

INJURY SURVEILLANCE PILOT PROJECT

STUDY SITE

Research Lab Jai Prakash Narain Apex Trauma Center, All India Institute Of Medical Sciences, New Delhi, India

OBJECTIVE

To study the feasibility of injury surveillance and to identify a model for sustained data collection, analysis and reporting.

INTRODUCTION

Injury and trauma often used interchangeably represent a major health problem worldwide. Everyday around the world, almost 16,000 people die from all types of injuries. Injuries represent 12% of global burden of disease.¹ Road traffic injuries contribute to the major cause of mortality 22.8% in the overall burden of death related to injuries.² It is startling to note that the lower and middle income group countries (which includes India), contribute about 90% of global burden of injury mortality, thus highlighting the disparities in outcome of trauma between the high, lower and middle income nations. Injuries affect the productive youth of the country. In addition to excess mortality, there is a tremendous burden of disability from extremity, head and spinal injuries in developing nations. The ever more tragic fact is that, injury is the 3rd most important cause of mortality and main cause of death amongst 1-40 year olds. Therefore, trauma effects the productive youth of the country which is other wise healthy and free from chronic disease.

Global Trends in Trauma

- Major health problem worldwide
- Affects the productive youth of country
- World report on road traffic injury prevention. *World Health Organization* 2004.
- >16,000 people die daily from all types of injuries.
- 12% of global burden of disease
- 1.2million deaths
- 20-50 million Injuries
- Estimated 40 million DALYs (Disability adjusted life years) lost
- 9th leading contributor to global burden of disease and Injury and will be the 3rd leading contributor to global burden of disease by 2020.

Trauma Trends - India

All data is mortality data primarily from the National Crime Records Bureau which is primarily emanating out of Road Traffic Injury estimates.

Accidental injury is one of the leading causes of mortality and morbidity in India. India has one per cent of total vehicles in the world but accounts for six per cent of total road

accidents. There are approximately 400,000 road crashes causing injury in India each year, resulting in 85,000 deaths and 1.2 million seriously injured.

In India, road-traffic accidents are increasing at annual rate of 3%. In 1997, 10.1% of all deaths in India were due to accidents and injuries. A vehicular accident is reported every 2 minutes and a death every 8 minutes on Indian roads. During 1998 nearly 80,000 lives were lost and 330,000 people were injured. Out of the total injured 78% were men in age group of 20-44 years, causing significant impact on productivity. A trauma-related death occurs in India every 1.9 minutes. The majority of fatal road traffic accident victims are pedestrians, two wheeler riders and bicyclists.

Till date no credible data is available on outcome of trauma victims. Even by rough estimates, mortality in serious (ISS > 16) injuries is six times worse in a developing country such as India compared to a developed country.

90% of all Road Traffic Deaths occur in Middle and Low Income Countries like India

In addition to excess mortality there is a tremendous burden of disability in developing nations. It is estimated that India Loses approx 2-2.5% of its GDP to only Road Traffic Injuries. The World Health Organization (WHO) has projected that by 2020 road accidents will be a major killer in India accounting for 546,000 deaths and 15,314,000 disability-adjusted life years lost.

Nearly all the data we have from various sources, most of the data is that of road traffic accidents but all Injuries are not due to Road Traffic Accidents. According to WHO estimates only 22.8% injuries are Transport related Injuries rest 77.2% are non transport related e.g. Falls (more in pediatric age group), Agricultural related trauma, Fire Arms, Intentional self harm, Assault, Fall of objects, Burns, Drowning, Natural Disasters, Terrorist Attacks etc.

Injury Surveillance

What is surveillance?

The term, “surveillance,” as used in the public health field, refers to the ongoing and systematic collection, analysis, interpretation and dissemination of health information.*** Generally speaking, it involves the keeping of records on individual cases, assembling information from those records, analyzing and interpreting this information, and reporting it to others.

Surveillance produces data that describe:

- The size and characteristics of a health problem (i.e. what are the number of cases of injury, broken down by type, and what are the characteristics of each type?);
- The population at risk (i.e. which kind of people are most likely to incur each type of injury?);
- The risk factors (i.e. what things contribute to each type of injury, and what things are associated with each type of injury?);

- The trends (i.e. is a particular type of injury occurring more or less frequently, and is it doing more or less harm?).

Armed with such data it is possible to

- Design and apply appropriate interventions;
- Monitor the results and assess the impacts of interventions.

Why do surveillance?

The scale of the injury problem is not a matter of dispute. As previously indicated, the number of people who die from injury every year runs into the millions. However, deaths are only a small part of the total injury problem; for every person killed, many more are seriously and permanently disabled and many more again suffer minor, short-term disabilities. The costs of injury mortality and morbidity are immense, not only in terms of lost economic opportunity and demands on national health budgets, but also in terms of personal suffering.

Without reliable information, health care planners are severely handicapped. They are unable to allocate resources so as to achieve the greatest impact in preventing injuries, reducing the harm they do, and treating and rehabilitating injured persons.

What little information is available tends to focus on fatal injuries and shows that:

- Injury profiles vary greatly from country to country, with large differences in the total numbers of injuries, types of injuries, numbers of deaths and serious disabilities, and levels of intervention.
- Trends vary from country to country. Injury profiles can change suddenly in response to economic ups and downs, social upheaval, and rapid shifts in the levels of industrialization, urbanization and motorization.
- Injury problems tend to be greatest in those countries with the fewest resources. Low-income countries especially, are plagued by a greater number and variety of potential hazards, yet have the least capacity to prevent and treat injury.
- As injury classifications have only been standardized very recently, much of the information generated by surveillance systems up until now is not comparable between countries, or even within countries.

Local, regional and national injury surveillance systems, established in accordance with standard guidelines, will generate the data needed to plan and deliver effective injury and prevention programmes to community members and to regional and national populations. Moreover, by conforming to international standards, such systems will contribute international statistics that will not only enable comparisons between countries to be made, but will also provide an accurate global picture of the injury problem. In turn, country comparisons and an accurate global picture will help countries, through international agencies like WHO, to cooperate and coordinate their efforts to prevent and treat injuries.

What is an injury?

An injury is the physical damage that results when a human body is suddenly or briefly subjected to intolerable levels of energy. It can be a bodily lesion resulting from acute exposure to energy in amounts that exceed the threshold of physiological tolerance, or it can be an impairment of function resulting from a lack of one or more vital elements (i.e. air, water, warmth), as in drowning, strangulation or freezing. The time between exposure to the energy and the appearance of an injury is short.

The energy causing an injury may be:

Mechanical (e.g. an impact with a moving or stationary object, such as a surface, knife or vehicle)

Radiant (e.g. a blinding light or a shock wave from an explosion)

Thermal (e.g. air or water that is too hot or too cold)

Electrical

Chemical (e.g. a poison or an intoxicating or mind-altering substance such as alcohol or a drug).

METHODOLOGY

Feasibility Study on Injury and Road Traffic Surveillance was conducted in the Research Lab of Jai Prakash Narain Apex Trauma Centre, All India Institute of Medical Sciences by Research Associates (Senior Resident level) and Research Assistants (Junior Resident Level).

As per WHO format, finalization of a data capture format of AIIMS was done. On the basis of above mentioned format, a Visual Basic interface was made by software professionals and data entered into the VB format by our qualified data operators, which got stored as MS Access format, the data was later converted to MS Excel format for easy analysis. As admitted patients were not followed further so their ICD codes are not known.

Retrieval of injury cases record was done from Medico legal registers and autopsy registers. Data was collected from 1st Jan 2005 to 30th June 2006. We scanned records of 41,764 patients out of whom 27,840 were found to be injury patients. Time taken for retrieval of data was 5 months, for entry into electronic format was 3 weeks and 1 week was taken for analysis. Time for filling one format was 5min and time for 1 data entry was 3 min. Out of 27,840 patients, most common cause of injury was from assaults amounting to 13,387 patients (48.1%). Road traffic patients were second most common (10,682 patients, 38.4%) There were 3162 cases (25.7%) of unintentional/Accidents and suicide were least common (608 patients, 2.1%).

RESULTS

Period of Data collection- 1st Jan 2005 to 30th June 2006

Total medical records scanned- 41,764

Total injury patients identified- 27840

No of records coded on to performa-27840

No of performa entered-27840

SEX DISTRIBUTION

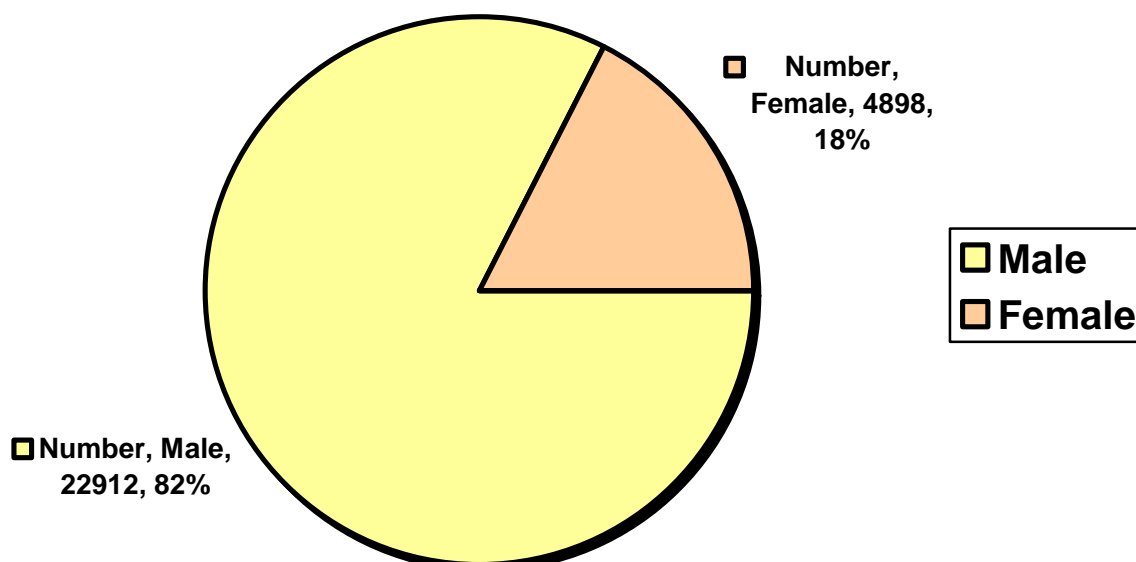


Fig 1

Table 1: Sex Distribution

SEX	FREQUENCY	PERCENT	CUM
FEMALE	4898	17.61	17.61
MALE	22912	82.39	100.00
	TOTAL	27,810	100.00

We have documented the core data of 27840 patients with 22912 males and 4898 female patients. 52.91% of patients were found in the age group of 25-49. Second most common age group was 15-24 in which consisted of 29.98 % of the total. Overall there were 10% of patients under the age group of 15 and 9.4 % of patients above 50 years. The distribution of all the patients according to the age group.

AGE DISTRIBUTION

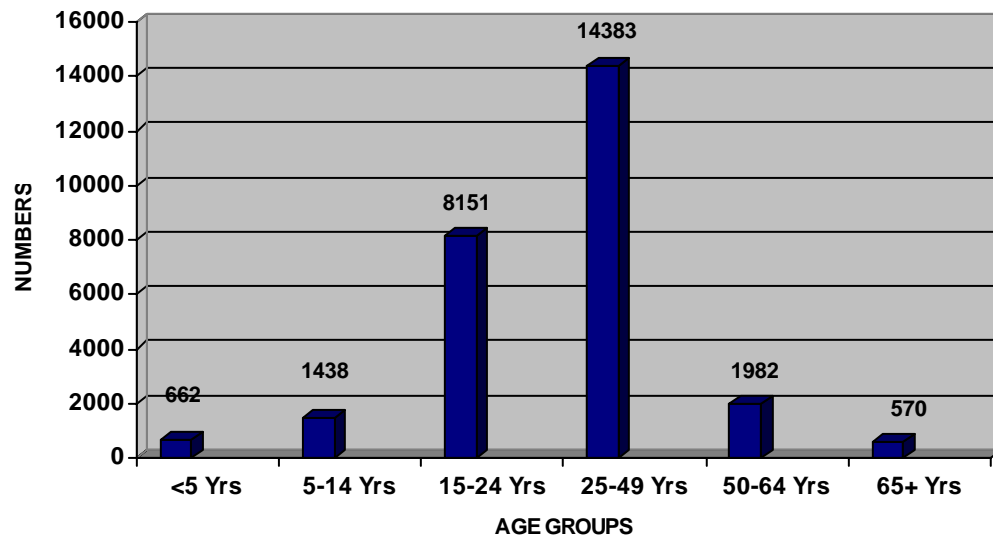


Fig 2

Table 2: Age Distribution

AGE	FREQUENCY	PERCENT	CUM
<5	662	2.44	2.44
5-14	1438	5.29	7.72
15-24	8151	29.98	37.71
25-49	14383	52.91	90.61
50-64	1982	7.29	97.90
65+	570	2.10	100.00
	TOTAL	27186	100.00

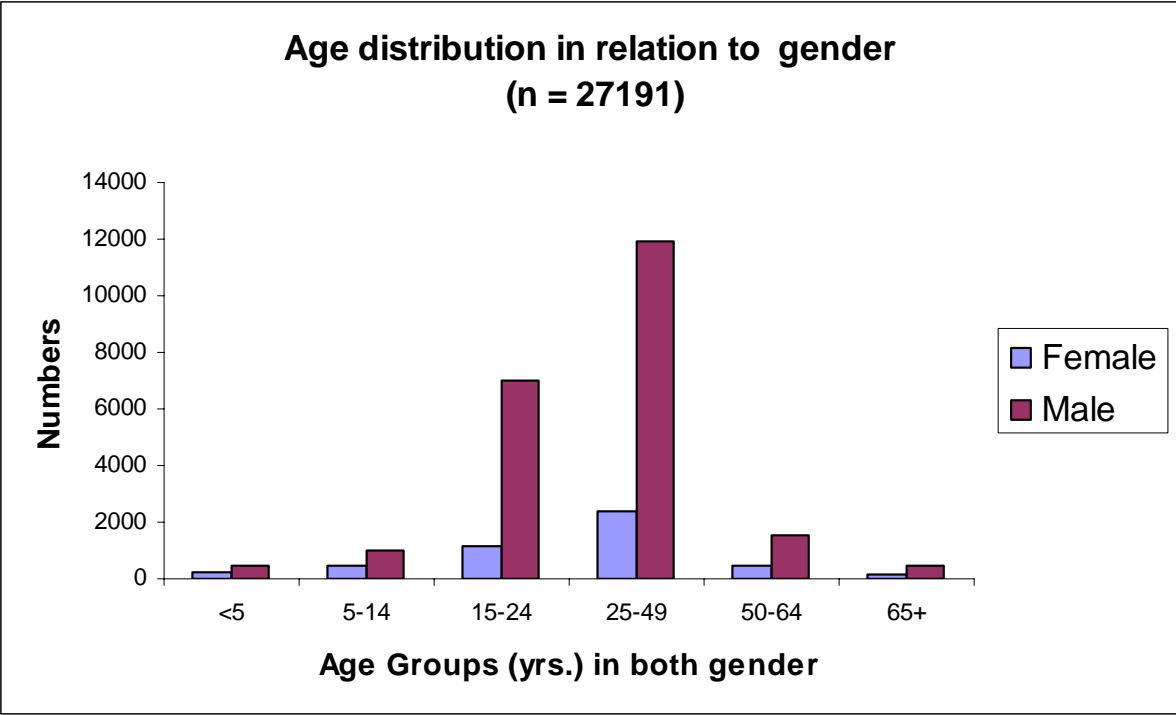


Fig 3

TYPE OF INJURIES

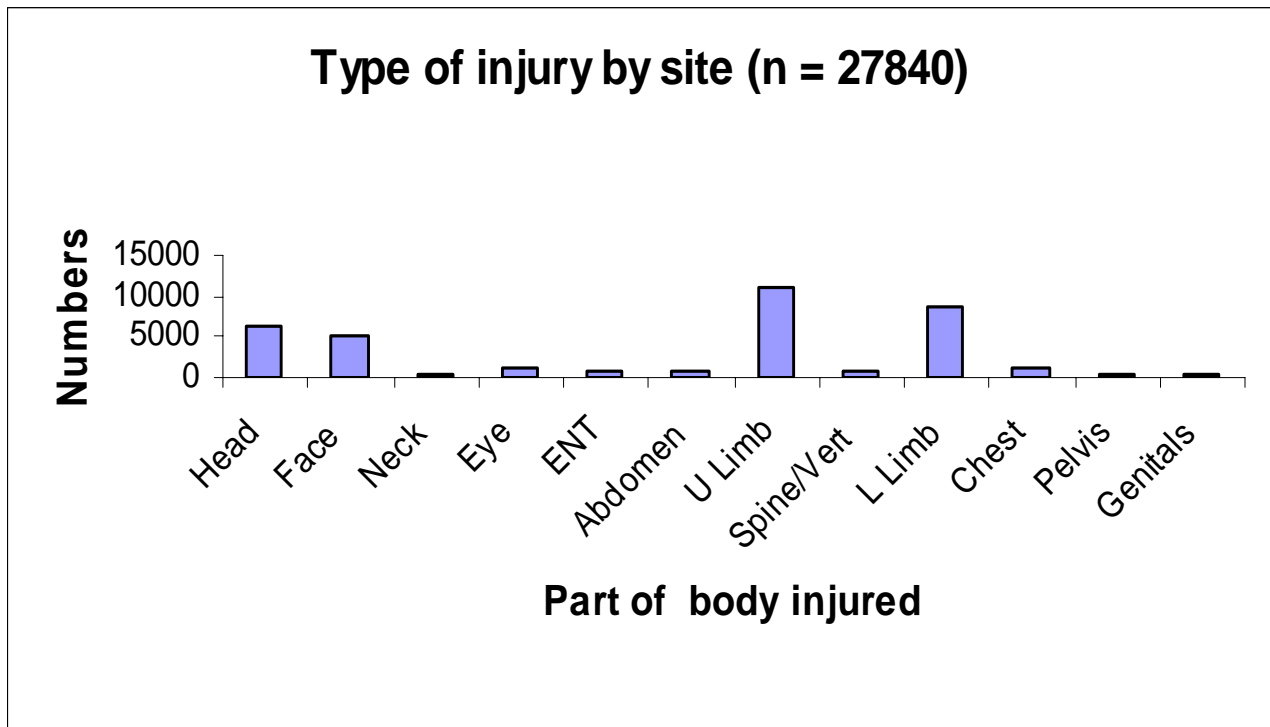


Fig 4

Table 3: Type of injury by site

PART	FREQUENCY	PERCENTAGE
HEAD	6458	23.20
FACE	4956	17.80
NECK	572	2.05
EYE	1206	4.33
ENT	821	2.95
ABDOMEN	670	2.41
UPPER LIMB	10873	39.06
SPINE/VERT	717	2.58
LOWER LIMB	8649	31.07
CHEST	1309	4.70
PELVIS	345	1.24
GENITALS/PERINEUM	202	0.73

SEVERITY

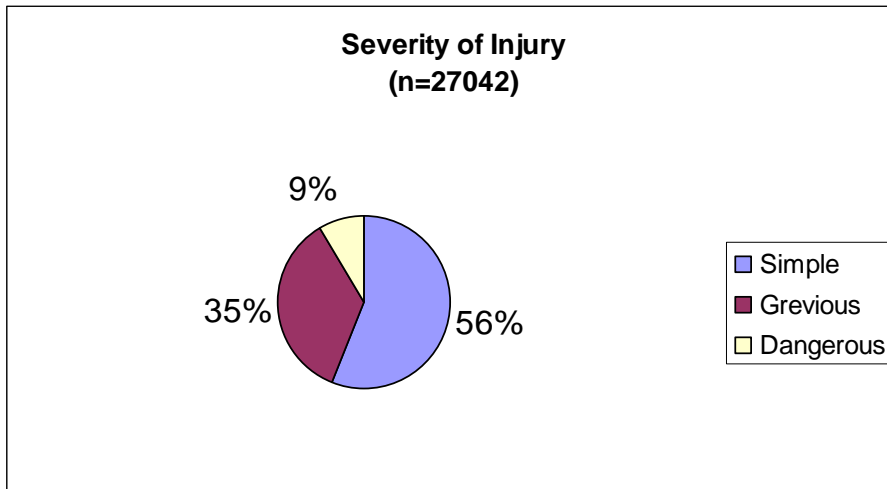


Fig 5

Table 4: Severity

TYPEINJURY	FREQUENCY	PERCENT	CUM
DANGEROUS	2365	8.75	8.75
GRIEVOUS	9519	35.20	43.95
SIMPLE	15158	56.05	100.00
TOTAL	27042	100.00	

PART OF BODY INJURED V/S SEVERITY

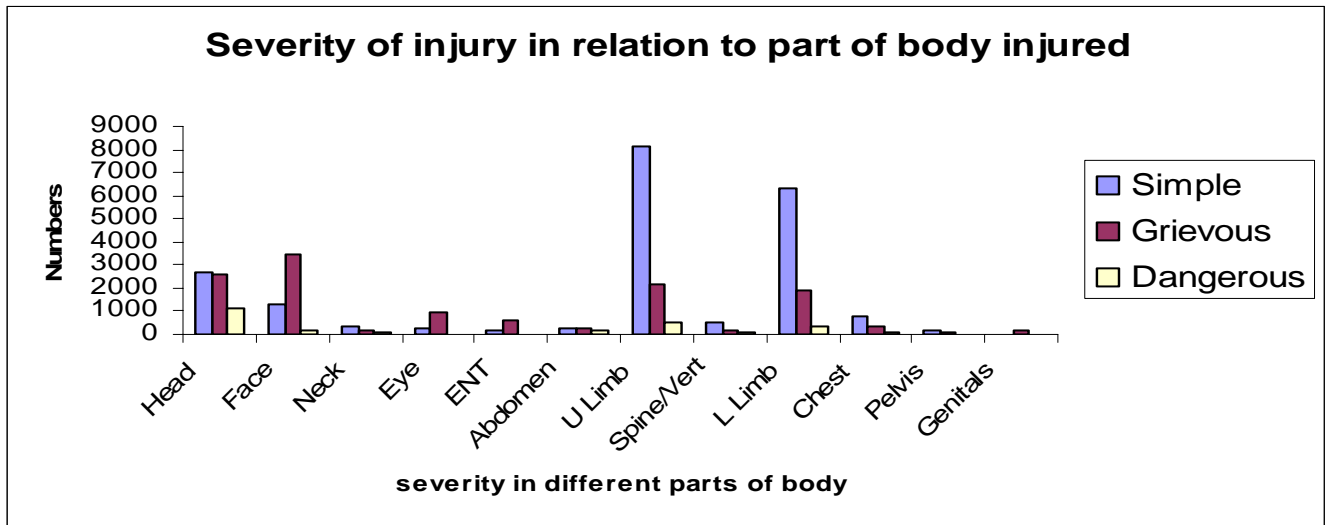


Fig 6

Table 5: Part of body injured v/s Severity

PART	SIMPLE (%)	GREVIOUS (%)	DANGEROUS (%)
HEAD	2700 (41.95)	2605 (40.48)	1131 (17.57)
FACE	1312 (26.55)	3475 (70.32)	155 (3.14)
NECK	347 (60.88)	170 (29.82)	53 (9.30)
EYE	224 (18.64)	945 (78.62)	33 (2.75)
ENT	166 (20.32)	639 (78.21)	12 (1.47)
ABDOMEN	270 (41.10)	235 (35.77)	152 (23.14)
UPPER LIMB	8139 (74.99)	2158 (19.88)	556 (5.12)
SPINE/VERT	486 (68.07)	167 (23.39)	61 (8.54)
LOWER LIMB	6359 (73.71)	1906 (22.09)	362 (4.20)
CHEST	792 (60.92)	382 (29.38)	126 (9.69)
PELVIS	210 (60.87)	115 (33.33)	20 (5.80)
GENTALS/PERINEUM	33 (16.84)	149 (76.02)	14 (7.14)

OUTCOME

Table 6: Outcome

OUTCOME	FREQUENCY	PERCENT	CUM
Admitted to AIIMS	731	5.23	5.23
Referred to other Hospital	27	0.19	5.42
Referred to other hospital	3694	26.43	31.85
Treated and Discharged from Emergency	9525	68.15	100.00
TOTAL	13977	100.00	

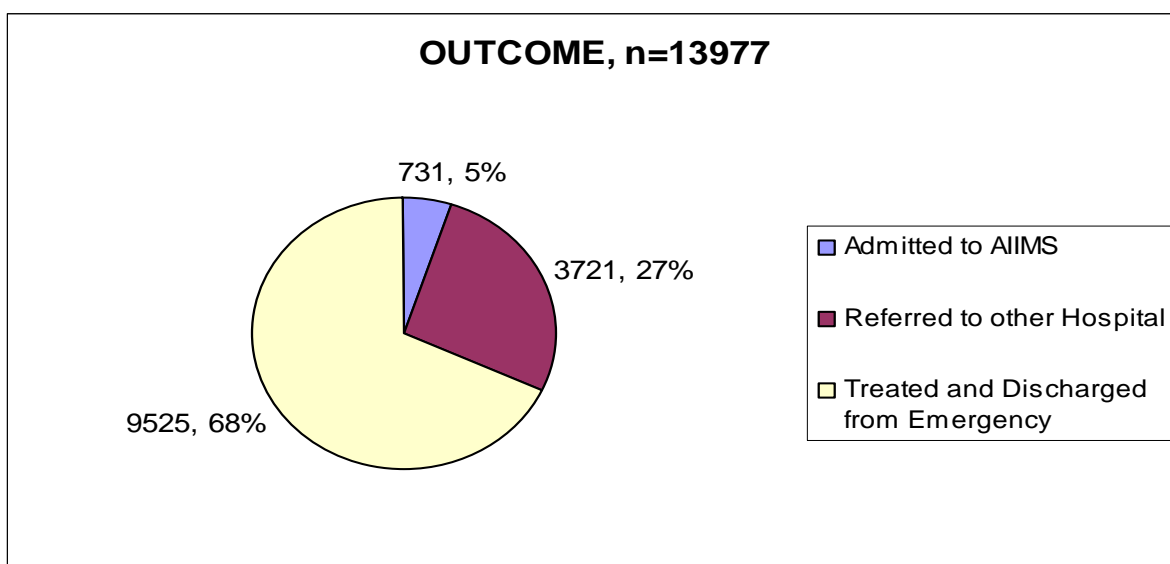


Fig 7

CAUSE OF INJURY V/S SEVERITY IN FEMALES

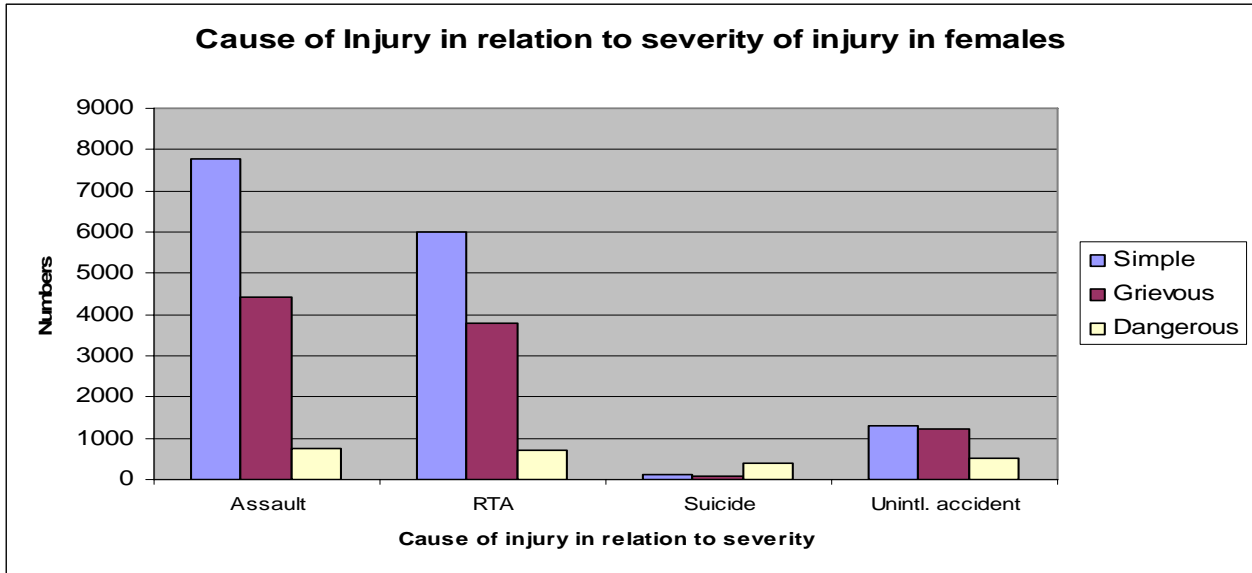


Fig 8

Table 7: Cause of injury v/s Severity in Females

TYPE INJURY	ASSAULT (%)	RTA (%)	SUICIDE (%)	UNINTENTIONAL ACCIDENT (%)	TOTAL (%)
DANGEROUS	750 (5.80)	727 (6.92)	387 (68.98)	501 (16.54)	2365 (8.75)
GREVIOUS	4432 (34.25)	3791 (36.06)	66 (11.76)	1230 (40.61)	9519 (35.20)
SIMPLE	7758 (59.95)	5994 (57.02)	108 (19.25)	1298 (42.85)	15158 (56.05)
TOTAL	12940 100.00	10512 100.00	561 100.00	3029 100.00	27042 100.00

CAUSE OF INJURY V/S SEVERITY IN MALE

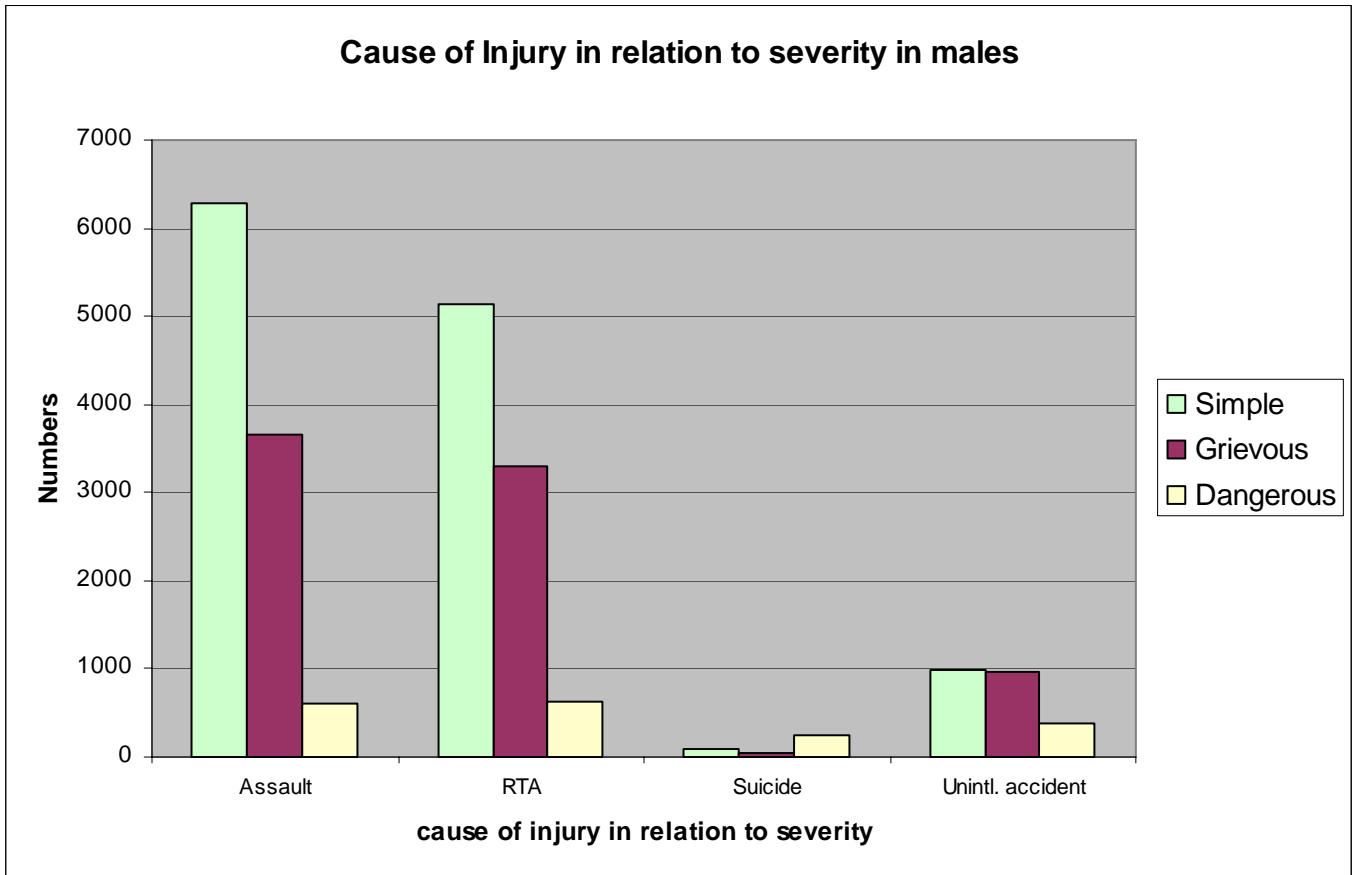


Fig 9

Table 8: Cause of injury v/s Severity In Males

Type of Injury	Assault	RTA	Suicide	Unintentional/Accident	Total
Dangerous	601 (5.70)	618 (6.83)	236 (63.78)	375 (16.12)	1830 (8.21)
Grievous	3659 (34.68)	3302 (36.49)	51 (13.78)	956 (41.08)	7968 (35.73)
Simple	6291 (59.62)	5130 (56.69)	83 (22.43)	996 (42.80)	12500 (56.06)

NATURE OF INJURY V/S SEVERITY

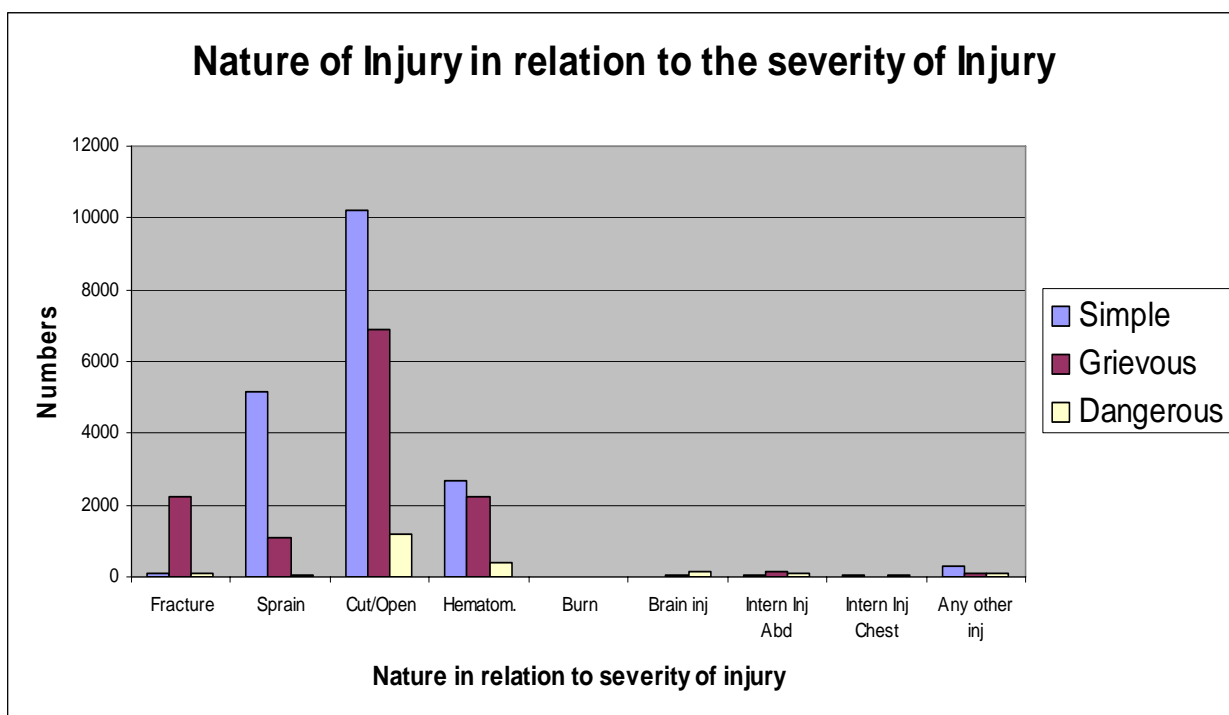


Fig 10

Table 9: Nature of injury v/s Severity

PART	SIMPLE (%)	GREVIOUS (%)	DANGEROUS (%)
FRACTURE	89 (3.63)	2256 (92.01)	107 (4.36)
SPRAIN	5137 (81.89)	1078 (17.18)	58 (0.92)
CUT OR OPEN WOUND	10208 (55.76)	6892 (37.65)	1207 (6.59)
HAEMOTOMA/WOUND	2670 (50.30)	2219 (41.80)	419 (7.89)
BURN WITH %	3 (21.43)	5 (35.71)	6 (42.86)
BRAIN INJURY	6 (3.33)	49 (27.22)	125 (69.44)
INTERNAL INJURY ABDONMEN	46 (13.86)	170 (51.20)	116 (34.94)
INTERNAL INJURY CHEST	33 (37.93)	15 (17.24)	39 (44.83)
ANY OTHER INJURY	277 (55.51)	111 (22.24)	111 (22.24)

Table 10: Nature of Injury

PART	Number	Percentage
Fracture	2460	8.85
Sprain	6272	22.55
Cut or open wound	18317	65.86
Haemotoma wound	5319	19.13
Burn with %	14	0.05
Brain Injury	181	0.65
Internal Injury abdomen	343	1.23
Internal Injury chest	90	0.32
Any other injury	536	1.93

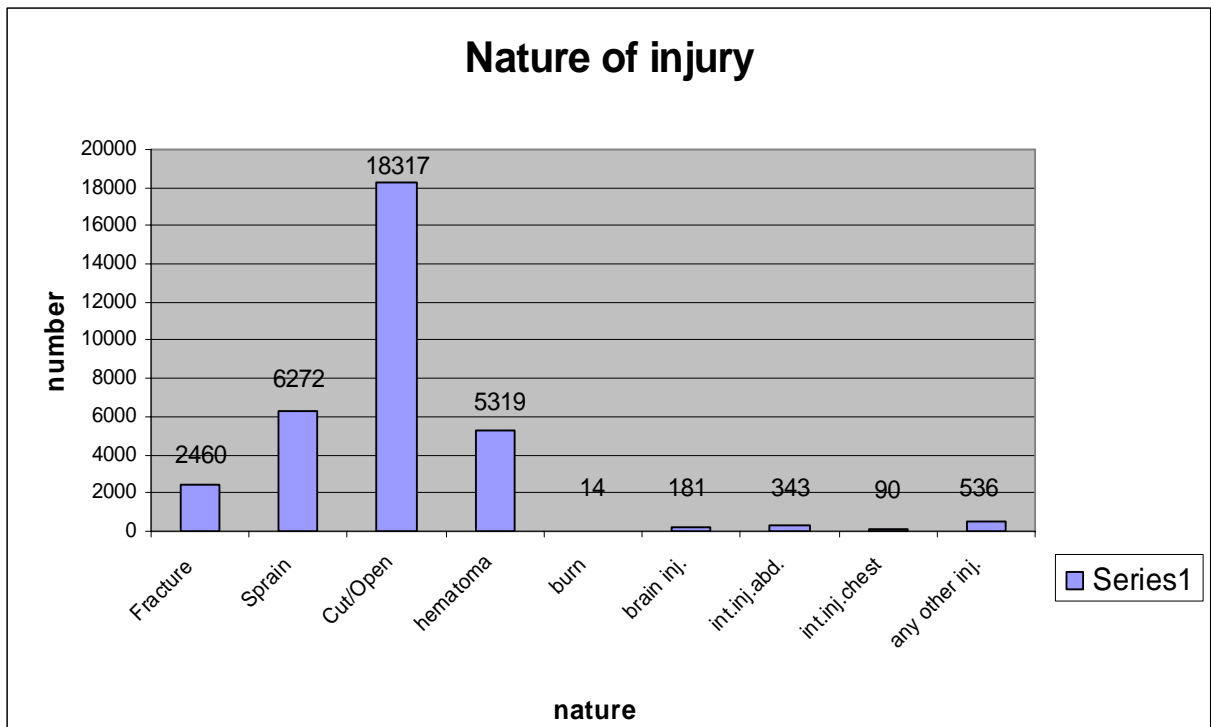


Fig 11

AGE DISTRIBUTION OF CAUSE OF INJURY IN MALES

Table 11: Age Distribution cause of injury in males

CAUSE OF INJURY	<5 YEARS	5-14 YEARS	15-24 YEARS	25-49 YEARS	50-64 YEARS	65+ YEARS	TOTAL
ASSAULT	88 (17.92)	218 (21.71)	3713 (53.09)	5758 (48.25)	677 (44.86)	182 (41.94)	10636 (47.5)
RTA	121 (24.64)	461 (45.92)	2566 (36.69)	4991 (41.82)	666 (44.14)	185 (42.63)	8990 (40.19)
SUICIDE	15 (3.05)	14 (1.39)	149 (2.13)	184 (1.54)	18 (1.19)	7 (1.61)	387 (1.73)
UNINTENTIONAL/ACCIDENT	267 (54.38)	311 (30.98)	566 (8.09)	1001 (8.39)	148 (9.81)	60 (13.82)	2353 (10.52)

AGE DISTRIBUTION OF CAUSE OF INJURY IN FEMALES

Table 12: Age distribution cause of injury in females

CAUSE OF INJURY	<5 YEARS	5-14 YEARS	15-24 YEARS	25-49 YEARS	50-64 YEARS	65+ YEARS	TOTAL
ASSAULT	44 (20.47)	135 (31.11)	570 (50.04)	1427 (59.02)	206 (43.64)	63 (42.86)	2445 (50.67)
RTA	48 (22.33)	162 (37.33)	347 (30.47)	658 (27.21)	188 (39.83)	51 (34.69)	1454 (30.13)
SUICIDE	11 (5.12)	3 (0.69)	85 (7.46)	99 (4.09)	9 (1.91)	2 (1.36)	209 (4.33)
UNINTENTIONAL/ACCIDENT	112 (52.09)	134 (30.88)	137 (12.03)	234 (9.68)	69 (14.62)	31 (21.09)	717 (14.86)

PLACE OF INJURY

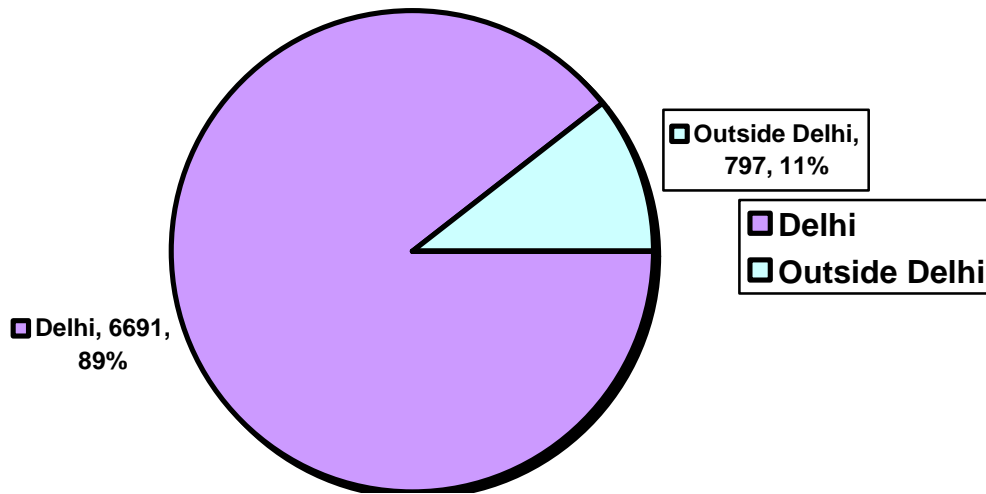


Fig 12

EDUCATION DISTRIBUTION

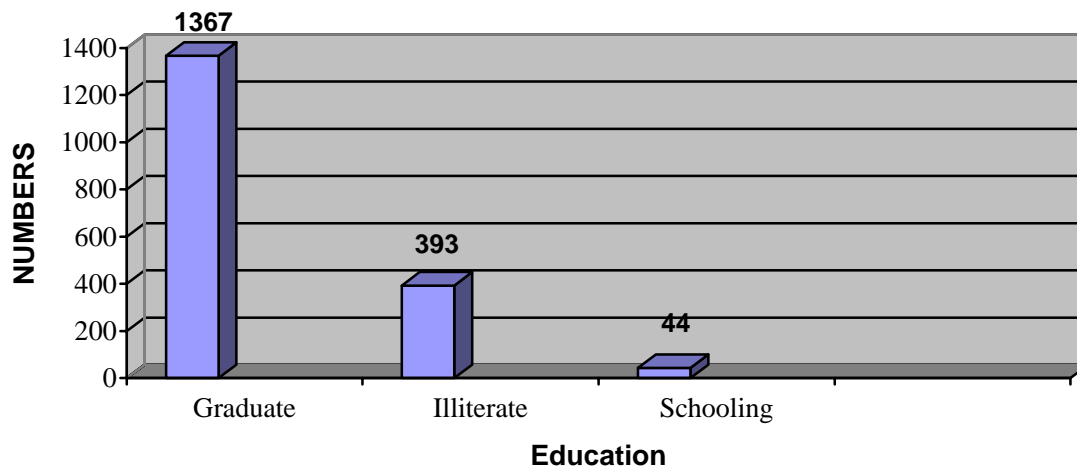


Fig 13

SEVERITY OF INJURY BY EDUCATIONAL STATUS IN BOTH GENDERS

Table 13 Severity of injury by education status in males

Type of Injury	Graduate	Illiterate	Not Known	Schooling	Total
Dangerous	97 (8.61)	8 (32.00)	1677 (8.05)	48 (15.24)	1830 (8.21)
Grievous	45 (4.00)	2 (8.00)	7910 (37.97)	11 (3.49)	7968 (35.73)
Simple	984 (87.39)	15 (60.00)	11245 (53.98)	256 (81.27)	12500 (56.06)

Table 14: Severity of injury by education status in Females

Type of Injury	Graduate	Illiterate	Not Known	Schooling	Total
Dangerous	22 (9.32)	5 (26.32)	490 (11.16)	14 (18.42)	531 (11.25)
Grievous	5 (2.12)	1 (5.26)	1525 (34.74)	10 (13.16)	1541 (32.64)
Simple	209 (88.56)	13 (68.42)	2375 (54.10)	52 (68.42)	2649 (56.11)

SEVERITY OF INJURY BY OCCUPATION FOR BOTH GENDERS

Table 15: Injury type v/s occupation: Males

TYPE OF INJURY	OTHERS	UNEMPLOYMENT	EMPLOYED
DANGEROUS	1828 (8.20)	1 (25.00)	1 (7.14)
GRIEVOUS	7963 (35.74)	0 (0.00)	5 (35.71)
SIMPLE	12489 (56.05)	3 (75.00)	8 (57.14)

Table 16: Injury type occupation : Females

TYPE OF INJURY	OTHERS	UNEMPLOYMENT	EMPLOYED	TOTAL
DANGEROUS	531 (11.25)	0 (0.00)	0 (0.00)	531 (11.25)
GRIEVOUS	1540 (32.64)	1 (50.00)	0 (0.00)	1541 (32.64)
SIMPLE	2647 (56.10)	1 (50.00)	1 (100.00)	2649 (56.11)

SEVERITY OF INJURY BY PLACE OF RESIDENCE BOTH GENDERS

Table 17: Severity of injury v/s place of residence in males

Type of Injury	Delhi	Outside Delhi	Total
Dangerous	449 (8.37)	81 (12.20)	530 (8.79)
Grievous	1793 (33.43)	250 (37.65)	2043 (33.89)
Simple	3122 (58.20)	333 (50.15)	3455 (57.32)

Table 18: Severity of injury by place of residence in females

Type of Injury	Delhi	Outside Delhi	Total
Dangerous	151 (13.21)	14 (13.08)	165 (13.20)
Grievous	328 (28.70)	38 (35.51)	366 (29.28)
Simple	664 (58.09)	55 (51.40)	719 (57.52)

SEVERITY OF INJURY BY CAUSE OF INJURY MALE

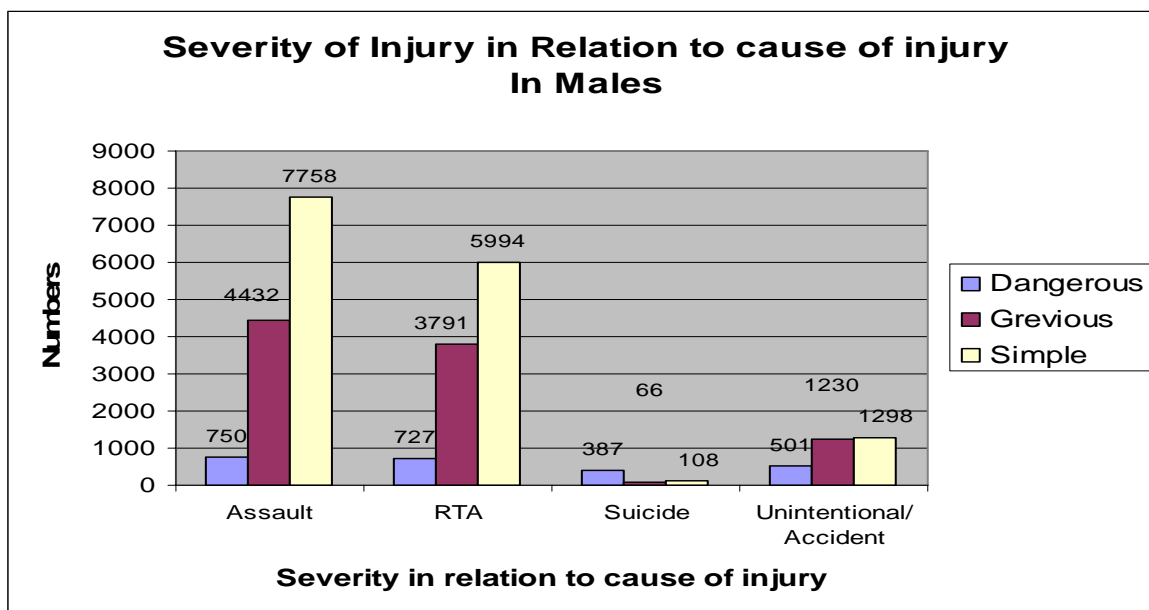


Fig 14

Table 19: Severity in relation of Cause of Injury in Male

Type of Injury	Assault	RTA	Suicide	Unintentional/Accident	Total
Dangerous	750 (5.80)	727 (6.92)	387 (68.98)	501 (16.54)	2365 (8.75)
Grievous	4432 (34.25)	3791 (36.06)	66 (11.76)	1230 (40.61)	9519 (35.20)
Simple	7758 (59.95)	5994 (57.02)	108 (19.25)	1298 (42.85)	15158 (56.05)
Total	12940	10512	561	3029	27042

SEVERITY OF INJURY BY CAUSE OF INJURY IN FEMALES

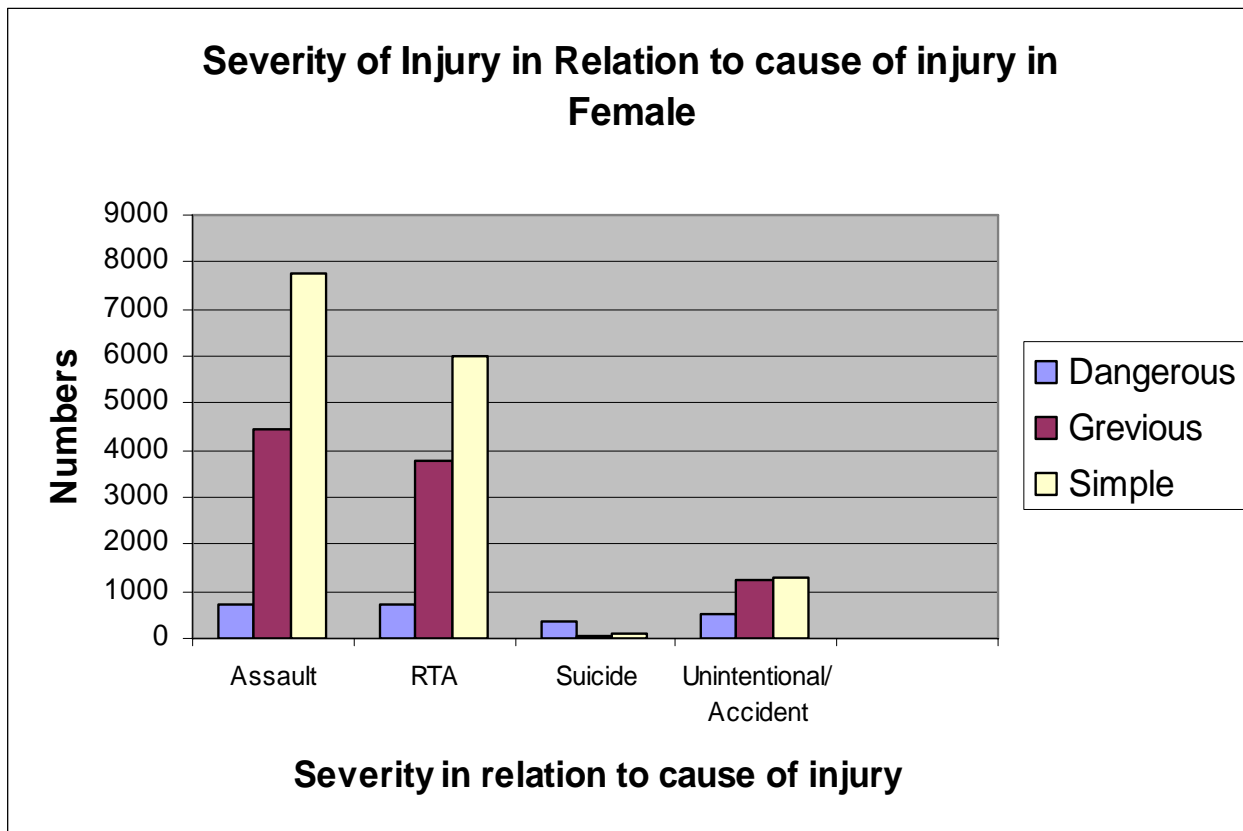


Fig 15

Table 20: Severity in relation to cause of injury in female

TYPE INJURY	ASSAULT (%)	RTA (%)	SUICIDE (%)	UNINTENTIONAL ACCIDENT (%)	TOTAL (%)
DANGEROUS	750 (5.80)	727 (6.92)	387 (68.98)	501 (16.54)	2365 (8.75)
GREVIOUS	4432 (34.25)	3791 (36.06)	66 (11.76)	1230 (40.61)	9519 (35.20)
SIMPLE	7758 (59.95)	5994 (57.02)	108 (19.25)	1298 (42.85)	15158 (56.05)
TOTAL	12940 100.00	10512 100.00	561 100.00	3029 100.00	27042 100.00

ALCOHOL CONSUMPTION

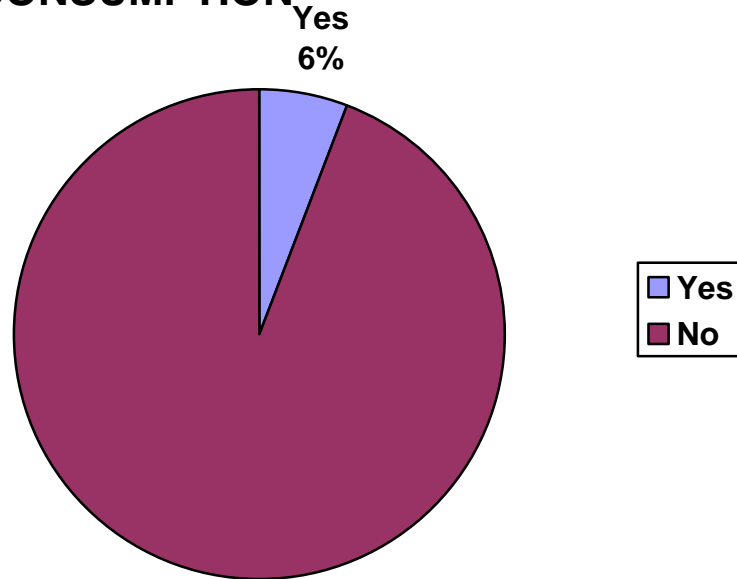


Fig 16

SEVERITY OF INJURY V/S ALCOHOL CONSUMPTION

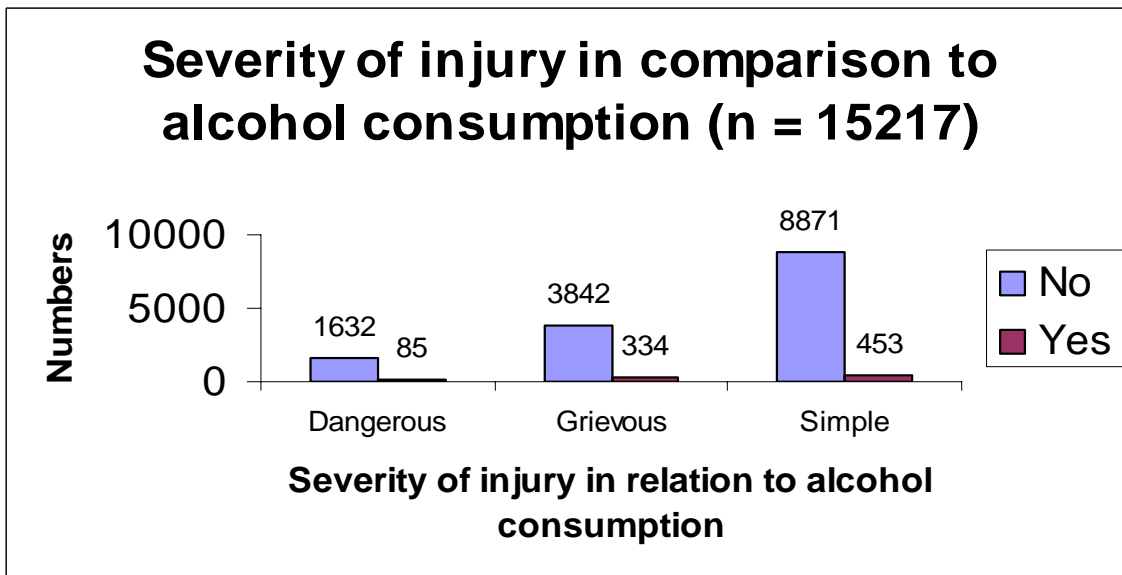


Fig 17

TYPE OF COLLISION

Table 20: Type of Collision

RTA Collision Type	Freq.	Percent	Cum
Head of Collision	71	0.67	0.67
Hit Pedestrian	159	1.50	2.16
Hit and Run	45	0.42	2.59
Hit fixed object	31	0.29	2.88
Hit from Back	245	2.30	5.18
Hit from Side	205	1.93	7.11
Nose to Tail Collision	13	0.12	7.23
Others	9371	88.11	95.35
Overturn	110	1.03	96.38
Run off Road	27	0.25	96.63
Skid	358	3.37	3.37
Total	10,635	100.00	

RTA COLLISION TYPE AGE DISTRIBUTION IN BOTH GENDERS

Table 21: RTA collision Type – age distribution Male

CAUSE OF INJURY	>5 YEARS	5-14 YEARS	15-24 YEARS	25-49 YEARS	50-64 YEARS	65+ YEARS	TOTAL
Head of Collision	0 (0.00)	6 (1.31)	14 (0.55)	37 (0.74)	3 (0.45)	0 (0.00)	60 (0.67)
Hit Pedestrian	2 (2.02)	20 (4.36)	29 (1.13)	66 (1.33)	8 (1.21)	6 (3.30)	131 (1.46)
Hit and Run	1 (1.01)	4 (0.87)	12 (0.47)	15 (0.30)	5 (0.76)	0 (0.00)	37 (0.41)
Hit fixed object	0 (0.00)	4 (0.87)	6 (0.23)	13 (0.26)	3 (0.45)	1 (0.55)	27 (0.30)
Hit from Back	4 (4.04)	12 (2.61)	56 (2.19)	118 (2.37)	15 (2.27)	3 (1.65)	208 (2.33)
Hit from Side	2 (2.02)	16 (3.49)	47 (1.83)	85 (1.71)	7 (1.06)	2 (1.10)	159 (1.78)
Nose to Tail Collision	0 (0.00)	2 (0.44)	5 (0.20)	2 (0.04)	2 (0.30)	0 (0.00)	11 (0.12)
Others	81 (81.82)	373 (81.26)	2,261 (88.25)	4,448 (89.30)	588 (88.82)	159 (87.36)	7,910 (88.43)
Overturn	1 (1.01)	5 (1.09)	24 (0.94)	87 (0.97)	49 (0.98)	7 (1.06)	1 (0.55)
Run off Road	0 (0.00)	3 (0.65)	4 (0.16)	12 (0.24)	4 (0.60)	2 (1.10)	25 (0.28)
Skid	8 (8.08)	14 (3.05)	104 (4.06)	136 (2.73)	20 (3.02)	8 (4.40)	290 (3.24)

Table 22: RTA collision Type – age distribution Female

RTA Collision Type	>5 YEARS	5-14 YEARS	15-24 YEARS	25-49 YEARS	50-64 YEARS	65+ YEARS	TOTAL
Head of Collision	0 (0.00)	1 (0.62)	2 (0.58)	4 (0.61)	1 (0.53)	1 (2.00)	9 (0.62)
Hit Pedestrian	0 (0.00)	2 (1.23)	6 (1.73)	8 (1.21)	7 (3.74)	2 (4.00)	25 (1.72)
Hit and Run	1 (2.13)	2 (1.23)	1 (0.29)	2 (0.30)	0 (0.00)	2 (4.00)	8 (0.55)
Hit fixed object	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	2 (1.07)	0 (0.00)	2 (0.14)
Hit from Back	1 (2.13)	10 (6.17)	7 (2.02)	11 (1.67)	1 (0.53)	0 (0.00)	30 (2.07)
Hit from Side	1 (2.13)	4 (2.47)	7 (2.02)	13 (1.97)	9 (4.81)	2 (4.00)	36 (2.48)
Nose to Tail Collision	1 (2.13)	0 (0.00)	1 (0.29)	0 (0.00)	0 (0.00)	0 (0.00)	2 (0.14)
Others	42 (89.36)	124 (76.54)	299 (86.42)	588 (89.23)	162 (86.63)	43 (86.00)	1258 (86.70)
Overturn	1 (2.13)	5 (3.09)	5 (1.45)	9 (1.37)	1 (0.53)	0 (0.00)	21 (1.45)
Run off Road	0 (0.00)	0 (0.00)	1 (0.29)	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.07)
Skid	0 (0.00)	14 (8.64)	17 (4.91)	24 (3.64)	4 (2.14)	0 (0.00)	59 (4.07)

SEVERITY OF INJURY IN RELATION TO TYPE OF COLLISION

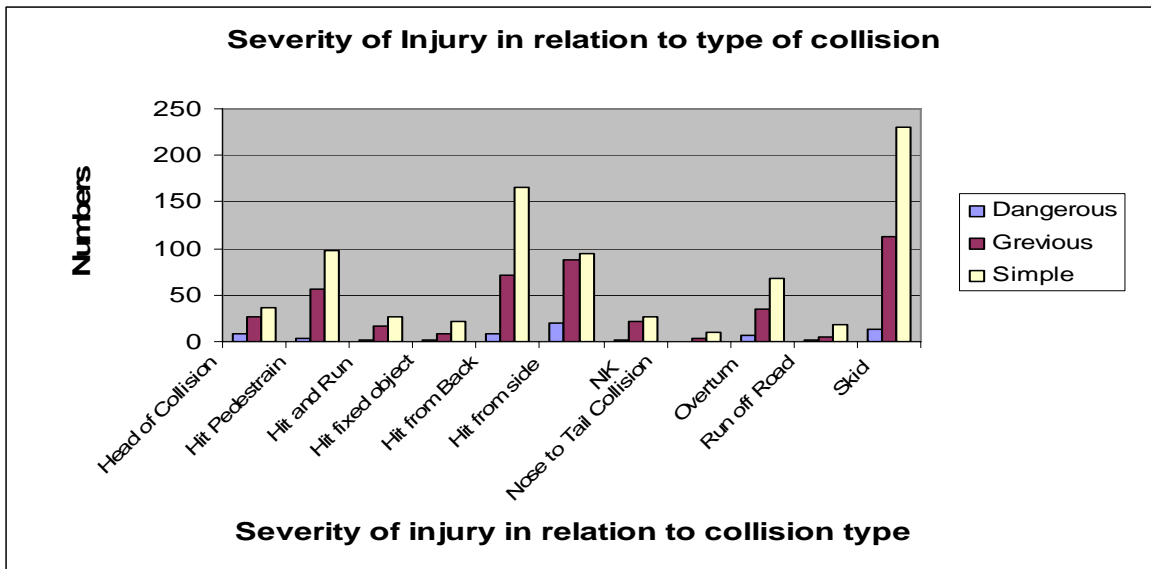


Fig 18

Table 23: Severity of Injury by Type of Collision

TYPE OF COLLISION	DANGEROUS	GRIEVOUS	SIMPLE	TOTAL
Head of Collision	8 (1.10)	27 (0.71)	36 (0.60)	71 (0.68)
Hit Pedestrian	4 (0.55)	56 (1.48)	98 (1.63)	158 (1.50)
Hit and Run	1 (0.14)	17 (0.45)	27 (0.45)	45 (0.43)
Hit fixed object	2 (0.27)	8 (0.21)	21 (0.35)	31 (0.29)
Hit from Back	8 (1.10)	71 (1.87)	165 (2.75)	244 (2.32)
Hit from Side	20 (2.75)	87 (2.29)	94 (1.57)	201 (1.91)
NK	2 (0.27)	22 (0.58)	27 (0.45)	51 (0.48)
Nose to Tail Collision	0 (0.00)	3 (0.08)	10 (0.17)	13 (0.12)
Others	661 (90.80)	3348 (88.29)	5201 (86.74)	9210 (87.58)
Overturn	7 (0.96)	35 (0.92)	68 (1.13)	110 (1.05)
Run off Road	2 (0.27)	5 (0.13)	19 (0.32)	26 (0.25)
Skid	13 (1.79)	113 (2.98)	230 (3.84)	356 (3.39)

VEHICLE INVOLVED IN RTA

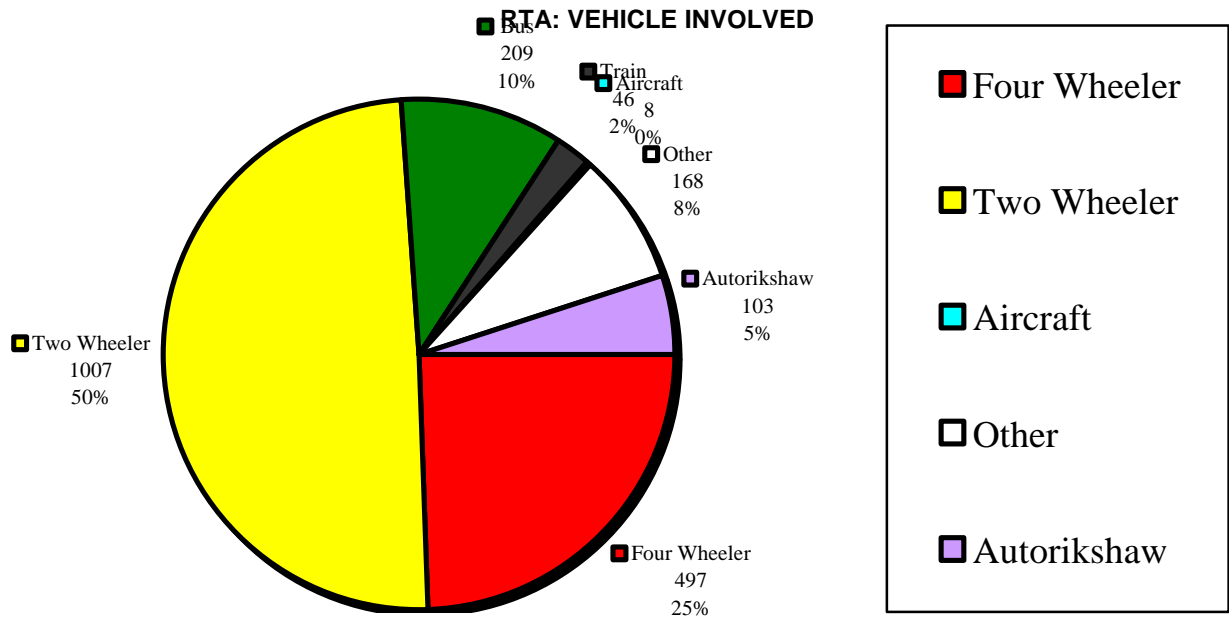


Fig 19

HELMET USE

RTA: HELMET

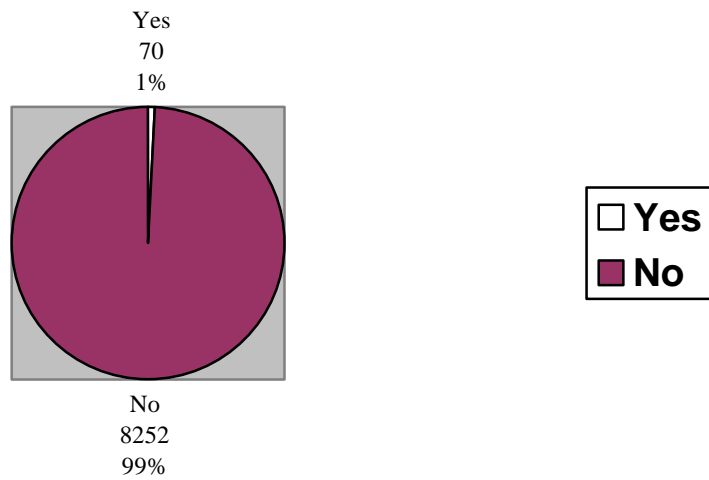


Fig 20

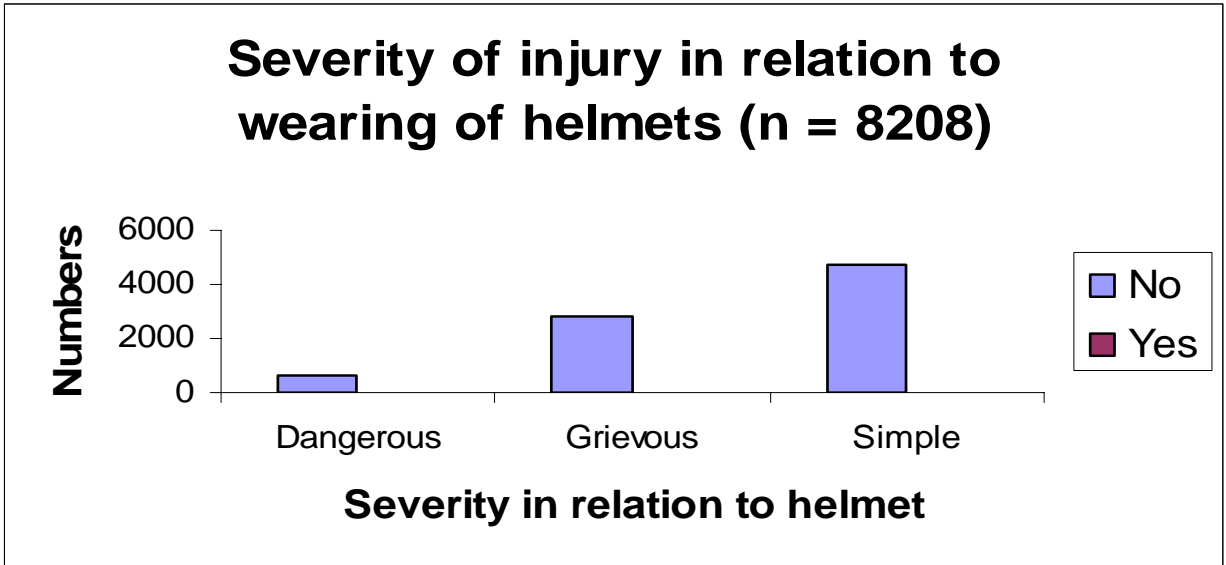


Fig 21

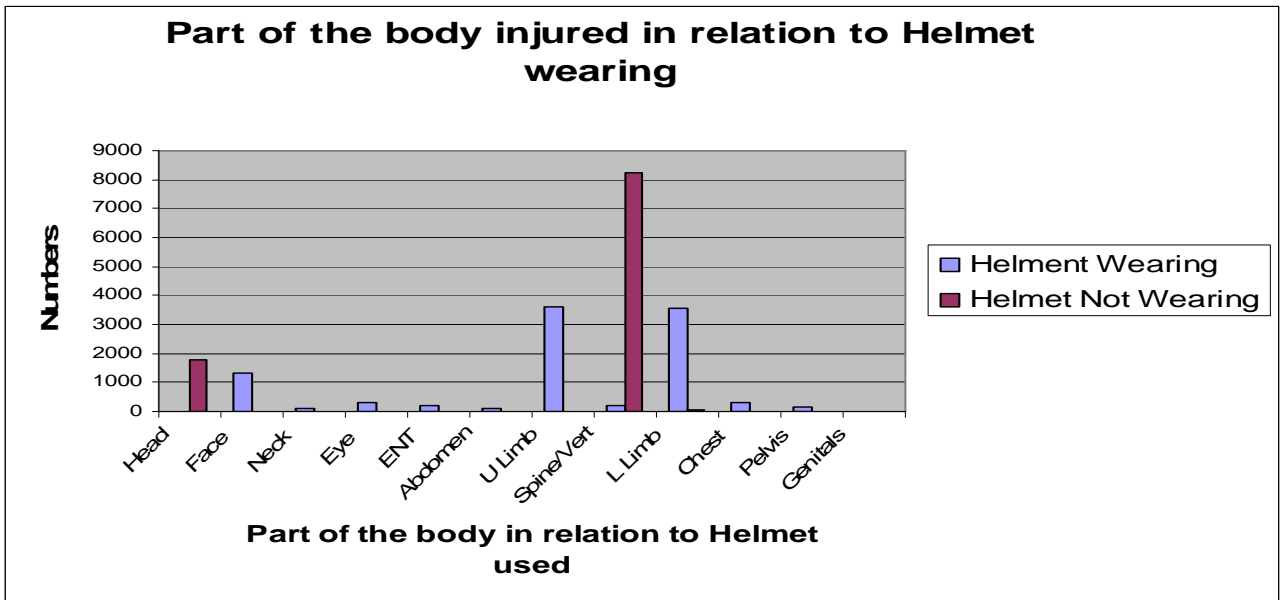


Fig 22

Table 24: Part of the body injured in relation to Helmet use

PART OF BODY INJURED	HELMET WEARING	HELMET NOT WEARING
HEAD	17 (0.96)	1756 (99.04)
FACE	1299 (99.39)	8 (0.61)
NECK	118 (97.52)	3 (2.48)
EYE	298 (99.67)	1 (0.33)
ENT	196 (98.49)	3 (1.51)
CHEST	324 (99.08)	3 (0.92)
ABDOMEN	114 (98.28)	2 (1.72)
UPPER LIMBS	3593 (99.36)	23 (0.64)
LOWER LIMBS	3550 (99.27)	26 (0.73)
SPINE/VERT. COLUMN	205 (99.51)	8252 (99.16)
PELVIS	156 (99.36)	1 (0.64)
GENITALS/PERINEUM	22 (100.00)	0 (0.00)

WHO GAVE THE FIRST AID**Table 25: Cause of injury in relation to the person who gave first aid**

Pre-Hospital Details	Assault	RTA	Unintentional/Accident	Total
Doctor	12 (92.31)	29 (93.55)	12 (100.00)	53 (94.64)
Others	0 (0.00)	1 (3.23)	0 (0.00)	1 (1.79)
Para Medic/Health Worker	0 (0.00)	1 (3.23)	0 (0.00)	1 (1.79)
Police	1 (7.69)	0 (0.00)	0 (0.00)	1 (1.79)

MODE OF TRANSPORTATION BY AREA OF RESIDENCE

PRE-HOSPITAL - MODE OF TRANSPORT

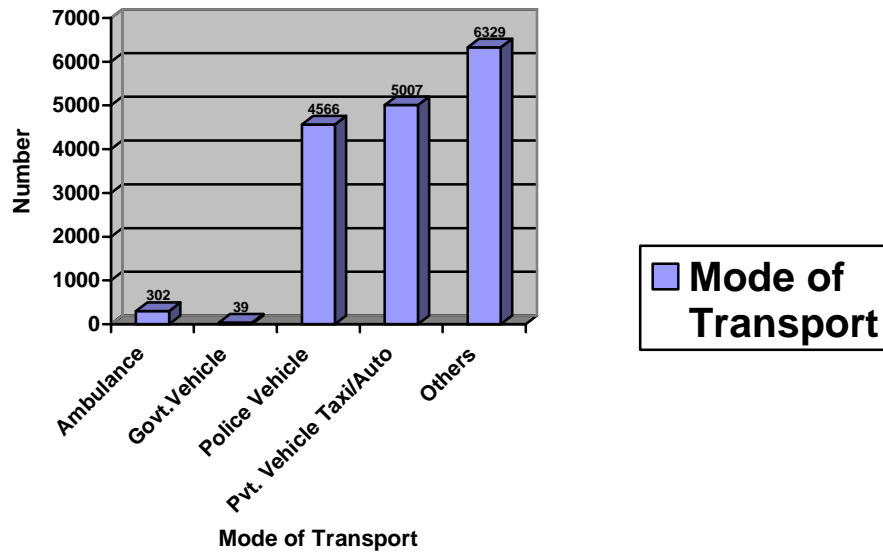


Fig 23

Table 26: Mode of transport in relation to the area of residence

Mode of Transport	Delhi	Outside Delhi	Total
Ambulance	72 (1.90)	12 (2.73)	84 (1.98)
Govt. Vehicle	11 (0.29)	0 (0.00)	11 (0.26)
Others	1915 (50.42)	256 (58.31)	2171 (51.24)
Police Vehicle	1018 (26.80)	69 (15.72)	1087 (25.65)
Pvt. Vehicle/Taxi	782 (20.59)	102 (23.23)	884 (20.86)

OUTCOME OF THE PATIENT IN RELATION TO SEVERITY OF INJURY

Type of Injury: Outcome

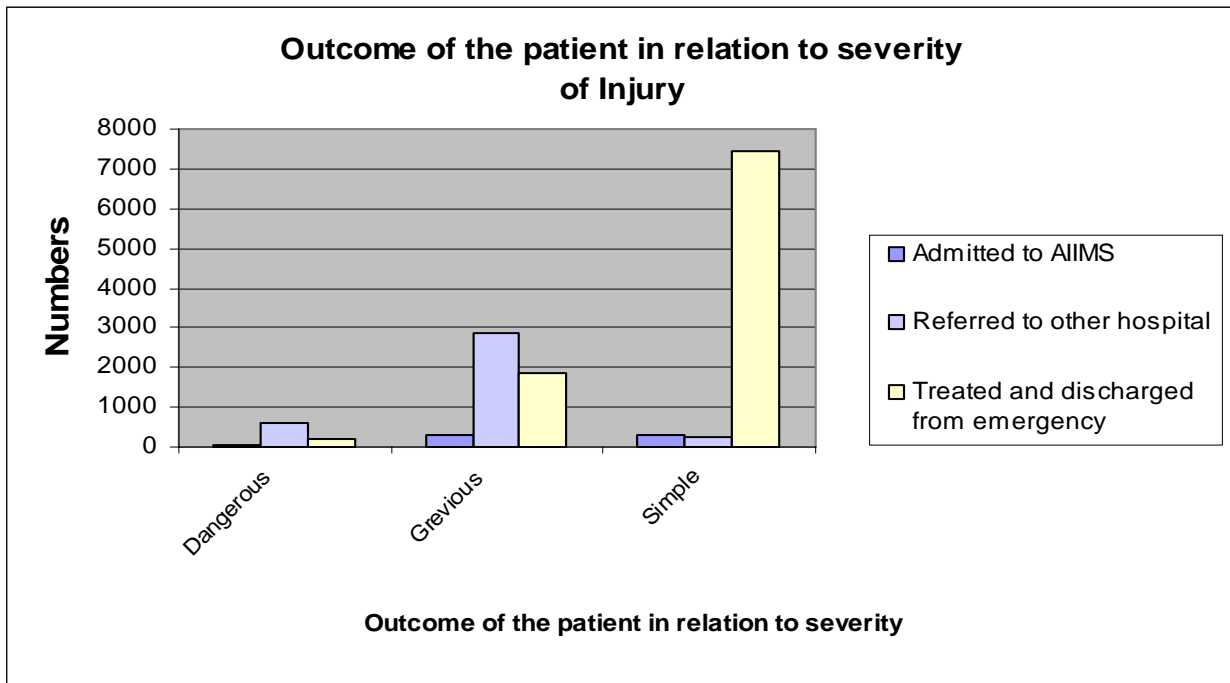


Fig 24

Table 27: Outcome of the patient in relation to severity of injury

Type of Injury	Admitted	Referred	Treated and Discharged from Emergency	Total
Dangerous	73 (10.17)	615 (16.63)	177 (1.86)	865 (6.21)
Grievous	32 (44.57)	2855 (77.20)	1872 (19.68)	5047 (36.24)
Simple	325 (45.26)	228 (6.17)	7462 (78.46)	8015 (57.55)
Total	718	3698	9511	13927

OUTCOME BY GENDER

Table 28: Outcome by sex

Outcome	Female	Male	Total
Admitted to AIIMS	118 (5.08)	611 (5.25)	729 (5.22)
Referred to other Hospital	605 (26.06)	3115 (26.75)	3720 (26.63)
Treated and Discharge from Emergency	1599 (68.86)	7919 (68.00)	9518 (68.15)
Total	2322	11645	13967

OUTCOME OF THE PATIENT IN RELATION TO PART OF THE BODY INJURED

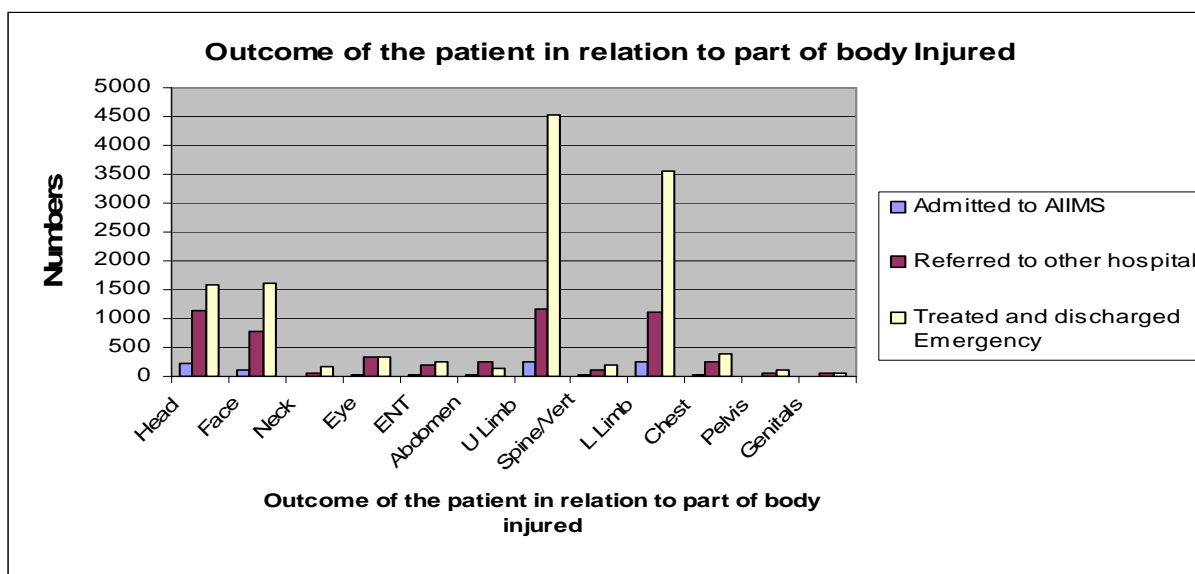


Fig 25

Table 29: Outcome of the patient in relation to part of the body injured

Outcome	Admitted to AIIMS	Referred to other Hospital	Treated and Discharge from Emergency	Total
Head	220 (7.46)	1135 (38.50)	1593 (54.04)	2948
Face	100 (4.04)	768 (31.06)	1605 (64.90)	2473
Neck	10 (3.86)	69 (26.64)	180 (69.50)	259
Eye	20 (2.87)	335 (48.06)	342 (49.07)	697
ENT	22 (4.50)	208 (42.54)	259 (52.97)	489
Abdomen	37 (8.33)	260 (58.56)	147 (33.11)	444
Upper Limb	245 (4.05)	1177 (19.47)	4623 (76.48)	6045
Spine/ Vert. Column	17 (5.14)	122 (36.86)	192 (58.01)	331
Lower Limb	249 (5.08)	1099 (22.44)	3549 (72.47)	4897
Chest	38 (5.62)	261 (38.61)	377 (55.77)	676
Pelvis	9 (4.95)	58 (31.87)	115 (63.19)	182
Genitals/Perineum	5 (5.26)	48 (50.53)	42 (44.21)	95

TYPE OF INJURY v/s CAUSE OF INJURY IN MALE

Table 30: Type of injury in relation to cause of injury

Type of Injury	Assault	RTA	Suicide	Unintentional/Accident	Total
Dangerous	750 (5.80)	727 (6.92)	387 (68.98)	501 (16.54)	2365 (8.75)
Grievous	4432 (34.25)	3791 (36.06)	66 (11.76)	1230 (40.61)	9519 (35.20)
Simple	7758 (59.95)	5994 (57.02)	108 (19.25)	1298 (42.85)	15158 (56.05)
Total	12940	10512	561	3029	27042

TYPE OF INJURY BY GENDER

Table 31: Type of injury in relation to gender

Type of Injury	Female	Male	Total
Dangerous	531 (11.25)	1830 (8.21)	2361 (8.74)
Grievous	1541 (32.64)	7968 (35.73)	9509 (35.19)
Simple	2649 (56.11)	12500 (56.06)	15149 (56.07)
Total	4721	22298	27019

OUTCOME BY GENDER

Table 32: Outcome of the patient in relation to gender

Outcome	Female	Male	Total
Admitted to AIIMS	118 (5.08)	611 (5.25)	729 (5.22)
Referred to other Hospital	605 (26.06)	3115 (26.75)	3720 (26.63)
Treated and Discharge from Emergency	1599 (68.86)	7919 (68.00)	9518 (68.15)
Total	2322	11645	13967

INJURY TYPE: MALE DIFFERENT AGE GROUPS

Table 33: Distribution of severity of injury according to age in male

Type of Injury	>5 YEARS	5-14 YEARS	15-24 YEARS	25-49 YEARS	50-64 YEARS	65+ YEARS	TOTAL
Dangerous	51 (10.76)	91 (9.28)	555 (8.08)	948 (8.16)	107 (7.55)	43 (10.36)	1795 (8.24)
Grievous	235 (49.58)	401 (40.88)	2264 (32.95)	4141 (35.66)	559 (39.42)	157 (37.83)	7757 (35.63)
Simple	188 (39.66)	489 (49.85)	4052 (58.97)	6525 (56.18)	752 (53.03)	215 (51.81)	12221 (56.13)

INJURY TYPE: FEMALE DIFFERENT AGE GROUPS

Table 34: Distribution of severity of injury according to age in female

Type of Injury	>5 YEARS	5-14 YEARS	15-24 YEARS	25-49 YEARS	50-64 YEARS	65+ YEARS	TOTAL
Dangerous	28 (13.93)	32 (7.64)	166 (15.29)	236 (10.03)	50 (11.06)	13 (9.35)	525 (11.29)
Grievous	90 (44.78)	197 (47.02)	335 (30.85)	673 (28.61)	151 (33.41)	64 (46.04)	1510 (32.48)
Simple	83 (41.29)	190 (45.35)	585 (53.87)	1443 (61.35)	251 (55.53)	62 (44.60)	2614 (56.23)

SEVERITY OF INJURY V/S EDUCATION: MALE

Table 35: severity of injury in relation to education

Type of Injury	Graduate	Illiterate	Not Known	Schooling	Total
Dangerous	97 (8.61)	8 (32.00)	1677 (8.05)	48 (15.24)	1830 (8.21)
Grievous	45 (4.00)	2 (8.00)	7910 (37.97)	11 (3.49)	7968 (35.73)
Simple	984 (87.39)	15 (60.00)	11245 (53.98)	256 (81.27)	12500 (56.06)

SEVERITY OF INJURY V/S OCCUPATION: MALE

Table 36: Severity of injury in relation to occupation

Type of Injury	Others	Unemployment	Employed
Dangerous	1828 (8.20)	1 (25.00)	1 (7.14)
Grievous	7963 (35.74)	0 (0.00)	5 (35.71)
Simple	12489 (56.05)	3 (75.00)	8 (57.14)

SEVERITY OF INJURY V/S PLACE: MALE

Table 37: Severity of injury in relation to gender

Type of Injury	Delhi	Outside Delhi	Total
Dangerous	449 (8.37)	81 (12.20)	530 (8.79)
Grievous	1793 (33.43)	250 (37.65)	2043 (33.89)
Simple	3122 (58.20)	333 (50.15)	3455 (57.32)

SEVERITY OF INJURY V/S EDUCATION : FEMALE

Table 38: Severity of injury in relation to education in female

Type of Injury	Graduate	Illiterate	Not Known	Schooling	Total
Dangerous	22 (9.32)	5 (26.32)	490 (11.16)	14 (18.42)	531 (11.25)
Grievous	5 (2.12)	1 (5.26)	1525 (34.74)	10 (13.16)	1541 (32.64)
Simple	209 (88.56)	13 (68.42)	2375 (54.10)	52 (68.42)	2649 (56.11)

SEVERITY OF INJURY V/S EDUCATION: MALE

Table 39: Severity of injury in relation to occupation in female

Type of Injury	Others	Unemployment	Employed	Total
Dangerous	531 (11.25)	0 (0.00)	0 (0.00)	531 (11.25)
Grievous	1540 (32.64)	1 (50.00)	0 (0.00)	1541 (32.64)
Simple	2647 (56.10)	1 (50.00)	1 (100.00)	2649 (56.11)

SEVERITY OF INJURY V/S PLACE: FEMALE

Table 40: Severity of injury in relation to place of residence

Type of Injury	Delhi	Outside Delhi	Total
Dangerous	151 (13.21)	14 (13.08)	165 (13.20)
Grievous	328 (28.70)	38 (35.51)	366 (29.28)
Simple	664 (58.09)	55 (51.40)	719 (57.52)

SEVERITY OF INJURY IN RELATION TO CAUSE OF INJURY IN MALE

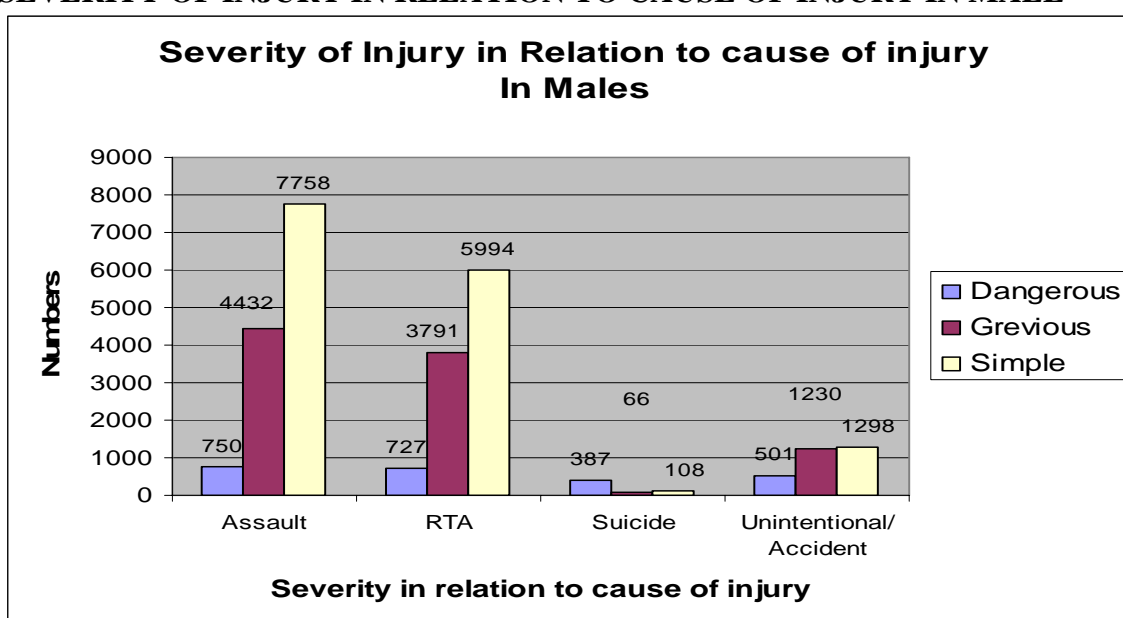


Fig 26

Table 41: Severity of injury in relation to cause of injury (Male)

Type of Injury	Assault	RTA	Suicide	Unintentional/Accident	Total
Dangerous	601 (5.70)	618 (6.83)	236 (63.78)	375 (16.12)	1830 (8.21)
Grievous	3659 (34.68)	3302 (36.49)	51 (13.78)	956 (41.08)	7968 (35.73)
Simple	6291 (59.62)	5130 (56.69)	83 (22.43)	996 (42.80)	12500 (56.06)

SEVERITY OF INJURY IN RELATION TO CAUSE OF INJURY IN FEMALE

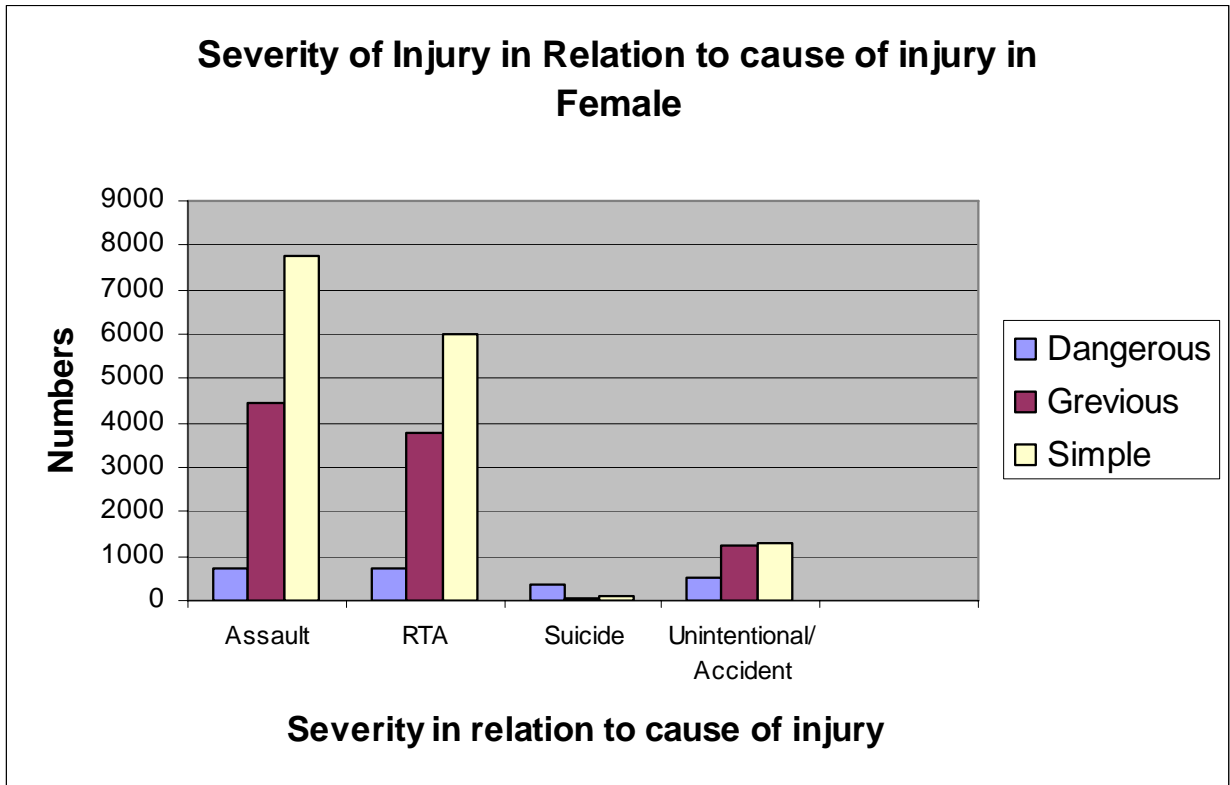


Fig 27

Table 42: Severity of injury in relation to cause of accident (Females)

Type of Injury	Assault	RTA	Suicide	Unintentional/Accident	Total
Dangerous	147 (6.18)	107 (7.38)	151 (79.06)	126 (18.00)	531 (11.25)
Grievous	770 (32.35)	484 (33.38)	15 (7.85)	272 (38.86)	1541 (32.64)
Simple	1463 (61.47)	859 (59.24)	25 (13.09)	302 (43.14)	2649 (56.11)
Total	2380	1450	191	700	4721

Table 43: Severity of injury in relation to the RTA collision type

RTA collision	Dangerous	Grievous	Simple	Total
Head of Collision	8 (1.10)	27 (0.71)	36 (0.60)	71 (0.68)
Hit Pedestrian	4 (0.55)	56 (1.48)	98 (1.63)	158 (1.50)
Hit and Run	1 (0.14)	17 (0.45)	27 (0.45)	45 (0.43)
Hit fixed object	2 (0.27)	8 (0.21)	21 (0.35)	31 (0.29)
Hit from Back	8 (1.10)	71 (1.87)	165 (2.75)	244 (2.32)
Hit from Side	20 (2.75)	87 (2.29)	94 (1.57)	201 (1.91)
NK	2 (0.27)	22 (0.58)	27 (0.45)	51 (0.48)
Nose to Tail Collision	0 (0.00)	3 (0.08)	10 (0.17)	13 (0.12)
Others	661 (90.80)	3348 (88.29)	5201 (86.74)	9210 (87.58)
Overturn	7 (0.96)	35 (0.92)	68 (1.13)	110 (1.05)
Run off Road	2 (0.27)	5 (0.13)	19 (0.32)	26 (0.25)
Skid	13 (1.79)	113 (2.98)	230 (3.84)	356 (3.39)

Table 45: Severity of injury in relation to the place where first aid was given

Pre where	Dangerous	Grievous	Simple	Tota
Ambulance	0 (0.00)	1 (2.50)	2 (13.33)	3 (4.23)
Nearby Govt. Hospital	6 (37.50)	14 (35.00)	9 (60.00)	29 (40.85)
Onsite	0 (0.00)	3 (7.50)	0 (0.00)	3 (4.23)
Others	0 (0.00)	0 (0.00)	1 (6.67)	1 (1.41)
Pvt. Hospital/Clinical	10 (62.50)	22 (55.00)	3 (20.00)	35 (49.30)

OUTCOME OF THE PATIENT IN RELATION TO SEVERITY OF INJURY

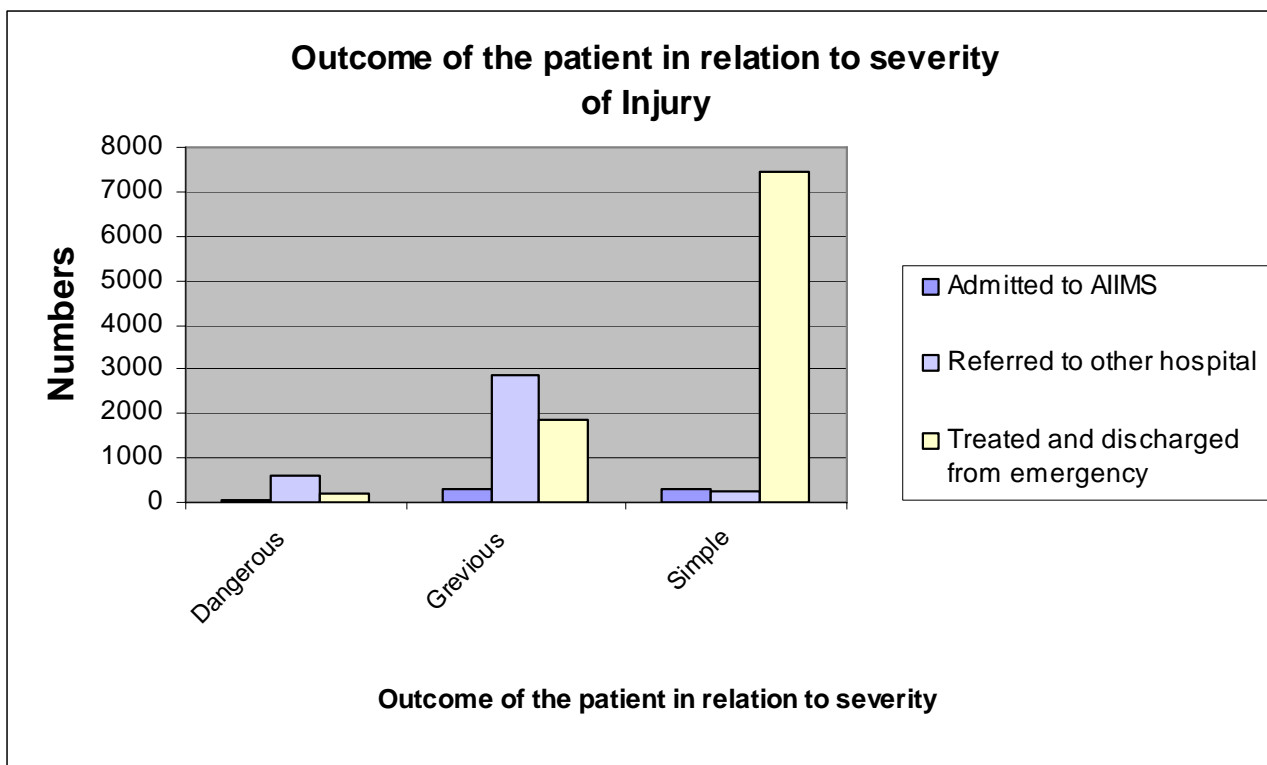


Fig 28

Table 46: Outcome v/s severity of Injury

Outcome	Dangerous	Grievous	Simple	Total
Admitted to AIIMS	73 (8.44)	320 (6.34)	325 (4.05)	718 (5.16)
Referred to other Hospital	615 (71.10)	2855 (56.57)	228 (2.84)	3698 (26.55)
Treated and Discharge from Emergency	177 (20.46)	1872 (37.09)	7462 (93.10)	9511 (68.29)

**SOME OF THE TABLES ARE ANALYSED AND GIVEN AS RAW DATA
FREQUENCY TABLES IN ANNEXURE – I
They Are**

BY AGE GROUP AND GENDER

**SITE OF INJURY
Page 60- 67**

**BY SEVERITY
Page 113-114**

**BY OUTCOME
Page 113**

**BY NATURE OF INJURY
Page 19-22 and 43-47**

**BY ACTIVITY AT THE TIME OF INJURY
Page 31-32**

**BY PLACE OF INJURY
Page 29-31**

**SEVERITY OF INJURY BY PLACE OF INJURY
PAGE 116-117**

DISCUSSION

1. Hospital Injury surveillance is feasible and can give a variety of information regarding injury patterns in hospital patients. The information can be shared between the stake holders for their requirements and policy framework.
 2. The retrospective study has guided us in the following ways:
 - a. Incorporation of more variables in the Medico-legal records so that most of the information regarding the surveillance can be retrieved from the Medico-legal records themselves.
 - b. Formulations of in-hospital injury surveillance formats. These formats are essential for collecting detailed data on injury surveillance and should ideally be incorporated into the hospital forms, to be filled in by the resident staff. But there are practical problems in resident doctors filling up this form as they already have lots of clinical work to do.

The data capture formats should be easy to use and should be made in consultation with the software professionals so that software can be developed for them to be used for data entry in an easy to use window.
 - c. The point of data entry into such a performa in prospective studies should be defined. Ideally all data should be collected in the emergency itself.
 - d. Strengthening of electronic data storage and data archiving platforms. The data storage in the computers should be protected and new platforms which are more secure be made.
 3. Incorporation of information regarding the initial condition of the patient while receiving in Emergency
 - a. Idea about the ISS scoring and outcome measures
 4. Broadly the variables in the WHO performa are comprehensive and cover the injury patterns fully.
 5. Difficulties in prospective data capture are mainly pertaining to
 - a. Trained Manpower for data capture and retrieval
 - b. Logistics like statistical analysis, format and software development etc.
- And these must be addressed, before prospective trials are initiated