

Transport and health



A briefing note from the BMA Board of Science

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1 Introduction

Transport is an essential activity, connecting people to shops, employment, healthcare services, family, community, and recreation. Since the second half of the 20th century there has been a sharp decline in walking and cycling levels in the UK and a rapid expansion of car use.^{1,2} Car ownership is now ubiquitous, and with traffic volume increasing, congestion is a serious problem in most towns and cities, and set to increase further by 2025.¹ These changes in transport patterns have a negative impact on health – physical activity levels are declining, exposure to the health risks from transport are increasing, and reliance on motor transport is contributing to the obesity epidemic, climate change, and health inequality.

These health impacts are interconnected, and a solution to tackle one transport-related issue will help address multiple transport and health-related problems: for example reducing traffic volume on roads has the potential to affect road safety, air quality, climate change and physical activity levels. Creating living streets (designed for community use, where cars have access only at slow speeds) enhances community networking and can have a beneficial effect on road safety, activity levels and health inequalities. Transport policies that prevent injury and improve health will have cost saving implications for the NHS in the medium to long term, and will help the NHS to meet its sustainability targets.

Doctors have an interest in transport and health for two key reasons: firstly, because of the impact different transport modes can have on an individuals' and the nation's health; and secondly, for the need to improve transport safety. The British Medical Association (BMA), through its Board of Science, has developed comprehensive policy on transport and its impact on health. The Board's 1997 report *Road transport and health* was said to be well ahead of its time. This briefing note provides background information on the key issues related to transport and health, and an overview of the key BMA work and policy in this area. Links to all of the BMA Board of Science publications can be found in *Appendix 1*.

2 Health benefits of transport

2.1 Active travel and physical activity

There are a number of positive health benefits associated with physical activity. Moderate physical activity, including walking and cycling, is protective against obesity, diabetes, hypertension, coronary heart disease, stroke, and mental illness.^{3,4,5,6,7} Lower risk of colon, breast and lung cancer has also been linked to physical activity.⁸ Weight loss is most effective and maintained long-term when physical activity in daily life is incorporated into the weight loss programme.¹⁵

Walking and cycling are important factors for healthy ageing. Older people are more at risk of heart disease, stroke, hypertension, osteoporosis and depression, and physical activity is both a risk factor and treatment for these conditions. Regular physical exercise is preventative of cardiovascular diseases,⁹ and is also recommended for improving patient outcome after stroke.¹⁰ Similarly, regular walking can protect against and is recommended as a treatment for depression.^{11,12}

Walking can also protect against osteoporosis by increasing bone mineral density, and can increase mobility and reduce slips, falls, and resulting bone fractures, in older people.¹³ Regular physical activity in childhood and adolescence is protective against osteoporosis in later life, and so should be a health priority at all life stages.¹⁴

Activity levels have declined in the past 30 years, and the majority of children and adults in the UK are not physically active.^{15,16,17} Two thirds of men, and three quarters of women in Britain do not meet the minimum activity level of 30 minutes of moderate activity five days a week, as recommended by the World Health organisation (WHO).^{18,19} The majority of journeys in Britain are less than five miles, yet 60 per cent of these are made by car, and this is increasingly so for journeys of less than a mile.¹ Two thirds of people perceive that it would be burdensome to walk or cycle these distances.²

The negative health effects of a sedentary lifestyle are as severe as the effects of a poor diet, which is more widely recognised as a damaging health behaviour.^{20,21} A sedentary lifestyle is often associated with other damaging health behaviours such as smoking and poor diet. The cost of inactivity on the UK economy has been estimated at £8.2 billion annually, additional to the £2.5 billion cost associated with obesity.¹⁵ The Northern Ireland Health Promotion Agency estimates that reducing inactivity by five per cent could save £410m and 358 lives per year.²²

Short periods of moderate activity throughout the day are as beneficial to health as a single sustained session of activity.¹⁵ In this context, shifting transport modes towards active travel can

be an important contribution to an individual's overall activity level. Public attitudes, however, may be a barrier to increasing activity levels. Most people tend to overestimate their activity levels and underestimate their unhealthy behaviour. Despite only 30 per cent of adults achieving the recommended daily activity,⁸ 80 per cent consider themselves to be 'fairly active' or more.²³ Even among those who have not done any physical activity within the past month, half perceive themselves to be 'fit'.²³ Many people also perceive a healthy lifestyle to be too difficult, unrealistic, expensive, and a 'middle class' interest.²⁴

Awareness of the health benefits of regular physical activity on preventing obesity is very high, though fewer recognise its relationship to cardiovascular disease, diabetes or cancer (95%).^{23,25,26} Two thirds of adults report that they would like to do more physical activity, and many believe that more motivation and more leisure time would increase their participation levels.^{4,5,23} Targeting people who are motivated to change their transport behaviour is more effective in increasing walking and cycling than generic publicity campaigns or financial incentives.^{27,28}

The 1997 BMA Board of Science report *Road transport and health*⁶ outlines the large body of evidence demonstrating the positive health benefits of physical activity, and recommends that:

- increasing walking and cycling in daily activity should be a public health priority, especially with respect to children
- active travel should be promoted as a means of energy expenditure to help to address the energy imbalance that results in overweight and obesity, alongside encouraging a healthy and balanced diet
- the Department of Health (DH) should develop a cross-governmental active transport policy
- the DH should promote physical activity, particularly in children and adolescents
- doctors are well-placed to promote physical activity, and should lead by example.

At its 2009 Annual Representative Meeting (ARM), the BMA reiterated its support for active travel initiatives, and recommended that:

- highway authorities create safe and comprehensive cycle networks suitable for all cycling abilities
- facilities for the combination of cycling with rail travel should be increased, so as to provide a practical alternative to the private car for many journeys
- cycling should be included into NHS exercise promotion programmes.

The BMA web resource *Health and Ageing* (2008) outlines the health benefits of walking and cycling for older people, and recommends that doctors should encourage physical activity in older people.

In taking forward work on nutrition and physical exercise, the Board of Science hosted a roundtable meeting in September 2008 in support of the new DH 'Change4Life' initiative aimed at improving children's diets and levels of activity. The event was attended by a range of representatives from the DH, the medical royal colleges and various BMA committees. In November, the BMA formally signed up as a national partner to the Change4Life initiative with the aim of extending awareness of the campaign, and supporting and disseminating the key messages on diet and activity. This was followed by a meeting with representatives of the cross Government Obesity Unit in March to discuss ways in which we could work collaboratively.

In Scotland, the BMA has met with the government's Physical Activity Strategy Review Group to discuss how they can engage with GPs, and promote active travel and physical activity for their patients. BMA Scotland recommended that doctors prescribe exercise for obese children and adults, through reduced cost or free access to local sports facilities.

2.2 *Physical activity in children*

The 2007 Welsh Health Survey found that 45 per cent of children do not meet the recommended minimum 60 minutes of physical activity every day. In England, a 2009 DH poll identified that 72 per cent of children do not achieve this level of activity.²⁹

Childhood obesity has increased rapidly over the past 20 years in Britain, where one in six children is now obese, and one in three is overweight or obese.³⁰ In both children and adults, obesity prevalence is forecast to increase further by 2025.³¹ Children value and recognise the benefits of outdoor activity on their mental health and wellbeing. Children, in particular obese children, report that they want to participate in more family-centred activities such as bike rides or walks.²⁵ Activity levels in children are higher in families where parents are also active, and where children walk or cycle to school.²³ Road safety, air pollution from traffic, and access to facilities are concerns to children, and seen by children as a barrier to outdoor play.³⁵

Parents assume that children participate in the required level of physical activity at school, but physical education in schools is declining. While 90 per cent of children in England achieve the government target of two hours or more of physical education per week at school, this is among the lowest levels in Europe, and alone will not achieve the CMO recommended daily activity level.³² Play, sport and active travel outside of school are therefore important targets for increasing physical activity in children. The House of Commons Transport Committee recommends safe walking routes to schools as the preferred school transport option, and highlights 'walking buses', cycling and road safety training as effective measures to achieve this.³³

The 2005 BMA Board of Science report *Preventing childhood obesity*³⁰ identifies declining physical activity levels in children as a contributing factor to the growth in childhood obesity. It highlights that:

- physical activity plays an essential role in the healthy growth and development of children, including their social development through play
- childhood provides the greatest opportunity to influence attitudes towards activity. When children leave school with positive attitudes towards sport and their own ability, they are more likely to be physically active as adults
- protection of school playing fields should be strengthened. The BMA remains deeply concerned by the sale of school playing fields.

BMA Scotland published a briefing note in October 2008 on the benefits of physical exercise in tackling obesity in children, and recommended that the government encourage children to walk or cycle to school, and take action to improve communities to make them clean, safe and healthy for children.

2.3 *Facilitating active travel through the built environment*

The majority of physical activity is incorporated into daily events such as commuting, school travel, and shopping, which involves navigating the built environment.³⁴ In the UK, 80 per cent of the population lives in towns or cities,³⁵ so urban design and land use planning can have a large impact on access to active travel.

The Commission for Architecture and the Built Environment (CABE) with the National Heart Forum (NHF) emphasise that to achieve an increase in active travel, the healthy choice should be the easy choice.⁵ Transport choices can be influenced via tax, subsidies, service provision, regulation and awareness.³⁶ Active travel can be promoted through the built environment by:

- *traffic calming measures and 20mph zones*: these have been successful in increasing walking and cycling in towns and cities such as York, Oxford, London, and many European cities.^{36,37,38,39}
- *prioritising pedestrians and cyclists*: walkable neighbourhoods, pedestrianised town centres, cycle networks and safe school routes have been shown to increase active travel uptake.^{27,36}
- *cycle hire schemes*: daily or hourly bicycle rental schemes have been successful in European cities such as Lyon, Paris, and Amsterdam. Similar schemes are being trialled in the UK in Bristol. Proposals for a cycle hire scheme in central London are being reviewed by the Mayor of London, and may be implemented as early as spring 2010.

- *providing local services*: accessible services that are near the home and reflect the needs of the local community can decrease overall transport needs and increase walking and cycling.³⁴
- *investing in public transport*: public transport use is low and declining everywhere except greater London. While driving a car is less expensive than in the 1990s, the cost of rail and public transport has increased.^{1,40} Any measure to decrease dependency on cars will need to include better provision of affordable public transport services, linked to active travel networks.

Community severance and smaller social networks exist in neighbourhoods near busy roads, which can further impact on health outcomes and reduce levels of active travel. One study in San Francisco found that neighbourhood social networks are greater on streets with light traffic compared to streets with heavy traffic.⁴¹ Reducing motor vehicle traffic and speed can have positive effects on air pollution and road traffic accidents, which would in turn increase levels of active travel. The introduction of traffic calming in a deprived neighbourhood in Glasgow, for example, resulted in a 20 per cent increase in walking by local residents.⁴²

There is currently little incentive for local authorities, primary care organisations (PCOs) or developers to promote health through urban planning. Local authorities and PCOs should take the leadership and responsibility in promoting active travel to improve health in the local community.

In *Road transport and health* (1997)⁶ the BMA recognises the role of the built environment in creating opportunities for active travel and highlights that:

- it is not environmentally acceptable or economically possible to meet the demand for road space through building new roads
- transport policy should focus on reducing transport volume, with national targets, which would improve population health, reduce road traffic injuries and reduce air pollution
- 20mph zones should be more widely implemented near schools and in residential areas
- the government invest in safe routes to school, bicycle and road safety training for children
- health impact assessments should be carried out for all new transport infrastructure
- local government should prioritise pedestrians and cyclists in new developments
- land use planning should be used to concentrate facilities in town centres, so that they are accessible without cars
- investment in public transport should be increased, and integrated with active travel networks
- local governments should consider pedestrianising city centre areas
- the NHS should develop healthy, accessible transport plans for staff and patients.

In 2008, BMA Cymru Wales – along with Sustrans, Friends of the Earth, WWF Cymru, Age Concern, and the National Union of Teachers – petitioned the Welsh Assembly to develop and maintain a national network of traffic-free paths for cyclists and pedestrians.

3 Improving transport safety

3.1 Road traffic crashes

Road traffic casualties have been decreasing in the UK since the 1950s, and road traffic fatalities are among the lowest in Europe. Despite this, over 250,000 road traffic casualties and fatalities were recorded in 2007⁹, and road traffic injuries are a major cause of death and serious injury in children in the UK.³⁵ The Parliamentary Advisory Council for Transport Safety (PACTS) estimates that the lifetime risk of being injured in a road traffic crash is between 1 in 2 and 1 in 3.⁴³ In almost all road traffic crashes (95%), the driver of at least one vehicle is at fault.⁴⁴ Common contributing factors to crashes are speeding, dangerous driving and drink/drug driving.⁴⁷

^a The DfT acknowledge that road traffic injury statistics are distorted due to the under-recording of non-fatal road traffic injuries, which may be significantly higher than documented. The extent and variability of this under-reporting is not known, and the UK Statistics Authority recognises that this is a 'significant and intractable problem'. These limitations are taken into consideration in this briefing note.

Other factors, such as driver fatigue or distraction (for example from mobile phone use), are increasingly recognised as contributing factors to road traffic accidents. In 2008 the Department for Transport (DfT) published a review of factors related to driver distraction. The report found that estimates of the role of driver distraction in accident causation can vary widely due to the lack of a standardised definition and inconsistencies in accident reporting. It highlighted a range of research evidence, including that:

- inattention contributes up to 78 per cent of accidents
- external distractions (eg from outside persons, objects, events) are the most frequently reported cause of distraction-related accidents
- driving performance decrements (amount by which performance decreases) have been shown as a result of distraction by mobile phones, in-vehicle information systems (IVIS), in-car entertainment (ICE) and email systems, as well as advertising billboards, variable message signs (VMS) and other distractors
- drivers are poor judges of their performance decrements while driving
- the current state of knowledge is not sufficient to confidently identify 'high risk' groups for driver distraction; however, age and gender differences have been found when examining distracted driving performance.⁴⁵

The BMA responded to the 2009 DfT consultations on road safety compliance and the road safety strategy respectively highlighting relevant BMA policy on speeding, and drink and drug driving. The BMA Board of Science also hosts an annual meeting with the DfT to discuss matters of mutual interest and take forward relevant BMA policy.

3.2 *Speeding*

Speeding is a contributing factor in many road crashes, and can determine the severity of injuries.^{1,46,47,48} The majority of motorists do not perceive speeding as a serious offence,⁴⁹ and speeding is by far the most common traffic offence.^{1,50} In a Northern Ireland survey, 65 per cent of respondents admitted to regularly exceeding the speed limit.⁵⁰ Awareness campaigns and education do not significantly influence driver behaviour. Traffic calming and speed cameras are more effective in changing driver behaviour and reducing road traffic crashes.^{27,43,46,51} Recent studies have also demonstrated that 20 mph zones are cost-effective and successful in decreasing road traffic casualties.^{27,37,52,53,54}

In *Road transport and health* (1997)⁶ the BMA highlights the role that speeding plays in road traffic crashes, and recommends that:

- traffic calming and 20mph zones should be implemented in towns and cities, especially in residential areas
- speed cameras should be used as an effective way of enforcing speed limits.

The BMA Board of Science meets annually with representatives of the DfT Road Safety Division to discuss ways of improving road safety and matters of mutual interest.

3.3 *Drink driving*

Alcohol interferes with driving ability by affecting driver judgement, motor coordination and reactions. Drink driving has decreased since the 1980s, however, 80,000 drivers are convicted of drink driving each year in Britain, the majority of whom are young males. Alcohol was a contributing factor in 14,000 (6%) road transport casualties and 560 (17%) fatalities in 2006 in Britain.¹

The current blood alcohol content (BAC) limit in the UK is 80mg/100ml, which is among the highest levels in Europe. Driving performance deteriorates significantly between a BAC of 50mg and 80mg/100ml, and crash risk increases.^{55,56} The relative crash risk of drivers with a BAC of 50mg/100ml is double that for a person with a zero BAC; the risk rises to 10 times for a BAC of 80mg/100ml.^{46,54,58} Reducing the BAC limit from 80mg to 50mg/100ml has been shown to reduce serious and fatal crashes, and could be expected to save 65 lives and prevent 250 serious injuries per year in the UK.⁵⁷

Current UK legislation requires prior suspicion of driver intoxication before police can implement roadside alcohol breath testing. Random breath testing is permitted everywhere in the European Union except Denmark and the UK. Under this legislation, drivers are unable to influence the likelihood of being tested, and research has shown that highly visible, random breath testing is effective at reducing drink driving, alcohol-related crashes and fatalities by increasing the perceived risk of detection.^{54,58,59} Research from Northern Ireland, Scotland and England indicate public support for these policies.^{49,50,60}

Ensuring a reduction in the drink drive limit in the UK is one of the BMA's priority policy aims and the BMA has repeatedly called for a reduction to 50mg/100ml. The 2008 Board of Science report *Alcohol misuse: tackling the UK epidemic* (2008)⁵⁸ recommends that:

- the legal BAC limit should be reduced from 80mg/100ml to 50mg/100ml
- legislation should be introduced permitting the use of random roadside breath testing without the need for prior suspicion of intoxication.

Following the publication of *Alcohol misuse: tackling the UK epidemic*, the Board of Science hosted a 'stop drink-driving' stakeholder event in March 2008 which included representatives from the Medical Royal Colleges, the DfT, the police, the hospitality trade as well as representatives from organisations such as Alcohol Concern, and the Institute of Alcohol Studies. The aim of the event was to establish support from the various organisations that were represented in order to lobby the UK governments on this matter. Letters of support from stakeholder organisations were sent to the DfT after the event, and circulated to the DH, members of the Alcohol Health Alliance, and Medical Royal College Presidents.

3.4 Drug driving

Drugs, both medicinal and recreational, can have a detrimental influence on an individual's ability to drive safely. They can affect a driver's behaviour in a variety of ways (depending on the drug) including slower reactions, drowsiness, poor concentration, distorted perception, over confidence, poor co-ordination and erratic behaviour.

There are limited data on the levels of drug driving in the UK. A study by the Transport Research Laboratory (TRL) of fatal collisions between 1985 and 1987 found that the incidence of prescription drugs and illegal drugs was relatively low in comparison to alcohol (a ratio of about 1:5).⁶¹ A study in 2001, using a sample of 1,184 fatalities (including 533 drivers and 246 riders) between 1996 and 1999, found that at least one impairing prescription or illegal drug was detected in 22.9 per cent of the drivers and 20.3 per cent of the riders. Since the earlier study, the incidence of such drugs had increased by a factor of three, and the proportion of those testing positive for multiple drugs increased dramatically, from 5 per cent in 1985-7 to 26 per cent in 1996-9. The 2001 study identified cannabis as the drug most frequently found among casualties. A 2000 survey of club-goers in Scotland found that 69 per cent had taken cannabis and 85 per cent had at some time driven after using illegal drugs.⁶² The survey also identified common attitudes among drug users: many were not aware of drug driving legislation, ignored anti-drug campaigns, and did not believe that cannabis impairs driving ability.

Drug driving carries the same penalties as drink driving. Drug testing is more difficult than the accurate alcohol breath testing, due to the different metabolic excretion rates of various drugs, and the challenges in developing reliable drug tests. Drug testing systems based on saliva samples are being developed, however, none are currently in use by police in the UK. Field impairment tests (FIT) such as the 'walk and turn' and 'one-leg stand' are reliable predictors of drug use, where drug use has subsequently been confirmed by forensic (77%) or medical (94%) testing.⁶³

The BMA Board of Science web resource *Driving under the influence of drugs (2009)* outlines the effects of recreational and prescription drugs on driving ability, the legal position on drug driving, and the need for further education and awareness. The resource recommends that the UK Governments should raise awareness among the general public of the risks of drug driving and the side effects of certain prescribed drugs that can affect the ability to drive. The resource also recommends that there should be increased funding for research aimed at developing appropriate roadside drug testing devices.

In 2006 the BMA endorsed the publication of the DfT report *Fitness to drive: a guide health professionals*⁶⁴ which provides guidance on the role of healthcare professionals in advising patients on the effects of medications on driving ability. The guidance recommends that healthcare professionals:

- advise specifically on the risks of medication and on the driver's need to read the label and package insert, and to follow the recommendations given
- record advice they have given on driving in the patient's notes
- if necessary send a letter to the patient confirming the advice or a 'no driving prescription'
- indicate clearly to the patient where it is necessary to inform the Driver and Vehicle Licensing Agency (DVLA) of a condition, and follow up to check that the patient has followed the recommendation
- advise that it is the patient's responsibility to act on the health professional's advice.

3.5 Rural roads

Rural road safety has not improved at the same rate as built up and urban roads – while they account for only 42 per cent of traffic volume, 62 per cent of road fatalities occurred on rural roads in 2007.¹¹¹ Rural roads face different safety challenges – older winding A and B roads with 60mph speed limits have been identified as the most dangerous rural roads.⁶⁵ Common factors in a crash include speeding, or inappropriate speed for the road conditions, and loss of control. Drink driving, fatigue, and distraction are not, however, more common contributing factors than

in urban crashes. Some studies indicate that engineering solutions to modernise rural roads, such as speed management, self-explaining roads, and vehicle-activated signs, would improve rural road safety.⁶⁵

3.6 *Fitness to drive*

Drivers have an obligation to ensure that they are fit to drive, and to disclose any medical conditions to the Driver and Vehicle Licensing Agency (DVLA). There are only limited data on the number of crashes that are caused by defined medical conditions such as vision impairments, diabetes, psychiatric conditions, Parkinson's disease, stroke or epilepsy.

The 2006 DfT report *Fitness to drive: a guide for health professionals* (which was endorsed by the BMA) provides information on the capabilities that a driver requires to drive safely and the effects of health-related impairments on these. This includes guidance on:

- the responsibilities for action, in particular the role of health professionals, and ways in which the personal mobility of a driver can be maintained, without compromising road safety
- the sensory inputs needed for safe driving, especially vision
- the capabilities of mental function and of the nervous system that are needed for driving
- the effect of limitations to the driver's movement – from injury, surgery and musculoskeletal disease – on the control of a vehicle
- the main forms of sudden incapacitation that can threaten a driver's ability to remain in control of a vehicle (for example myocardial infarction, stroke, epileptic fit).

3.7 *Cycling and pedestrian safety*

Pedestrians and cyclists are vulnerable road users relative to motorists, and have high rates of fatality and injury per million miles travelled.^{1,2,52} While safety has improved for motorists and passengers in terms of advances in vehicle design, it is likely that the decrease in pedestrian and cyclist injury can largely be attributed to risk aversion and the decrease in walking and cycling levels, rather than improved pedestrian and cyclist safety.^{1,52}

Traffic volume is a barrier to active travel.³⁹ Increasing walking and cycling does not lead to increased road traffic casualties, in fact a 'safety in numbers' effect has been observed in countries where more journeys are made by bicycle.^{27,66} In a 1992 study, the BMA calculated that for cycling, the health benefits outweigh the risks by a factor of 20 to 1.^{4,67}

The BMA promotes cycling as a safe, healthy and sustainable alternative to car use. The 1999 Board of Science report *Cycle helmets*⁶⁸ identified a number of measures to improve cyclists' safety, including:

- publicity and education campaigns in order to raise drivers' awareness of more vulnerable road-users
- the creation of a safer cycling environment (eg improving cycle routes)
- reductions in vehicle speeds and traffic volume in urban areas
- the provision of cycling training for all children
- recognising road safety, including cycling proficiency education, as part of the curriculum for all school children. This should include basic cycle maintenance, and safety precautions (eg lights, reflective clothing), information on the health benefits of cycling, as well as encouraging cycle helmet use
- ensuring the correct fitting of cycle helmets as poorly fitted helmets are less effective
- advertising standards officials should ensure that the public are protected against misleading safety claims from manufacturers
- cycle manufacturers and retailers should consider supplying a free cycle helmet (or helmet voucher) with every bike sold
- helmet costs should be reduced substantially.

The 2008 Board of Science web resource *Promoting safe cycling*⁶⁹ highlights that best evidence supports the use of cycle helmets as they have been shown to reduce the risk of head injury and its severity should it occur. This does not apply to fatal accidents as in such instances the force of impact is considered to be so significant that most protection would fail. It concludes that as a part of a range of measures to improve cycling safety, cycle helmet wearing should be made compulsory. The resource further recognises that voluntary helmet wearing should increase before any legislation is enacted.

The 2001 Board of Science report *Injury prevention (2001)*⁷⁰ noted that the introduction of 20mph speed limit zones in parts of the UK resulted in local reductions in road crashes involving child cyclists and pedestrians. In *Road transport and health (1997)*⁶ the BMA recommended that:

- road safety and bicycle maintenance should be included in the school curriculum, which encourages safe active travel in children and is effective at decreasing transport-related injuries.
- cycle awareness should be incorporated into driver training
- traffic reduction should be part of all transport strategies, otherwise walking and cycling targets will be missed.

4 Air and noise pollution

Transport is the main source of health-damaging air pollutants, and concentrations are highest near major roads and urban areas.^{71,72} Petrol- and diesel-engined vehicles emit a range of pollutants, including:

- nitrogen oxides (NOx)
- volatile inorganic compounds (VOC)
- ground-level ozone
- carbon monoxide
- sulphur dioxide
- PM₁₀ and PM_{2.5} (particulate matter (soot) less than 10 µm or 2.5 µm respectively)
- Benzene.

Pollutants pass through the nose and mouth, and aggravate the respiratory tract.⁴⁰ Air pollution from transport emissions can exacerbate symptoms of pre-existing respiratory and cardiovascular disease, and lead to premature death.^{73,74,85} Asthma prevalence is associated with air pollution levels and living in a high traffic density area.^{74,75} Ground-level ozone is associated with lung tissue damage and respiratory symptoms.^{76,77} Urban air pollution has also been associated with poorer birth outcomes and child development, and lower birth rate.^{78,79,80}

Particulate matter nitrogen oxide pollution has been linked to ischaemic heart disease and mortality,⁸¹ and the Committee on the Medical Effects of Air pollution (COMEAP) concluded that this effect is likely causal.⁸² It has been estimated that PM₁₀ emissions caused over 350,000 premature deaths in the European Union (EU) in 2005, and over 24,000 in the UK.^{83,84}

Air quality has improved since the 1990s, and the UK is set to achieve its sulphur dioxide and VOC 2010 targets, but forecast to miss its PM₁₀ target. London has the worst air pollution in the UK,⁸⁵ and is forecast to breach the EU National Emissions Ceiling Directive 2010 NOx emissions targets. Reducing air pollution has been shown to have a direct effect on asthmatic events in children, deaths from cardiovascular and respiratory disease, and life expectancy.⁸⁶ In Tokyo, where nitrogen oxide emissions were reduced and controlled over a period of 20 years, economic analysis suggests that the project saved over \$14 billion in healthcare costs and lost work, and calculated a net benefits-to-costs ratio of 6:1.⁸⁷

Measures to reduce air pollution can include engineering solutions for cleaner fuel and fuel exhaust, but without additional supporting measures these technological improvements risk being negated by increases in road traffic volume. Urban planning, efficient public transport systems and green urban spaces can all contribute to reducing air pollution, and meeting greenhouse gas emissions targets will also reduce associated air pollution.

Over 70 cities in Europe have adopted or are implementing low emission zones, whereby high-polluting vehicles are restricted from entering the city, or charged. These have been implemented in order to meet EU air quality directive targets. In the UK, London, Oxford and Norwich have adopted such schemes. Other European countries, for example Germany and Italy, have low emission zones to cover whole regions, sections of motorway, or metropolitan areas.

Many people are also chronically exposed to high noise levels due to urbanisation, development of the countryside, and increased road and air traffic volume, and over the past 50 years noise levels have increased significantly across the UK.^{71,88} It is estimated that 30 per cent of the population within the European Economic Area (EEA) are exposed to noise levels above 55 decibels (dB) from traffic, and 10 per cent from aircraft noise pollution.⁸⁹ The negative health impacts of noise pollution can include increased cardiovascular disease risk, stroke, hypertension, a weakened immune system, depression, sleep apnoea, lack of concentration and impaired cognitive development in children.^{74,90} Many of these health effects are linked to chronic stress and elevated stress hormones in people exposed to noise pollution. The WHO estimate that 3,030 deaths from coronary heart disease in the UK each year can be attributed to noise pollution.⁹¹

Noise from aircraft near airports is an important source of noise pollution in the UK, in particular in the South East of England near Heathrow and Gatwick international airports. The WHO defines noise pollution as being greater than 50-55dB during daytime hours, and 45-50dB during night-time hours. Although the DfT-funded Attitudes to Noise from Aviation Sources in England (ANASE) study demonstrated that community nuisance from aircraft occurs above 50dB⁹², the Department continues to use 57dB as the lower limit for noise contour maps, which significantly reduces the noise footprint of an airport relative to 50dB.

In *Road transport and health* (1997)⁶ the BMA outlines the effects of air and noise pollution on cardiorespiratory and mental health, and highlights that:

- reducing traffic volume and speed is the most effective way of reducing air and noise pollution respectively
- any technology that removes pollutants from emissions, for example catalytic converters fitted to vehicle exhaust systems, will be negated by the forecast increase in traffic volume
- the DH should monitor air pollution and its effect on health.

5 Aviation and passenger health

Commercial air travel is a rapidly growing transport sector, and more than two billion passengers now travel by air annually, including passengers with pre-existing medical conditions. Healthcare professionals are commonly requested to certify a patient's fitness to fly, yet relatively little data are available on the impact of flying for patients with medical conditions, or healthy patients. The 2000 House of Lords Science and Technology Select Committee inquiry into the health impacts of air travel concluded that there was 'no significant impact of air travel on health for the vast majority of travellers', as did the 2007 follow-up inquiry.^{93,94}

The 2004 Board of Science report *The impact of flying on passenger health*⁹⁵ for health professionals, outlines pre-flight, in-flight and post-flight medical conditions. The report is a comprehensive resource for doctors, enabling them to provide informed advice to patients about the potential effects of flying on passenger health and wellbeing. In particular it highlights fitness to fly considerations for passengers with medical conditions such as pregnancy, cardiovascular and respiratory diseases, diabetes, or psychiatric disorders. It also considers human physiology changes during air travel as a response to altitude, exposure to ozone and cosmic radiation, risk of deep vein thrombosis (DVT), the risk of contracting communicable diseases, and the effects of travel fatigue or jetlag. The report concludes that:

- air travel is a safe activity and mode of transport for the majority of people, but recognises that certain groups are at greater risk when flying;
- air passengers are not protected by regulated standards of healthcare or medical advice, and there is no legal obligation for airlines to provide medical care in-flight.

6 Transport, climate change and sustainability

Transport is a major contributor to climate change.⁴⁰ Atmospheric greenhouse gases (GHGs) have increased exponentially in the past 200 years, and it is internationally recognised that the vast majority of this increase is attributed to anthropogenic carbon dioxide emissions.⁹⁶ This rapid change is leading to a latent increase in global temperatures, major changes to regional climate systems, and a failure of ecosystems and humans to adapt in pace with rapid climate change.⁹⁶ As climate change accelerates the impact on human health will intensify.

The main health consequences in the UK are an increase in heat-, flood- and pollution-related deaths and illness, but fewer cold-related deaths. Climate change disproportionately affects low income countries, but even high income countries, including the UK, are not equipped to cope with extreme weather events and resulting health impacts.^{97,98,99,100}

Globally, climate change is predicted to change the distribution of allergenic pollen, infectious diseases and insect-vectored diseases. As global temperatures increase, heat wave-related deaths will increase, as will mortality and morbidity from extreme weather-related events such as wildfire, floods, and storms. Environmental consequences of climate change contribute to reduced crop yields, contamination of drinking water and habitat degradation, leading to malnutrition, diarrhoeal diseases, population displacement, and poverty.^{96,99}

The transport sector generates one quarter of UK GHG emissions, and is the only sector to have increased emissions from 1990 levels.^{40,101} Greenhouse gas emissions from the aviation industry have doubled since 1990, and are forecast to quadruple by 2050 under current government plans for airport expansions.⁴⁰

Rail travel is relatively energy efficient, accounting for less than two per cent of the UK GHG emissions compared to two per cent from air and over twenty per cent from road transport. The development of high speed rail networks may therefore provide a long-term modal shift away from short haul flights and road transport, as they generate less GHG emissions, increase rail capacity, reduce the demand for new roads and air travel, and can have positive economic impacts such as job creation and regional development. One Eurostar journey from London to Paris, Brussels or Amsterdam, for example, has the same capacity as five flights to these destinations, and is the main mode of transport for these routes.¹⁰²

Extensive national high speed rail networks have already been developed in France, Germany and Japan. In the UK, Network Rail has proposed a high speed north-south rail link between London and Scotland that would also connect to Manchester, Liverpool, and Birmingham. The service would reach speeds of 200mph, and cost £34bn, to be completed by 2030.¹⁰³ Network Rail estimate that this would save 30 million tonnes of carbon through modal transport shift away from air travel.¹⁰⁴

Sustainable development aims to reduce the negative human impact on future generations and the environment, through safeguarding natural resources, mitigating climate change and promoting sustainable consumption and communities. Transport policies that promote active travel often overlap with many sustainable development goals, reduce the environmental impact of transport, and can contribute to urban and rural regeneration programmes.^{105,106}

As the largest employer in Europe, the NHS can make a significant contribution to tackling climate change, and has the opportunity to take leadership on this issue. The NHS set up a sustainable development unit (SDU) in 2008 to transform the NHS into a low carbon organisation. In its carbon reduction strategy, *Saving carbon, improving health*, the NHS SDU identified low carbon travel as one of the ten key principles for reducing the carbon footprint of

the NHS. It recommended that Trusts work with the DfT to produce tailored transport plans, aim to reduce car use and incentivise public transport and active travel for staff, patients and visitors, and incorporate active travel into planning for new hospitals.

The 2008 Board of Science web resource *Health professional taking action on climate change*⁹⁷ provides an overview of climate change and what it means for the UK. The key purpose of this resource is to highlight what practical actions health professionals and health organisations can take to reduce their carbon footprint and to protect and promote the health of the public. This resource also includes examples of good practice and links to sources of further information.

The BMA is a member of the Climate and Health Council (CHC) which aims to guide the position of UK, European, and other Governments in the 2009 United Nations Climate Change Conference through a pledge-based campaign. Following a request from the Council for funding to support their pledge-based campaign, the BMA Research Grants Trustees agreed to make a contribution of £10,000, which was provided in March 2009.

Road transport and health (1997)⁶ recognises the public health benefits of low carbon living, and that many sustainable development goals overlap with active travel and road safety policy. In particular, it highlights that walking and cycling have low environmental impact and carbon footprint, and are the least polluting modes of transport. The report also notes that reducing overall transport volume is a necessary goal for sustainable development as well as health. Any increase in transport efficiency or safety will be negated by an increase in transport.

7 Health inequality

Poor transport infrastructure can increase health inequality, and vulnerable groups – including children, pregnant women, older people, disabled people, ethnic minorities and those living in deprived areas – are particularly at risk of the negative impacts of transport.^{36,52,107} Disadvantaged neighbourhoods have busier traffic, more traffic injuries, greater noise and air pollution, and have poor public transport and poor access to services, including healthcare. Low income families are more likely to live in urban areas near busy roads compared to affluent neighbourhoods, increasing the risk of asthma and mental illness.^{52,108} Children and adults from lower income groups are also more likely to be obese and less physically active, which increases the risk of cardiovascular disease, diabetes and cancer.²³ Children from low-income families are also five times more likely to be injured or killed in road traffic crashes than those from the highest social class, as a consequence of living and playing near busy roads.³⁵

Public transport and walking are important transport modes for low income and vulnerable groups. A decrease in public transport provision, increasing costs of public transport, dependence on cars, and a lack of active travel networks disproportionately impacts low income groups, especially in rural communities where access to health services is already limited.^{108,109}

People without access to public transport or car ownership face higher prices and a limited variety of products in their immediate local area. They are either unable to shop in supermarkets – which have a wider, healthier and cheaper selection of food – or have high transport costs associated with travel to supermarkets. Sixteen per cent of people without cars find access to supermarkets difficult, compared with six per cent of people with cars. Over 1.4 million people in the UK have turned down medical help due to lack of transport options, and a third of people who do not own cars report difficulty accessing their local hospital.¹⁰⁸ Adequate access to transport also increases health and employment prospects for disabled people, and decreases their dependence on healthcare and social services.¹⁰⁸

Evidence suggests that re-design of the built environment in deprived areas can significantly improve health outcomes, for example through wider pavements, cycle lanes, traffic calming and designing walkable neighbourhoods.¹¹⁰ The NHS has a role in supporting local authorities develop transport plans that prioritises public transport, air quality, road safety, active travel and accessibility, and in making health services more accessible by public transport.

In *Road transport and health* (1997)⁶ the BMA recognises the contribution of transport to health inequalities. The reports highlights that:

- locating supermarkets and hospitals in out-of-town developments requires people to travel further to access healthy affordable food and healthcare, and is a barrier to health for people without cars
- poor access to medical care leads to an increase in hospitalisation from chronic diseases, especially for disabled people, older people, low income groups and in rural communities
- many children from deprived areas are less likely to have access to sports facilities
- subsidies and investment in local facilities are needed, with reduced cost or free access to local authority sports centres for lower socioeconomic groups.

In *Healthcare in a rural setting* (2005), the BMA identifies travel time and cost of travel as barriers to health in rural communities. The report recommends:

- increasing provision of public transport to hospitals and GP surgeries
- developing mobile health services for rural areas, to bring facilities such as CT and MRI scanning, sexual health services, and health screening to local communities. Mobile health services can also provide health information and education tailored to community needs.

8 Government policy

8.1 Transport

Considerable variability in active travel, sustainable transport, and transport safety policies exists between England, Scotland, Wales and Northern Ireland.

8.1.1 England

The DfT is currently consulting on its Road Safety Strategy for 2010-2030,¹¹¹ with a target of “making Britain’s roads the safest in the world”. The strategy takes into account the health benefits of active travel and the need for a sustainable transport system,¹⁰⁵ and specifically addresses pedestrian and cyclist casualties, child road traffic injuries, motorcyclist casualties, health inequality, speeding, and drink and drug driving. As part of this strategy, the DfT supports the wider implementation of 20mph zones in residential areas, but does not support lowering the BAC limit to 50mg/100ml.

The DfT *Walking and Cycling Action Plan* (2004)¹¹² aims to increase active travel participation, with explicit goals of reducing obesity, cardiovascular disease and mental illness. In the *Sustainable Future for Cycling* (2008)¹¹³ paper, the DfT announced a further increase in funding for cycle and road safety training for children, cycle networks linked to schools, and the development of 10 cycling demonstration towns.

The DH 2004 *Choosing Health*¹¹⁴ white paper commits the government to incorporate health impacts assessments into all future legislation, including transport and planning. The DH is leading the *Healthy Weight Healthy Lives* (2008)¹¹⁵ cross-governmental strategy on obesity and the *Change4Life* campaign. A key message in the campaign is to encourage walking and cycling as part of daily routine. The NHS has also published an active travel action plan to promote walking and cycling in NHS staff and as a travel option for patients.¹¹⁶

8.1.2 Scotland

The Scottish Government recently consulted on a new road safety strategy,¹¹⁷ which identified speed limits, drink driving, rural roads, and young drivers as priorities; and education, enforcement, and engineering as strategies for addressing road safety priorities. The Scottish Government supports a reduction in the drink-driving limit from 80mg to 50mg per 100ml of blood, and for the police to be given the power to carry out random breath tests at the side of the road.

A cross-governmental active travel strategy – *Promoting Active Lifestyles*¹¹⁸ – was developed in 2006, focusing on local health promotion, partnership between health and transport sectors, incentives and rewards to change travel behaviours, and is currently being reviewed. Active travel

is also a key priority in the *National Transport Strategy* (2006),¹¹⁹ *Let's Make Scotland More Active*¹²⁰ physical activity strategy (2003), and *Delivering a Healthy Future* (2007)¹²¹ action framework.

8.1.3 Wales

The National Public Health Service for Wales has recently launched an active travel action plan,¹²² with walking and cycling targets for 2009-2013. In a 2007 report, the Welsh Audit Office found that a lack of cooperation and streamlined goals between organisations was hindering progress on increasing physical activity levels in Wales.¹²³ The Welsh Assembly Government has a 'Health Gain' target to increase the number of adults aged 50 to 65 achieving 30 minutes of physical activity on five days per week by 2012. The majority of the Welsh transport budget is currently spent on road infrastructure and aviation, with little investment in public transport or active travel.¹²⁴

8.1.4 Northern Ireland

The Northern Ireland cross-departmental ministerial group on public health (MGPH), which sets national strategic health priorities, does not have a defined policy on transport and health. However, the Northern Ireland Executive 10 year transport strategy (2002) incorporates health impact assessments, and identified a lack of provision for pedestrians and cyclists and growing congestion in Northern Ireland. An Obesity Prevention Steering Group has recently been established to oversee the implementation of the *Fit Futures*¹²⁵ programme, and to develop an overarching obesity strategic framework for preventing obesity, which will incorporate actions on nutrition and physical activity, and feed into the five-year physical activity plan.²² Regional development goals include prioritising walking and cycling, reducing fatal road crashes, and improving air quality.

The BMA has given evidence to the NI Health, Social Services and Public Safety Statutory Committee inquiry into obesity, and responded to the NI Department of Environment consultation to elicit views on a range of proposed measures aimed at deterring drink driving.

8.2 Climate Change

The DH has outlined the health consequences of climate change on the UK population, and recommends strengthening health risk assessments and interventions after flooding; raising emergency preparedness for floods and heat waves; and reducing outdoor air pollution.⁹⁸ The UK is not currently meeting its United Nations Framework Convention on Climate Change (UNFCCC) Kyoto Protocol emissions targets or more stringent national targets, due largely to the increase in CO₂ emissions in the transport and aviation sectors.⁴⁰ In 2008 the UK government passed the Climate Change Act, which set legally binding CO₂ emissions targets for the UK: an 80 per cent reduction by 2050 and 26 per cent reduction by 2020 from 1990 levels. The new Department for Energy and Climate Change (DECC) was also formed in 2008, with the aim of integrating UK energy policy with the transition to a low carbon economy.

Appendix 1 – Links to BMA resources

Alcohol misuse: tackling the UK epidemic (BMA, 2008)

http://www.bma.org.uk/health_promotion_ethics/alcohol/tacklingalcoholmisuse.jsp

Driving under the influence of drugs (BMA, 2009)

http://www.bma.org.uk/health_promotion_ethics/drugs_prescribing/drugdrivingresource.jsp

Health and Ageing (BMA, 2008)

http://www.bma.org.uk/health_promotion_ethics/health_ageing/HealthAgeing.jsp

Health professionals taking action on climate change (BMA, 2008)

http://www.bma.org.uk/health_promotion_ethics/environmental_health/climatechange.jsp

Healthcare in a rural setting (BMA, 2005)

http://www.bma.org.uk/healthcare_policy/healthcarerural.jsp

Preventing childhood obesity (BMA, 2005)

http://www.bma.org.uk/health_promotion_ethics/child_health/ChildhoodObesity.jsp

Promoting safe cycling (BMA, 2008)

http://www.bma.org.uk/health_promotion_ethics/transport/promotingsafecycling.jsp

Road transport and health (BMA, 1997)

http://www.bma.org.uk/health_promotion_ethics/transport/Roadtransporthealth.jsp

The impact of flying on passenger health (BMA, 2004)

http://www.bma.org.uk/health_promotion_ethics/transport/Flying.jsp

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