

The neglected epidemic: road traffic injuries in developing countries

Vinand M Nantulya, Michael R Reich

Road traffic injuries are a major cause of death and disability globally, with a disproportionate number occurring in developing countries.^{1,2} Road traffic injuries are currently ranked ninth globally among the leading causes of disability adjusted life years lost, and the ranking is projected to rise to third by 2020.¹ In 1998, developing countries accounted for more than 85% of all deaths due to road traffic crashes globally and for 96% of all children killed.² Moreover, about 90% of the disability adjusted life years lost worldwide due to road traffic injuries occur in developing countries.¹ The problem is increasing at a fast rate in developing countries due to rapid motorisation and other factors (fig 1).³ However, public policy responses to this epidemic have been muted at national and international levels. Policy makers need to recognise this growing problem as a public health crisis and design appropriate policy responses.

Vulnerable population groups

Road traffic injuries in developing countries particularly affect the productive (working) age group (15-44 years) and children. (A developing country is defined as a country that has an annual per capita gross national product (GNP) less than US\$9361 (£6456), based on 1998 figures from the World Bank.⁴ Most low and middle income countries fall into this category.) Globally, in 1998, 51% of fatalities and 59% of disability adjusted life years lost due to road traffic injuries occurred in the productive age group.² Fatality rates

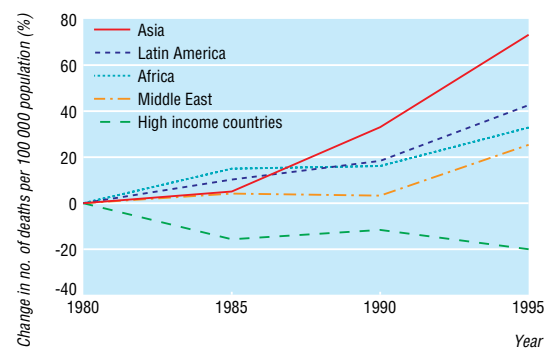


Fig 1 Trends in fatalities due to road traffic injuries for different regions of the world, 1980-95. Data from Transport Research Laboratory³

Summary points

Injury and deaths due to road traffic crashes are a major public health problem in developing countries

More than 85% of all deaths and 90% of disability adjusted life years lost from road traffic injuries occur in developing countries

Among children aged 0-4 and 5-14 years, the number of fatalities per 100 000 population in low income countries was about six times greater than in high income countries in 1998

The highest burden of injuries and fatalities is borne disproportionately by poor people in developing countries, as pedestrians, passengers of buses and minibuses, and cyclists

Harvard Center for Population and Development Studies, Cambridge, MA 02138, USA

Vinand M Nantulya
senior research scientist, international health

Michael R Reich
Taro Takemi professor of international health policy

Correspondence to: V M Nantulya
vnmantul@hsph.harvard.edu

BMJ 2002;324:1139-41

among children are especially high in developing countries, as shown in fig 2. In 1998 the fatality rate for children aged 0-4 years was 29.5 per 100 000 population in South East Asia and low income countries of the western Pacific region, compared with 4.5 deaths per 100 000 population in high income countries. For older children, aged 5-14 years, the fatality rate was 28.1 per 100 000 population in Africa compared with 4.8 for North America, western Pacific countries, and high income countries in Europe.

Road traffic injuries in developing countries mostly affect pedestrians, passengers, and cyclists—as opposed to drivers, in whom most of the deaths and disabilities in the developed world occur. In the United States, for example, more than 60% of road crash fatalities occur in drivers, whereas drivers make up less than 10% of the deaths due to road traffic injuries in the least motorised countries (shown by Kenya in fig 3). In developing countries, where most injuries occur in urban areas, pedestrians, passengers, and cyclists combined account for around 90% of deaths due to road traffic injuries.^{5,6} Urban pedestrians account for 55-70% of deaths.^{5,6}

The choice of mode of transport in developing countries is often influenced by socioeconomic factors, especially income.^{5,7} In Kenya, for example, 27% of commuters who have no formal education were found

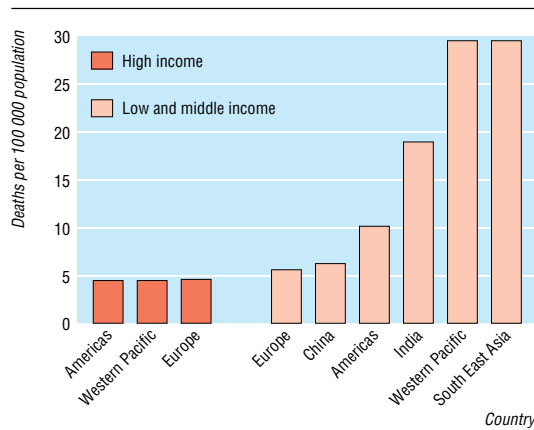


Fig 2 Fatality rates due to road traffic injuries in children aged 0-4 years. Data from World Health Organization²

to travel on foot, 55% usually used buses or minibuses, and 9% used private cars. By contrast, 81% of people with secondary level education or above usually travelled in private cars; 19% travelled by bus, and none walked. People with little formal education earn low incomes. For them, the affordable means of transport are walking, travelling by bus or truck, or cycling—all of which expose them to high risks for road traffic injuries.

People in developing countries are frequently aware of these risks. A regular commuter on the buses in Lagos, Nigeria—which are referred to locally as *danfós*, “flying coffins,” or *molue*, “moving morgues”—said, “Many of us know most of the buses are death traps but since we can’t afford the expensive taxi fares, we have no choice but to use the buses.”⁸

Reasons for high burden in developing countries

Growth in motor vehicle numbers

The growth in numbers of motor vehicles is a major contributing factor in the rising toll of fatalities and injuries from road traffic crashes in poor countries. In India, the number of four-wheel motor vehicles increased by 23% to 4.5 million between 1990 and 1993, and by 2050 the number could rise to 267 million.⁹ In Vietnam, deaths increased by 31%, injuries

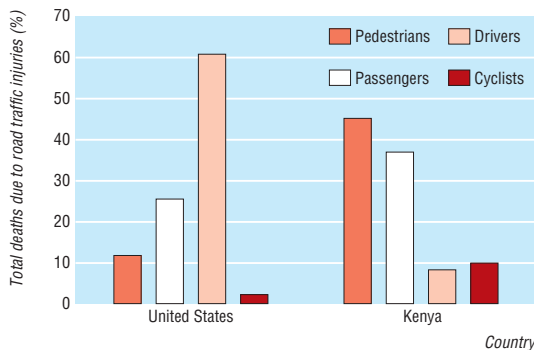


Fig 3 Deaths due to road traffic injuries by road user category in a developed and a developing country. US data for 1996¹³; Kenya data for 1996⁵

by 16%, and crashes by 12% between 2000 and 2001,¹⁰ whereas the number of motor vehicles is estimated to have increased by 14%.¹⁰ Motorcyclists were involved in 62% of the crashes.¹⁰

The trend of increasing numbers of injuries is likely to continue as the number of motor vehicles rises, especially in countries with low numbers at present.¹¹ People in developing countries, which comprise 84% of the global population, currently own around 40% of the world’s motor vehicles.¹²

People killed or injured per crash

The higher number of people killed or injured per crash in countries with low income is a second reason for the high number of road traffic injuries in developing countries. Fig 4 shows the number of fatalities and injuries per 10 000 crashes for a developed country, the United States,¹³ and two developing countries in Asia and Africa—Vietnam and Kenya. The number of people killed and the number of people injured per 10 000 crashes were higher for Vietnam and Kenya than for the United States. The high rates in Vietnam and Kenya (and elsewhere) are due to frequent crashes involving multi-passenger vehicles, including buses, trucks, and minibuses.^{5 8}

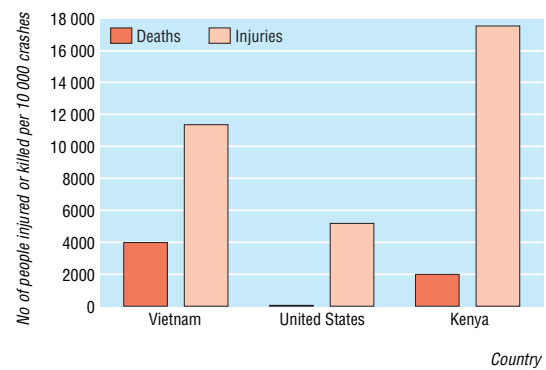


Fig 4 Injuries and deaths in a developed and developing countries. Vietnam data for 1998¹⁰; US data for 1996¹³; Kenya data for 1996⁵

Poor enforcement of traffic safety regulations

A third explanation for the high burden is poor enforcement of traffic safety regulations in low income countries due to inadequate resources, administrative problems, and corruption.⁶ Corruption is a huge problem in some countries, often creating a circle of blame—the police blame drivers and the public, the public blames drivers and the police, and drivers blame the police.⁶ Corruption also extends to vehicle and driver licensing agencies. An officer with the Lagos State Inspection Unit in Nigeria said, “You wonder how most of the buses secured road worthiness certificates in the first place. And when you ban the buses from the roads, they still find their way of returning to the roads.”⁸

Inadequacy of public health infrastructure

A fourth explanation is the inadequacy of the public health infrastructure in providing treatment for traffic injuries. Only 40% of public, mission, and private hospitals in Kenya in 1999 were well prepared to treat trauma cases from traffic crashes, with 74% of the least

prepared being public health facilities. All or most of the items needed for management of injuries—that is, oxygen, blood units, plaster of Paris, dressings, antiseptics, local and general anaesthetics, intravenous fluids, Boyle's anaesthetic machine, and blood pressure machine—were available at mission and private hospitals, whereas government health facilities rarely had these items in stock (VM Nantulya, F Muli-Musiime, T Omurwa, personal communications). The poor public health infrastructure means that patients often do not receive appropriate care promptly. This delay can compromise the patient's recovery, as there is a strong correlation between the time taken to receive appropriate treatment and the likelihood of adverse health outcomes and long term disability occurring.^{14 15}

Poor access to health services

A fifth explanation is poor access to health services by vulnerable groups. In developing countries, pedestrians, cyclists, and passengers in minibuses and buses frequently belong to lower socioeconomic groups.^{5 7} These groups cannot afford out-of-pocket payments for health care at the better equipped private health facilities. Moreover, with the introduction of user fees at public health facilities in many developing countries, these groups have lost the free health care that was previously available to them. For example, a study in Ghana showed that only 27% of people injured in road crashes used hospital services. Among patients with severe injuries, 60% of people injured in towns and cities, and 38% of people injured in the countryside received hospital care.¹⁶ The most common reason cited for not seeking health care was lack of money.

Discussion

The injury profile for road traffic crashes in developing countries differs in important ways from the profile seen in developed countries, and it can provide guidance for making policies to improve prevention and control. Protection is needed for three main vulnerable groups—pedestrians, who in urban areas constitute up to 70% of the fatalities; passengers commuting on buses, trucks and minibuses, who constitute the next largest population group affected; and cyclists. Addressing the risks of these three groups will require multiple policy initiatives.³

To be effective, policies on traffic safety in developing countries must be based on local evidence and research, and designed for the particular social, political, and economic circumstances found in developing countries.⁵ In particular, policies for devel-

oping countries need to protect poor people, who are predominantly affected by road traffic crashes owing to the mixture of vehicles and unprotected road users on the same roads, as well as other factors.^{5 6 17}

International efforts should be made to promote learning among developing countries about policies that can successfully reduce the injury burden from road traffic crashes in developing countries.

Contributors: The authors wrote the article together, using data collected by VMN in his research in Kenya, while Director of Programs at the African Medical and Research Foundation (AMREF), in Nairobi, Kenya, and by MRR through a participant observation study in the Dominican Republic.

Funding: The Takemi Program in International Health at the Harvard School of Public Health provided funding for a research fellowship for VMN during 2001.

Competing interests: None declared.

- Murray C, Lopez A. *The global burden of disease*. Vol 1. Cambridge, MA: Harvard University Press, 1996.
- Krug E, ed. *Injury: a leading cause of the global burden of disease*. Geneva: WHO, 1999. www.who.int/violence_injury_prevention/index.html (accessed 11 Dec 2001).
- Jacobs G, Aaron-Thomas A, Astrop A. *Estimating global road fatalities*. London: Transport Research Laboratory, 2000. (TRL Report 445).
- World Bank Group. Glossary. www.worldbank.org/depweb/english/modules/glossary.htm (accessed 9 March 2002).
- Nantulya VM, Muli-Musiime F. Kenya. Uncovering the social determinants of road traffic accidents. In: Evans T, Whitehead M, Diderichsen F, Bhuiya A, Wirth M, eds. *Challenging inequities: from ethics to action*. Oxford: Oxford University Press, 2001.
- Hijaar MC. Traffic injuries in Latin American and the Caribbean countries, 1999. www.globalforumhealth.org/Non_compliant_pages/forum3/Forum3doc962.htm (accessed 11 Dec 2001).
- Kapila S, Manundu M, Lamba D. *The "matatu" mode of public transport in metropolitan Nairobi*. Nairobi: Mazingira Institute Report, 1982.
- BBC News. On the buses in Lagos. 2001. http://news.bbc.co.uk/1/hi/english/world/africa/newsid_1186000/1186572.stm (accessed 4 March 2002).
- World Disaster Report. *Must millions more die?* Geneva: International Federation of the Red Cross/Red Crescent Society, 2000.
- Xinua News Agency. Traffic accidents in Vietnam rise. Hanoi, 5 November, 2001. Vietnam News List. <http://combs.anu.edu.au/~vern/vnnews-list.html>; List owner: Stephen R Denney sdenney@ocf.berkeley.edu (accessed 24 April 2002).
- UNDP. *Human development report*. Oxford: Oxford University Press, 1994.
- Global Road Safety Partnership. *Moving ahead: emerging lessons*. Geneva: GRSP, 2001. www.grsproadsafety.org (accessed 11 Dec 2001).
- National Highway Traffic Safety Administration (NHTSA). *Traffic safety facts 1999*. www.nhtsa.dot.gov/people/nca/pdf/TSFovr99.R.pdf (accessed 24 April 2002).
- Trunkey DD. A public health problem. In: Moore EE et al, eds. *Early care of the injured patient*. 4th ed. Philadelphia: Decker, 1990:3-11.
- Elechi, EN, Etawo SU. Pilot study of injured patients seen in the University of Port Harcourt Teaching Hospital, Nigeria. *Injury* 1990;21:234-8.
- Mock CN, Nii-Amon-Kotei D, Maier RV. Low utilization of formal medical services by injured persons in a developing nation: health service data underestimate the importance of trauma. *J Trauma* 1997;42:504-13.
- Mohan D, Tiwari G. Traffic safety in low-income countries: issues and concerns regarding technology transfer from high-income countries. In: *Reflections of the transfer of traffic safety knowledge to motorizing nations*. Melbourne: Global Safety Trust, 1998:27-56.

An old friend returns in disguise

Since my graduation from medical school in 1968 I had been prescribing diphenhydramine (Benadryl) for night cramps with very satisfactory results; it had been the only drug mentioned for this condition in the *Harrison's Textbook of Medicine* of that period. When the drug was deleted from the local markets about 15 years ago and *Harrison's Textbook of Medicine* also stopped promoting it, I had to shift to an older medicine, quinine sulphate, although it was available in only a few pharmacies. Moreover, a few philosophising

pharmacists would send patients back to remind me that the drug was for malaria.

Therefore, it was a pleasant surprise for me to learn that my old friend diphenhydramine had recently come back to the market, wearing a paracetamol mask under the name Panadol Night, even though muscle cramps are not mentioned as one of its indications.

Boghos L Artinian *internist in private practice, Beirut, Lebanon*