

Transport policy and health inequalities: a health impact assessment of Edinburgh's transport policy

D. Gorman^{a,*}, M.J. Douglas^b, L. Conway^c, P. Noble^d, P. Hanlon^e

^aLothian Health, Public Health Medicine, 148, Pleasance, Edinburgh, UK

^bCommon Services Agency, Trinity Park House, Edinburgh, UK

^cScottish Needs Assessment Programme, University of Glasgow, Glasgow, UK

^dCity of Edinburgh Council, Edinburgh, UK

^ePublic Health Institute of Scotland, Glasgow, UK

Received 15 February 2002; received in revised form 21 June 2002; accepted 5 July 2002

KEYWORDS

Health impact assessment; Road traffic accidents; Health

Summary Health impact assessment (HIA) can be used to examine the relationships between inequalities and health. This HIA of Edinburgh's transport policy demonstrates how HIA can examine how different transport policies can affect different population groupings to varying degrees.

In this case, Edinburgh's economy is based on tourism, financial services and Government bodies. These need a good transport infrastructure, which maintains a vibrant city centre. A transport policy that promotes walking, cycling and public transport supports this and is also good for health.

The HIA suggested that greater spend on public transport and supporting sustainable modes of transport was beneficial to health, and offered scope to reduce inequalities. This message was understood by the City Council and influenced the development of the city's transport and land-use strategies. The paper discusses how HIA can influence public policy.

© 2003 The Royal Institute of Public Health. Published by Elsevier Science Ltd. All rights reserved

Introduction

The links between the transport infrastructure of a region and the health and well-being of its residents are well recognized. The potential of using health impact assessment (HIA) to examine transportation policy and health is becoming exploited with recent publications on individual HIAs and also guidance from the Faculty of Public Health Medicine.^{1,2} Edinburgh is the capital city of Scotland with a

population of 450,000 and a Council which, since 1994, has had a contemporary transport policy, *Moving Forward*.³

HIA offers a systematic approach to assess the health impact of planned changes in transport policies.⁴ This paper explains the use of HIA to inform the development of the *Moving Forward* strategy, and reports on the identified health impacts, both positive and negative, of that strategy. HIA has been identified by the Scottish Executive as an 'essential step' towards putting health at the centre of the decision-making process at both national and local levels.⁵ HIA is further seen as having potential to reduce health inequalities.

*Corresponding author. Tel.: +44-131-536-3099; fax: +44-131-536-9164.

E-mail address: dermot.gorman@lhb.scot.nhs.uk

The Acheson Report recommended that ‘as part of HIA, all policies likely to have a direct or indirect effect on health should be evaluated in terms of their impact on health inequalities’.⁶

Since 1998, the City of Edinburgh Council (CEC) has been investing around £6 million per year on developing its transport infrastructure. This is more than would be expected of a council of this size and the funding came from the proceeds of selling an out-of-town shopping centre. In 1998, the CEC was considering how to take their transportation policy forward and had developed three possible scenarios for its future direction. These were based on possible funding levels (Box 1), and the CEC was keen to engage the health community to ensure that the newly developed policy would provide benefits for all the populations in Edinburgh and surrounding council areas.

Edinburgh is the centre for the Scottish Parliament and a large commercial centre with much of its economic strength based on the finance and tourism sectors. The city is compact and European in nature, with a large proportion of the population living within 2 km of the city centre. There is high usage of buses with, by British standards, an excellent bus service. It is the focus of a large

‘travel to work’ area drawing commuters to the city from the Lothians, Fife and throughout South Central Scotland. Edinburgh is affluent in Scottish terms with its average weekly earnings being 6% higher than those of Scotland (although 4% below the UK average—an often forgotten fact). Some 30% of the Edinburgh population do not own cars and car ownership is particularly low in the three most deprived areas of Edinburgh, which are social inclusion partnership areas. These have a population of 55,000 and 45% of households with children in these areas have no access to a car (CEC, City Development Department, Internal Reports).

The planned redevelopment of the transportation strategy afforded the opportunity for health and local authorities to co-operate in performing an HIA of the proposals.

The following are the five main areas where transport is described as affecting health.⁷ These are adapted from the World Health Organization’s Charter on Transport, Environment and Health and are the areas explored in this HIA.⁸

- Road traffic accidents;
- physical activity;
- access to goods and services;

Scenario 1

This is based on funding at the level of £0.7 million per year. This is the amount of money that a ‘typical’ council of 450 000 population would spend on transportation infrastructure each year. This would provide, for example, some 20 mph speed limits, very limited extra priorities on road, improved paper information, and integrated ticketing.

Scenario 2

This requires £6.5 million, which is the maximum level of funding that it is envisaged the CEC could designate from its own funds. This would afford, for example, 30–50% of the city with 20 mph speed limits, limited new traffic calming, continuation of the present progress on the cycle network, better pedestrian provision in the city centre, improved paper information, integrated ticketing, more greenways, one additional CERT-guided busway, and more park-and-ride schemes.

Scenario 3

This would take £29 million per year and require road tolling. This level of funding would enable the CEC to provide: 20 mph speed limits on all residential and shopping streets, widespread traffic calming, a city-wide cycle network, much better pedestrian provision, improved paper information, integrated ticketing, more greenways, more park-and-ride schemes, real-time information at bus stops and *either* further busways/light railways and heavy rail re-openings *or* greatly increased bus frequencies.

Box 1 The three scenarios.

- community networks and
- pollution.

Road traffic accidents

Road traffic accidents (RTAs) are a major cause of death and serious injury. They account for almost half of all childhood accidents and are an important cause of childhood mortality and morbidity. Inequalities are prominent. Morbidity and mortality rates for motor vehicle traffic accidents are not spread evenly across communities, but are higher in lower socio-economic groups. Other studies have demonstrated that pedestrian fatality rates for children of unskilled parents are five times higher than those of professional parents.⁹ Similarly, in Lothian, children from disadvantaged areas have RTA rates seven times higher than affluent children.¹⁰

Physical activity

Transport policies can help by promoting and facilitating walking and cycling. As each journey by public transport involves an average of 10 min walking (to and from bus stop or station), encouraging its use also encourages physical activity. If a person uses public transport twice a day, this is likely to involve about 20 min brisk walking time, two-thirds of the amount of physical activity required for health gain.

It has been estimated that the health gain for cycling, even in the current climate of heavy traffic and few cycle lanes, outweighs the health risks of accidents and pollution. Transport policies designed to promote cycling and make it safer could increase this benefit. A June 1999 British Medical Association report, principally about cycle helmets, repeats the message that cycling should be promoted as 'a healthy, physically active form of transport'.¹¹

Scottish work has estimated that if regular physical activity became the norm, around one-third of all coronary heart disease and stroke could be avoided, and in adults aged 45 years and over, just under one-quarter of non-insulin-dependent diabetes and over half the hip fractures could be avoided.¹²

Additional benefits of regular physical activity, especially to older adults, include improvement of co-ordination, balance, mobility, functional capacity, and grip and leg strength.⁸ Mental health can also be greatly affected, with higher self-

esteem, enhanced mood and improved cognitive function all associated with increased levels of physical fitness.⁶ The symptoms of common mental health conditions such as stress, depression and anxiety can be relieved by physical activity, which has great potential to reduce ill health and increase well-being. Within Edinburgh, the amount of cycling to work has doubled in recent years albeit from a low base; 2-4%. This has been building on existing infrastructure and utilizing park areas, which give Edinburgh more possibilities than many cities. 'Safe Routes to School' schemes are also prominent and encourage children to cycle.

Community networks

Heavy road traffic can divide communities, reduce opportunities for children's independent social contacts, worsen quality of life and be associated with lower local social support, which is related to higher mortality in the elderly and to other health events.⁸

Transport policies can have an effect on social interaction within neighbourhoods. Studies have demonstrated that in streets where there is heavy traffic, there is less interaction between neighbours. A study in San Francisco,¹³ for example, found that residents in a street with light traffic (2000 vehicles per day) had three times as many friends and twice as many acquaintances in the same street as residents in streets with heavy traffic (16,000 vehicles per day). This lack of social interaction can have impact on social support, which in turn impacts on health. Having a good social network can, for example, reduce a person's risk of coronary heart disease, depression or susceptibility to infection.¹⁴ The lack of such social support has been associated with higher mortality rates from all causes.¹⁵

There is a close link between transport policy and social exclusion. A lack of suitable transport is a major factor in certain groups having fewer opportunities. This includes the cost of transport, vehicle design, inadequate service levels, inadequate and poor staffing, inaccessible housing and facilities, and road safety. Elderly and disabled people may often have permanent mobility difficulties, such as parents with young children and shoppers with heavy bags. Good public transport should be designed for everyone, avoiding the need for special arrangements.

Transport policy overlaps with land-use planning when public policy is trying to promote community

networks. Good land-use planning where residential and economic development are considered in light of their effects on health, is increasingly recognized as being crucial to the economic prosperity of cities, and is a powerful weapon to combat inequalities in society. Where people live and work affect how far they have to travel and their choice of mode of travel, and thus impact on the environment and health. The CEC are anxious to maintain Edinburgh's 'urban villages', which provide local services for local communities. This, they believe, requires limiting out-of-town retail developments to three main nodes.

Access to goods and services

Evidence has shown that a poor diet contributes significantly to coronary heart disease, stroke and cancer. Improved access to healthy foods, therefore, offers substantial opportunity for health gain.

Limited access is not restricted to shopping facilities. As well as shops, other recreational, sporting, cultural and business facilities may be more sparsely provided in disadvantaged communities. Again, lack of easy access by residents disadvantages them by making it harder to get the full benefit from what society offers. In particular, job opportunities may be difficult to seek out as the limitations of public transport may restrict the radius within which one can seek a job. In Edinburgh, the largest concentration of low car ownership is in the disadvantaged housing estates located on the periphery of the city. It is a CEC priority to ensure good public transport provision in these areas.

Pollution

Transportation is a major contributor to air pollution.¹⁶ Exposure to air pollutants is known to be related to respiratory and cardiovascular diseases, and contains carcinogenic substances.

Methods

This HIA was prospective and can be described as a rapid assessment. It was important that the HIA provided prompt answers and the methods reflect this. An expert group was formed that consisted of council transport planners, health board and university public health staff with local knowledge and professional expertise in transport, and

representatives of the local community (from the local health council and SPOKES, a cycling advocacy group). Two group members did the background work including literature review and policy analysis. The main categories of health impact to be explored in this HIA were identified from the literature review and analysis of the transport policy and were grouped as: RTAs, pollution, physical activity, access to services, and community networks as described above. The whole group then met for two half days to conduct the HIA.

At these meetings, the group:

- Heard presentations on HIA, CEC's Transport Policy, and links between transport and health;
- Looked closely at the evidence on health impacts of transport, particularly work done by WHO,^{7,8} and agreed the categories of impacts to be considered;
- Agreed the particular risk groups within the population in Edinburgh to be considered, informed by the population profile and their own knowledge of the city. The group looked at the health impact on two main population groupings, which were described as:
 - Middle class/affluent/predominantly car owning.
 - Disadvantaged/predominantly non-car owning.
 Within these groups, the following subgroups were identified: young families; adolescents; the elderly; working people and the unemployed.
- Devised a methodology for scoring the risks to each groups in each possible scenario. The impacts were graded on a five-point scale: -2, -1, 0, 1 and 2 where -2 is the most negative and 2 is the most positive impact on health. This involved first capturing the group's views in text form and subsequently scoring them.
- The recommendations were drawn up by two group members and circulated to the others for comments.

Results

We present the results of scenarios 1 and 3, the low-cost and high-cost options (Boxes 2 and 3, Tables 1 and 2), in text form (to give some indication of the logic employed) and also present summary grids for the same scenarios.

This level of funding would not significantly enhance infrastructure and this scenario would lead to continued car dominance.

The consequences of this scenario would be increased pollution, an increase in accidents, increased pressure from businesses for out-of-town developments and a negative effect on tourism.

The group concluded that Scenario 1 would have an overall negative health impact on all groups. The disadvantage would be more severe on deprived groups.

Pollution did not, in the main, discriminate between groups, but some more affluent groups who spend a lot of time in cars (i.e. young families and working people) were considered to be at more risk because evidence suggests that, under urban driving conditions, car occupants are subject to the poorest air quality.

	Affluent	Deprived
Young families	High car use Children kept off streets but driven to recreational activities Scattered social networks	Reliant on public transport so limited access Increasing risk and perceived risk to children from accidents
Adolescents	Dependant on parents for transport but likely to want independence	Reliant on public transport, so limited access
Elderly	Perceived risk of accidents and poor physical environment Likely to use car or taxi	Poorer physical environment and reliant on public transport so more isolated and poor access
Working people	Increase in car use, including out-of-town use Higher journey times because of congestion	May buy cars but high opportunity cost
Unemployed	—	Poor physical environment so limited access and more isolation

Box 2 Health impacts of scenario 1: low cost.

Discussion

This work was a rapid HIA built around a combination of evidence from a literature review, available data on relative impacts and insights from key informants with local knowledge of health

and transport issues. It focused on carrying out a rapid assessment that would give practical recommendations for the concurrently developing transport policy in Edinburgh. Recommendations must be made before policy implementation to have a real prospect of making a difference.

This level of investment would allow greater priority to pedestrians and cyclists, make public transport far more user friendly and reduce congestion.

It was felt that in some areas, i.e. community networks and access, the health impact would be greater on the more deprived groups as better public transport could reduce the isolation in some estates, allowing greater access to a wider variety of jobs and services. The reduction in pollution would be beneficial for all groups because, due to the road layout in the city, it was considered that, unlike reported elsewhere, particulate and noise pollution did not discriminate by affluence.

	Affluent	Deprived
Young families	Still likely to use cars to transport children but more alternatives and better physical environment	Better access, less fear of accidents
Adolescents	Able to be more independent and mobile	More use of public transport so better access and networks
Elderly	Alternatives to cars and better physical environment means better access, social networks and walking as physical activity	Better public transport so better access, better physical environment so more activity and less isolation
Working people	More likely to work near home and use alternative to car, so more physical activity and social networks nearby	Better public transport and cycling access means more access to work
Unemployed	—	Better access to transport brings prospects for employment and recreation

Box 3 Health impacts of scenario 3: high cost.

Participation

We recognize that we did not gain wide public participation in the HIA, particularly not involving members of all the defined population groups. Clearly, wider participation could have added more weight to the results. However, given the broad scale and scope of the policy and large number of people affected, consulting a wider representative group would have been

impracticable in the available time and resources. We, therefore, chose to present and consider different perspectives on the health impacts using key informants, explicitly considering each of the identified groups separately. The CEC has since consulted on their transport policy by questionnaire to every household in the city. More research is needed to examine at what stage in the process public participation is most effective.

Table 1 Scenario 1: low spend

Risk group	Accidents	Pollution	Physical activity	Access to goods and services	Community network
Young families					
Affluent	+	--	-	-	-
Deprived	--	-	--	--	-
Adolescents					
Affluent	-	--	-	--	--
Deprived	--	-	-	--	--
Elderly					
Affluent	-	-	--	-	-
Deprived	--	-	--	--	-
Working people					
Affluent	0	--	-	-	-
Deprived	-	-	-	--	-
Unemployed					
Deprived	-	-	-	--	--

Defining the populations

In this HIA, we only considered impacts borne by the resident population of the CEC area. Naturally, the CEC feels most responsibility towards this population, but different impacts may be borne by others, especially commuters into the city. Defining each of the subgroups also has implications for the impacts that are identified. Determining the population in an HIA is an ethical question, and it is important to be explicit about the populations and subgroups considered in the assessment.

Scope of impacts

We could also be criticized for excluding some impacts, in particular the impact on global warming and sustainability.¹⁶ We recognize that this is an important threat to health and that traffic is a major

determinant. However, it is difficult to assess the effects on climate change and transport policy in only one city. Clearly if transport policy at national and international level were being subject to HIA, climate change would be a major area of impact.

Assessment of impacts

In our work, we did not further quantify the health impacts by, for example, estimating the number of people who would bear each impact. The information we gathered was enough to make the key health impacts explicit and describe their distribution in the population. Further quantitative assessment would have been time consuming, and we did not think it would help to shape recommendations and policy development. Indeed, it might have distracted from the main points and overstated the detail of

Table 2 Scenario 3: high spend

Risk group	Accidents	Pollution	Physical activity	Access to goods and services	Community network
Young families					
Affluent	+	+	+	++	+
Deprived	+	+	+	++	+
Adolescents					
Affluent	++	+	+	++	++
Deprived	+	+	++	++	++
Elderly					
Affluent	++	+	++	++	+
Deprived	+	+	++	++	++
Working people					
Affluent	+	+	+	+	++
Deprived	+	+	++	++	++
Unemployed					
Deprived	+	+	+	++	++

For all

- The effect of transportation policy on social exclusion and inequalities in health should be more widely recognized.
- Public health targets on exercise and the mechanisms to achieve them should be fully integrated with transport policy at both national and local Government level.
- Transportation should be considered as part of the wider land-use policy.
- There should be better co-ordination of public and private bodies where land-use and transportation policies are concerned.
- The merits and demerits of peripheral developments in Edinburgh should be widely debated.
- Transport awareness plans should be developed which promote:
 - Needs and rights of pedestrians (as defined in the Highway Code)
 - Health benefits of moderate exercise, such as walking for 30 mins every day
 - Need to reduce conflicts between cyclists and pedestrians
 - Rights of children.
- The following hierarchy of road users in assessing the allocation of road space should be incorporated into planning guidance:
 - Pedestrians
 - Cyclists
 - Public transport users
 - Freight and deliveries
 - Car users.
- The business community should make maximum use of new communication technology and minimize unnecessary journeys.
- Safer routes to school should continue to be developed.

For local authorities

- Local transport policies should embrace sustainability and developments should be subject to health inequalities impact assessment.
- Local authorities in Southeast Scotland should have a combined transport land-use strategy, perhaps through SESTRAN.
- When carrying out traffic management and road maintenance, priority should be given to walking, cycling and public transport policy over the motor car.
- Local transport policies should incorporate wide public consultation involving local communities. The best ways to ensure this should be considered.

- Local authorities should not expand road provision without a thorough assessment of all the impacts of doing so.
- Local authorities should work with large leisure and retail operators to ensure that they are fully aware of the impacts of their developments.
- Large developments should produce green commuter plans as a precondition for planning permission.
- New developments should always involve consideration of facilities for cyclists and pedestrians.
- Car-free residential areas should be evaluated and more developed as appropriate.
- Consider how to encourage cycle use in more disadvantaged areas where secure cycle storage is not readily available, e.g. in high-rise flats.

For the NHS

The NHS in Lothian should:

- Be an exemplar where transportation policy is concerned, in particular developing inclusive travel policies.
- Promote sustainability.
- Develop green commuter plans (including a review of providing cars as an incentive for senior employees).
- Eliminate unnecessary use of transport, and provide pool cars as appropriate.
- Co-ordinate efforts to ensure that the New Royal Infirmary of Edinburgh being built on a 'green field' site on the outskirts of Edinburgh is accessible to all members of the public and has appropriate transport provision for staff.

Box 4 (continued)

our quick screen. Our philosophy was to use information that was 'fit for purpose', gathering data which were relevant rather than all the information that was possible.

Transport and inequalities

A major conclusion of the HIA is that having a contemporary transportation policy which reduces private car use by encouraging cycling, walking and public transport is beneficial to all, but particularly to the most disadvantaged groups. We explicitly compared impacts borne by different population groups, and showed how the three scenarios impacted differentially on deprived and affluent populations. Disadvantaged groups bear the heaviest burden of negative impacts and have most to gain from the positive impacts. Transport policy, therefore, offers an opportunity to reduce inequalities in health.

Recommendations

The full series of recommendations are given in [Box 4](#). These recognized the potential to address inequalities by giving priority to pedestrians, cyclists, and public transport. Arguably, we could have made other more specific recommendations, for example, to have better facilities at bus stops and train stations, to re-introduce conductors on buses in the evenings, or to use public transport as a host for health-promoting messages.

For transport policy to recognize and address inequalities, it should be seen as a key component of land-use policy. For example, the damaging effects of out-of-town developments on the opportunities offered to those who do not have cars should be recognized and managed. This will require a regional perspective on transport and on economic development more generally.

Conclusion

Performing this HIA was opportunistic in that it coincided with a real policy update and has resulted in the health impact of transportation policy becoming ingrained in policy development and affecting decisions locally. It also facilitated closer working between health and local authority partners in the field, arguably an important outcome in itself.¹⁷ In particular, the need to have a local transport policy that does not decrease opportunity for socially disadvantaged groups, and indeed seeks to reduce inequalities, is now understood.

Using a rapid assessment methodology was important in getting this work progressed promptly and offers a model for working between health and local authorities. Comparing impacts on affluent and disadvantaged groups can help to determine which areas of public policy have potential to increase or reduce inequalities.

Transport policy has significant impacts on health and health inequalities. We hope that explicit consideration of these impacts will become routine as part of the development of all public policies.

References

1. Fleeman N, Scott-Samuel A. A prospective health impact assessment of the Merseyside Integrated Transport Strategy (MerITS). *J Public Health Med* 2000;**22**: 268–74.
2. Transport and Health Study Group, *Carrying out a health impact assessment of transport policy*. London: Faculty of Public Health Medicine; 2000.
3. Moving forward: a transport strategy for Lothian. Edinburgh: Lothian Regional Council; 1994.
4. Lock K. Health impact assessment. *BMJ* 2000;**320**:1395–8.
5. The Scottish Office, *Towards a healthier Scotland (a white paper on health)*. Edinburgh: The Stationary Office; 1999.
6. Inequalities in health (The Acheson Report). London: The Stationary Office; 1998.
7. Dora C. A different route to health: implications of transport policies. *BMJ* 1999;**318**:1686–9.
8. Charter on Environment. Transport and Health EUR/ICP/EHCO 02 02 05/9 Rev. 4. Copenhagen: WHO Regional Office for Europe; 1999.
9. Roberts I. Does the decline in child injury mortality vary by social class? A comparison of class specific mortality in 1981 and 1991. *BMJ* 1996;**313**:784–6.
10. Gorman DR, Ramsay LJ, Bull M, McGuigan D. Uptake of the children's traffic club in Lothian. *Health Bull* 2000;**58**: 58–62.
11. Britain Medical Association, *Cycle helmets*. London: BMA; 1999.
12. Scottish Needs Assessment Programme, *Health related physical activity*. Glasgow: SNAP; 1996.
13. Appleyard D, Lintell M. The environmental quality of city streets: the residents viewpoint. *Am Inst Plan J* 1972;**38**: 84–101.
14. Wilkinson R, Kawachi I, Kennedy B. Mortality, the social environment, crime and violence. In: Bartley M, Blane D, Davey Smith G, editors. *Sociology of health inequalities*. Oxford: Blackwell; 1998.
15. Berkman L, Syme L. Social networks, host resistance and mortality: a nine year follow-up study of Alameda County residents. *Am J Epidemiol* 1979;**109**:186–204.
16. Haines A, McMichael T, Anderson R, Houghton J. Fossil fuels, transport, and public health. *BMJ* 2000;**321**:1168–9.
17. Kemm JR. Can health impact assessment fulfil the expectations it raises? *Public Health* 2000;**114**:431–3.