

Appendix 3: Sustainable transport interventions

Table. Summary of possible transport interventions with bearing on health and health inequalities	
Policy/intervention	Comments
<p><i>Urban planning and design</i></p> <p>Urban planning and design, such as that pursued in Copenhagen, to promote walking and cycling over other forms of transport (Box 1.)</p>	<p>Well planned and managed local environments are likely to increase physical activity,^{1,2,3} with consequent benefits to physical and mental well-being.⁴ Time and space should be reallocated from private motor vehicles to pedestrians, cyclists and public transport. Development should be high density around public transport corridors, permeable to cyclists and pedestrians with restricted car access and parking. As the Chief Medical Officer has noted, “for most people, the easiest and most acceptable forms of physical activity are those that can be incorporated into everyday life. Examples include walking or cycling instead of travelling by car...”⁵ There seems to be much potential to replace vehicle travel with active travel - research in three English towns identified that 55% of car journeys were less than 5km and with limited modification to the local environment, half of these car trips could be walked, cycled or made by public transport.⁶ Where traffic is slower, parents allow their children to play outdoors in much greater numbers than in similar streets where it is faster.⁷</p>
<p><i>Infrastructure development</i></p> <p>The development of public transport infra-structure, which has been shown to increase usage of public transport services (Box 2).</p> <p>The implementation of measures to enforce traffic calming, such as the 20 mile-an-hour zones (Box 3).</p>	<p>Rather than encourage increased car ownership, it is preferable to encourage better public transport links and street design that enables higher level of active travel. In the absence of good public transport, lack of access to a car can be a direct barrier to accessing health services. The NHS report ‘Making the Case: Improving Health through Transport’⁸ states that: “...over a 12 month period, 1.4 million people miss, turn down or choose not to seek medical help because of transport problems.” A health impact assessment of Edinburgh’s transport policy suggested that greater spend on public transport and supporting sustainable modes of transport was beneficial to health, and offered scope to reduce inequalities.⁹ Affordable public transport can help to reduce dependence on the car and income inequalities in rail use.</p> <p>Evidence suggests that area-wide traffic calming is associated with absolute reductions in injury rates and, if appropriately targeted, can help achieve relative reduction in inequalities in road-injuries and deaths¹⁰</p>

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<p><i>Financial incentives and disincentives</i></p> <p>Fuel taxes and road duties are important elements in discouraging use of private motor vehicles and in helping to achieve climate change mitigation objectives.</p> <p>Use of congestion charging schemes, such as that implemented on modest scale in London (Box 4).</p>	<p>Need to ensure adverse financial effects on those with low income are minimized.</p> <p>Though not intended as a measure to benefit public health, there is emerging evidence of the impact of the London scheme on outdoor air pollution, road casualties and other societal effects, but appreciable health benefits and impact on health inequalities will require much more ambitious schemes.</p>
<p><i>Public education and behaviour change</i></p> <p>Soft transport measures: implementation of schemes designed to support road safety and to encourage health-promoting behaviour.</p>	<p>Such schemes include 'walking bus' initiatives and workplace travel plans (Box 6)</p>
<p><i>Legal</i></p> <p>Progressive tightening of controls on vehicle tailpipe emissions</p> <p>Setting and enforcement of measures (speed limits, alcohol levels) to enhance road safety</p> <p>Legal priority for vulnerable modes requiring car drivers to anticipate the wide variety of walking and cycling practices.</p>	<p>Vehicle tailpipe emissions legislation is set by the EU. Hydrocarbons, nitrogen oxides, carbon monoxide and particulate emissions limits have been progressively tightened since coming into force in 1992. Recently agreement has been reached to legislate car fuel efficiency through carbon dioxide emissions in order to reduce the climate change impacts. Only four countries do not have some element of increased responsibility attributed to drivers over more vulnerable road users in their road traffic laws: Cyprus, Malta, Ireland and the UK.</p>

Box 1. Urban design for sustainable transport
Based on Lynn Sloman, 2006. *Car sick*. Totnes, Devon, Green Books Ltd.

Geographic location:

Timing of data or observations:

Health hazards covered: motor vehicle traffic hazards

Health outcomes covered:

Health equity and sustainability issues covered: Studies have shown that underprivileged groups are more likely to be affected by the health impacts of private motor vehicle transport than more affluent groups. This includes traffic crash injuries, air pollution effects, traffic noise effects and lack of physical activity effects. Replacing private motor vehicle transport with feasible transport alternatives is a way to reduce these health inequalities and to reduce negative effects of motor vehicles including greenhouse gas emissions.

Text: Urban planning and design can lay the foundation for more sustainable and equitable transport services. The city of Phoenix, Arizona, in the United States is an example of a city specifically designed for car travel within the city, while in recent decades Copenhagen has developed its urban design for walkability, bicycle transport and public transport. In parallel the number of inner city parking places was slowly but steadily reduced which saved the city funds and made land available for parks. A concerted effort to ensure that most peoples' travel needs can somehow be met by alternatives to private motor vehicle transport is required and the planners and urban designers are key professionals in developing the plans.

New housing estates provide opportunities to test development of sustainable and equitable transport systems. A study of five new estates around Oxford has shown how "car-friendly" locations and designs create more car travel. The location and design of "superstores" are other features of urban planning that will influence travel patterns. For larger estates and "superstores" the design and construction of public transport access should ideally go in parallel with the building construction so that public transport can be used from day 1. Convenient walkability (and access for disabled people) needs to be built into the design as well. The experience from Copenhagen and other places show that major reductions in daily car travel is possible through urban design.

Box 2. Better public transport

Based on Lynn Sloman, 2006. *Car sick*. Totnes, Devon, Green Books Ltd.

Geographic location:

Timing of data or observations:

Health hazards covered: motor vehicle traffic hazards

Health outcomes covered:

Health equity and sustainability issues covered: Studies have shown that underprivileged groups are more likely to be affected by the health impacts of private motor vehicle transport than more affluent groups. This includes traffic crash injuries, air pollution effects, traffic noise effects and lack of physical activity effects. Replacing private motor vehicle transport with feasible transport alternatives is a way to reduce these health inequalities and to reduce negative effects of motor vehicles including greenhouse gas emissions.

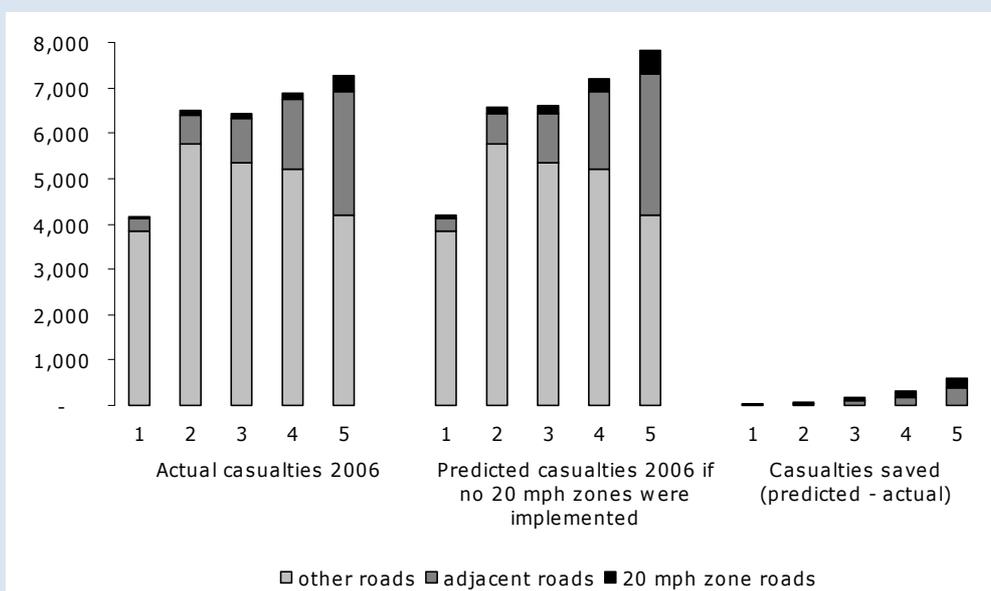
Text: The "car dependence" that has developed in most countries during recent decades is partly an issue of attitude to modernity, comfort and personal economic progress. The motor vehicle industry and its products are very visible in advertising and the popular press, and the alternative means of daily transport do not get the same promotional exposure in many communities. The planners and decision-makers often have a "windscreen perspective" of the travel needs and means of the local community. This has undermined the investment in public transport and active transport (walking and bicycling) in many places.

Experiences from improving public transport services and effectively promoting them, show that major changes in travel patterns are possible. Improved bus services in Bristol increased the usage by approximately 50%. In Norwich new and improved train services increased the use three-fold. To achieve progress the buses and trains need to be made clean, safe, comfortable and timely. Timetables need to be user-friendly and available at each stop as well as at a website. In low population density areas taxi-like bus services may be the best solution. The travellers makes requests for travel via email or phone calls, and modern GIS systems create travel pick-up routes (similar to airport shuttles) to meet the needs. This type of system has been applied very successfully in e.g. the Netherlands.

Box 3. 20 mph zones

Road injuries are among the leading causes of mortality and disability worldwide. There is good evidence internationally for the effectiveness of traffic speed reduction for reducing injury rates. One strategy for reducing speeds in urban areas is the use of road engineering interventions such as vertical deflections (humps), to prevent traffic travelling above 20 mph.

A recent observational study of the effect of 20 mph zones on road collisions, injuries and fatalities in London suggests that they were associated with a 41.9% (95% CI 36.0, 47.8%) reduction in road casualties after allowing for underlying time-trends. The percentage reduction was greatest in younger children, and greater for the category of killed or seriously injured casualties than for minor injuries.



Box 4. The London Congestion Charging Scheme (CCS) and beyond

The CCS, which charges motorists to enter the Congestion Charging Zone (CCZ) of central London, was introduced in 2003 to alleviate traffic congestion. It is a partial solution to the much greater changes needed in transport systems over the coming decades.

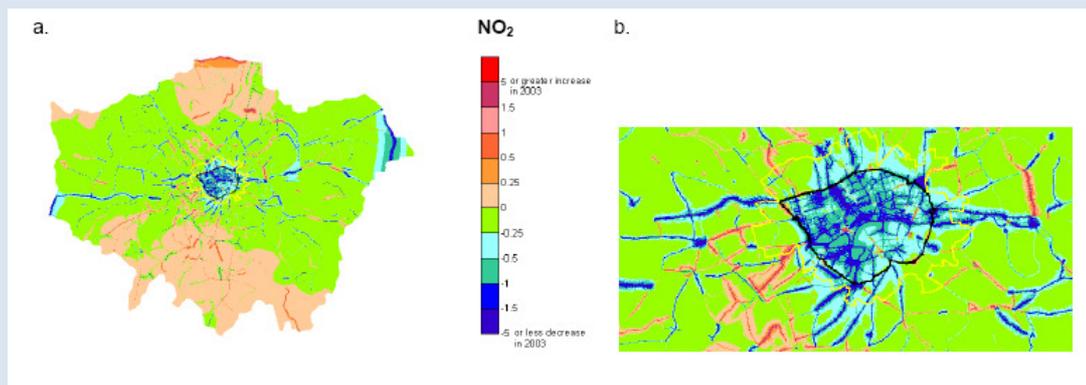
- a model-based study by Tonne et al, suggests probable small benefits on air pollution-related loss of life,¹¹ largest in lower socio-economic groups because of their higher exposure to traffic pollution
- two studies suggest a decrease in road casualties, though with possible increase in cycle injuries which may reflect the an increase in cycling within the CCZ^{12 13} The socioeconomic distribution of these impacts is unclear.

So far un-quantified are the potentially larger health effects operating through changes in walking and cycling.

A much more ambitious scheme will be needed to address the imperative of having a more sustainable transport system, and correspondingly larger effects can be expected on health. This will help to address inter-generational inequalities, and some, but not all, forms of intra-generational health inequalities.

Examining three transport visions for London, (business as usual, car free inner London and hybrid suburbs, and car free London) it argued that a car free London would not only rapidly reduce emissions but improve population health and equity in access. Looking at the potential health benefits from increased physical activity for four archetypal car using groups include reductions in risk of cardiovascular disease, colon and breast cancer, diabetes, obesity and musculoskeletal ill health.

Figure. Modelled difference (post minus pre-CCS) in annual average NO₂ concentration (µg.m⁻³) across Greater (a) and Central (b) London. The charging zone is outlined in black, wards within or adjacent to the zone in yellow.(21)



Modelled changes in nitrogen dioxide and life expectancy following the introduction of the CCZ.

Area	NO ₂ concentration (µg.m ⁻³)			Pop-ulation (10 ⁶)	Mortality rate per 10 ⁵ pop	YLG over 10 years
	Pre-CCS	Post-CCS	Pre-post difference			
GL	39.9	39.7	-0.10	7.195	799	1,888
CCZ	54.7	53.9	-0.73	0.373	812	683
Non-CCZ	39.4	39.3	-0.07	6.823	798	1,256
Deprivation quintile						
1 (least deprived)	38.2	38.1	-0.02	0.971	693	54
2	41.9	41.8	-0.07	1.713	731	321
3	43.3	43.2	-0.09	1.606	812	379
4	44.6	44.4	-0.14	1.548	871	563
5 (most deprived)	47.0	46.8	-0.24	1.357	908	812

Abbreviations: GL- Greater London; CCZ – congestion charging zone; YLG – years of life gained

Box 5. Cycling policy

Cycling offers the opportunity to provide incorporate physical activity as part of daily life at a low cost, can replace more motorized journeys than walking, and produces low greenhouse gas emissions.

Although lower income groups are less likely to engage in sports or leisure activity they can be more likely to engage in functional activity [Fiets beraad 2001], so increasing population levels of functional activity may reduce inequalities in total activity levels.

However, we lack good evidence on the effect on interventions to achieve change. Transport policy has not been formed on the basis of high quality evidence and walking and cycling have been marginalised within transport decision making. Although there is an emerging literature on the perceived and objective environmental correlates of activity and how these interact with social inequalities the evidence is not consistent.[Foster 2008][Gebel 2007]

Habit plays a major role in transport behaviour and developing a culture that normalises cycling is likely to play a major role in achieving societal change. The large variation within the UK (cycle commuting 2001: Hull 12% vs Gateshead 1%) and internationally (km cycled per person per year Denmark 936, Spain 20) illustrates what is possible.[UK Census 2001, Eurostat] Moreover, substantial increases in cycling have been achieved in Amsterdam, Copenhagen, Berlin and London.

Building the evidence base is essential but policy can and does not wait until this is developed. Large scale measures to reduce greenhouse gas emissions from transport and to increase cycling should be implemented based on the evaluation of good practice from high cycling areas combined with modelling studies using the best evidence available. The effect of these interventions should then be evaluated.

Policies to support cycling include:

- Invest in cycling at least according to best practice: Amsterdam spends Euro 27 per person per year
- Restrict motor vehicle speeds and volumes
- A permeable, signed, street network for the cyclist, while restricting car access
- Secure and convenient cycle parking, with restricted car parking
- Financial incentives to support cycling relative to the car
- Legal priority requiring motorists to anticipate the variability of cycling practices
- Residential, commercial and retail developments required to be accessible by bike
- Integrate cycling with public transport
- Social support for cycling, including bike shops, bike buddies and information resources modelled on best practice from high-cycling areas.

Box 6. Smarter choices: the "School walking bus" and the "workplace travel plan".
Based on Lynn Sloman, 2006. *Car sick*. Totnes, Devon, Green Books Ltd.

Geographic location: England

Timing of data or observations: recent

Health hazards covered: motor vehicle traffic hazards

Health outcomes covered:

Health equity and sustainability issues covered: Studies have shown that underprivileged groups are more likely to be affected by the health impacts of private motor vehicle transport than more affluent groups. This includes traffic crash injuries, air pollution effects, traffic noise effects and lack of physical activity effects. Replacing private motor vehicle transport with feasible transport alternatives is a way to reduce these health inequalities and to reduce negative effects of motor vehicles including greenhouse gas emissions.

Text: Daily commuting travel is a major part of the daily transport of the population in England. Schools, workplaces, health services, hospitals, shopping centres, sports facilities, and other mass assembly places function as "trip generators", for which schemes to reduce the transport risks can be developed. In relation to school transport, many places have established "walking school bus" schemes where children living reasonably close to their school walk to school instead of being driven in a car by their parents. This creates safety for the children, gives them exercise, and significantly reduces short car trips to and from school in most weathers, and this reduces unnecessary traffic. The children also get to meet their friends during the walk and sometimes singing and games add to the fun for the children. TravelWise in Merseyside (in inner-city Liverpool) was an early walking bus scheme, but many are now functioning all across Great Britain. School travel schemes are most successful when the children are partners in developing the schemes. It takes time to get the schemes up and running, but the existing schemes have reduced car travel to schools by up to 20%. Employers have started schemes to encourage alternative transport to car travel as well ("workplace travel plans"). Some pay employees for not driving to work and manage to reduce car parking needs (e.g. the Orange Corporation in Bristol). Others provide monthly bus tickets instead of car parking which reduces car commuting and saves money, both for the employer and the employee. Surveys have shown that as many as two thirds of daily work commuters in England are willing to consider more "green" commuting options. By reducing the cost of commuting by the same amount for every employee, these approaches would reduce financial inequality.

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REFERENCES

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