in retail sales
Other benefits...	Reduced inequality in life expectancy between most and least deprived areas
	More cohesive communities and reduced loneliness
	Reduced air pollution and lower carbon emissions contributing to global warming
	Reduce demand for health and social care services

Everyone playing their part: what we need to do together

We have set out a bold vision of the future locally. This vision is entirely achievable; indeed many aspects of it are already a reality in cities such as Amsterdam; and other European cities including Hamburg and Madrid have set out plans to drastically reduce the number of cars in them in the next 20 years.¹⁴⁹

To make a significant and sustained improvement in our health and well-being we need to take decisive action now and over the next 5-10 years. Doing so will mark out Cardiff and the Vale of Glamorgan as leaders in this field in Wales and across the UK. The public sector has a vital role to play in leading and modelling behaviours.

Throughout the chapters we have suggested many actions which will make a lasting difference in improving health, by making active and healthy travel the norm in our communities. The most important and achievable actions are highlighted below.

Who	What should be done
City of Cardiff Council and Vale of Glamorgan Council	<p>(a) Accelerate improvements to infrastructure to support active travel and low emission transport</p> <ul style="list-style-type: none"> • continue improvements and ongoing development of dedicated walking and cycling infrastructure, prioritising deprived areas first • provide access to local green spaces by active travel • maximise opportunities presented by Metro programme, including in rural areas • introduce bike hire schemes (including e-bikes) • consider widespread introduction of 20mph zones • increase electric vehicle charging infrastructure, particularly for areas without off-street parking • reject planning proposals which have an adverse impact on walking or cycling • support local renewable energy generation <p>b) Support staff to choose active travel</p> <ul style="list-style-type: none"> • encourage all staff to travel actively, to reduce sickness absence and increase productivity • visible senior leadership and role-modelling • assess opportunities at times of workplace moves • support employees preparing for retirement

	<p>(c) Engage with the local community and businesses on the benefits of active travel</p> <ul style="list-style-type: none"> • agree consistent communication across local public sector • emphasise increased customer spend in walkable areas • organise and promote co-ordinated car free days across the region <p>(d) Discourage unhealthy and polluting travel</p> <ul style="list-style-type: none"> • introduce 'no idling' zones outside all schools • consider gradual increases in public car parking charges to fund and accelerate improvements in active travel facilities and public transport • scope the introduction of a low emission zone in Cardiff, with any charges levied used to fund active travel and public transport improvements • introduce low emission pool cars for major sites where they are not already in place
Cardiff and Vale UHB	<p>(a) Accelerate improvements to infrastructure to support active travel and low emission transport</p> <ul style="list-style-type: none"> • work closely with local authorities to maximise opportunities for active travel to current and future sites, including links with new strategic cycle routes • introduce electric vehicle charging infrastructure • introduce pool bikes on UHW campus, and further improve off-road cycle routes through UHW site <p>b) Support staff and students to choose active travel</p> <ul style="list-style-type: none"> • visible senior leadership and role-modelling • encourage all staff to travel actively, to reduce sickness absence and increase productivity • assess opportunities at times of workplace moves • encourage healthcare students to travel sustainably, as future health leaders • support employees preparing for retirement <p>(c) Engage with our local communities on the benefits of active travel</p> <ul style="list-style-type: none"> • increase communications encouraging visitors to sites to use active travel and public transport • agree consistent communication across local public sector • promote and participate in co-ordinated car free days across the region • additional messages at key transitions, including new parents

	<p>(d) Discourage unhealthy and polluting travel</p> <ul style="list-style-type: none"> • introduce low emission pool cars for major sites • scope introduction of ultra low emission vehicles to fleet • review prices of staff car parking at congested sites. Changes in charging could directly fund improvements in active travel facilities and public transport
Cardiff and Vale Local Public Health team	<p>(a) Prioritise promoting healthy travel in the public health work plan</p> <ul style="list-style-type: none"> • identify promotion of active travel and addressing air pollution as cross-cutting themes in workplan • include active travel and air pollution references and actions in Making Every Contact Count • agree suitable performance indicators to measure progress and impact <p>(b) Work with partners to promote healthy travel</p> <ul style="list-style-type: none"> • work with PHW Environmental Health to produce local geographic maps of air pollution exposure, including exposure at schools and health sites • take action in response to forthcoming guidance from Welsh Government and PHW on addressing local air quality • work with Cardiff and Vale Healthy Schools Schemes to review air pollution levels around schools, to engage in conversations with staff and parents around active travel and impact of bringing cars to school gates • consolidate and strengthen links between Local Public Health team and local authority planning and transport departments, including in developing LDPs and the Health Board IMTP, to support action on active travel and air pollution <p>(c) Engage with our local communities and businesses on the benefits of active travel</p> <ul style="list-style-type: none"> • engage with Employers' Network • support the development and promotion of co-ordinated car-free days across our region
Public Services Boards	<p>Identify actions relating to active travel and air pollution which would benefit from a co-ordinated approach across the partnership, e.g. active travel support for staff, car-free days, joint procurement of low emission vehicles</p> <p>Agree key public messaging across the public sector in Cardiff and the Vale on the rationale and health benefits associated with increased active travel, reducing car use, and low emission transport</p>

	Provide visible senior leadership and role modelling at a PSB and organisational level to promote active travel
Current and future bus and train operators in Cardiff and the Vale	<ul style="list-style-type: none"> • Provide clean, frequent and reliable services across the network • Transition to low emission buses / electric trains • Provide routine space for carrying bicycles on buses/trains, including key routes at busy times and in rural areas • Support the introduction of integrated ticketing across travel modes • Make data available to support real-time travel information
Public Health Wales (national)	<p>Support local campaigns to increase active travel and reduce air pollution through</p> <ul style="list-style-type: none"> • standard promotion materials • support to produce local air pollution profiles with map of area highlighting schools and health facilities • continuing national leadership on active travel and air pollution as health issues
Welsh Government	<p>(a) Consider policy changes to support healthy travel</p> <ul style="list-style-type: none"> • make it easier for residents and local authorities to make temporary street closures to encourage children's outdoor play • prohibit secondary schools from offering car parking places for pupils who live within 2km of the school, except if they are disabled • consider allowing Local Health Boards to introduce proportionate parking fees for staff where alternative modes of transport are available, in order to incentivise appropriate active travel and public transport use • review NHS travel expenses policies to ensure they promote active travel where appropriate, for example by not routinely reimbursing for distances <2km <p>(b) Consider further legislative changes to support healthy travel</p> <ul style="list-style-type: none"> • introduce legal requirements for public transport operators to participate in region-wide integrated ticket programmes • introduce legal requirements for large public sector organisations to have sufficient cycle parking spaces (e.g. a minimum specified ratio of spaces per employee) <p>(c) Engage with citizens across Wales to encourage healthy travel</p> <ul style="list-style-type: none"> • undertake a national communications campaign to improve the image of active travel

Appendix

Summary of relevant strategies and policies

International and national strategies and policies

UK plan for tackling roadside nitrogen dioxide concentrations ²⁸	Defra and DfT plan to reduce NO ₂ emissions. Includes proposal for a Clean Air Zone framework for Wales, suggesting Cardiff may be one of the first areas to implement, by 2021; also guidance to be issued to Directors of Public Health and Local Authorities to support delivery of LAQM plans; and schemes to encourage bus retrofitting and electric taxis. Also commits that UK Government will 'end the sale of all new conventional petrol and diesel cars and vans by 2040'
Real Driving Emissions (RDE) regulations	Requirement for vehicle manufacturers to ensure real world NO _x emissions are controlled across a range of driving conditions, from September 2017. ²⁸
Office for Low Emission Vehicles (OLEV) grants	Grants available from UK Government for local authorities to support on-street charging, ¹⁵⁰ and for employers, including the public sector, to support workplace charging ¹⁵¹ for staff and fleet vehicles
Town & Country Planning Association (TCPA) guidance: Planning for better health and well-being in Wales ⁹⁸	This guidance was developed in conjunction with Public Health Wales and the Wales Health Impact Assessment Support Unit. It sets out opportunities for public health to work with planning, for each to positively influence the others' work programme using their area of expertise. ⁹⁸ It also recommends using the Director of Public Health Annual report to tackle unhealthy environments.
Royal Town Planning Institute (RTPI) policy ^{152,153}	Policy paper on transport infrastructure investment, including challenge to integrate schemes to encourage inter-modal transport
Local air quality management (LAQM) Wales guidance 2017 ¹⁵⁴	Guidance for LAQM in Wales in light of the WFG Act. Specifically, LAQM should not be carried out to seek short-term solutions; and should be carried out in an integrated way to find solutions to related outcomes including reduced carbon emissions and healthier lifestyles. Also recommends LA and public health should work together to reduce health risks and inequalities; and special consideration should be given to long-term risks of exposure by babies and children, including in homes, schools and nurseries, and travel between these locations

Manual for Streets ¹⁵⁵	UK Department for Transport guidance on designing streets. Recognises a user hierarchy which places pedestrians and cyclists above cars, explained more in Making Space for Cycling. ¹⁵⁶
UN Convention on the Rights of the Child (UNCRC) ¹⁵⁷ and Rights of Children and Young Persons (Wales) Measure 2011 ¹⁵⁸	Rights of children applicable under international law and domestic law in Wales. Article 31: Children have the right to relax and play, and to join in a wide range of cultural, artistic and other recreational activities. Article 24 includes the right to a safe environment
Public Health Wales (PHW) Well-being Objectives ¹⁵⁹	Objectives required under the WFG Act. One of the 7 well-being objectives is to 'maximise the potential of our natural and cultural resources to promote physical and mental health and well-being and contribute to a low carbon, environmentally resilient Wales'. Giving children opportunities to play and learn in a healthy and safe environment is another objective.
Future Generations Commissioner for Wales - Draft strategic plan 2017-23 ¹⁴⁰	Sets out four key purposes for the plan period. Includes highlighting the big issues facing future generations – the first of four being climate change, for which the focus should be reducing emissions and tackling impacts.

Local and regional strategies

Public Services Boards – Well-being objectives and plans	Well-being assessments and plans are required for each local authority area under the WFG Act, overseen by the local PSB. In the Vale, the objectives in the draft well-being plan focuses on four priority areas, including giving children the best start in life, and protecting, enhancing and valuing the environment, and tackling inequalities. ¹⁶⁰ In Cardiff, the draft objectives include resilient growth, giving children the best start in life, tackling poverty, and caring for older people (including tackling social isolation). ¹⁶¹
Regional Partnership Board – Area plan	An assessment identified needs including social isolation and loneliness; insufficient physical activity; and accessibility to green space. An Area Plan is being developed to respond to the assessment.

<p>Local Development Plans (LDPs)</p>	<p>Cardiff's LDP was adopted in 2016 and includes a commitment to over 40,000 new homes and a similar number of new jobs; 162 specific aims include to reduce reliance on the car, by improving travel choices for communities, integrated travel, orbital rather than radial bus networks, and improved traveller safety. Achieving a 50/50 modal split is described as a necessity for the transport network to cope with growth. It also sets out plans to retain and protect trees and green infrastructure in the city.</p> <p>The Vale LDP was adopted in June 2017 and includes improvements to walking, cycling and public transport infrastructure (including a proposed coastal cycle route, NCN 88, running east/west through the Vale), modernising the Valley rail line as part of the Cardiff Metro, and identifying areas for potential renewable energy regeneration.¹⁶³</p>
<p>Local Transport Plans (LTPs)</p>	<p>The Vale LTP promotes a shift from car use to sustainable travel, including increasing the number of cycle routes and encouraging integrated transport as the Vale of Glamorgan railway line is electrified. Where active travel is difficult due to the rural nature of the Vale, public transport accessibility will be enhanced.¹⁶⁴</p> <p>The Cardiff LTP promotes a shift away from hub and spoke bus lines to a grid system, which links communities better and prevents all traffic having to go through the centre of the City.¹⁶⁵</p> <p>The supporting masterplanning principles laid out by Cardiff Council recommend high density residential and mixed-use development along public transport corridors; and providing strategic walking and cycling corridors.¹⁶⁶ Streets will give priority to pedestrians and cyclists, and infrastructure should enable easy interchange between and active travel and public transport. All residents will be within easy access of off road paths. Varied green space open corridors will be provided.</p>
<p>Shaping our Future Well-being</p>	<p>Cardiff and Vale UHB's 10 year strategy prioritises prevention as a key theme, keeping people well for longer.⁸¹ It also aims to support people to choose healthy behaviours and reduce health inequalities; and also be an excellent employer to work for. Air pollution, obesity and physical activity are recognised as key issues in the population profile in the Health Board's integrated medium term plan.¹⁶⁷</p>

<p>Cardiff Transport Strategy Cardiff Cycling</p>	<p>The Cardiff Transport Strategy sets out an ambitious aim to create a modal shift to a 60/40 split of sustainable travel compared with car use by 2026, preceded by a 50/50 split in 2021.⁵ The strategy includes commitments to a city-wide cycling network, central cycle parking hub, transport interchanges at strategic points throughout the city, green bus technologies, integrated ticketing, and support for car clubs. This follows on from a laudable decline in city centre traffic of one quarter (26%) between 2004 and 2014</p>
<p>Strategy</p>	<p>The draft strategy sets out a vision of a city where cycling is normal, practical and safe for short trips, for people of all cycling abilities, and to double the number of cycle trips by 2026. Sets out plans for two primary route corridors in Cardiff – North/South and East/West; and promoting cycling in schools, workplaces, for shopping.</p>
<p>City Region Deal</p>	<p>A £1.2bn City Deal was agreed in March 2016 for 10 South East Wales local authorities, including a substantial investment in a Cardiff Capital Region Metro integrated public transport system. The City Deal also included a commitment to electrification of the Valley Lines rail network by 2023.⁵ The details of the Metro are still being worked through, but the proposal includes electrified rail; integrated transport hubs; park and ride facilities; light rail and/or bus rapid transit routes; better integration across modes and operators; and active travel interventions.¹²³</p>

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