

Economic and social burden due to injuries and violence in Nepal: A cross-sectional study

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Abstract

Background: Injury and violence cause five million deaths annually in the world which is around 9% of the global mortality. Eight out of fifteen leading causes of deaths in the age group 15-25 years are injury related.

Objective: The objective of this study was to assess the incidence, severity and socio-economic burden of injuries and violence in two cities of Nepal.

Materials and methods: Relevant data was collected from 17th August 2008 to 16th September 2008 from injured patients attending emergency departments at six health centres in two cities.

Results: In total, 505 injury cases were reported. 42.5% of the injuries occurred in roads and 34.1% at home. 65% of road traffic injuries involved motorcycles. The majority (60%) of the injured subjects were economically active. A single injury case cost 126.2 US\$ including all the expenses and the loss due to inability to work.

Conclusion: The high incidence of injuries, especially road traffic injuries, adds a huge economic burden to nation.

Key words: disabilities, economic burden, injuries, violence

Injury and violence cause more than five million deaths per year which makes around 9% of the global mortality¹. Eight of the fifteen leading causes of deaths in the age group 15-25 years are injury related. World Health Organisation (WHO) has predicted that by 2020, road traffic accidents will be the fifth leading cause of deaths with 3.6% of all deaths, self inflicted injuries will be in the 12th position with 1.5% and violence will take the 16th rank with 1.2% of total deaths worldwide². Together, injuries and violence will cause 6.3% of total deaths, which is definitely a huge proportion. Likewise, about 1.2 million people die every year as a result of road traffic crashes and up to 50 million more are injured or disabled¹. According to national publication of healthy people, every five second a worker is injured, and each day 17 die from work place injuries³.

The magnitude and burden of injuries and violence is more devastating in the developing countries⁴. A study conducted in a post mortem centre in Nepal found that 32% of all the post mortem cases were accident related, more than half of which were road traffic accidents. Likewise in a study performed by Sharma et al., suicides accounted for 25% and homicides for 9% of the total cases⁵.

There is no doubt about the high intensity of the threat and problem brought by injuries and violence in Nepal.

We do not have reliable data on the exact magnitude of the problem and there has been no proper study to assess the incidence of injuries, their severity and socio-economic burden.

We have therefore designed this study, which would be the first one to assess the incidence, severity and socio-economic burden of injuries and violence in two major cities of Nepal – Kathmandu and Bhaktapur. This study would provide reference data on injury and disabilities for further studies and policy formulation.

Materials and methods

A cross sectional descriptive study was designed and conducted in two of the major cities of the country; Kathmandu and Bhaktapur. These cities are advanced in terms of modern amenities, transport facilities and health care systems. We chose three health centres in each of the cities. Those three centres included one public health centre and two private centres. All injured patients seeking medical care in emergency departments of those health centres were enrolled in the study. A pre tested data collection format adopted from WHO Work

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Plan NEP INJ 001 was used to record data and qualified medical doctors were enrolled to interview the patients or their attendants and fill up the forms. The data was recorded for a month starting on 17 August 2008 till 16 September 2008. Data was collected 24 hours a day at two of the centres but only eight hours a day in the rest due to the limited number of research investigators and resources.

During the data collection, minor injuries were defined as bruises and cuts, moderate injuries as those injuries requiring skilled treatments like sutures, simple fractures of phalanges, and severe injuries as injuries requiring intensive medical and surgical management like internal organs and blood vessels injuries, major compound fractures etc.

The respondents below five years of age were grouped as preschool children, those above five up to nineteen years as school children, those above 19 up to 64 as economically active population and those above 64 years of age as elderly. Our definition considered all people between 19 to 64 years of age as economically active irrespective of their income status.

The cost of all the investigations, medications and hospital charge were calculated from the bills before the patient was discharged. The patients were asked about their monthly income and accordingly loss of income due to inability to work was calculated. Likewise, if they had to miss work for several days, we followed them by telephone to find the number of days they could not work and accordingly we calculated the total amount of loss of income. We did the same for the family members who could not go to work.

Data was analysed through Statistical Package for Social Sciences (SPSS) 11.5 version. Informed consent was obtained from the patients or their attendants in case they are unable to respond. The study was approved by ethical committees of each of the six study centres.

Results

A total of 505 injury cases were reported in the study, 367 males and 138 females (Table 1).

There were fifty three (10.5%) severe injuries, 264 (52.5%) moderately severe injuries, 176 (34.9%) minor

injuries. Two cases were brought in dead, so, the total number of study cases was 503.

Thirty one percent (31.08%) of the injuries occurred in the morning (6 AM to 12 PM), 27.89% during day time (12 PM to 4 PM), 26.89% in the evening (4 PM to 8 PM), 9.96% at night (8 PM to 12 AM) and 4.18% in early morning (1 AM to 6 AM).

Around thirty four percent (34.1%) of the injuries occurred at home, the majority of which were due to falls (30.4%, 153 out of 503). Age group distribution of domestic injuries is displayed in Table 2.

In overview, more than 40% of the injuries were road traffic injuries (Table 3). Similarly, 93 (18.5%) injuries were work related and 76 (15.1%) were sports related, which also includes indoor sports. Some of them are traditional kind of sports like throwing pebbles, spinning wheels, using sticks etc. Among the work place injuries, 32 (39.5%) involved machineries, however, machinery faults were not found in any one of them.

Every two out of three road traffic accidents involved motorcycles (Table 4). The drivers of the vehicles were the most vulnerable ones accounting for more than one third of the total injury cases (Figure 1).

Eighty two percent of the injuries were accidental. Remaining 18% of the injuries were intentional out of which 2% were suicidal attempts. Quarrels and gang activity together made 62 (77.5%) of intentional injuries. And 61 (76.3%) of intentional injuries involved males.

Cuts and open wounds accounted for 40.2% of all injuries and fractures 21.3%. Most of the fractures (60%, 78) were of the upper extremities (Table 5).

On average, a single injury case required 44.6 US\$ (at 1 US\$ = Rs. 80) including investigation and medication expenses (Table 6).

In addition, in a single incidence of injury the victim and his family lost an average 81.6 US\$ due to inability to go to work (Table 7).

Thus, a single injury case cost 126.2 US\$ including all the expenses and the loss due to inability to work.

Table 1: Demographic distribution of the injury cases

Age groups	Sex of the patients		Total (%)
	Male (%)	Female (%)	
Preschool children	14 (3.8)	11 (7.9)	25 (4.9)
School children	123 (33.5)	36 (26.1)	159 (31.5)
Economically active group	218 (59.4)	85 (61.6)	303 (60.0)
Elderly population	12 (3.3)	6 (4.4)	18 (3.6)
Total	367 (100)	138 (100)	505 (100)

Table 2: Domestic Injuries and their distribution

Age group	Female (%)	Male (%)	Total (%)
Pre School	9 (13.2)	8 (7.7)	17 (9.9)
School going	17 (25)	32 (30.8)	49 (28.5)
Economically active	39 (57.4)	59 (56.7)	98 (56.9)
Elderly	3 (4.4)	5 (4.8)	8 (4.7)
Total	68 (100)	104 (100)	172 (100)

Table 3: Distribution of cases according to their activity when they got injured

Activity during injury	Age group of the cases				Total (%)
	Preschool (%)	School going (%)	Economically active (%)	Elderly (%)	
Working	1 (4)	19 (12.1)	69 (22.8)	4 (22.2)	93 (18.5)
Playing Sport*	12 (48)	53 (33.8)	11 (3.6)	0 (0)	76 (15.1)
Travelling by vehicle	2 (8)	30 (19.1)	102 (33.7)	0 (0)	134 (26.6)
Walking on street	3 (12)	21 (13.4)	48 (15.8)	8 (44.4)	80 (15.9)
Household chores	7 (28)	31 (19.7)	63 (20.8)	4 (22.2)	105 (20.8)
Unknown†	0 (0)	3 (1.9)	10 (3.3)	2 (11.2)	15 (2.9)
Total	25 (100)	157 (100)	303 (100)	18 (100)	503 (100)

Note:

* These also include indoor sports.

† These are the cases in which the attendants didn't know what actually happened to the patient

Table 4: Types of vehicles involved in the accidents

Type of transport	Number (%)
Non engine vehicles like bicycle, rickshaw	12 (6.8)
Motorcycle, Scooter, Moped	115 (64.9)
Light four wheelers	26 (14.7)
Heavy four wheelers	20 (11.3)
Others‡	3 (2.3)
Total	177 (100)

Note:

‡ These include carts, bullocks.

The numbers signify only the vehicles involved and not the injured ones.

Table 5: Nature of injury

Nature of injury	Frequency (%)
Fracture	130 (21.3)
Sprain	56 (9.2)
Cut, bite, open wound	245 (40.2)
Bruise	102 (16.7)
Burn	8 (1.4)
Concussion	24 (3.9)
Internal organs injury	11 (1.8)
Others	33 (5.5)
Total	609 (100)

Table 6: Expenditure in investigations and treatment of the injured patients

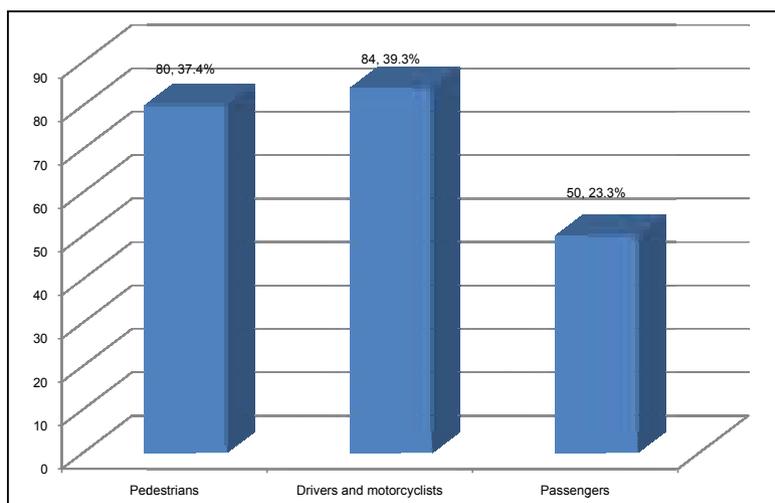
Investigation	Number	Mean Expenditure (US\$)§	Maximum Expenditure (US\$)	Minimum Expenditure (US\$)	Total Expenditure (US\$)
X rays	310	3.6	31.3	1.25	1098.1
Blood and urine investigations	106	6.8	15.4	0.25	375.5
CT scanning	40	26.7	47.5	25	1011.9
ECG	15	0.6	0.63	0.12	7
Medicines	356	5.8	181.3	0.02	2053.7
Hospital expenditures	419	1.1	43.8	0	446.5
Total	1246	44.6	319.9	26.6	4992.7

Note: § All the calculations are done at 1 US\$ = NRS 80.

Table 7: Economic loss due to inability to go to work

Loss due to	Minimum loss (US\$)§	Maximum loss (US\$)	Mean loss (US\$)	Sum (US\$)
Lost income from work for the victim	2.5	625	49.9	4996.8
Lost income from work for family members	1.25	250	31.7	2975.3
Total	3.75	875	81.6	7972.1

Note: § All the calculations are done at 1 US\$ = NRS 80.

**Fig 1: Distribution of road traffic injury cases**

Discussions

In this study, we found that road traffic accidents (42.5%) were the most common cause of injuries and 64.9% of them involved motorcycles. Men are involved more often than female (72.6% vs. 27.4%). On average, a single injury causes a total loss of about 125 US\$, while the per capita income is only 1000 US\$⁶.

The majority of victims were males (72.6%) and in the ages 20-64 years years (60%). A study of the post mortem cases in Nepal 2000 – 2004, also showed high number of fatalities (65.4%) in the age group 15 – 44 years and 69.14% of the cases were males⁵. A meta-analysis of studies on injuries in south Asia also concluded that majority of injuries occurred in males (67-80%)⁷. Likewise, a study in Brazil showed high number of male victims (59.1%)⁸ and so did a study in Europe⁹. The higher involvement of men may be explained by their outdoor work or their involvement in violent activities.

The study in Brazil also showed high incidence of injury (62.1%) among the age group 0-29 years⁸, whereas a similar study in South Asia found the highest incidence of injury among the age group 0-9 (40%)⁷. However, in our study, we found the highest incidence of injury in the age group 20 – 64 years (60%) and an incidence of 4.9% among the children aged less than four. The low incidence of injuries among children in Nepal could be explained by the fact that most of the people live in joint families and there is always someone to look after the children. Usually, the grandparents, who have retired and do not have any work, take the responsibility of taking care of the children. This culture of looking after children could have minimised the possibility of children getting injured.

Our study suggests that injuries involve economically active population more than others. This may be because these people are those exposed to work related injuries while other groups in the population, i.e. children and elderly, have few chances of work injuries. The high number of injuries among economically active population also has serious effects on the economy of the nation. In addition to the regular cost of treatment, there is additional loss of economic production due to the victim's inability to go to work.

In our study, 42.5% of the injuries were road traffic injuries (RTI) and 64.9% of the vehicles involved were motorcycles. RTIs are the leading cause of injuries in the whole world as shown in studies from Europe, Africa and Asia⁹⁻¹⁵. Even in Nepal, a previous post mortem study reported that 55% of accidental deaths were due to road traffic injuries⁵. Likewise, in Korea, RTI is the leading cause of death for people under 29

and it has increased nearly eight fold from 37000 in 1970 to 290481 in 2000¹⁴. In China, road traffic crashes increased 68 fold, from around 6000 in 1951 to 413000 in 1999, and the injuries increased 56 fold from around 5000 to 286000 in that period¹⁶.

The causes for RTI could be high speed, reckless driving, lack of strict traffic rules and regulation, disobedience of safety rules, lack of proper maintenance of vehicles as well as excessive number of vehicles. Nepal, in specific, also has narrow and winding roads with many potholes. In addition, it has very few one-way roads. Roads do not have a proper lane system, and most of them are under constant reconstruction which makes driving a high risk activity. The poor quality of roads in Nepal is also reflected by the fact that only 31% of its total 16,597 km of road is black topped, the rest are either only gravelled or earthen¹⁷. Another significant finding is the positive correlation between the rise in the number of vehicles and the incidence of injuries. Every year nearly 40,000 new vehicles have been added in Nepal, and so has the number of road traffic injuries¹⁷.

RTIs were the most common injuries among all the age groups except the preschool children. This is quite obvious as they do not travel much or if they do, they do it under the guidance and protection of their guardians. Besides, they travel most of the times in school buses, which are relatively safe and convenient.

In our study, 64.9% of the vehicles involved in accidents were motorcycles. The motorcycles are more vulnerable because they are less stable than the four wheelers and they lack the protection that is offered by the body of the four wheelers. However, involvement of motorcycles in every two out of three RTIs is a serious issue and should be looked upon with great concern. In Nepal, since cars are too expensive to afford for majority of the people, motorcycles have become the most optimal and common means of private transportation. It is not uncommon to see even a whole family on a single motorcycle.

Buses and other four wheelers accounted for 26% of the RTIs. Often, buses are overcrowded, people are seen hanging on the doors and seated on the roofs. It is unfortunate that there is no strict law that determines how many people could board a bus at a time. As the drivers have the only intention of carrying as many passengers as possible, irrespective of the capacity of the bus, this is often the cause of accident.

In our study, drivers and the motorcycle riders (39.3%) were most commonly injured in road traffic accidents followed closely by pedestrians (37.4%). However, another study in Nepal reported that 63% of RTI related

deaths included pedestrians and 18% were passengers in public vehicles⁵. Likewise, a study in India reported the highest incidence of injuries (29%) among motorcycle riders and 22% among the pedestrians¹³. A similar study in Ghana also reported a high incidence of injuries among the pedestrians (46.2%), followed by passengers of buses and trucks¹². The high involvement of pedestrians in RTAs in Asian as well as African countries may be explained by the fact that developing countries do not have well constructed roads. The facility of foot paths is poor; there is no proper system for road crossing like over head bridges.

In our study, domestic injuries accounted for 34.1% of the total injuries. A study in Gujarat, India showed an incidence of domestic injuries to be 1.7% and they were more common in extreme ages and among females and fall was the most frequent type of accident¹⁸. However, in our study, the domestic injuries were more common among males in the age group 20-64yrs. Our study also confirmed falls as the most common type of injury at home. This highlights the need for proper designing of house and adequate illumination.

Our study showed that 18% of the injuries were intentional, the most common cause was gang activity and quarrels (77.5%) and 76.3% of the intentional injuries involved men. Another study in Nepal reported an incidence of homicide as 9%⁵. A study from Norway showed that 26.8% of 2143 ever partnered women had experienced any violence by their partner during their lifetime, and 5.5% in the year before the study¹⁹. The low recording of female intentional injuries in comparison to male should be seen cautiously because, the religion and social norms in Nepal do not permit a woman to report violence on her by her family members. This leads to underreporting of intentional injuries among them.

We found a high incidence of fractures, cuts and open wounds (61.5%). This can be expected, considering the high incidence of RTIs. However, we saw few cases of burns. In another study in Nepal, abrasion was reported as the most common external injury (45%), followed by contusion (32%), internal haemorrhage (29%), fracture (25%), laceration (23%), cuts (9%), burns (8%) and penetrating injuries (6%)⁵.

On average we found a single incidence of injury and a single visit to an emergency department to cost around 44.6 US\$ including hospital charges and medical expenses. In addition, there is an indirect loss of around 81.6 US\$ due to loss of working hours. Another study in Nepal also showed high economic burden of injury. It reported that there is a cost of 430 US\$ at 70 rupees per US\$ per Disability Adjusted Life Year (DALY) to

achieve primary prevention that includes minimising the severity of injury by first aid treatment at the spot of injury²⁰. This figure is very significant compared to the per capita income of mere US\$ 1000⁶. In a condition where one third of the population live below the poverty line, the economic burden of injury of a magnitude as mentioned above is simply unaffordable. The cost is equally high in India, estimated to be more than 322 billion rupees (US\$ 7.4 billion)¹³. The economic burden seems global as the cost of injuries is estimated to 1-2% of the Gross National Product (GNP) even in Europe and 1.5% - 2.5% of GNP in Mozambique^{10,21}.

This is a descriptive study involving two cities of the country which vary considerably from other cities in terms of population density, economic status, transport services, and health care facilities. Therefore, the findings could not be generalised to the whole country. However, these two cities are the most advanced cities of the country in terms of health services which makes it certain that the majority of the injury cases will be reported to the health centres and only negligible number of injury cases will go unreported. Thus, these two cities are the most appropriate areas for the study of injury and violence in the country.

The six study centres are among the major health centres of the cities. The data collected at these centres can be considered adequate and the results can thus be generalised at least for the study cities.

Trained medical doctors were enrolled to interview and collect data which ensures the quality of the data as well as the findings of the study. Data was collected 24 hours a day in two of the centres and six hours a day in the remaining four centres which was mostly during the day. So, all injuries that happened at the night time could not be recorded. We could not thus get a picture of variation in the incidence and nature of injuries during day and night.

Conclusion

The most striking finding of our study is the high incidence of road traffic injuries and the huge economic burden which our nation cannot support. Though this study was conducted in only two cities, the findings could be generalised to all the cities like these. We felt a desperate need of immediate actions and preventive measures. Since, RTIs are more predominant, they should be addressed first. Proper road safety measures should be strictly applied. Rules like need of helmets, seat belts, speed limits should be strictly followed. The quality of roads should be improved with special focus on the width of the roads and foot paths. Besides, programs targeting immediate rescue from the injury sites and even primary management at the injury site

should be promoted. We think we need another study on Road traffic accidents, their causes, and possible intervention measures.

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