

Economic Cost of Road Traffic Accident Fatalities in Sri Lanka: An Empirical Analysis

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INTRODUCTION

Transportation is a key factor behind the economic growth of a nation. Yet, there are negative externalities that could affect the economic performance of a country; among such figures are the socio-economic losses owing to traffic accidents. Disabilities, fatalities, and property losses due to road traffic accidents have become popular topics amongst professionals and researchers in the transport sector.

The present research was conducted aiming at quantifying the economic burden of premature mortalities, one important dimension of road accidents, to understand their scale and economic costs in the Sri Lankan context, which could throw light on the necessity of formulating effective policies to neutralize this growing threat. In this respect, an attempt was made to estimate the cost of loss of lives due to road traffic accidents in Sri Lanka during the period between 2016 and 2019.

LITERATURE REVIEW

Literature shows that road accidents cause many financial, social as well as economic losses all over the world. According to World Health Organization (2009), road traffic accidents impose a considerable impact on the economies of low and middle-income countries that are frequently struggling with other developmental needs as well. Yet, the cost of road traffic accidents has not been explored enough to encourage policymakers to implement policies towards minimizing road accidents WHO (2009).

Sri Lanka is no exception. High road accident fatalities and injury rates in Sri Lankan roads undermine the country's economic growth and the progress made in reducing poverty and boosting prosperity over the past decade (World Bank, 2020).

This study, therefore, was conducted to estimate the economic cost of road traffic fatalities in view of estimating the economic cost of road traffic fatalities in Sri Lanka, pertaining to which there are no recent estimates.

METHODOLOGY

Several costs are associated with road traffic accidents; cost of fatalities, injuries, property damage cost, hospitalization cost, the cost to regulatory authorities, and loss of time due to congestion created by accidents, etc. Loss of productive life years caused owing to premature death or disability is measured through “Disability-Adjusted Life Years” (or DALYs), conceptualized to quantify the burden of disease and disability in the population. As premature death occurs before the age to which the dying person could have expected to survive if he/she were a member of the population with the standard model of life expectancy at birth. DALY is a health gap measure that combines both time lost due to premature mortality and non-fatal conditions. The loss of healthy life due to a non-fatal condition requires an estimation of the incidence of the injury in the specified period. For each new case, the number of years of healthy life lost is obtained by multiplying the average duration of the condition by a severity weight that measures the loss of healthy life using an average weight for health state (Murray & Lopez, 1996).

The economic cost of road traffic fatalities would thus be estimated using the following formula:

$$\text{Disability-Adjusted Life Years} = \text{Years of Life Lost} + \text{Years Living with a Disability}$$
$$\text{DALYs} = \text{YLL} + \text{YLD}$$

The present study opted to focus on the component of premature mortalities due to road accidents, and thus, the aspect of “living with disability” was intentionally excluded. The reason for this narrowing down was the non-availability of data pertaining to disabilities caused by accidents and their gravity, making the calculation of the cost of disability practically impossible.

To estimate the “Years of Life Lost” (YLL), the concept of *Global Burden of Disease* (GBD) developed by World Bank (1993)¹, was used. The following formula, used in the GBD study in 2010 (Murray, Ezzati, Flaxman, Lim, Lozano, & Michaud, 2012), was thus adopted to calculate the years of life lost (YLL) due to single premature mortality.

¹ GDB was developed to quantify the global burden of premature deaths, diseases and injuries.

$$YLL = \frac{KCe^{ra}}{(r+\beta)^2} \left[e^{-(r+\beta)(L+a)} [-(r+\beta)(L+a)-1] - e^{-(r+\beta)a} [-(r+\beta)a-1] \right] + \frac{1-K}{r} (1-e^{-rL})$$

Where:

a = age at which death occurs (years).

r = discount rate (GBD study considered it to be 3 percent p.a.).

β = age weighting constant (ex: $\beta=0.04$).

K = age-weighting modulation constant (ex: K=0).

C = adjustment constant for age-weights (ex: C=0.1658).

Total YLL for a particular year could then be derived by summing up the YLLs estimated for specific age groups. Once the YLLs were estimated, the “Human Capital Approach²” was used to assign economic values to premature mortalities resulting from road traffic accidents. As the years lost are discounted (at a rate of 3 percent in conformity with the GBD Study), GDP per capita could be used as a proxy to measure the loss of output due to a given life year lost.

The analysis was based on secondary data on road traffic accidents in Sri Lanka, sourced from Sri Lanka Traffic Police Headquarters, the Annual Performance Reports of the Sri Lanka Police, Department of Motor Traffic, Ministry of Health as well as the Department of Census and Statistics. Data published in the Annual Report of the Central Bank of Sri Lanka were used to estimate economic values.

FINDINGS AND DISCUSSION

Years of life lost (YLLs) associated with traffic accidents that occurred in each year from 2016 until 2019, with their gender break-up, were estimated using the above-mentioned methodology; the outcome of which is summarized in Table 1.

Table 1: Summary of the Years of Life Lost (2016-2019)

² Human Capital Approach focuses on the loss of productivity to the economy associated with mortality. This research adopted the “Human Capital Approach” to convert the loss of years into financial terms. As the GDP per capita measures the contribution of a person to the economy, multiplication of the summation of the loss of years due to premature mortalities for that respective year by the GDP per capita of the same year to estimate the economic burden of loss of life years owing to road traffic crashes of the same year.

Year	Male YLL	Female YLL	Total YLL
2016	49,615	8,432	58,047
2017	49,832	10,375	60,208
2018	50,213	9,793	60,007
2019	44,757	9,007	53,765

According to these results, 58,047 life-years had been lost in 2016 owing to traffic accidents and increased up to 60,208 in 2017. However, a declining trend has been observed thereafter, with 60,007 and 53,765 life years lost due to road accidents that occurred in 2018 and 2019 respectively.

Table 2 summarizes the “economic values” assigned to the YLLs adopting the Human Capital Approach (as described above) and using per-capita income data published by the Central Bank of Sri Lanka.

According to the results of this analysis, the nation has been deprived of more than USD 200 million (or, in other words, over Rs 40 billion) worth of economic value annually in terms of productive human capital lost between 2016-2019 owing to road accident fatalities, corresponding to over a quarter-per-cent of the country’s GDP.

It is noteworthy that this is almost an annually recurring economic loss, which is more than the annual Government capital spending on the

Table 2: Economic Cost of Road Traffic Fatalities from 2016 to 2019

Year	2016	2017	2018	2019
Total Deaths	3,020	3,154	3,151	2,851
Total YLL	58,047	60,208	60,007	53,765
Cost (USD Mn)	226	245	245	207
Cost (Rs Mn)	32,843	37,409	39,794	37,019
As a % of GDP	0.27	0.28	0.28	0.25
Average Cost per Fatality (USD)	74,834	77,679	77,753	72,606
Average Cost per Fatality (Rs Mn)	11	12	13	13

Source: Authors' estimations

health sector and approximately half of that on education. It also is more than 5 times the annual operating “financial loss” of the Sri Lanka Railways, and also more than the capital expenditure budgeted voted for both transport and civil aviation sectors together in the year 2019.

CONCLUSIONS

The research outcomes enabled the conclusion that premature fatalities owing to road accidents have become a significant over-burden on the Sri Lankan economy. Even though the average human capital-based economic cost estimated per fatality of around USD 75,000 is still lower than the average cost per fatality of USD 84,579 in other low-income countries (Wijnen, 2016), road fatalities cost over 0.25% of GDP every year to the economy, solely in terms of productive human capital lost owing to traffic accidents.

The actual economic cost of road traffic accidents in Sri Lanka, however, is bound to be much higher than the values estimated in this research because the estimated human capital-based value of life years lost is only one component of the cost of traffic accidents. Road traffic accidents implicate more ramified costs including, inter-alia, disability-related costs, treatment-based expenditures, property losses, etc. Therefore, the estimates made in this study could be considered as “lower-side estimates” of the cost of road traffic accidents in Sri Lanka.

It is evident from the outcomes of the present research that road traffic accidents implicate a substantial and persisting value loss to the Sri Lankan economy, highlighting the necessity of urgent intervention by the strategists and policymakers to develop mitigative measures. It may be pertinent to perceive that such interventions should go beyond mere regulating and policing road traffic in Sri Lanka to improve driver discipline and venture into a strategic reduction of road vehicular traffic by promoting high occupancy modes of transport and non-road-based modes, as transport professionals have consistently advocated over decades, though unattended to by the policymakers. Railway mode, in particular, has to be vigorously promoted in view of attracting a greater modal share for railways through an effective mode shift. The results of the study reflect that any expenditures made in that direction are likely to be more than compensated through savings on road accident costs.

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