



Perspectives of Road Traffic Injuries: An Additional Task in the List of Non-Communicable Diseases from the Tertiary Centre Hospital of North India

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ABSTRACT

Background: The World Health Organisation's Global Status Report on Road Safety highlighted that more people die in road traffic accidents in India than anywhere else in the world, including the more populous China.

Objective: To assess the socio-demographic profile, pattern of injuries incurred by the victims along with some antecedent factors influencing these road traffic accidents (RTAs) like alcohol presence, months of occurrence etc

Methods: Descriptive Cross-sectional Retrospective Study of 2 consecutive years of 2012 & 2013 was carried out in a tertiary care centre. All the RTA cases in the 2 years recorded in the department case sheets file deposited in the medical records department (MRD) was taken for study.

Results: The 55.4% in 2012 and 40.6% in 2013 were young drivers with males exceeded the females. The 4 mass casualties were also occurred in the 2013.

Conclusion: Most of them were young road users with males predominantly involved in accident both years. The accident severity rate in terms of number of deaths per 100 cases was 6.6% in 2012 and 4.1% in 2013. Lacerations was the commonest injury.

Key Words: Road traffic accidents, epidemiology, injury, Non communicable disease

INTRODUCTION

Road traffic injuries kill 1.2 million people each year and injure or disable as many as 50 million, which represents a 60% increase in the last 5 years.² By 2020, road traffic injuries are forecast to become the 2nd leading cause of DALYs lost in developing countries and decreasing the burden of injuries is one of the main challenges for public health in the next century.³ According to official statistics of a report on road accidents in India by IIT Delhi, 2015, the 141526 persons were killed & 477731 injured in road traffic crashes in India in 2014 (NCRB 2015). However, this is probably an underestimate as not all injuries are reported to the police (Guru-

raj G 2006, Mohan D et al 2009)^{4&5}. The target of halving the global number of deaths & injuries from road traffic crashes by 2020 has been made in the newly adopted 2030 Agenda of sustainable development goals.⁶

India is signatory to the "Brasilia Declaration" and has committed to reduce road accidents by 50% by 2020. As per the report " Road Accidents in India-2015 Report" released by transport Research wing (TRW) of the Ministry of road transport & highways under MOHFW, GOI, the total number of road accidents in 2015 was 501423 as against 489400 in 2014, representing an increase of 2.5%.

The resulting number of deaths in 2015 was 146133 as against 139671 making an increase of 4.6%.⁷

William Haddon was an American epidemiologist and a prominent advocate for collision prevention & injury control. (Haddon 1968, 1970, 1972, 1980). He identifies three temporal phases which he called opportunity reduction (Pre-event phase), injury protection (event phase) and the minimization of adverse consequences (Post event phase). These phases make up the rows of his two-dimensional matrix and 3 epidemiological factors make up the columns of the matrix like human, vehicle/equipment & environment/roadbased. In accordance with the model, interventions for preventing crash and injury numbers & severity may involve changes in factors during any of the 3 phases.^{8,9,10 & 11}

As we are in the era of triple burden of diseases inclusive of malnutrition, communicable & non-communicable diseases and road traffic injuries fit in the category of non-communicable diseases. Hitherto say that RTI prevention and mitigation should be given the same attention and scale of resources that is currently paid to other prominent health issues if increasing human loss & injury on the roads, with their devastating human impact and large economic cost to society, are to be averted. Thus, the present study is planned to provide information to the policy makers about the hospital based scenario of road traffic injuries in the Kumaun region of Uttarakhand state.

The study was conducted to determine the biosocial profile of RTA cases reported in the 2 years along with finding descriptive picture of these cases and associated factors for the injury.

MATERIAL & METHODS

A hospital based retrospective cross-sectional study was carried out in which all RTA cases file submitted in the MRD of the medical college reported in the 2 years (2012 & 2013) irrespective of age and sex was included. After taking ethical approval of the study from the college ethical committee and permission letter from the medical superintendent of the hospital, the RTA case file submitted in the MRD of the tertiary centre from different departments of the hospital in the 2 years was asked and investigator looked for relevant details in these files for data collection in the semi-structured questionnaire for the variables like age, sex, districts, refer from, date of admission & discharge, concerned department, alcohol presence, brought by 108 ambulance, type, mode & sites of injury, treatment given, refer to & outcome of the cases. The classification of injuries were done as noted in the case file by the attending physician

and it is presumed that he or she might have used the standard operational definitions for the injury classification. The master chart was prepared in ms excel 2007

Statistical analysis: The data so collected was checked for errors and entered in MS excel 2007. Analysis was done in the form of percentage and single proportion z test was used to assess the relationship of weekdays, winter months and alcohol presence with the occurrence of RTA

RESULTS

The 2 districts of Uttarakhand from where the highest percentage of RTA cases was reported in the year 2012 & 2013 was Nainital and Udham-singhnagar with 46.4% & 27.1% from Nainital district and 38.6% & 19.3% from Udham-singh nagar . There were 10.8% in 2012 and 9.6% in 2013 RTA cases from adjoining state of UP.

Table 1 : District wise distribution of RTA cases in the 2 years

Districts	2012 (n=166)	2013 (n=197)
Almora	10 (6)	12 (6.1)
Bageshwar	4 (2.4)	8 (4.1)
Champawat	8 (4.8)	4 (2)
Haridwar	0 (0)	1 (0.5)
Nainital	77 (46.4)	76 (38.6)
Others (Nepal)	0 (0)	1 (0.5)
Pittoragarh	2 (1.2)	7 (3.6)
Unknown (Uttarakhand)	1 (0.6)	31 (15.7)
Udham singh nagar	45 (27.1)	38 (19.3)
Pauri Garhwal	1(0.6)	0 (0)
UP	18 (10.8)	19 (9.6)

Figure in parenthesis indicate percentage

Table 2: Biosocial profile of RTA cases

Biosocial profile	2012 (n=166) (%)	2013 (n=197) (%)
Religion		
Hindu	135 (81.3)	152 (77.2)
Muslim	26 (15.7)	43 (21.8)
Sikh	3 (1.8)	2 (1)
Christian	2 (1.2)	0 (0)
Marital status		
Married	98 (59)	103 (52.3)
Single	68 (41)	93 (47.2)
Widower	0 (0)	1 (0.5)
Sex		
Male	138 (83.1)	171 (86.8)
Female	28 (16.9)	26 (13.2)
Age (in years)		
< 25	52 (31.3)	96 (48.7)
25-49	92 (55.4)	80 (40.6)
50-74	22 (13.3)	20 (10.2)
≥ 75	0 (0)	1 (0.5)

Table 3: Treatment and outcome of RTA cases along with the place of referral made and inter-departmental reference opinion in the 2 years

Parameter	2012 (n=166)	2013 (n=197)
Referred from		
District govt hospital	39 (23.5)	49 (24.9)
CHC	41 (24.7)	44 (22.3)
PHC/local hospital	2 (1.2)	5 (2.5)
Private hospital	10 (6)	4 (2)
Not referred	74 (44.6)	95 (48.2)
Case reporting Department		
Medicine	0 (0)	2 (1)
Surgery	50 (30.1)	104 (52.7)
Ortho	111 (66.9)	88 (44.7)
ENT	5 (3)	3 (1.5)
Treatment given		
Conservative	83 (50)	141 (71.6)
Operation	83 (50)	56 (28.4)
Outcome of RTA cases		
Improved/discharged	119 (71.7)	135 (68.5)
Lama (Left against medical advice)	18 (10.8)	46 (23.4)
Expired	11 (6.6)	8 (4.1)
Referred	18 (10.8)	8 (4.1)
Interdepartmental opinion (n=72)		
Multiple	26 (36.1)	19 (24.1)
Single	46 (63.9)	60 (75.9)
Interdepartmental opinion* (n=72)		
Surgery	13 (18.1)	11 (13.9)
Medicine	24 (33.3)	13 (16.5)
Psychiatry	2 (2.7)	1 (1.3)
Ortho	13 (18.1)	10 (12.7)
Ent	19 (26.4)	20 (25.3)
Optha	13 (18.1)	9 (11.4)
Dental	4 (5.5)	4 (5.1)
Neurosurgery	17 (23.6)	37 (46.8)
Skin	1 (1.4)	0 (0)
Tb chest	4 (5.5)	1 (1.3)

*Multiple responses; Figure in parenthesis indicate percentage

The RTA cases record file deposited in the medical record sections was maximum from surgery and ortho department. The conservative management was given to maximum RTA cases being 71.6% in 2013 as compared to operative management which is 50% in 2012. There were 6.6% cases in 2012 and 4.1% in 2013 who got expired with referred percentage of cases being 10.8% in 2012 and 4.1% in 2013. The single department reference opinion was greater with 63.9% in 2012 and 75.9% in 2013. Maximum reference opinion made from medicine department with 33.3% in 2012 while it was ENT department in 2013 from which the highest opinion was made with 25.3% in 2013.

Majority of the RTA cases recorded in the year 2012 & 2013 were hindus and their respective percentage was 81.3% and 77.2% with married proportion of 59% in 2012 and 52.3% in 2013. The male RTA cases in the 2 calendar years being outnumbered by the females i.e 83.1% versus 16.9% in 2012

Table 4: Descriptive profile of RTA cases in the 2 years

Parameter	2012 (n=166)	2013 (n=197)
Injury in RTA		
Injured RTA	153 (92.2)	190 (96.4)
Non-injured RTA	13 (7.8)	7 (3.6)
Fatality in RTA		
Fatal RTA	11 (6.6)	8 (4.1)
Non Fatal RTA	155 (93.4)	189 (95.9)
Day of RTA		
Weekend	46 (27.7)	85 (43.1)
Weekdays	120 (72.3)	112 (56.9)
Alcohol presence		
Yes	11 (6.6)	11 (5.6)
No	155 (93.4)	186 (94.4)
Brought by 108 ambulance		
Yes	2 (1.2)	11 (5.6)
No	164 (98.8)	186 (94.4)
Hospital stay (mean days)		
	8 (n=155)	5 (n=187)
Range of stay in days		
	1 to 78 days	1 to 66 days
Time of injury of RTA cases (n=129) (%) (n=166) (%)		
6am to 12pm (Morning)	37 (28.7)	20 (12)
12.01pm to 6pm (Afternoon)	50 (38.8)	77 (46.4)
6.01pm to 12pm (Evening)	35 (27.1)	61 (36.7)
12.01am to 6am (Night)	7 (5.4)	8 (4.8)
Time taken (n=116) (%) (n=154) (%)		
≤ 1hr	3 (2.6)	2 (1.3)
>1 - 6 hr	55 (47.4)	73 (47.4)
>6 hr	58 (50)	79 (51.3)
Season of accident		
Winter (Dec - Feb)	37 (22.3)	18 (9.1)
Spring (March-May)	48 (28.9)	68 (34.5)
Summer (June-Aug)	45 (27.1)	34 (17.3)
Autumn (Sept-Nov)	36 (21.7)	77 (39.1)

Figure in parenthesis indicate percentage

and 86.8% versus 13.2% in 2013. About half of them belonged to the age group of 25-49 years in 2012 and two-fifths were in 2013.

The median duration of hospital stay of the RTA cases in the 2 years is 8 days and 5 days respectively in 2012 and 2013 with range of stay ranges from 1 to 78 days in 2012 and 1 to 66 days in 2013. There were 11 cases in 2012 and 10 cases in 2013 who has been discharged on the same date as they have been admitted at the tertiary centre.

The frequency of RTA cases occurring on weekdays is comparatively more than in weekends in both the years. Also, the proportion of fatal RTA cases was 6.6% in 2012 and 4.1% in 2013. The maximum RTA cases with 92.2% in 2012 and 96.4% in 2013 were got injured.

In the study in 2013, it was found that majority of RTA cases happened in the spring and autumn seasons with 34.5% and 39.1% respectively, whereas, in 2012 the cases were occurring more in spring and summer season being 28.9% and 27.1% respectively.

Table 5: Pattern of injuries in RTA cases in the 2 years

Parameter	2012(n=153)	2013(n=190)
Type of injuries in RTA cases*		
Abrasions	71 (46.4)	66 (34.7)
Lacerations	90 (58.8)	86 (45.2)
Crush injury/tendon rupture /avulsion injury	19 (12.4)	7 (3.6)
Degloving injury	6 (3.9)	3 (1.5)
Fractures	98 (64)	96 (50.5)
Organ injury/Bruises	12 (7.8)	8 (4.2)
Organ blood	18 (11.7)	30 (15.7)
Associated findings/others#	22 (14.3)	21 (11)
Head injury	28 (18.3)	59 (31)
Sites of injury in RTA cases*		
Lower limbs	96 (62.7)	81 (42.6)
Upper limbs	45 (29.4)	44 (23.1)
Abdomen	19 (12.4)	12 (6.3)
Thorax	21 (13.7)	15 (7.8)
Head/face	61 (39.8)	73 (38.4)
Neck	5 (3.2)	3 (1.5)
Ear	4 (2.6)	9 (4.7)
Eye	7 (4.5)	21 (11)
Spine	10 (6.5)	6 (3.1)
Mode of injury in RTA cases (n=166) (n=197)		
Collision with another vehicle	15 (9)	28 (14.2)
Hit by another vehicle	57 (34.3)	40 (20.3)
Self mistake	51 (30.7)	34 (17.3)
Mass casualty	0	51 (25.9)
Kumaun bus fell into valley	0	4
Overturning bus from hill near deividhua	0	10
Overturning DCM near ka ladhungi	0	26
School bus from bridge fell down	0	11
Unspecified	43 (25.9)	44 (22.3)

*Multiple responses

#The associated/other group includes presence of other clinical findings like surgical emphysema, neurovascular damage, retrograde amnesia, pneumothorax, shock/pulse absent, HIV positive and hepatitis C virus positive, tooth loss, and deviated nasal septum.

Table 6: Relationship of some characteristics with the RTA

Characteristics	2012 (n=166)	P* value	2013 (n=197)	P* value
Alcohol presence	11 (6.6%)	<0.05	11 (5.6%)	<0.05
Weekdays	120(72.3%)	>0.05	85 (43.1%)	>0.05
Winter/foggy months	37 (22.3%)	>0.05	18 (9.1%)	>0.05

*single z test of proportion

Laceration was the commonest type of injury revealed in 58.8% in 2012 and 45.2% in 2013. Abrasions were seen in 46.4% in 2012 and 34.7% in 2013. Abrasions and lacerations are common due to the RTA victim being dragged on to the road because of accident. Regarding the site of injury, the lower limbs were commonly injured in 62.7% in 2012 and 42.6% in 2013. The few cited cause for head injury in 2013 were due to subarachnoid haemorrhage

(n=4), extradural haemorrhage (n=4), Lt temporal lobe haemorrhagic contusion (n=2), Lt thalamus bleed, concussion & diffuse axonal injury, each with n=1 while in 2012 there was subaracnoid haemorrhage (n=3) & Lt temporal lobe haemorrhagic contusion (n=1). Most of the injuries had occurred as a consequence of rear end collision i.e hit by another vehicle being 34.3% in 2012 and 20.3% in 2013. The injuries also occurred due to self mistake of the victim in which the accident occurred as a result of being hit to a tree, stone, own disbalance etc. The 4 mass casualties took place in 2013 which occurred due to Kumaun bus fell into valley, overturning of bus from hill near deividhua and near kaladhungi and school bus fell from bridge.

As in case of variables like alcohol presence, weekdays and winter months, the expected or population value of proportion is not known and it is assumed to be 50% for calculating the z value of proportion. Only the relationship of alcohol presence with the RTA is found to be significant as compared to that of weekdays and winter months.

DISCUSSION

According to the joint WHO/World Bank world report 2002 on road traffic injury prevention, every day thousands of people are killed & injured on roads. Men, women or children walking, biking or riding to school or work, playing in the streets or setting out on long trips, will never return home, leaving behind shattered families & communities. Millions of people each year will spend long weeks in hospitals after severe crashes and many will never be able to live, work or play as they used to do. To address this growing human suffering, effort has been made in the present study about the magnitude, some cited risk factors and impact of road traffic injuries in terms of death. As per the WHO Global status repot 2013 on road safety, India has the highest number of road accidents in the world which earned India a dubious distinction. With over 130000 deaths annually, the country has overtaken china and now has the worst road traffic accident rate worldwide. In 1990, the road traffic accident is at the 9th rank amongst the global burden of diseases in WHO-SEARO region. But by 2020, it will become the 3rd largest contributor to the global burden of diseases after ischaemic heart diseases (IHD) & depression.¹²

In the current study, the 93.4% and 95.9% of patients were injured in 2012 & 2013 respectively with deaths occurring in 6.6% in 2012 and 4.1% in 2013. These deaths could be averted by laying down the foundation stone of trauma centre in 2016 at the tertiary centre. When study was carried out in 2012 & 2013, no trauma centre was there in

the hospital. Hence, adequate trauma care requires a range of medical specialities & equipment, as well as approximate logistic support to ensure that the equipment and other specialities are available to the patient on arrival.

The present study illustrates that the highest number of RTA cases occurred in the young economically productive age group i.e <25 years & 25-49 years with 86.7% in 2012 and 89.3% in 2013 and male preponderance of 83.1% & 86.8% respectively in 2012 & 2013. This may be due to more outdoor activity and greater exposure to traffic of the males and immature behaviour of reckless, careless over-speedy driving of young adults. This is in accordance with the findings of other studies conducted in other states as 54.19% cases occurred in 20-40 year age group in 69.95% males in a study by Shibajee Debbarma¹³ et al in Uttar Pradesh and 31% in 21-30 years & 24% in 31-40 years in a study by KK et al in Patiala.¹⁴ Also, 74% the injured subjects were between 15 & 44 years as reported by Suryanarayana SP et al in Bangalore, Karnataka.¹⁵ In India, in 2015 according to the annual report of the TRW, 54.1% of those killed belonged to the 15-30 year age group. The higher male preponderance was revealed in the studies by Suryanarayana SP et al (76.4% males), Menon Geetha R et al in Bangalore & Pune (76.9% males) and Pruthi N et al in Bangalore (70.4% males).^{15& 16, 17}

In the study, 2.6% in 2012 and 1.3% in 2013 victims reached the tertiary centre in upto 1 hr of injury. The best chance of survival for a serious RTA victim is if they are brought into the emergency department within the 1st hour of trauma or the so called golden hour¹⁸. The Kolkata study observed that 41.3% patients arrived at a tertiary care facility within 1st hour of accident¹⁹

As per the annual report of Ministry of Road Transport & Highways, TRW, GOI, 2015, the highest number of road accidents occurred in the month of May (46247) followed by march (42842), thus contributing 9.2% & 8.5% of total accidents month wise respectively throughout the calendar year 2015. Same was the situation in the previous calendar year 2014, the highest number of road accidents occurred in the month of may (45404) followed by march (42524), thus contributing 9.2% & 8.6% of total accidents. The present study shows that as the cases were occurring less in the winter season with 22.3% in 2012 and 9.1% in 2013, it may be assumed that the environmental factor (foggy weather) is playing less role in the causation of the accident as compared to the interplay of agent (vehicle) -host (occupant). It is in contrast to the study done in south india²⁰ which revealed that greater number of accident cases (52%) took place in the winter.

In the same report, the time slot with highest rate of road accidents was 15:00 to 18:00 hours & 18:00 to 21:00 hours accounting for a share of 17.5% (87819) & 17.3% (86836) respectively in the total road accidents during 2015. During the same slots in 2014, the rate of accidents was 17.3% (84436) & 17% (83254) respectively. In a study in Kolkata¹⁹, most of the RTAs occurred between 6AM to 12PM (31.55%), followed by 6PM to 12AM (27.18%), 12AM to 6AM (20.87%) and 12PM to 6PM (20.39%). These results probably stem from the fact that these are the time periods when there is high human & traffic congestion on roads. But Ganveer BG²¹ and Malhotra C²² reported that accidents mostly occurred during the daytime in Nagpur & Delhi respectively. Another study²⁰ observed that most of RTA cases (50.22%) were reported during the day time (6AM to 12 noon) that during late in the night (12AM to 6AM) i.e 5.33%. A study in Haryana²³ showed that most of the accidents had taken place in the evening hours in 6PM to 12PM (40.15%) followed by in 6AM to 12 noon (28.84%), 12 noon to 6PM (21.8%) and 12AM to 6AM (9.21%). The findings of the present study revealed that most of the accidents took place in the afternoon and evening time of the day and their percentage was 38.8% in 2012 & 46.7% in 2013 (afternoon) and 27.1% in 2012 & 36.7% in 2013 (evening). It may be due to more traffic congestion at these times on the road.

The alcohol presence was evident in 6.6% and 5.6% cases respectively in 2012 & 2013 in the study. Although alcohol is a stimulant but depressant of central nervous system and thus resulting impairment by alcohol is an important factor influencing both the risk & severity of road crashes. The risk of road crash when a driver is alcohol impaired varies with age. At almost every blood alcohol content level, the risk of crash fatality decreases with increasing age and experience.²⁴ A study in Haryana²³ found that 18.01% were found to be having consumed alcohol.

In a study in Haryana²³ reported that maximum number of injuries were seen in the abdomen (39.98%) followed by lower limbs (23.99%) and least in the upper limbs (9.53%). This is in contrast to the study by Biswas G²⁵ who cited that maximum (56.4%) injuries were found on head & neck, followed by thorax (54.5%) and abdomen (44.5%). While KK aggarwal et al¹⁴ observed that most common injuries were abrasions (86%) followed by laceration (75%) and the most common site involved was head & face (85%) followed by lower limbs (65%), upper limbs (54%), chest (48%) and abdomen (36%). In a study in Kolkata¹⁹, 68.44% had fractures being lower limbs commonly involved, 28.64% had head injury and 11.65% sustained lacerated injury. Similar findings were re-

ported by Tiwari RR et al²⁵ and Patil SS et al²⁷. However studies^{22,28} had seen more injury of head and neck. While in the present study, lacerations was the commonest injury revealed in 58.8% in 2012 and 48.2% in 2013. Lower limb was the most commonly injured part in amongst 62.7% in 2012 and 42.6% in 2013.

In a study in Kolkata¹⁹, it was revealed that 34.74% were referred from primary healthcare centre, 53.38% from secondary healthcare centre. Whereas in the present study very few cases were being referred from primary health centre with 1.2% in 2012 and 2.5% in 2013 and the greater percentage of them referred from secondary health centre comprises of CHC & district hospital which constitutes 48.2% in 2012 & 47.2% in 2013.

It was revealed in a study in Haryana²³ that higher number of reported accident cases occurred on weekdays (54.12%) when compared to weekends (45.88%). Other studies have observed more accident cases on weekends^{29,30}. This finding is in accordance with our study where in both the years the maximum cases happened on weekdays and they are 72.3% in 2012 and 56.9% in 2013.

In a study in south India²⁰, it was observed that more than three-fourth underwent operative procedure and 18.54% received general treatment. And in the present study that higher number of 71.3% in 2013 had underwent operative treatment than that of 50% in 2012.

CONCLUSION AND RECOMMENDATION

The study shows the picture of 4 mass casualties which occurred due to bus fell into valley, overturning of bus either in hilly terrain or in congested road and bus fell from bridge and also, it may be due to the tiredness of the driver, ill maintained vehicle. The accident severity rate in terms of number of deaths per 100 cases was 6.6% in 2012 and 4.1% in 2013. The contributing factor like alcohol was present in 6.6% in 2012 and 5.6% in 2013. The pedestrian injury was n=6 in 2013 and n=5 in 2012, may be more also as the data is secondary. Improvement of roads as well as fitness of the vehicle & driver should be done in order to avoid future mass casualties. Although the case fatality rate of the cases is 6.6% in 2012 and 4.1% in 2013 and some cases are bring referred from tertiary centre that can be avoided by the establishment of trauma centre in tertiary centre for which in our area in the year 2016 the foundation stone has been laid down.

Limitation

The study did not cover social security, health cover or life insurance access to the RTA victims. Also, the behaviour of road user in using helmets/seat

belts, condition & type of roads like highways, characteristics of driver like overspeeding vehicle etc, characteristics of traffic like absence of traffic/street lights and other environmental aspects has not been explored in the present study as there is insufficient information in the recorded hospital data. Disability due to RTA was not revealed in the study.

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REFERENCES:

1. Dash DK. India Leads World in Road Deaths: WHO. The Times of India, Aug 17; 2009
2. Pedon M, SR, Sleet D, Mohan D, Hyder AA, Jarawan E. World Report on Road Traffic Injury Prevention. WHO 2004.
3. Krug EG, Sharma GK, Lozano R. The Global Burden of Injuries. *Am J Public Health*, 2000; 90: 523-526.
4. Gururaj, G. 2006. Road traffic injury prevention in India. Bangalore: NIMHANS.
5. Mohan, D. 2009. Road accidents in India. *Journal of International Association of Traffic and Safety Sciences*, 33, 75-79.
6. <https://sustainabledevelopment.un.org>
7. Road Accidents in India-2015: Government of India, Ministry of Road Transport & Highways, Transport Research Wing, New Delhi. www.morth.nic.in.
8. Haddon, W. The Changing Approach to the Epidemiology, Prevention and Amelioration of Trauma: The Transition to Approaches Etiologically Rather Than Descriptively Based. *American Journal of Public Health*, 58, 1968: 1431-1438.
9. Haddon, W. On the Escape of Tigers: An Ecological Note. Originally Published 1970 in *MIT Technology Review*, 72(7). Republished 2000 as Ch. 2 in Mohan, D and Tiwari, G (eds). *Injury Prevention & Control*, London: Taylor and Francis.
10. Haddon, W. A Logical Framework for Categorizing Highway Safety Phenomena and Activity. *The Journal of Trauma*, 12 (3), 1972: 193-207.
11. Haddon, W. Advances in the Epidemiology of Injuries as a Basis for Public Policy. *Public Health Reports*, 95(5), 1980: 411-421.
12. Rumar K. Transport Safety visions, targets & strategies: beyond 2000. Brussels, European Transport Safety Council, 1999 (1st European Transport Safety Lecture) <http://www.etsc.be/eve.htm>, accessed 30 October 2003)
13. Shibajee Debbarma, Seema Nigam, Dinesh Singh Martolia, Punit Varma, Santosh Kumar Barman, Tanu Midha. Correlates of Road Traffic Accident in Cases Attending Lala Lajpat Rai Hospital, Kanpur. *Indian Journal of Community Health*, Jan-Mar 2016, Vol 28, issue no1.
14. Aggarwal KK, Oberai SS. Distribution of Fatal Road Traffic Accident Cases. *J Punjab Acad Forensic Med Toxicol*, 2009; 9(1): 9-11.

15. Suryanarayana S, Gautham M, Manjunath M, Narendranath V. Surveillance of Injuries in a Tertiary Care Hospital. *Indian J Community Med*, Jan 2010; 35(1): 191-2.
16. Menon GR, Gururaj G, Tambe M, Shah B. A Multi-sectoral Approach to Capture Information on Road Traffic Injuries. *Indian J Community Med*, Apr 2010; 35(2): 305-10.
17. Pruthi N, Ashok M, Kumar VS, Jhavar K, Sampath S, Devi BI. Magnitude of Pedestrian Head Injuries & Fatalities in Bangalore, South India: a Retrospective Study from an Apex Neurotrauma Centre. *Indian J Med Res*, Dec 2012; 136(6): 1039-43.
18. Madan VS. Road traffic Accidents: Emergency Epidemic. *Indian J Neurotrauma*, 2006; 3(1):1-3.
19. Manna N, Malik S, Mandal PK, Chakraborty D, Sardar JC, Pritibikash H, Gupta SD. Epidemiological Factors of Road Traffic Accidents: A Study in a Tertiary Care Setting in India. *J Pak Med Stud*, 2013; 3(1): 48-53.
20. P Shruthi, VT Venkatesh, B Viswakanth, C Ramesh, PL Sujatha, IR Dominic. Analysis of Fatal Road Traffic Accidents in a Metropolitan City of South India. *J Indian Acad Forensic Med*, Oct-Dec 2013; 35(4)
21. Ganveer GB, Tiwari RR. Injury Pattern among non-fatal Road Traffic Accident Cases: A Cross-sectional Study in Central India. *Indian J Med Sci*, 2005; 59:9-12.
22. Malhotra C, Singh MM, Garg S, Malhotra R, Dhaon BK, Mehra M. Pattern & Severity of Injuries in Victims of Road Traffic Crashes Attending a Tertiary Care Hospital of Delhi. *Anil Aggrawal's Internet Journal of Forensic Medicine & Toxicology*, 2005; 6(2).
23. Abhishek Singh, Anu Bhardwaj, Rambha Pathak, SK Ahluwalia. An Epidemiological Study of Road Traffic Accident Cases at a Tertiary Care Hospital in Rural Haryana. *Indian Journal of Community Health*, 2011; 23(2)
24. World Report on Road Traffic Injury Prevention, www.who.int/violence-injury-prevention, WHO 2004.
25. Biswas G, Verma SK, Sharma JJ, Aggarwal NK. Pattern of Road Traffic Accidents in North East Delhi. *Journal of Forensic Medicine & Toxicology*, 2003; 20(1): 27-32.
26. Tiwary RR, Ganveer GB. A Study on Human Risk Factors in Non-fatal Road Traffic Accidents at Nagpur. *IJPH* 2008, 52(4): 197-99
27. Patil SS, Kakade RV, Durgawale PM, Kakade SV. Pattern of Road Traffic Injuries: a Study from Western Maharashtra. *IJCM*, 2008; 33(1):56-7
28. Singh H, Dhatarwal SK. Pattern and Distribution of Injuries in Fatal Road Traffic Accidents in Rohtak (Haryana). *JIAFM*, 2004; 26(1):20-23
29. Menta SP. An Epidemiological Study of Road Traffic Accident Cases Admitted in Safdarjung Hospital, New Delhi. *Indian Journal of Medical Research*, 1968; 56(4): 456-466
30. Stallones RA and Corsal L. Epidemiology of Childhood Accidents in Two California Countries. *Public Health Report* ,1961; 76(1): 25-36.