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Estimating Crash Costs

Why assess crash costs?

"Putting a monetary value of human life and limb often provokes strong reactions on ethical grounds. However, if this is not done, casualty reduction measures cannot be weighted properly in relation to resource allocation....."

ETSC 1997

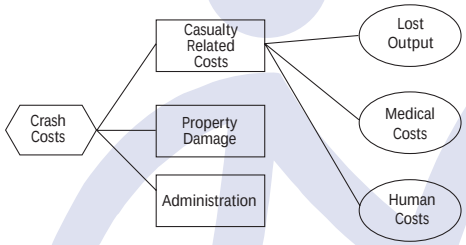
There are two main uses for estimates of crash costs in developing countries.

First, an estimate of total annual costs of traffic crashes can be used for resource allocation at a national level to ensure road safety is given due recognition. Even a relatively crude cost estimate, as long as it is realistic, will be useful to highlight the economic benefits of investing in road safety.

Second, estimates of unit crash costs by injury severity can be used to ensure that best use is made of any investment, through economic appraisal. Potential economic benefits can be estimated, based upon predicted crash savings. Economic benefits can be estimated after a scheme has been implemented, based on before and after records of crashes to which unit costs are applied.

Preferred methodology

The Willingness-To-Pay method has replaced the Human Capital method as the preferred crash costing method in some high income countries. However, this method is extremely difficult to use, especially where notions of probability and statistical risk are unlikely to be widely understood. The method is based on the completion of complex questionnaires, which relate to understanding risks and individuals' stated willingness to pay to avoid a given hypothetical change in risk. The Human Capital method, with sums added to reflect pain, grief and suffering, is considered the natural starting point. This leaflet summaries the work of Babtie Ross Silcock and TRL (2003) on the main cost components within the Human Capital method.



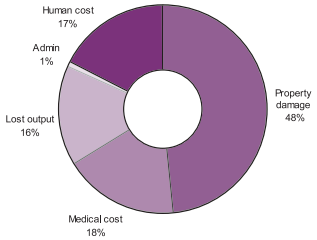
Cost Components

In the Human Capital method the cost can be divided in 5 categories:

- property damage
- administration costs
- lost output
- medical costs
- human costs.

Property damage

Average cost of a crash involving a serious injury in Bangladesh



Property damage

By far the largest portion of property damage stems from damage to vehicles. Other property damage is small.

Historically, insurance data has been used, but is not representative of all crashes. In some countries the proportion of vehicles which are insured is small, and claims will only include the more costly examples of vehicle damage. As a result, unit costs of vehicle damage have tended to be overestimated. Despite this, the total cost of property damage is likely to have been underestimated. The total number of crashes is rarely adjusted for the often substantial under-reporting within official statistics - particularly of damage only-crashes and amongst vulnerable road users.

Although insurance information is likely to be the most accessible source of vehicle damage costs, it is possible to supplement this with data from other sources, such as motor repair businesses, fleet owners or individual vehicle owner surveys. However, experience has shown that this is often difficult. Data is also required on the average numbers of vehicles involved in each crash, and the average number of vehicles damaged in each crash. These numbers will be different. For example, in some fatal crashes a vehicle may be completely destroyed, in others the vehicle may suffer negligible damage, even though a pedestrian is killed.

In South Africa, data collected from fleet owners, panel beaters, 'shade tree mechanics' and household surveys in low income areas, yielded unit vehicle damage costs that ranged from half to three-quarters (by crash severity) of previous assumptions based on insurance records. Whilst the sample sizes were small this demonstrates that repair costs taken from insurance records tend to overestimate average costs.

Administration costs

Police and administration costs are usually low when compared to other cost components. The only source of data is from the police service, courts and insurance companies themselves. Where the effort in collecting such data is felt to be out of proportion to its contribution to overall costs, a similar proportion of total costs to that used in other previous studies can be added.

Lost output

Lost output

Lost output refers to the lost productive capacity from those affected by road crashes and is typically the largest part of casualty-related costs. It can range from the value resulting from as little as one day of lost time for a slight casualty, up to decades of foregone work for those killed or permanently disabled. Lost output is believed to have been underestimated in most past studies, as it was limited to the crash victim(s) only and to the number of work days lost - either to recovery or to average retirement age in the case of death. However household survey data has shown that some of those injured will not return to their jobs, and will spend additional time looking for new employment. Thus there is not only lost working time to take into account, but also reduced income after resuming employment. In Bangladesh, a case study found that the seriously injured reported a decrease in income after resuming work.

Lost output estimates should also take account of income lost by caregivers. When someone in a poor family is injured the whole family gets involved; those on daily wages may lose their job, children may not go to school and older members may spend less time caring for infants. A further concern is that costings focus on the short term, with little information on the long-term disabled.

Data is required on time lost by victims and their carers, along with previous average income. This may have to rely on data from national statistics on wage rates, supplemented by data from hospital and travel time surveys. It might be possible to collect better data from hospital or household casualty surveys, though these can be difficult.

Average working time lost in Bangladesh

- Fatality: 30 years (average age of victim, 28. Retirement age, 58)
- Serious injury: 35 days (20 days recovery, 7 days looking for work and 8 carer-days)
- Slight injury: 5 days (3 days recovery and 2 days looking for work)

Note that using official retirement age may underestimate lost time, as many self-employed and informal sector workers have no retirement age

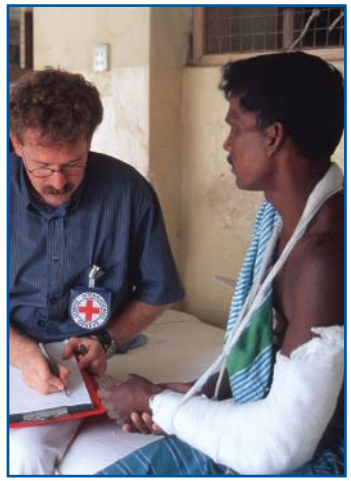
Medical costs

Medical costs

Direct medical costs generally constitute a small proportion of the total costs of crashes. However, the burden of casualties on scarce medical sector resources is likely to be significant. Also, the medical costs will often be the first economic burden experienced by the victim's family.

Medical costs have been assessed from the perspective of individual hospitals, with estimates based on average cost per bed-day estimated from overall public sector budget allocations. However, in most societies, medical costs also include private sector expenditure, typically direct costs paid by the victim and/or carer.

To estimate the medical costs resulting from casualties, data is required on a range of items, for example the cost of at-scene care, transport, in-hospital stay, treatment, drugs and prosthetics. Data may be available from national hospital estimates, insurance payments, hospital studies and casualty surveys. Although hospital surveys are easier to undertake, they may not be as representative as household surveys. There is evidence that only the richer crash victims are admitted to hospital, and these are disproportionately working-age males.



Road crash victim, Batticaloa, copyright ICRC

It should be remembered that many poor households do not have medical insurance and that the cost of hospitalisation is disproportionate to income. The real cost to such households is not accurately reflected by the money value of medical costs. They may have to sell assets to pay bills or get trapped into long-term indebtedness. Investment in treating a seriously ill family member may stop once all assets are sold.

Human costs

Human costs

An amount to reflect 'pain grief and suffering', often termed human costs, is usually added to the total costs for each severity of crash when using the Human Capital method, for example 20% for a fatal crash in Bangladesh. The amount to be added can be considered to reflect the social objective of poverty alleviation, as crashes are known to have a greater adverse effect upon the poor. The amount to be added is a political decision, and an element of judgement is unavoidable - but the greater the amount added, the higher the implied value placed on crash prevention.

Impersonal economic calculations mask the social implications of road crashes. To illustrate, a case study in Bangladesh revealed:

- 24% of road deaths were children
- 41% of deaths were pedestrians
- 57% of road deaths occurred in the 45% of households defined as 'poor'
- In poor families, 32% of deaths were to head of household (21% for non-poor)
- 61% of poor families had to borrow money as a result of a death (34% for non-poor)
- Only one quarter of poor families received any compensation

Calculation of national costs

The unit costs discussed above can be applied to the total number of casualties and crashes to estimate the national cost of road crashes. Police data are the usual starting point for making estimates of the number of crashes and casualties, and are likely to be the only source of data on the number of casualties per crash. However, it should be acknowledged that police data often suffers from substantial under-reporting. Therefore, it is worthwhile pursuing data on the number of casualties from other sources that may be available. Often hospital surveys and mortality and injury surveillance systems in the medical sector are useful to assess the level of under-reporting in police statistics and to provide a basis for deriving factors to allow for under-reporting in the police records.

Find out more

Find out more

This summary draws heavily from work carried out by Babtie Ross Silcock and TRL (2003) for the UK Department for International Development - see *Guidelines for Estimating the Cost of Road Crashes in Developing Countries* Available on the DFID Transport Links: http://www.transport-links.org/transport_links/index.asp

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Road crash, Accra, Ghana, copyright GRSP

GLOBAL
ROAD SAFETY
PARTNERSHIP

Global Road Safety Partnership
PO Box 372
17 chemin des Crêts
CH-1211 Geneva 19
Switzerland
Tel: (41 22) 730 4249
Fax: (41 22) 733 0395
E-mail: grsp@ifrc.org
Website: www.GRSProadsafety.org

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