

SEVERITY AND CAUSES OF ACCIDENTS ON MOTORWAY M-1 AND M-2

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ABSTRACT

Objective: To evaluate the severity and causes of accidents on motorways M-1 and M-2.

Study Design: Descriptive survey.

Place and Duration of Study: Department of Public Health, Sarhad University Islamabad Campus from Jan to Mar 2017.

Material and Methods: It was a census study and data of all accidents, occurred during 2015 (01 Jan-31 Dec), was collected by using National Highway and Motorway Police Forms (Form No: 1.1/ops, 1.2/ops and 1.3/ops). No sampling technique was involved as all accidents were studied.

Results: Out of total 453 accidents during 2015, 242 (53%) were non-fatal, 102 (23%) were fatal and 109 (24%) involved property damage. Out of total 153 deaths, 89 (58%) were passengers, 51 (33%) were drivers and 13 (9%) were pedestrians. Six hundred (77%) passengers were injured out of 769 and number of drivers injured was 169 (22%). Major causes of accidents were over speeding (39%), dozing at wheel (21%) and tyre bursts (15%). Most of accidents were reported on Saturdays and Sundays; 78 (17%) and 75 (16.5%) respectively, whereas least number reported on Fridays 49 (11%). Maximum number of accidents happened in December that was 69 (15%), followed by July and September (14% in each month).

Conclusion: According to the results of this study road accidents are more prevalent in male drivers (91%). Majority of crashes involved LTV (70%) and peak timings were midnight to early morning (30%) and afternoon (28%). Over speeding and dozing at wheel (63%) and poor tyre conditions (27%) were main causes of accidents requiring multi-sectoral approach along with community participation.

Keywords: Accidents, Causes, Motorway, Severity.

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INTRODUCTION

According to World Health Organization (WHO), globally 1.25 million people die in road traffic accidents every year and about 50 million sustain injuries. According to the statistics of road accidents in the last 10 years in Pakistan, 7,000 to 10,000 people die every year all over the country¹. Global disability adjusted life years (DALYs) due to road traffic accidents, in all ages, is 41.2 (millions) which is 27% of the total DALYs. Region wise DALYs is; 4.6 in America, 3.7 in European regions, 9.6 in Western Pacific region, 7.2 in Africa, 5.1 in East Mediterranean region and 11 in South East Asia². It is estimated that globally by the year 2020, road traffic crashes will account for about 23 million deaths and road

traffic injuries may become the third common cause of death and disability, from their current position of ninth. Mortality due to road traffic accidents is suspected to increase by 83% in developing countries and to decrease by 27% in developed countries³. Historically, health policies in Pakistan have been based towards curative services and tertiary health care rather than prevention. In such an environment, injuries cannot be a priority agenda for health decision makers. Road safety is a rising concern, like other non-communicable diseases, all over the world especially in the developing countries. Motorways are frequently used routes for transportation both for LTV and HTV and therefore account for a considerable number of road crashes. This study was planned to assess the severity and causes of accidents on motorways M-1 and M-2, to find out the epidemiological factors behind it. It aimed at grading the

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accidents on the basis of severity, determining various causes of accidents, factors affecting injury occurrence, number of deaths and injuries. According to royal automobile club (RAC) it was highlighted that rural roads are responsible for 62% of all fatal crashes as compared to urban roads that is 32% while contribution of motorway is only 6%. According to a study in Ireland the single most common contributing factor to road casualties is speed limit. High speed is the reason for more than 40% of fatal accidents. Speed increases both the risk and severity of the road crash injuries⁴. It is the common conclusion of many studies, conducted all over the world, that road traffic accidents affect males more than

low income countries (National Road Safety, 2009). The social costs of road traffic accident have been calculated and found to be around 1% GDP in developing countries and 2-3% in developed countries⁷. The purpose of this document is to provide the reader with an over view of a number of factors related to severity and causes of accidents on M-1 and M-2 because road traffic injuries are a leading but least concerned public health issue which require effective efforts and sustainable preventive measures.

MATERIAL AND METHODS

It was a descriptive survey based on a census study and data of all accidents, occurred during

Table-I: Severity wise distribution of accidents on M1 and M2 in 2015.

Severity	M-1	M-2	Total
Fatal	24 (16.67%)	78 (25.24%)	102 (23%)
Non-fatal	72 (50%)	170 (55.02%)	242 (53%)
Property damage	48 (33.33%)	61 (19.74%)	109 (24%)
Total	144 (100%)	309 (100%)	453 (100%)

Table-II: Mortality data from M1 and M2.

Fatality	M-1	M-2	Total
Drivers death	10 (28.57%)	41 (34.75%)	51 (33%)
Passengers death	22 (62.86%)	67 (56.78%)	89 (58%)
Pedestrians death	3 (8.57%)	10 (8.47%)	13 (9%)
Total	35 (100%)	118 (100%)	153 (100%)

Table-III: Causes of accidents on M1 and M2.

Causes	M-1	M-2	Total
Human Errors (Over Speeding, dozing at wheel, carelessness)	84 (58.33%)	201 (65.05%)	285 (63%)
Vehicle related factors (Mechanical fault, brake failure, tyre burst, short circuit)	42 (29.17%)	79 (25.56%)	121 (27%)
Weather road conditions (Dense fog, rain, slippery road)	10 (6.94%)	19 (6.15%)	29 (6%)
Pedestrian/ animal crossing	8 (5.55%)	10 (3.24)	18 (4%)
Total	144 (100%)	309 (100%)	453 (100%)

females (WHO 2002) due to their-risk taking behaviors⁵. Sleep research centre has conducted a study which shows that about 20% accidents are due to fatigue of driver especially on long routes. Severity of road crashes increases due to sleepiness firstly because speed is very high and secondly, driver cannot take any preventive or avoiding measure⁶. Road safety is a major issue throughout the world, especially in middle and

2015 from January to December, was collected by using national highway and motorway police forms as: Preliminary accident report, Flash report (Form No: 1.1/ops), Initial information report (Form No: 1.2/ops), Follow up report (Form No: 1.3/ops) from Motorway authorities. As it was a census study, no sampling technique was used. Following descriptive statistics were collected:-

- Severity of accidents
- Deaths/injuries of drivers/passengers/pedestrians
- Time distribution of accidents
- Types and numbers of vehicles involved
- Common causes of accidents

Complete confidentiality of the subjects was ensured by not mentioning their identity and data was collected after getting formal permission from national highway and motorway police authorities. Formal approval was taken from Ethical Review Committee of SUIT, Peshawar. Data was organized and analyzed by using SPSS version 21 and the Microsoft Excel 2010 and frequencies and percentages of the variables were

109 (24%) involved property damage (table-I). Out of 153 total deaths, 89 (58%) were passengers and 51 (33%) drivers (table-II). Similarly distribution of injuries showed that 600 (78%) passengers were injured out of 769 and number of drivers injured was 169 (22%). Distribution of accidents according to causes revealed that major causes were over speeding (39%), dozing at wheel (21%) and tyre bursts (15%) table-III. Out of 453 road accidents, 70% were LTV while 30% were HTV (figure). Month-wise frequency of accidents showed that maximum accidents took place in July, Sep and Dec (30%). About half of the accidents took place on weekends. Maximum accidents occurred between 0100-0700 hours

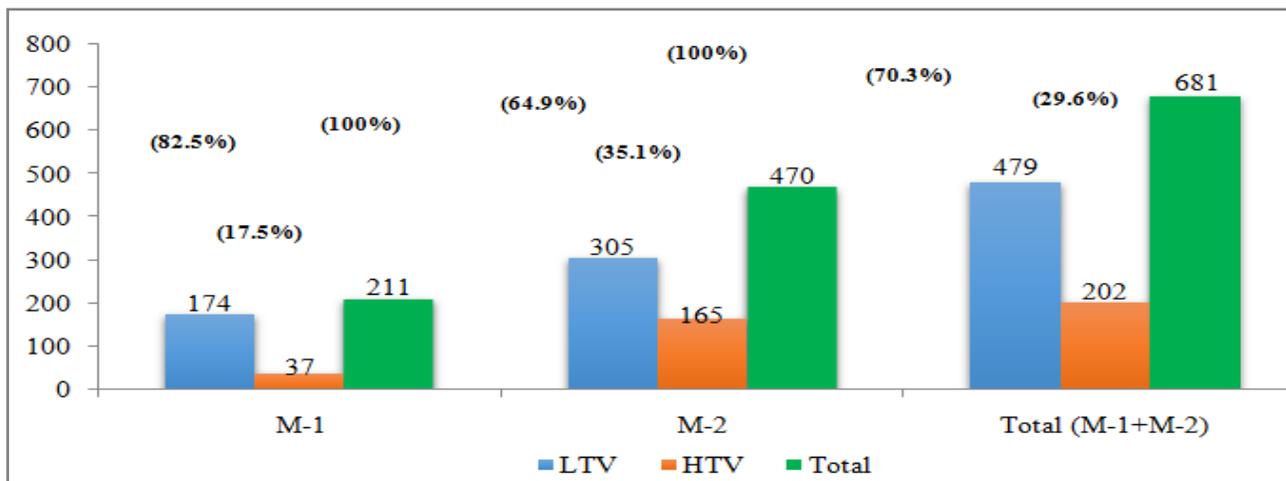


Figure: Type of vehicles involved in accidents.

calculated.

RESULTS

Study results showed that average number of vehicles passing through motorways was 30 to 35 thousand vehicles per day on M-1 and 60 to 65 thousand vehicles per day on M-2. The average daily Kms coverage was 28 million-travel-Kilometers (3.36 billion- travel-kilometers in a year). The death rate on motorway was 7.8 per one billion-travel-kilometers. The LTV were 70% and HTV 3% (figure). The severity wise distribution of accidents is given in table-I. Out of 453 drivers, 410 (91%) were males while only 43 (9%) were females. Out of total accidents, 242 (53%) were non-fatal, 102 (23%) were fatal and,

[137 (30%)], followed by 125 (28%) between 1300-1900 hours.

DISCUSSION

As majority of the vehicles are driven by male drivers, so more males (410, 91%) were involved in accidents and only (43, 9%) were females. The implications of road traffic injuries to the males are important due to social costs which include both, the cost of treatment as well as the cost of work lost days. Most of the accidents took place at early morning (0100-0700 hours) and in afternoon (1300-1900 hours) due to increased fatigue and drowsiness. Highest number of accidents occurred on weekends due to obvious reason that most people travel for work

at the start of week and go back home on weekends. The death rate on motorway was 7.8 per one billion-travel-kilometers, which is very high as compared to other countries. A few countries publish the safety record of their motorways; the Federal Highway Research Institute provided International Road Traffic and Accident Database (IRTAD) statistics for the year 2012 is given below in table-IV. Different studies on RTIs show that males account for about 80% of RTA victims as compared to females due to their greater exposure to traffic. Males are the bread earners of their families and have more risk-taking behaviour, whereas women have limited outdoor activities as well as exposure to

system and provision of rescue services¹³. A retrospective study suggested that sleepiness in drivers is an important factor contributing to the burden of traffic related morbidity and mortality¹⁴. The most common cause of an accident in present study was over speeding, followed by dozing at wheel and tyre burst. A report by European transport safety council found that 67% deaths on motorway occurred where there was no speed limit and only 33% deaths occurred on the sections with permanent speed limits. Other causes reported in order of frequency are mechanical faults, slippery road due to rain, brake failure, carelessness, pedestrian crossing, short circuit, dense fog and animal

Table-IV: Death rates per billion vehicle kilometer.⁸

International Country	Killed per 1,000,000,000 veh km	
	All roads	Motorways
Austria	6.88	1.73
Belgium	7.67	2.07
Czech Republic	15.73	2.85
Denmark	3.40	0.72
Finland	4.70	1.94
France	-	1.70
Germany	5.00	1.74
Slovenia	7.77	3.17
Switzerland	5.60	2.90
United Kingdom	3.56	1.16
United States	7.02	3.38

vehicles^{9,10}. According to a study, drivers were involved in maximum numbers 36 (56%) in head-on crashes whereas passengers 138 (62%) were affected mostly in crashes due to skidding and/or rolling down¹¹. A study was conducted in India, revealed that a considerable number of RTAs are associated with use of mobile phone while driving. This happens because of diverted mental concentration and not because of the visual and motor functions such as typing or dialing¹². Ganveer GB (2005) conducted a study in India to determine the causes of bad road safety conditions. The study emphasized the national road safety activities, traffic rules and regulations, strict enforcement of laws, education, safety training, vehicle inspection, better traffic

crossing. Careless driving means non-obedience of traffic rules and regulations. It includes over speeding, overtaking, lack of road sense, risk-taking behavior, performance of stunts and use of cell phones while driving. Carelessness can be reduced by proper education on road safety, awareness campaigns and improving driving test standards. Dozing at wheel is a powerful predictor of RTAs. In this study LTV were commonly involved in road accidents on motorways, may be due to the reason that number of LTV is more than HTV. As observed in various studies, number of LTV involved in accidents were more (70%) than HTV and the accidents were more often during the day time,

the reason behind this can be increased traffic load¹⁵⁻¹⁷.

CONCLUSION

It is concluded from this study that approximately 30 to 35 thousand vehicles pass through M-1 and 60 to 65 thousand vehicles through M-2, per day. Majority of drivers were male (91%). Deaths/ injuries of passengers were more than that of drivers (58%) most probably due to non-use/non-availability of the seat belts. Most of the accidents were non-fatal (77%). Over speeding and dozing at wheel (63%) along with tyre burst/vehicle related factors (27%) were the most common causes of accidents. About 70% accidents involved LTV and mostly happened on weekends (33%). Peak timings were midnight to early morning (30%) and afternoon (28%). Maximum accidents occurred during December and July (29%) may be due to more travelling during winter and summer vacations. The study highlighted the importance of drivers' education/training and public awareness because most of the accidents occur due to human error/negligence. Fitness of vehicles, especially tyres and role of weather related factors is equally important. In short, road traffic accidents have multi-factorial causation requiring inter-sectoral approach along with community participation. All the forms used by NH&MP for accidents data collection do not have column for age of the driver/passengers/injured, therefore this variable be included in the above mentioned forms.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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