Health Issues in Transport and the Implications for Policy

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1 BACKGROUND

This paper has been prepared under the Department for International Development's (DFID) Transport Resource Centre Scheme to help identify how transport could support DFID's poverty reduction strategy through its health objectives. It highlights the impacts of transport on health particularly for poor people and examines the health opportunities that improved transport can offer.

The authors were asked to focus on three key transport-related health issues, namely access to health care, the transmission of disease particularly Aids/HIV and the problem of road crashes and the deaths and injuries caused. Transport also has an impact on health through pollution, for example vehicle emissions and dust, but this issue will be looked at separately but a few key findings have been summarised in Section 3.4. Current knowledge of health impacts are summarised under each issue in turn and this is followed up by an outline of policy implications and opportunities to improve health of the poor through better and safer transport provision. The policy recommendations are aimed at national and international decision makers and these include representatives of government, private sector and civil society

The paper has drawn on the review of a few key publications, the considerable technical experience of the authors and feed back from DFID's Infrastructure and Urban Development Department . The authors also consulted Sarah Nancollas of TRANSAID, Fiona Power of DFID's Centre for Health information(CHI) and Margie Peden of the World Health Organisation (WHO). The CHI's H&P News was found to be a useful source of information. Several web sites were searched and these included sites of the WHO, the World Bank, the British Medical Journal, UN AIDS, UNESCAP and the ILO and a number of news sites including the BBC.

The authors have raised some issues that could arise from a poverty and livelihoods approach in comparison to a more traditional top down approach but it is recognised that the implications need further discussion and inputs. The key publications used in this review were as follows.

- 'Poverty and Transport' by David Booth et al, Overseas Development Institute (ODI), 2000.
- 'Poverty Reduction Strategies Sourcebook', consultative draft by the World Bank, 2001.
- 'Better Health for Poor People', Department for International Development (DFID), 2000.
- 'From camels to aircraft', S Nancollas, TRANSAID, 1999
- 'HIV/Aids Strategy', DFID, 2001.
- 'Livelihoods of Poor People – What Contribution Can Transport Make?', workshop report, TRL, 1999.
- 'Estimating Global Road Fatalities', G Jacobs et al, Transport Research Laboratory (TRL), 2000.
- 'Transport Safety for the Poor', G Jacobs et al, TRL, 1999.
- 'The Global Burden of Disease', C Murray and A Lopez, 1996.
- Various other DFID strategy reports including the two White Papers.

2 INTRODUCTION

2.1 Multisectoral poverty reduction strategy

In DFID's 1997 White Paper the UK's international development strategy was significantly refocused on the elimination of poverty through policies aimed at creating sustainable livelihoods for poor people. This spotlighting of measures targeted on poverty with a livelihoods approach allowed a breakaway from traditional sector improvement programmes and facilitated the scope for multisectoral actions. Such an approach is vital if a sustainable attack on global poverty is to be a reality. However, achieving integrated multisectoral programmes is far from easy and this paper attempts to identify how stakeholders in transport and health can work together.

2.2 Multidimensional aspects of poverty

Common agreement has also been reached on the multidimensional aspects of poverty.

> *' poverty is a multidimensional phenomenon, encompassing inability to satisfy basic needs, lack of control over resources, lack of education and skill, poor health, malnutrition, lack of shelter, poor access to water and sanitation, vulnerability to shocks, violence and crime, lack of political freedom and voice' (World Bank, 1999).*

In the Poverty Reduction Strategy Sourcebook (World Bank, 2001), a five dimensional framework for poverty has been adopted for most but not all of the Chapters (sectors). The five dimensions are:

- Income
- Health
- Education
- Security and
- Empowerment

2.3 Transport, health and livelihoods

Although transport is not a specific dimension of poverty, mobility is a vital human asset for maximising livelihoods. The poor need sufficient means of transport (all modes) to get to work, water, school and health clinics, and to participate in trade. Transport is therefore important for a wide range of livelihoods strategies.

Health is a major concern of the poor and a major livelihoods asset. It is given clear priority within DFID's poverty reduction strategy and two of the United Nation's seven development targets relate to health. Their focus is on infant and maternal mortality and they do not directly address the negative health impacts of transport. Nevertheless, improved transport policies and transport projects or interventions can help achieve these targets, particularly maternal mortality, by improving access to health care and also significantly contributing to the reduction in morbidity and mortality rates due to accidents. It is important to understand how this can be achieved and demonstrate successes, particularly for the poor. This paper begins this process by giving some indication of the impacts of transport on health and by raising some implications for transport policy which can help improve the health of the poor.

Some illustrative examples are as follows.

'Every 10 % increase in distance from a health care facility increases mortality by 2 %' (A Wagstaff, 2000).

In rural regions, but also in the slums of large cities, access to health care is often significantly impeded by the difficulty in getting to medical services; lack of suitable transport is often an important issue for the poor both in rural and urban areas. In addition, access to health care is a particular concern for women who carry most of the burden of dealing with the ill health of family members and have special health care needs themselves.

'85 % of all deaths from road crashes occur in developing and transition countries' (G Jacobs et al, 2000).

There is also widespread recognition that road transport has a major negative impact on health through road crashes and that it can be a factor in the increased transmission of disease particularly Aids/HIV. The poor are particularly vulnerable to both these problems. Although men are usually much more at risk than women, women carry the burden of caring for the victims at the same time as trying to maintain the livelihoods of their families.

The impact of transport on the health of the poor is likely to have rural/urban and gender dimensions. These factors are considered in more detail in section 3 which takes a closer look at the three key issues of transport and health that form the focus of this paper. The section also identifies any major knowledge gaps and research needs.

2.4 Difficulties in delivering improved transport for better health

Clearly programmes aimed at improving the poor's access to health care, the safety of vulnerable road users and the health of transport operators can help countries meet their health targets and improve the sustainable livelihoods of the poor. Yet national governments and, indeed, all involved stakeholders, have generally been slow to act in the field of road safety and in those areas where health and transport overlap. Why is this? It seems unlikely that actions have been delayed due to a lack of global knowledge about potential solutions. More likely reasons could include

Government

- Transport related health problems not seen as an international or national priority
- Lack of commitment to real safety and health improvement
- Inadequate funds
- Insufficient capacity for delivering improvements
- Lack of leadership and co-ordination of sectors and agencies who have a potential role
- Transport agencies tend to meet the costs of improvements but benefits go to health agencies
- Safety policies and action plans not properly focused on helping the most vulnerable and they can conflict with transport efficiency/capacity requirements.

Public, especially the vulnerable and the poor

- Unaware of the risks
- Not aware of improvements that they can make to protect themselves
- Not aware of improvements other agencies could offer
- Not prepared or unable to pay for improvements
- Concerned but not engaged in the decision making process.

Transport providers, vehicle manufacturers and private sector

- Unaware of possible improvements that they could make.
- Aware of the need for improvements but not prepared to raise standards or comply with existing standards.
- Costs and benefits of safety/health improvements not seen as worthwhile. This could be due to inadequate compensation and insurance systems particularly for the poor.
- Unable to pass on costs of safety improvements to the transport users many of whom are poor.
- Safety not seen as significant in attracting customers or improving business's competitive position.

Development agencies

- Safety projects often go beyond the capacity of local organisations.
- Technical assistance often fails to address sustainability adequately and projects tend to be too short term.
- Involving sectors other than the one directly receiving assistance has often proved difficult.

If transport is to have a better impact on health it has to address these problems. In addition, non-transport solutions should be considered for improving access to health care and reducing exposure to the dangers of road transportation. For example, better land use planning to enable safer access to the needs of communities and improvements in telecommunications.

2.5 Implications of a livelihoods and poverty approach

A livelihoods and poverty based approach to improving health through transport will almost certainly generate some differences from the more traditional top-down approaches. More thought and discussion with livelihoods specialists is needed to identify these differences but benefits could include

- Increased focus on interventions that benefit the poor ie non-motorised and public transport users.
- Better integration of a range of livelihoods interventions and co-ordination of different agencies at the local level eg health and transport.
- More innovative ideas for cross-sectoral support and partnerships.
- Improved ownership and support for improvements leading to greater compliance with recommendations.
- Improved understanding of the poor's needs and perceptions.
- Better identification of the risks of different types of trip and the high risk part of trips eg where non-motorised transport joins the main road or where public transport users join or leave vehicles and cross busy roads; the increased danger at harvesting time, etc.
- Finding solutions that the poor can afford.
- Finding standards that can be reduced without incurring any negative impacts (eg lower geometric design standards for lightly trafficked rural roads).
- Improved balance between transport and non-transport solutions.

The impacts of transport and health and more specific policy and research implications are looked at in more detail in section 3 below.

3 TRANSPORT AND SAFETY ISSUES

This section looks at the three issues of transport and health namely access to health care, the spread of HIV/Aids and road accidents. Where possible these have been related to DFID strategies and the implications for policy and interventions has been outlined and knowledge gaps identified.

3.1 Transport and access to health care

Transport affects health systems in three ways, by enabling

- access by the community to health centres,
- access by health workers to the community and,
- the development of sustainable health services themselves.

Not only will transport affect access by the public to health facilities, but it will be central in ensuring the supply of essential goods and resources such as drugs and personnel to where they are needed. Adequate transport is therefore an essential pre-requisite to achieve the international health targets. This section is primarily concerned with the issue of access and discusses the importance of transport in achieving the international health targets.

3.1.1 The DFID health strategy

DFID's health strategy is primarily aimed at meeting the International Development Targets (IDTs now incorporated into the Millennium Development Goals). These IDTs provide a clear focus on poverty reduction and enable progress to be objectively monitored. Among the seven targets, health features in the following, with target dates up to 2015:

- Reducing the rate of maternal mortality by three-quarters.
- Providing access through the primary healthcare system to reproductive health services for all individuals of appropriate ages.
- Reducing the infant mortality and child mortality rates in each developing country by two-thirds.
- Reducing the incidence of TB and malaria by 50% by 2010.
- Achieving a reduction in HIV infection rates among 15-24 year olds by 2005.
- Reducing the proportion of people living in extreme poverty by at least one half. Progress for this target is to be measured by income poverty statistics and also by the proportion of children under five who are underweight. Large expenditures on health care by households are widely recognised to be contributory factors to income poverty.

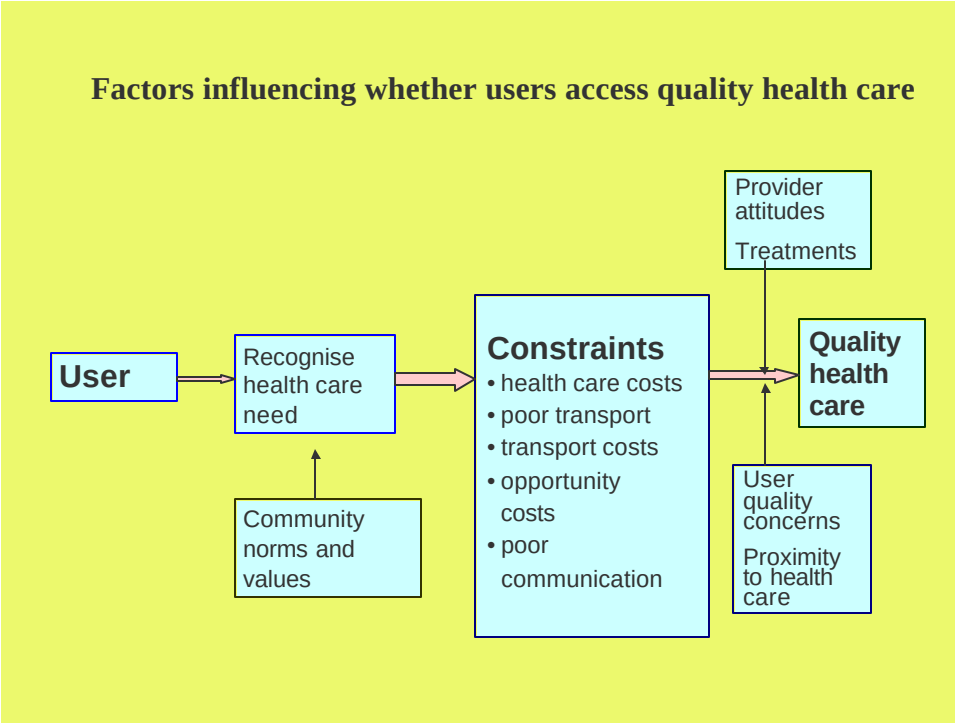
3.1.2 Factors influencing whether users access health services

Better transport should:

a) improve access and increase usage of health facilities,
b) increase the catchment populations for the health facilities, and
c) widen individual choice of these facilities.

However, whether a population will use a health facility is not solely governed by geographical access and other factors co-influence users in exercising their choices.

Figure 1: Factors influencing whether users access quality health care



The decision to seek health care is complex and involves a variety of social, psychological and medical factors. These include:

a) recognition by the user of the need for health care,
b) which in turn will be influenced by community norms and values,
c) the existence of appropriate health facilities and personnel,
d) whether these are sufficiently close to communities,
e) user's perception of quality of care by the providers,
f) whether the infrastructure and transport system is adequate to enable physical access, and
g) costs to the user, to include user fees, opportunity costs and transport costs.

Distance and ease of transport will therefore be factors in a complex decision making process. Sustainable transport and communications systems are essential both for the adequate delivery and for the uptake of health care (Leonard, 2000).

Health and transport policy are therefore closely linked and policy decisions around the provision of transport should consider the potential health benefits. Similarly health policies need to be mindful of existing and future transport and rural development strategies because these will have an impact upon the success of health care delivery and uptake.

3.1.3 Impact of inadequate transport on health

There are few studies that have quantified the health impacts of poor transport to health facilities in developing countries. A few case reports have been published and these are discussed in the context of rural poverty, gender and health.

The distribution of health facilities in rural areas is usually sparse, particularly of hospital-based facilities. Contrary to this, there is usually a concentration of health facilities and manpower in urban areas, where disproportionately more health professionals are also found. It is in rural areas where transportation and other infrastructure may also be at their most deficient and where the effect of poor transport on health is likely to be greatest.

The World Health Organisation (WHO) has set a target maximum distance from health care of 8 kms. In practice only 40 to 60 per cent of the poorer country populations have this level of access. For example in the Orumia region of Ethiopia only 43 per cent reach this target (TRANSAID, 1999). Therefore transport and outreach services are crucial in enabling rural communities gain access to health care.

The role of transport

Health care delivery has to be timely in order to save lives and reduce suffering, as for example, in obstetric emergencies or when there is a need to control epidemics. Continuity is also required, such as with long-term tuberculosis therapy (daily visits for six months or more) and vaccination (repeated at set intervals to complete immunisation). The quality of the transport system will impinge on both of these factors. The transport sector is therefore one of the keys to ensuring good delivery of health to the poor, particularly in rural areas.

Studies in the UK suggest that distance from residence to an Accident and Emergency Department governs attendance rates, these falling off with longer distances. (Hull, 1997). Because of constraints in both facilities and manpower, the situation is very much worse in developing countries; the distances that have to be travelled by communities seeking health care are far greater, particularly to hospitals. Little routine quantitative information is collected on this but specific one-off surveys have been informative. For example, in Burkina Faso 40% of health centre users had to walk more than one hour to reach care. These distances may deter people from seeking care, as was demonstrated in Mozambique, where 38% of people who had been sick did not seek treatment because their local facility was too far away (World Bank, 2001). As stated earlier, a Philippine study indicated a 2 per cent increase in mortality for every 10 per cent increase in distance from health care facilities (A Wagstaff, 2000).

The rural poor will be disproportionately affected by transport costs as a proportion of their income if they have to travel to seek health care. In an example from South Africa, the poor resorted to self-treatment, or to 'traditional methods' closer to home instead of seeking primary care and antenatal care. High transport costs were an important factor that prevented them accessing health care (Whittaker, 1985). When community concerns were sought, people expressed preference for a nurse in the village or a weekly visit by a doctor.

Road quality

A study of the Makete District in Malawi showed that rehabilitation of the road from Njombe to Makete resulted in an increase in patient numbers of around 15 per cent at the mission run hospital (SD Ellis, 1997). Also this study demonstrated that a

strong link between rainfall and disease. Diseases such as Malaria showed significant increases in the rainy season when, coincidentally, the roads themselves were at their worst because of the weather. Thus access to health care is often most difficult when it is most needed. Improving roads for transport will not necessarily increase access for the poor, for whom health service fees, perceived quality of government health services and transport and opportunity costs may still be a barrier to seeking care. A study from Kenya (Airey, 1991) showed that, after building new, direct roads, the better-off increased their use of a district hospital whereas user fees and transport costs continued to be constraints for the poor. As the better-off came from further afield, the catchment population of the hospital also increased. Access to the hospital was therefore improved for the wealthier few.

Alternative transport and improved transport management

Where roads are poor, patients and outreach services can use motorcycles or even bicycles. Motorcycles have proved very effective in providing health care to rural communities but the management and maintenance of the transport service has been shown to be critical to health care coverage. For example in the Orumia region of Ethiopia, the non-availability of motorcycles caused a drop in the target coverage rate from 123 to 48 per cent (TRANSAID, 1999). There is only a small amount of data available on the impact of improved transport services on health and the results are summarised below under selected diseases, emergencies and outreach programmes.

The role of transport in reducing maternal mortality

Maternal mortality is one of the international development targets (to reduce the maternal mortality rate by three-quarters by 2015). Every day 1600 women die because of complications of childbirth or pregnancy. This translates into 585,000 deaths per year. On top of this, 50,000,000 experience pregnancy-related complications which, in a large proportion, will lead to long-term disability (WHO, 1996). The majority of these occur in developing countries, where only 65% of women attend at least one ante-natal clinic, only 53% give birth with a skilled attendant, and just 30% make at least one post-partum clinic visit.

Well-organised maternity services are vital to reducing maternal mortality. This normally involves the provision of antenatal care at a primary care level. Women and their attendants (midwives or traditional birth attendants) need to be capable of identifying the need for specialist obstetric care when complications arise (with facilities for Caesarean section, transfusion, antimicrobial therapy etc.), and there needs to be a system of ensuring their safe transfer. Transportation is therefore a key factor in ensuring that the needs of women who require maternity care are met. The availability of maternity services and improvement in their quality are clearly central issues. For example, one study estimated that 30% of antenatal deaths are due to poor obstetric care (Kusiako). In Gambia, maternal mortality has fallen, as in many other developing countries, but is still 50 times higher than in high-income countries. The study identified lack of transport to facilities with obstetric care as an important contributing factor together with substandard obstetric and primary care, lack of recognition of the severity of a problem, and delay in decision making.

Better access is needed to all of the different levels making up the continuum of maternity care. These are; primary antenatal care with systems for referral; hospital-based care for checks and emergencies; childbirth and postpartum care. But solutions for improving access also need to overcome constraints due to poor transport services.

Community-based approaches have been successful in identifying and prioritising concerns over transport. For example, in Jordan the cost of transportation was perceived by women to be a barrier to accessing antenatal health facilities. Another example of the complex interplay of transport and health service interventions comes from Matlab in Bangladesh. The decline in maternal mortality was thought to be due not only to community midwives making appropriate referrals to a hospital with obstetric services, but also to their ability to facilitate transport for their patients (Maine et al, 1996)

In Malawi, with Maternal Mortality Rates (MMR) nearly 100 times those of developed countries, a pilot study (Lungi et al, 2000) of bicycle ambulances and community transport plans was introduced to assess their benefit for emergency referral of pregnant women. Previous studies in Malawi showed that:

- 69 % of pregnant women walked to health centres.
- On average they travelled 2-5 hours.
- 42 % lived more than 2 hrs away.

Unfortunately pregnant women were reluctant to use the bicycle ambulance for cultural reasons and although there was a reduction in home deliveries of babies, more research is needed to find effective ways of improving health service transport.

Malaria
Forty per cent of the world's population live in areas at risk from malaria. Ninety percent of malaria is found in Africa. There are 1-2 million deaths each year from malaria, primarily of children in Africa. Difficult and costly transport in rural areas has been described as a major impediment preventing people from seeking treatment (Howard P P, 1994). Malaria control and disease management programmes require adequate transport for the distribution of antimalarial drugs, repellents and impregnated bednets; epidemic control and disease prevention whenever there is an outbreak. It should also be noted that cerebral malaria is a medical emergency requiring rapid transport to hospital. When this is not available the fatality rate is high (50%) as shown in a study from Malawi where the majority of children with presumed cerebral malaria or meningitis died whilst awaiting transport (Cullinan, 1998). There are little data available on the impact of improved transport and this topic needs more research.

Tuberculosis (TB)
Tuberculosis therapy has to be sustained for six months and longer if it is to be successful in eradicating TB from the patient. Transport costs borne by the patient and the family are an important factor which will influence patient compliance and ultimately whether the programme will be successful or not. There are numerous publications which attest to the fact that transport costs are a major impediment to seeking sustained treatment in settings ranging from Bangladesh, Zambia, Uganda, South Africa (Godfrey-Faussett, 1995; Croft, 1998; Westway, 1990).

Furthermore, adequate transport facilities also influence the success of tuberculosis and other immunisation and disease control programmes through the safe and timely delivery of vaccines, particularly in maintaining the 'cold chain'. There is little quantified information on this topic but its importance is obvious.

Child health programmes
Similarly poor transport is also an impediment to the implementation and uptake of child health programmes. Transport is a vital component of comprehensive

vaccination programmes for which repeat attendance is required. Again, rapid transport is needed to maintain the cold chain for vaccines. The role of transport in this aspect of health care has not been adequately quantified, but its importance has been articulated by many (Porapakkham, 1992, Howard-Grabman, 1993). Some examples of successful vaccination progammes are described in the section on outreach services below.

Emergency care

The response times of emergency services will be influenced by the transport infrastructure. In developing countries this has not been well quantified either but short response times for ambulances are accepted policy and practice in reducing mortality and morbidity from life threatening conditions. Minimum standards for response times are normally set as part of delivering a service of acceptable quality. For serious trauma, the 'golden hour', or the first hour after trauma, is accepted as the period of time beyond which further delays result in increased fatalities. Delayed transport can worsen outcomes in maternal health e.g. increased maternal mortality due to delays in transport include eclampsia and haemorrhage. This is also true for cardiovascular disease and other medical emergencies, where shortening the time to definitive care results in health gain. A case series from Malawi describes childhood deaths from meningitis and cerebral malaria whilst awaiting transport from the health centre to hospital (see malaria section above). In order to shorten transport times, on-the-scene triage is being carried out to transport patients directly from the scene to the appropriate centre for definitive care. Transport is, of course, not the only factor and delivering emergency pre-hospital care is also critically dependent on a sound telecommunications infrastructure (see communications below).

3.1.4 Transport and outreach programmes

In developing outreach programmes, emphasis has to be made on using appropriate means for delivering care. Mobile health clinics require good quality roads to allow access to their target populations and these may not be available in remote areas. This has been the experience of some projects, for example, projects in India and South Africa. Use of appropriate transport is exemplified by projects that have successfully used motorbikes to provide outreach services to communities in remote areas. Examples from Ghana suggest that motorcycle health care workers were able to deliver effectively not only routine EPI vaccination programmes but also effective epidemic control (they were used to vaccinate 46,000 children during a severe outbreak of Meningitis (Save the Children Fund, 1997)). The programme run by Riders for Health (RfH, 1998) reported improvements in vaccination coverage of over 100 per cent, up to 400 per cent more antenatal attendees and over 100 per cent more outreach clinics in Ghana. In Zimbabwe the use of reliable motorcycles reduced the time for social welfare officers to reach drought stricken villages from 18 to 6 days.

TRANSAID and RfH have demonstrated the importance of reliable transport, effective transport management and the value of contract hire systems to sustainable health (Nancollas, 2001). Others have reported increased community visits made by primary care health workers. Such innovative ways of delivering health care need to be monitored to evaluate their cost-effectiveness as well as assessed for their appropriateness and sustainability.

3.1.4 Urban issues

The problems of access to health care are certainly greater in rural areas and Demographic and Health Surveys (DHS) indicate that urban children are much more likely to be immunised than rural children whatever the disease (Sommerfelt and

Piani, 1997). For example 10 per cent of urban children in Nigeria received no immunisation compared with 40 per cent of rural children. However there are also problems of access for the urban poor that will be compounded by long distances to travel and lack of suitable transport or the high cost of public transport in large cities. These problems are likely to be greater for women as they often have no money and may be worried about security. Emergency transport is also a problem in cities where congestion can cause significant delays and the sick or injured are often transferred by public transport.

3.1.5 Communications

Radio and telecommunications can clearly help in emergencies and with early diagnosis and referral. They can also help improve the management of the health transport system and its efficiency. Information from TRANSAID based on Save the Children reports indicated that the introduction of effective voice communication between health centres, district centres and regional centres led to a 25 per cent reduction in distances travelled by health services. In Malawi, ambulance response times to maternity emergencies were reduced from 6 to under 2 hours by the installation of radios in health centres (Gunneburg, 1999). Given the rapid technological developments in telecommunications and its wider availability, it is important that health strategies take into account both transport and communications and that their interactive potential is taken into account.

3.1.6 Implications for policy and interventions

As highlighted above, the poor face the largest problem accessing health services and are more likely to suffer the constraints of a lack of affordable transport. Although the problem has been widely publicised it has not been well quantified and there have been no intervention studies examining the potential health gain. It is suggested that:

1. More research is needed with better studies to measure the impact of transport and how this will contribute to attaining the international development targets;
2. Livelihoods and participation approaches need to be used to identify the health concerns of poor communities and the problems caused by access;
3. Policies designed to improve access to health should also take into account transport availability and costs as barriers, which need to be overcome;
4. Interventions need to be concerned with teaching the family why referral hospital care is important and how transport could be organised;
5. The ways in which transport can meet the health needs of the poor should be examined and economical, appropriate and effective responses developed and evaluated e.g. outreach vaccination programmes;
6. Appropriate measures need to be undertaken to improve the rapid transfer of patients and to develop emergency transport facilities with communication systems and referral mechanisms;
7. Communications systems are also crucial to successful health delivery and need to be considered together with transport in developing health strategies;
8. Partnerships need to be developed between the Ministries responsible for health and for transport, donor organisations, international and local NGOs and local communities;
9. Opportunities for health and transport to work together, in particular, to develop shared indicators whereby health information systems could be used to monitor access to health services in relation to improvements in transport systems.

Knowledge gaps

1. There are few published studies that examine the role of transport and access to health care. Such studies need to be undertaken to examine the impact on achieving the development targets;
2. There is a need for linkage between health information management systems, finance and transport records to quantify the benefits that can be gained by better delivery from outreach services and improved access;
3. Integrated rural development projects including transport improvements need to be evaluated on the basis of a wide range of indicators. Methodologies should enable the contributions of different components to be estimated so that more effective integrated policies can be developed;
4. There is a need to evaluate the effect of improving maternity services in conjunction with improved transport systems.

3.2 Transport and the spread of HIV/Aids

The increased mobility of populations, the on-going infrastructure expansion, growing rural-urban and inter-country linkages provide opportunities for the spread of HIV and other infectious diseases. In the case of HIV/AIDS, the pandemic has been exacerbated by the increased mobility of individuals and transport employees. Rural communities are vulnerable to the spread of HIV from urban areas where prevalence rates are higher due to high risk practices. This section emphasises the role of the transport sector in contributing to the AIDS epidemic and the societal response to it.

> *'Being mobile in and of itself is not a risk factor for HIV/AIDS; it is the situations encountered and the behaviours possibly engaged in during mobility or migration that increase vulnerability and risk regarding HIV/AIDS'. (UNAIDS, 2001)*

3.2.1 Population mobility

Population mobility has increased over the last decade and is likely to continue to increase. This is because economic pressures push people to seek opportunities elsewhere, conflicts and tension displace millions, closed societies and borders have opened, and land and air transport are more readily available.

The term population mobility encompasses both population migration and circulation. Both may be merely national and internal or may be international. Migration is more permanent, circulation by contrast is the repetitive, non-permanent movement and includes return migration, circular migration, labour migration, commuting and shorter-term mobility. The spread of HIV will be influenced by transport and the mobility of populations. In this section we are mainly concerned with circulation, which results in the greater movement of people.

3.2.2 The scale of the problem

There were an estimated 40 million HIV positive people in the world in the year 2000, and about 75% were thought to have AIDS. HIV has caused a reversal of the gains in life expectancy in Sub-Saharan Africa (SSA) seen in recent decades. Developing countries have a disproportionate share of the problem. It affects adults in their productive life and can be transmitted to children, thus limiting productivity and resulting in high societal costs. HIV is one of the most important challenges to development in many poor countries. Furthermore AIDS is having a disproportionate affect on the poor, and is, itself exacerbated by the pressures exerted by poverty. Surveillance of the problem in developing countries is by no means complete and much of the information comes from surveys and sentinel sites. In SSA these suggest that pregnant women attending antenatal clinics in urban hospitals have a prevalence of HIV from 20-30% and that, at child birth, an estimated 30% transmit this to their newborn children.

In high prevalence areas HIV/Aids will:

- Reduce economic growth by 25% in 20 years
- Reduce populations by 20% by year 2015
- Reduce the work force by 10-20% by 2020

(International Labour Office, 2000)

The International Development Target is to achieve a 25% reduction in HIV infection rates among 15-24 year olds in the worst affected countries by 2005 and globally by 2010.

3.2.3 Vulnerable groups

Risk factors have been described for the transmission of HIV. These include sex with commercial sex workers (CSWs), co-infection with a sexually transmitted infection, number of sexual partners, type of sexual partners, condom usage, and intravenous drug use. Amongst these, CSWs have a prevalence of HIV of 70-80% and act as a reservoir for the spread of the disease.

Rural poor

Obvious routes of spread to the rural communities are via truckers and other transport industry workers and via migrant workers returning from urban areas to rural areas. The rural poor are amongst the most vulnerable, not only in terms of exposure to the disease from high prevalence carriers, but also because they pick up the burden of care. In these communities it affects adults in their productive life and children, wherever it is acquired, yet the burden for care is picked up by rural communities. The route of spread appears to be infection from polygamous partners acquired in urban and other high risk settings. Monogamous women are at risk because they may acquire the infection from polygamous partners. The availability of transport links may provides easier access for some women to seek employment in towns as CSWs.

Transport sector workers

Transport sector workers, including those who build and maintain infrastructure, operate transport services, and supervise and manage transportation projects, are particularly at risk because they are a mobile population whose jobs keep them away from home for prolonged periods, leading to increased opportunities to engage in risk related sexual behaviour. Some statistics of prevalence are given below.

3.2.4 The impact of transport on HIV/AIDS

Railways have long been regarded as 'the corridor for movement of disease' in South Africa (Hogbin 1985). More recently road transport has been playing an increasing role. There are areas of high transmission along transport routes because of the high incidence of unprotected sex with infected people. These are around trucking centres and along major transport routes. Spread has been caused by truck and other commercial drivers, and as a result of urban migrants travelling back home to rural communities. These have been instrumental in the spread of AIDS and helped the spread of other communicable diseases, for example, in Tanzania and in Rakai district in Uganda (Laukamm 1995, Gysels 2001). In 1989, in a sample of 68 lorry drivers at the port of Mombasa, 35% were found to be HIV positive, had travelled to seven different countries and had a history of sexually transmitted infections. This finding provided early evidence that lorry drivers and their assistants were a major route for the heterosexual spread of HIV in East Africa (Carswell 1989).

In India a number of reports give figures of prevalence. These vary considerably and perhaps more confident estimates are needed. Some examples of the conflicting figures are:

- 1% of long distance truckers are HIV positive (Rao, 1999)
- 7% of long distance truckers are HIV positive (BPWT, 1993)
- 84% of truckers and helpers had a history of sexually transmitted disease (STD) (BPLST, 1993)
- 33% of truckers are HIV positive (Gorrett L, 1994)

In India (Rao, 1994), truckers report visits to several CSWs per week amounting to about 100 different CSWs per year. Truckers had poor knowledge of AIDS or the safety offered by condom use and consequently had a low reported practice of condom use.

> "In India the average long distance trucker earns $233 a month, has a minimum of 25 paid intercourses per month and stops for sex every 180 miles".
>
> (Garrett L, 1994)

Through their risky behaviour, truckers therefore expose the communities whom they have visited as well as their communities of origin to considerable risk of HIV transmission. For example it is now widely accepted that the spread of HIV in Nepal originates largely from neighbouring India which has a much higher HIV rate. Male clients of CSWs are thought to be the main cause.

In Kwazulu-Natal, South Africa, a survey of 213 truck drivers found that 35% of the respondents had more than one sex partner in the week immediately preceding the survey. There is high cross-border traffic between Kwazulu-Natal, Swaziland and Mozambique, increasing the risk of HIV transmission.

In 1993 a survey of bus and truck drivers in Cameroon found that, on average, drivers spent two weeks away from home on each trip, 62% had sex during the trip, and 25% had sex every night that they were away. Information on condom use is not provided (Booth et al, 2000).

Action so far

There have been some responses to the AIDS epidemic which focus on combating the effects of population mobility. One is the West Africa Initiative for HIV/AIDS that

involves five countries (Burkina Faso, Cote d'Ivoire, Mali, Niger and Senegal). This carries out action research focusing on places with high populations of mobile people or migrants such as transport hubs and markets. A variety of interventions promoting the use of condom are employed, with peer educators a key component (UNAIDS, 2001).

Another example is the Coordination of Action Research on AIDS and Mobility (CARAM) project in SE Asia which involves a cross-border response. Migrant workers are educated and empowered (especially women) before travelling to work in the ASEAN area and are desensitised on their return. The cyclical use of the experience of mobile people and information exchange is used in an effective way.

Most interventions have focussed on educating/counselling truckers and CSWS about aids and promoting the use of condoms. Examples include the Healthy Highways project in India (Wilson, 1999), National AIDS Control Organisation (NACO) programme in India and numerous programmes in Africa. These programmes have had varied success in increasing the use of condoms but there appears to be little information about reduced prevalence or spread of HIV. Key achievements for the Truckers Highways Community Health project in India for 1999-2000, (H&P News, 2001) were:

- checked more than 52,000 truck drivers
- village clinic service accessed by over 5,000 women and 795 treated for STDC
- 100% increase in sales of condoms

Although a World Bank model suggests the most cost effective approach is to target CSWS ($2.66 per DALY saved), the review of the Healthy Highways Project (Wilson, 1999) suggests that greater impact is likely if truckers and CSWS are targeted equally, especially with a focus on highway 'hotspots'.

Private Sector Opportunities

The Private sector has a role to play in improving working conditions of truck drivers, by providing advice and counselling and in distributing condoms. In Thailand, the Thailand Business Coalition on Aids claimed to have raised condom use among CSWS from 33 to 95 per cent. Other steps taken by the transport industry included allowing drivers to take wives or partners with them and reducing the number of long trips.

In Zimbabwe, technical assistance was provided to help solve problems with transporting condoms and several innovative solutions were found using existing distribution systems for other products and services. For example, the large freight carrier, SWIFT, transports contraceptives and some essential drugs to the provinces and can extend this to District level at no extra cost if there is a regular delivery service (H & P News, 2001).

3.2.5 Implications for policy and interventions

Action needed

As there is unlikely to be an effective vaccine in the near future, the mainstay of public health preventive action will have to be health education about sexual practices and promotion of condom usage. In some countries such interventions are already being implemented (Laukman, 1995); more, however, are needed. Another way of reducing sexual transmission is to treat co-existing sexually transmitted infections. Since transport plays a key role in the spread of the disease, an

understanding of this role can help authorities to devise effective public health interventions targeted where they are most needed.

These interventions should address the factors that contribute to risky behaviour. For example, allowing truck drivers to take wives with them may be one way of changing their behaviour, but the acceptability of this needs to be assessed. Education programmes should be coordinated to target truckers and CSWs together, and the programmes themselves could be broadened to address all health risks, eg truckers programmes could include advice on alcohol, drugs and fatigue and other road safety messages.

As mentioned above, the private sector can help by implementing training programmes for employees in the transport industry and by supporting the distribution of condoms to rural areas.

The spread of disease is multi-faceted and the response to it should therefore involve sectoral collaboration. In this respect the health sector needs to work closely with the transport sector as part of a multisectoral response. Policy development should take into account the effect of transport and resulting population mobility as a co-factor in the spread of HIV. The following points need to be considered:

1. Linguistically and culturally appropriate outreach HIV/AIDS programmes need to be developed.
2. In responding to AIDS, strategy development should be multi-sectoral, for example, the transport and industry sectors should be included on National AIDS Committees.
3. Surveillance and detection are a key pre-requisite for co-ordinated national strategies, and are urgently needed for the prevention of HIV transmission involving trucking centres and other major transport routes.
4. Strategies should target *populations* vulnerable to the spread of HIV by transport systems and increased mobility. Thus preventive strategies need to focus on those mediating the spread of HIV eg migrant labourers, CSWs, and transport industry workers.
5. Community education programmes need to also target host populations from which these people arise.
6. Early warning systems to detect the increase in HIV in these and other populations are needed.
7. HIV prevention efforts should be focussed in *zones* where there is an increased likelihood that risk behaviours will occur and HIV will be encountered e.g. truck stops, bus stops, train stations, harbours, markets
8. Mapping assessments of roads and related risks of HIV could be useful new tools for interventions and advocacy.
9. Cross border programmes need to be implemented
10. Programmes should involve collaboration with the transport operating industry and transport workers unions in order to implement interventions.
11. Opportunities need to be created to permit health, transport, private sector and transport unions to work together.
12. Lessons learned need to be shared and successful approaches scaled up.

Knowledge gaps

There is already much evidence of high HIV prevalence among truck drivers and their helpers. However the impact of transport on raising the incidence of HIV in communities close to transport and the impact of opening new roads on transmission of disease needs to be better understood.

Effective interventions need to be developed with indicators more focused on prevalence of HIV in truck drivers and rural communities rather than sexual behaviour. Key knowledge gaps are:

1. Impact of transport on HIV prevalence in communities and the understanding of how the disease is spread within the communities.
2. Impact of transport systems and the spread of disease particularly for the more remote rural areas.
3. The effectiveness of different interventions particularly those which tackle transport and migrant workers together with CSWs and consider the factors contributing to the high risk behaviours.
4. The scope for private sector innovations and for partnerships between health and transport.

3.3 Road crashes, an immense human problem

The most recent study of the global impact of road crashes (G Jacobs et al, 2000) estimated that, in 1999, the road transport system caused:

- Between 750,000 – 880,000 deaths.
- Between 23 – 34 million people injured.
- Losses valued at over US$ 500 billion.

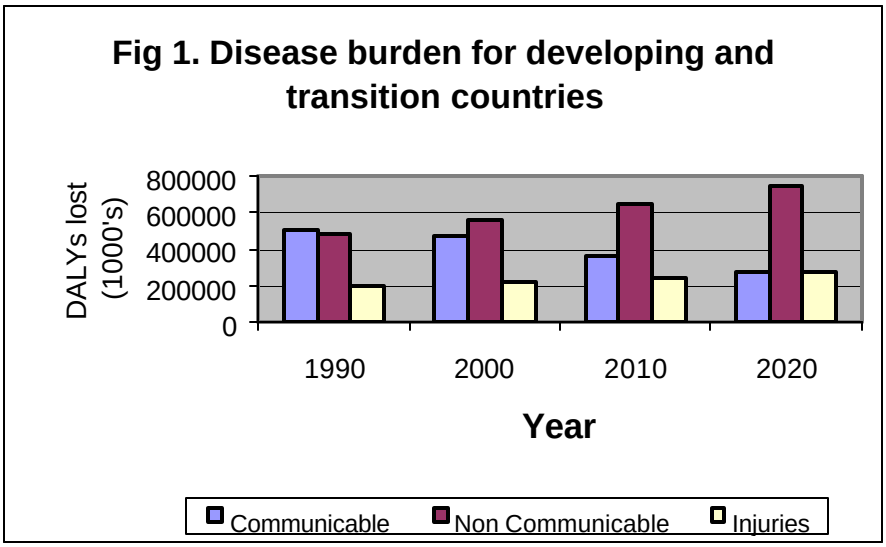
The estimates contain large ranges because of the difficulties with the police accident data used and the allowances made for missing information.

Most of the road crash deaths (85 %) occurred in developing and transition countries and nearly half (44 %) in the Asia and the Pacific region including large contributions from India and China. Africa accounted for 11 % of the global fatalities. The estimated cost of road crashes for the developing world was US$ 65 billion, which is more than the total official development aid (multilateral and bilateral) which they receive from the richer OECD countries.

3.3.1 Road crashes are a serious health problem

The relative impacts of communicable and non-communicable disease and injuries for developing and transition countries are summarised in Figure 1 below.

The figures and projections are based on the Global Burden of Disease report (C Murray and A Lopez, 1996). Developing country populations clearly suffer extensively from communicable disease but long term projections show a decrease in the disability-adjusted life years (DALYs) lost from communicable disease and an increase in those lost from non-communicable disease and injuries.



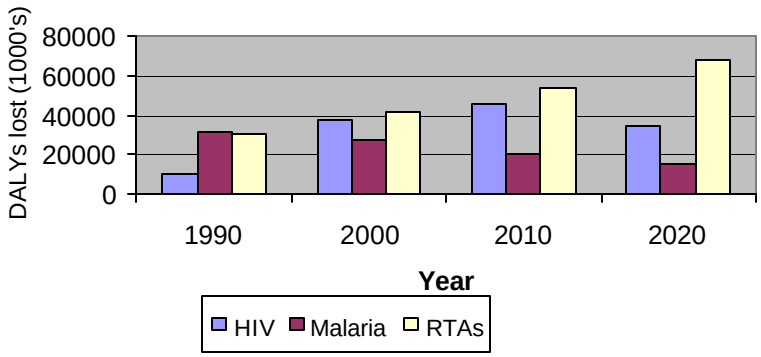
The DFID health strategy places priority on reducing:

- Communicable diseases particularly Malaria and TB
- HIV/AIDS
- Maternal mortality and morbidity
- Child mortality

It also supports healthier environments particularly safer dwellings and improved access to clean water and sanitation. However, apart from environment improvements, DFID's health strategy does not currently focus on injury prevention although it stresses the need for countries to set their own priorities targeting the principal diseases of the global poor and the most cost-effective solutions.

Figure 2 (from C Murray and Lopez, 1996) compares the projections of DALYs lost for three key causes, that is, HIV/AIDS, malaria and road crashes. These figures have to be treated with some caution as a number of assumptions have been made about future prevention programmes but the predicted trends indicate that DALYs lost from road crashes continue at a higher level than HIV/AIDS. By 2020 the study predicted that road crashes would rank third in the world as a cause of DALYs lost compared with 9th in 1990.

Fig. 2 Disease burden for developing and transition countries



The World Health Organisation recognises the importance of injuries as a leading cause of the global burden of disease and the World Bank and the development agencies are also concerned about the tragic toll of road crashes. In the words of James D Wolfensohn, President of the World Bank Group:

> "*Road safety is an issue of immense human proportions, it's an issue of economic and social proportions and also an issue of equity. Road safety very much affects poor people*"

3.3.2 Road crashes affect poor people

Information about poor people's involvement in road crashes is sparse but figures from five countries (G Jacobs et al, 1999) show that 20 to 56 % of pedestrian casualties came from the poorest socio-economic group.

Developed countries also show higher risks of involvement in road crashes for the poor, for example, in Scotland (White et al, 2000) children in the lowest socio-economic group were 4 times more likely to be killed as pedestrians than those in higher groups.

3.3.3 Pedestrians and two wheelers are the most vulnerable

In developing countries the victims of road crashes are mostly pedestrians or users of two wheelers. In Asia, Africa and the Caribbean pedestrians typically represented over 40% of the fatalities. In S. E. Asia and countries with substantial motorcycle traffic, the figure is under 30 % with motorcycles accounting for nearly 40 % of the deaths (G Jacobs et al, 2000).

3.3.4 Crashes in poor countries mostly involve buses and trucks

In the poorer countries a high proportion of crashes, particularly serious ones, involve public transport vehicles or trucks, ie the transport services. In India, buses or trucks account for 60% of the road deaths. A study of bus safety (T Pearce and D A C Maunder, 2000) indicated that in Nepal 65 % of all casualties came from crashes

involving buses compared with 35 % in Tanzania. In both these countries buses were largely run by the private sector (over 95 % of services).

3.3.5 Crashes are more severe in rural areas

The proportion of crashes on urban and rural roads varies from country to country but more than half the fatal crashes usually occur on rural roads (A Downing et al, 2000). Nevertheless at least a third of the crashes are likely to be in villages. Also, in countries with large amounts of ribbon development, the proportions of rural crashes are likely to be much higher.

3.3.6 Women are less at risk but they carry the burden of caring

In developing countries women represent between 20 to 30 per cent of the pedestrian casualties (A Downing, 1993). Their involvement may be increasing as they begin to travel more but the main burden on women is the need to care for victims who are usually the main breadwinners for their families. This burden is currently being quantified in a DFID accident costing study (R7780).

3.3.7 Road crashes place a considerable burden on health facilities

The victims of road accidents also place a heavy burden on health authorities. Early work by TRL in the late 1970s (unpublished) indicated that 5 per cent of inpatient days in Nairobi hospitals were taken up by accident victims compared with only 0.5 per cent in the South of England. More recently a study of a Hospital in Ethiopia (Nega et al, 1998) indicated that about 3.5 per cent of admissions were road accident victims. Also their average length of stay in hospital was nearly double that for all admissions. If health costs represent between 5 to 7 per cent of total crash costs, then a crude estimate of health expenditure on road accident victims is between $3 to $4.5 billion dollars per annum for developing and transition countries. These figures are based on very little data and more research is needed to obtain safer estimates.

The time to the start of the treatment, the so-called Golden Hour, and fast transportation to hospitals are critical for the survival of casualties. The poor are likely to under-utilise hospital facilities as they cannot afford to pay the associated charges.

The above very limited presentation of data on impacts provides examples that demonstrate that:

- road crashes are an important health concern,
- road crashes harm the poor disproportionately,
- there are significant differences between urban and rural areas,
- women carry the burden of care, and
- public transport and freight services in the poorer countries are frequently involved in road crashes.

3.3.8 Road safety stakeholders and partnerships

The multisectoral nature of road safety is widely recognised. Key stakeholders include:

- Road users, ie motorised and non-motorised users and also people using the road for non-travel purposes eg trade.

- Private sector, ie transport service providers, vehicle and vehicle parts manufacturers, road furniture manufacturers, road contractors, land developers, insurance agencies, media and industries involved in transportation.
- Government agencies at national and local levels, ie a wide range of sectors involved in or concerned about road safety.
- Non-government organisations
- International development organisations such as the World Bank, DFID and the World Health Organisation (WHO).

It is recommended practice that countries prepare and implement national road safety strategies involving all the first four groups of organisations above. National and local plans bringing together key stakeholders to address the safety needs of the community are a key way forward. However, a review of current practice (A Aeron-Thomas et al, 2001) indicates that, although there have been some successes in countries such as Fiji and Botswana, most plans have only partly met their objectives and targets in developing countries. Fiji and Botswana are relatively wealthy countries, and small, and these factors may have contributed to their success.

The reviewers identified a number of reasons for failure including:

- Over-ambitious plans
- Inadequate stakeholder ownership especially at implementation (sector) level
- Inadequate capacity
- Inadequate understanding or follow through of financial requirements

Key issues arising from the health impacts outlined above are:

1. The private sector, which makes an enormous business out of transport, needs to play a more significant role in raising safety standards of its own operations and products, and by contributing resources to safety interventions.
2. The health sector as a major beneficiary from safety interventions needs to play a greater role in advocacy, from informing policy makers through to educating the poor.
3. Partnership approaches, involving business and civil society with government need to be more widely adopted. These should aim to improve management of road safety interventions as well as increasing resources that could help reduce the cost of safety for the poor.
4. Integrated road safety plans are important for identifying priority actions but they must be achievable and the stakeholders must be absolutely clear about their roles and responsibilities especially in implementation and obtaining funds.

The Global Road Safety Partnership (GRSP) is developing and evaluating partnership demonstration projects in 11 focus countries and lessons learned will be made available on their web site at www.GRSProadsafety.org .

The WHO is developing improved strategies for advocacy through its regional offices and is encouraging the health sector to play a much stronger role in advocating road crash injury prevention policies.

3.3.9 Implications for road safety policy and interventions

There is a considerable amount of advice available on recommendations for policy and interventions in road safety in developing countries. This paper does not attempt

to summarise these but instead it tries to emphasise the implications for transport given health objectives and a poverty focus. The bibliography contains useful references on road safety recommendations. The main implications are as follows.

Targets and strategies in the transport sector

1. Transport sector projects should always include an assessment of the impact of projects on health including road safety and provide information on health and road safety indicators. Consideration should be given to including a road safety component if there is scope to benefit the poor and evidence of demand.
2. National road safety plans should include health-related indicators and identify the potential benefits for the health sector.
3. Multisectoral road safety plans are important for developing a targeted and a prioritised set of interventions. However, they should be achievable within anticipated capacities of organisations and consideration should be given to including a proper assessment of the needs of the poor in relation to road safety and the use of a livelihoods approach (see section 2.5 and section 3.3.4 on research below).
4. Road safety plans should also relate to poverty reduction strategies, health strategies and other development plans and take into account non-transport solutions that improve access but reduce exposure to dangerous traffic. The adoption of participatory approaches should encourage multisectoral solutions at the local level and strengthen local stakeholder ownership and compliance.
5. The health sector receives much of the benefits of road safety improvements in terms of resource savings. It can and should make considerable contributions to road safety programmes particularly regarding advocacy, community education and improving the care of road crash victims.
6. Independent road safety audits should be mandatory for all new road schemes or road rehabilitation projects. It may be possible to reduce design standards for low trafficked rural roads but this needs confirmation by research.

Non-transport strategies and road safety

1. Development agencies should consider broadening their health strategies to encompass injury reduction targets including those relating to road crashes.
2. Development agencies should include safer access objectives and road safety interventions in appropriate non-transport sector programmes and identify how they support poverty reduction objectives and health benefits. For example, road safety messages can be combined with health education programmes or literacy programmes aimed at both rural and urban communities at risk.
3. Non-transport project proposals that improve access, for example to health facilities or schools, should consider whether there are possible road safety benefits that could add value to the projects and, if so, include road safety indicators.

Private sector and partnerships

1. Transport (and health) involves infrastructure and services. In both these, the standards and levels of provision contribute significantly to the health of everyone, particularly the poor. Transport services are usually provided by the private sector and they, as well as government, have a responsibility and considerable potential to improve the safety of transport. The private sector organisations can help raise standards of vehicles, drivers and operational conditions, provide leverage for compliance and the multinationals can lead the way. The costs and benefits of safety improvements in private sector operations are not well understood (see research) and ways need to be found to offset the additional costs of transport safety for poor people, eg through financial support from advertisers on public transport vehicles and at bus stops.

2. Many businesses could be interested in supporting road safety action including those outside the transport sector. Transport strategies need to stress partnership approaches. Good win-win conditions are required for successful partnerships but business interests often go beyond improving their image and competitive edge. The GRSP is progressing the partnership approach and disseminating lessons learned but more information on lessons learned need to be gathered from countries outside the 11 GRSP countries.
3. Partnerships in road safety should also include civil society and NGOs. NGOs can play a very useful role as they are often more in touch with poor communities and more capable of engaging the private sector and managing multiple sources of funds.
4. Insurance companies also have considerable potential for participating in road safety actions, financing safety and putting pressure on the private sector to raise its standards. However, legislation on insurance and compliance needs to be improved and compensation particularly for the poor needs to be raised in line with road crash valuations using recommended approaches (DFID guidelines on valuing crashes currently under revision).

Information and informed decisions

1. The public, especially the poor and other key stakeholders in the involved sectors need to be informed about road safety risks, the impacts and how to minimise risks. The poor should be empowered to make informed decisions about safety actions that they can take and to influence decisions made by other stakeholders. More information is needed about the risks to the poor and potential solutions, for example the impact of raising the safety standards of transport operations (see research below).
2. The health sector should support current road crash information systems based on police data with medical information systems. These will help quantify the burden of road crashes and enable the monitoring of road safety benefits.
3. International organisations need to establish an efficient approach to generating and disseminating knowledge. The GRSP is now looking after the World Bank's road safety knowledge base. For sustainability it should be supported by all agencies. It is important that 'best' practice based on scientific evidence is made widely available.
4. Research programmes should be co-ordinated internationally. One possibility is to use the WHO Global Forum for Health Research. Alternatively a global road safety research association could be established.
5. Development agencies and their clients should be encouraged to make available new knowledge and advice generated by projects and the known impacts of projects on safety and health indicators (positive or negative).
6. One way to strengthen knowledge of development effectiveness could be to introduce a more scientific evaluation process into development projects. This would enable the effects of multisectoral projects to be better understood and encourage better links between development projects and research.

3.3.10 Knowledge gaps and areas for research

Knowledge gaps have been identified in an earlier DFID report on Road Safety and the Poor and the brief summary below focuses on those gaps particularly related to the problems of the poor and appropriate and innovative solutions. The key gaps and areas for research are:

- The impact of road crashes on medical resources.
- The medical resources used by the poor involved in road crashes and consequences for their recovery.

- The characteristics of crashes involving the urban and rural poor including multi-modal trips, trip purpose and the contribution of poor road environment and non-motorised transport. The identification of high risk factors for trips made by the poor.
- The effects on road safety plans and interventions of adopting a poverty focused and participatory approach compared with more traditional top down strategies.
- The scope for private sector initiatives, examples of good practice and lessons learned from countries outside the GRSP programme. For example Shell indicators such as rates of working hours lost through work accidents including road crashes, show Nigeria as one of the safest countries and Australia as one of the worst.
- The contribution of private sector transport operations to crashes and the opportunities for improved standards, regulation and compliance within the private sector. The costs and benefits to the private sector of such improvements and the factors which influence operator choice. There has been much research on how road design effects safety and something similar is needed for transport operations.
- Ways of improving advocacy and commitment to safety amongst decision makers and the public particularly the poor including greater involvement of the health sector and poor communities.
- The identification of viable and cost effective solutions to provide the poor with safer means of access. Measures need to be developed on the basis of participatory approach and trials of appropriate solutions carried out. The solutions should have livelihoods objectives and also investigate partnership approaches with private sector and government agencies. A possible model is the road safety literacy programme for villages on the National Highway 2 in India, (Baluja, 2001).
- The possibility for under-designing rural roads and keeping risks of road crashes low.
- The potential role of insurance in providing incentives to the private sector for safer operations and for financing road safety initiatives.
- The role of NGOs in road safety and the added value they can bring to the safety of the poor.

DFID funded research is currently investigating crash costs and community road safety education programmes. The former study involves household surveys and includes an assessment of the burdens placed on women. There is also a scoping study on insurance and some safety data is being collected from a study of vehicle operating costs.

Participatory and livelihood research approaches provide an excellent opportunity for the wide range of transport and non-transport problems and solutions to be investigated in a co-ordinated way. The challenge is to combine the above ideas with other research priorities for the poor in a useful way. Care will also have to be taken not to overburden communities and individuals with research investigations.

3.4 Environmental issues

This paper has not attempted to review the impact of transport on the environment but an indication of some of the key problems is given below.

A paper by Carlos Dora (Dora, 1999) identifies three elements of transport related air pollution which are having an impact on health in Europe and the USA. These are:

- Particulate matter
- Ozone
- Carbon monoxide

There is a considerable amount of data on vehicle emission levels and on the impacts of air pollution on health. In developing countries there has been concern about the pollution from cooking stoves (indoor air pollution) and the health of poor people. However it is likely that vehicle emissions and the consequences for air pollution also have serious effects on health particularly for those living and exposed to the poor air of large cities. However quantifying the relative cause and effect due to vehicle emissions has been difficult and estimates are still uncertain. The general level of the health of populations and sub-populations will be a factor as well as exposure and again the poor will usually be more at risk.

Within the United Kingdom, high pollution concentrations are estimated to bring forward the death of between 10,000 and 24,000 people per year (Department of Health, 1998, UK). Many of these deaths have been associated with fine particulate matter (particles less than 10 microns or PM10). In Northern Europe it is estimated that about 40% of particulate matter comes from traffic. The UK study suggested that the effect of particulate pollution could be two to three times that of passive smoking on individuals. Air pollution will of course affect most people living in cities unlike passive smoking. In the UK concentrations of PM10 are typically between 20 and 30 micrograms per cubic metre. In many developing world cities (e.g. Delhi) concentrations are typically in excess of 150 micrograms per cubic metre, and as such the relative numbers of premature deaths will be considerably higher. Particulate matter is also associated with increases in respiratory symptoms and illnesses.

In the city of Chongqing, China, traffic police officers who direct traffic at busy road intersections were reported to have a life expectancy of 7 years less than those of the general population, and this premature was credited to exposure to high pollution levels (Chongging University, 1995).

In conclusion there is need for more research and air quality monitoring to establish the relative cause and effect of vehicle emissions on air quality and the impact on health. Developing country cities typically have serious air pollution problems and the poor are particularly at risk due to their lower than normal level of health. The transport sector has many opportunities to improve air quality but integrated environmental policies supported by strong advocacy for improvements are needed if the policies, regulations and technologies are to be successfully implemented.

4 CONCLUSIONS

This paper has reviewed the readily accessible information available about the relationship between health and transport and poor communities.

It is widely recognised that transport particularly in the road sector contributes significantly to development and to the livelihoods of the poor. Expenditure on transport represents from 5 to 15 per cent of countries' GNP with many poorer countries at the higher end of the range (J Hine, 2001). This is a massive investment and the potential for improving the effectiveness of transport services is considerable. Transport is also crucial for the delivery of key services and people's access to them.

This paper has focused on the relationship between transport and health and particularly on the benefits of facilitating improved access to health and the two negative side effects of the spread of disease through transport sector workers and the problem of road accidents.

According to the WHO more than 40 to 60 per cent of the people in poor countries live more than 8 kms from a health care facility. A lack of access to health care is a widespread concern for the poor and a major threat to their livelihoods. Maternal and infant mortality rates are much higher for the poor who clearly make less use of government provided medical services. Remoteness and a lack of suitable transport are two of a number of factors which affect usage. The cost of these services to the poor and their reputation for poor quality are two other deterrents.

The main text of this report has highlighted the authors' views on the main implications for policy and interventions with the aim of identifying health opportunities that improved transport could offer.

The problems caused by the poor's lack of access to health care is well recognised but there is a shortage of quantifiable data to demonstrate how transport improvements can benefit health in terms of the international development targets. Some projects such as Riders for Health in Africa have claimed significant improvements in delivery of immunisation programmes but a study of improved road access in Kenya on use of health care facilities suggested that cost remained a critical factor even if physical access was improved.

There is clearly a need for health and transport policies to be developed in an integrated way in relation to the development of rural areas rather than the traditional sectoral approach used in the past. Key conclusions are:

- Most of the poor especially in rural areas, depend on transport for access to and the delivery of basic health care.
- Transport improvements have considerable potential to improve the health of the poor if combined with health care provision improvements that tackle the key issues of cost and quality. In particular vaccination programmes for children and antenatal care for pregnant women can be significantly improved by better transport provision in rural areas.
- Transport is also crucial in emergencies when delays in medical treatment cost lives. Innovative rescue services such as motorcycle and cycle ambulances have been tried but perhaps the best opportunities are offered by better management of scarce hospital transport services and improved communications. For example the introduction of radio communications in Malawi reduced ambulance response times from 6 to less than 2 hours.
- Transport is less of a factor in access to health care in urban areas but still likely to be a problem for the poor, particularly women. Ambulances are still scarce and there is the added problem of congestion in major cities.
- Health sector plans need to tackle the issues of access and mobility. Most policies will focus on providing district health care facilities but it will be a long time before the majority will live within the WHO 8 km target. Outreach programmes and transport services must be a major consideration in any health policy.
- Rural development projects with transport components should include health objectives and measure impacts in terms of health development target indicators including key mortality indicators.

- Country strategies and health policies should be reviewed with the aim of identifying and improving best practice in balancing decisions between location of health care services and transport requirements.
- Transport sector specialists can make significant contributions to health sector policies by providing guidance on transport and access to health care.

The problem of transport systems spreading disease, particularly sexually transmitted disease and HIV/Aids, is well documented. The high-risk sexual behaviour of the transport sector workers with commercial sex workers (CSWs) exposes them to disease and their travel contributes to the spread of these diseases.

There have been numerous projects aimed at educating professional drivers and commercial sex workers, and promoting the use of condoms. These programmes have addressed issues of sustainability and used participatory approaches to encourage acceptance of the messages by the target groups. Significant improvements have been claimed in terms of changes in sexual behaviour and use of condoms but no evidence was found in this brief review of changes in incidence of HIV/Aids amongst truck drivers. NGOs have been very active in prevention and care provision and there have also been a few promising examples of support from the private sector both in improving working conditions and delivering condoms to rural areas. The main conclusions are:

- There are many examples of transport spreading communicable diseases by enabling infected people or animals to travel long distances. Transport has also made major contributions to enabling immunisation schemes and treatment of disease with major benefits for dealing with epidemics.
- HIV/Aids is a major problem in the transport sector of most developing countries. Estimates of the percentages of HIV-positive truckers vary considerably with figures of 35 per cent in Kenya and South Africa and a range of 1 to 33 per cent in India. Truck drivers have clearly contributed to the spread of Aids and other sexually transmitted diseases through commercial sex without condoms, and truck stops where CSWs are working have been identified as high-risk areas.
- The transport sector is largely run by the private sector and it can make significant contributions to the reduction on the incidence of sexually transmitted disease amongst its own workers. The transport industry should be encouraged to lead these improvements.
- The transport sector needs to look at its general health and safety strategy and improve the working conditions and status of transport workers. Programmes should address a wide range of issues such as working schedules, alcohol and drugs, traffic accidents and first aid as well as the problem of sexually transmitted diseases.
- There are many examples of successful approaches. These include counselling of drivers and CSWs and the provision of free condoms. These measures need to be evaluated with a greater focus on monitoring the incidence of sexually transmitted diseases. Successful approaches need to be scaled up and programmes maintained on a sustainable basis.
- The transport industry may also be able to help with low cost delivery of condoms and drugs to rural areas and innovative solutions should be encouraged.
- The transport industry may suffer a shortage of drivers in countries with high HIV/Aids prevalence levels. Potential labour shortages should be investigated and appropriate plans developed for maintaining transport services.

- Guidance should be developed and provided on managing the social changes faced by communities due to dramatic changes in transport opportunities resulting from development programmes. For example, health education programmes should cover the risks that new roads bring ie sexually transmitted diseases and road accidents.
- Dealing with HIV/Aids is a massive international undertaking. There are many opportunities for sharing lessons learned and adopting successful schemes not just through the recognised agencies but also through the private sector. In transport there is considerable opportunity for the multinational businesses to participate and set an example.

In road safety, there is considerable evidence of the seriousness of road accidents as a global problem and the WHO predicts it will be one of the top three major killers by 2020. It is clear that the problem of deaths and injuries will continue to grow and international and national health strategies will need to reflect this trend. The most vulnerable are the non-motorised road users and the poor but more information is needed to quantify the impact on low-income groups. Current strategies and interventions are having some success in saving lives and serious injury in developed countries but progress in developing countries has been slow. Successful approaches need to be adapted and applied elsewhere. Key conclusions are:

- Road accidents are a serious and growing health problem for developing countries.
- Health strategies need to give more priority to deaths and injuries from accidents particularly road crashes.
- Countries need to draw up multisectoral road safety plans with closer integration between the transport and health sectors.
- Rural development and road/transport improvement projects must take into account possible impacts on safety. All road improvements should be subject to impartial road safety audits and the programmes should consider including safety objectives, safety actions such as community awareness programmes and health indicators.
- Road safety programmes should focus on the vulnerable road users who mostly come from the poorest communities.
- Benefits from road safety may not directly affect maternal and infant mortality rates but the consequent freeing up of medical resources previously needed for treating accident victims should help.
- The health sector has a vital role in advocating road safety improvements, broadening the scope of health education to cover road safety, and in improving emergency care of victims.
- The private sector has considerable responsibility for delivering safe transport. Transport operators need to accept this responsibility and play a key role in raising safety standards. There is also significant potential for raising safety standards through partnerships not just between government sectors but through business, civil society and government working together (see GRSP, 2001).

Air pollution has also been demonstrated to have a significant impact on life expectancy and respiratory health. The problem is particularly serious in major cities and the poor are particularly at risk as their already low health levels make them more vulnerable. It is proposed that a separate review is carried out to look more closely at the impact of traffic emissions and other transport pollutants on the health of the poor.

Improving transport and health services are major requirements in poverty reduction strategies. This brief review has examined how transport can impact on the health of the poor and many of the recommendations made relate to the need for transport and health to work together. The overall conclusion is that development programmes need to adopt multi-dimensional approaches even at the project level. Community based interventions using livelihoods methodologies should encourage this but it is important that transport and road improvement projects recognise and build in positive contributions to health and that opportunities for health initiatives are included. Similarly, health policies and projects need to consider transport impacts on health and both sectors should make use of each other's specialists.

There is also a shortage of evidence about the benefits of such multisectoral development projects. Projects should include the measurement of a wide range of indicators particularly those relating to the development targets and there should be closer ties between research and impact assessment. It is recommended that the methodologies of impact studies are improved and that the lessons learned are made widely available. In this way the effectiveness of multisectoral approaches in health and transport and other sectors can be better understood and their potential contribution to development targets better assessed.

In conclusion, it is hoped that this paper will lead to a more extensive dialogue between health and transport agencies and a critical review of country policies. The review should identify best practice and make recommendations on how health and transport can work together to maximise the livelihoods of the poor.

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