A Literature Study On Road Accidents
Statistics And Reasoning

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Abstract— This paper analyses traffic safety situation in India and identifies the areas in which the total harm caused by crashes can be substantially and readily reduced. This focuses on two aspects road accident statistics and reasons for road accidents. The first part of the report provides a comprehensive analysis of the current statistics of road accidents happening in India. It is pointed out in analysis that fatality rate have increased during the past few years. These statistics indicate that number of fatalities in India is not likely to start to decline for many years to come unless new policies are implemented. Second part of the paper gives a brief insight on the various reasons for road accidents in India. From the reasons, we can make out, both the Govt. and motorist are equal shareholders.

Key words: Traffic Safety; Road Accidents; Accident Parameters;

I. INTRODUCTION

In a country where 34 births happening every minute and over 10 deaths happening every minute, people really don’t care to mourn for the dead. Of the various reasons for a person to die, road accidents are the major ones. The analysis of road accident data 2015 reveals that about 1,374 accidents and 400 deaths take place every day on Indian roads which further translates into 57 accidents and loss of 17 lives on an average every hour in our country. About 54.1 per cent of all persons killed in road accidents were in the 15 -34 years age group during the year 2015[1]. This paper provides an overview of various reasons and statistics of the road accidents that are happening on a daily basis in India. With almost one life lost for every 3.8 minutes the road accidents are not taken into consideration with greater seriousness. The road accidents should actually take a place in country’s public health agenda. This is not achieved because, the statistics released by the government every year does not actually reflect the accidents that are happening. Most of the accidents in India go unreported, thereby providing a leverage to question the statistics provided by the government.

In this paper we also try to look into the various reasons that cause road accidents in India. First of all most roads in India aren’t safe for driving. The government every year makes an attempt to rectify the situation but all goes in vein. Most roads constructed today doesn’t even last for six months. Most of the roads have open man holes and pits that are very angerous for two wheeler drivers. Also in most roads there in no proper way of handling waste water most of the time the rain water flows on the roads there by damaging the roads. Due to this reason most roads don’t even last for one whole rainy season. Apart from government’s inability to provide good infrastructure, people’s ignorance also contribute to major portion of the road accidents. Most people in India always try to find a way to break the traffic rules and try to get away with it. Jaywalking, overtaking on the wrong side, not following the lane discipline, parking on the wrong side of the road, driving without helmet these are very common in India and they are not treated as big mistakes. Also strict rules are not followed while issuing the driving license to the people. All these things collectively contribute to the road accidents happening in India.

II. ROAD ACCIDENTS STATISTICS

Road accidents are an outcome of the interplay of various factors, some of which are the length of road network, vehicle population, human population and adherence/enforcement of road safety regulations etc. Road accident causes injuries, fatalities, disabilities and hospitalization with severe socio economic costs across the country. Consequently, road safety has become an issue of concern both at national and international level. The United Nations has rightly proclaimed 2011-20 as the Decade of Action on Road Safety. India is also signatory to Brasilia Declaration and is committed to reduce the number of road accidents and fatalities by 50 per cent by 2020.

As far as the recent statics released by the Indian Ministry of Road transport and Highways goes, in India the total number of road accidents increased by 2.5 per cent from 4,89,400 in 2014 to 5,01,423 in 2015. The total number of persons killed in road accidents increased by 4.6 per cent from 1,39,671 in 2014 to 1,46,133 in 2015. Road accident injuries have also increased by 1.4 per cent from 4,93,474 in 2014 to 5,00,279 in 2015. The severity of road accidents, measured in terms of number of persons killed per 100 accidents has increased from 28.5 in 2014 to 29.1 in 2015. About 1,374 accidents and 400 deaths take place every day on Indian roads.
which further translates into 57 accidents and loss of 17 lives on an average every hour in our country. About 54.1 per cent of all persons killed in road accidents were in the 15-34 years age group during the year 2015. Tamilnadu had the highest accidents for the year 2015. As per the statistics released by the state it had 67250 accidents in the year 2015. The total number of road accidents per lakh population increased in the country from 39.5 in 2014 to 40.0 in 2015. Similarly number of persons killed and injured per lakh population also increased from 11.3 to 11.7 per cent and 39.8 to 39.9 respectively in 2015.

Two Wheelers accounted for a highest share in total road accidents and next to it was the share of the group of Cars, Jeeps & Taxis in 2015 as reported by the States/UTs. Share of two wheelers in total road accidents has increased continuously from 26.3 per cent in 2013 to 27.3 per cent in 2014 and 28.8 per cent in 2015. Next to two wheelers, the share of cars, jeeps and taxis has also gone up slightly from 22.2 per cent in 2013 to 22.7 per cent in 2014 and 23.6 per cent in 2015. Out of total road accidents, 28.4 per cent, 24.0 per cent and 47.6 per cent of road accidents took place on National Highways, State Highways and Other Roads respectively in the country in 2015. National Highways (NHs) accounted for a share of 35.0 per cent in total number of persons killed and 29.1 per cent in total number of persons injured in road accidents during the calendar year 2015. Road accident on National Highways has gone up by 3.2 per cent from 1,37,903 in 2014 to 1,42,268 in 2015. Persons killed on National Highways has also gone up by 7.5 per cent from 47,649 in 2014 to 51,204 in 2015. Only the share of road accident injuries has marginally reduced from 29.9 per cent in 2014 to 29.1 per cent in 2015 as shown in Table I.

Statistical tables that summarize key information about road traffic injuries are reported by police stations to their district’s Crime Records Bureau, from where aggregated statistical tables flow upwards to the state’s crime records bureau, and the National Crime Records Bureau (NCRB), which publishes the official statistics for the country. Police-based statistics underreport road traffic deaths and injuries in India. A study done in Bangalore shows that while the number of traffic crash deaths recorded by the police may be reasonably reliable, the total number of injuries is grossly underestimated. According to that study, deaths were underestimated by 5% and the number injured who needed treatment in hospitals was underestimated by more than a factor of two. In that study, the ratio of injured people reporting to hospitals versus those killed was 18:1. It is important to note that even this ratio would be an underestimate, as many of the injured would not have gone to a hospital, but would have taken treatment at home or from private medical practitioners. Another detailed study done in rural northern India recorded all traffic-related injuries and deaths through bi-weekly home visits to all households in 9 villages for a year and showed that the proportional numbers of critical, serious, and minor injuries were 1:29:69.

The Compound Annual Growth Rate (CAGR) of number of road accidents as well as the number of persons injured in the country during the decades 1994-2004 and 2005-2015 declined from 2.8 per cent to 1.3 per cent and from 4.1 per cent to 0.7 per cent respectively[3]. However, the CAGR in respect of the number of road accident fatalities, increased from 3.7 per cent to 4.4 percent during the same period. This is depicted in Fig 1.

Table I Road Accident Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>2014</th>
<th>2015</th>
<th>% change over previous year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total accidents in the country</td>
<td>4,89400</td>
<td>5,01,423</td>
<td>2.5</td>
</tr>
<tr>
<td>Total no of persons killed in the country</td>
<td>1,39,671</td>
<td>1,46,133</td>
<td>4.6</td>
</tr>
<tr>
<td>Total no of persons injured in the country</td>
<td>4,93,474</td>
<td>5,00,279</td>
<td>1.4</td>
</tr>
<tr>
<td>Accident severity*</td>
<td>28.5</td>
<td>29.1</td>
<td>2.1</td>
</tr>
</tbody>
</table>

*No of persons killed per 100 accidents

Fig 1 CAGR
Fig 2. Number of Accidents per Lakh Population

Fig 2 indicates the increase in the number of accidents per lakh population from 21.2 in 1970 to 22.8 in 1980 followed by a sharp increase in 1990 to 33.8. Between 2000 and 2005, the figures fluctuated in the range of 38.6 to 40.1; increasing to above 42 (2007 and 2008); a slight dip to 41.9 in 2009 followed by a rise to 42.5 in 2010. Between 1970 and 2010, number of accidents per lakh population increased by more than 2 time .Between 2011 to 2014 there was a decline from 41.1 in 2011 to 39.5 in 2014 with a marginal increase in 2015 to 40[3].

Fig 3 Number of Persons killed per Lakh Population

There has been a dramatic decline in the number of persons injured and killed per 10,000 vehicles. The number of persons injured per 10,000 vehicles plummeted from 500 in 1970 to about 27 in 2013. It is noteworthy that this parameter has consistently declined since1996 despite sustained high growth in vehicle population. Similarly, the number of persons killed per 10,000 vehicles in the country also fell from about 104 in 1970 to less than 8 in 2013 as shown in Fig 3.

Fig 4 Percentage share in Total Number of Road Accidents

The number of Persons killed per lakh population increased fourfold from 2.7 in 1970 to 11.8 in 2011, fluctuating between 11.8 to 11.7 during the period 2012 to 2015. This is depicted in Fig 4. Exposure of population to road accidents leading to deaths and injuries largely depend on the amount of travel undertaken, number of trips, the distance travelled, or time in the road environment, number of motor vehicles and the amount of motorized traffic, etc.

However, the extent of underreporting of road traffic deaths in India is not well understood. Recent studies that have estimated national road traffic deaths using data from the health sector suggest the possibility of higher underreporting by traffic police[2]. The Global Burden of Disease (GBD) study estimates that there were 264,000 (95%CI: 214,000-321,000) deaths in India in 2013 almost twice the deaths reported by traffic police GBD estimates of causes of death in India are based on estimates derived from comparative analysis of several national health data systems, including the Survey of Causes of Death (SCD), the Medical Certification of Cause of Death (MCCD), and the Million Death Study (MDS). With the notable exception of the MDS, the other data sources have large statistical biases (e.g. MCCD only tracks deaths from participating urban hospitals), and may not be a reliable source of information. The MDS, however, provides estimates of causes of death in India using a large nationally representative mortality survey. The most recent data from the study is for the year 2001-2003 and includes over 122,000 deaths from all causes in 1.1 million homes. The MDS estimated 183,600 (95%CI:173,800-193,400) deaths in the year 2005, about 47%-64% greater than the NCRB-reported official statistics for 2005.

In view of the reasons given earlier, it is possible that most of the critical and immediately fatal cases get recorded in crowded urban areas of India and those who die in government hospitals also enter the official statistics. Therefore, it is likely that the fatality statistic for urban areas in India may be underestimated by say 10%-20%. According to the MoRTH 61% of the RTI fatalities occur in rural areas and it is possible that a larger number of cases go unreported on rural roads. In a review of European and Japanese RTI data linkage, report that total RTI victims dying within 30 days of the crash are about 30% greater than those dying on the first day. If we assume that a significant proportion of fatalities that occur many days after the crash in rural areas are missed (that would reduce the number by less than 30% of the total deaths) and a smaller proportion of deaths on the spot or on the way to the hospital are missed, then we can expect underreporting to be around 50% of rural deaths. Overall, this would imply that the underreporting of fatalities in India may be less than 50%. This would indicate that the MDS estimate of RTI fatalities being about 47%-64% greater than the NCRB reported official number may be closer to the truth.
than the W.H.O. or GBD estimates. However, this issue cannot be resolved to satisfaction until such time when the recording of traffic crashes is done in a manner open to public scrutiny and mechanisms are established to audit the quality of official statistics of road traffic deaths on a regular basis.

III. REASONING

Road accident is most unwanted thing to happen to a road user, though they happen quite often. The most unfortunate thing is that we don't learn from our mistakes on road. Most of the road users are quite well aware of the general rules and safety measures while using roads but it is only the laxity on part of road users, which cause accidents and crashes. Main cause of accidents and crashes are due to human errors. We are elaborating some of the common behavior of humans which results in accident[4].

1. Over Speeding
2. Drunken Driving
3. Distractions to Driver
4. Red Light Jumping
5. Avoiding Safety Gears like Seat belts and Helmets

Various national and international researchers have found these as most common behavior of Road drivers, which leads to accidents.

i. Over Speeding

Most of the fatal accidents occur due to over speeding. It is a natural psyche of humans to excel. If given a chance man is sure to achieve infinity in speed. But when we are sharing the road with other users we will always remain behind some or other vehicle. Increase in speed multiplies the risk of accident and severity of injury during accident. Faster vehicles are more prone to accident than the slower one and the severity of accident will also be more in case of faster the severity of accident will also be more in case of faster vehicles. Higher the speed, greater the risk. At high speed the vehicle needs greater distance to stop i.e. braking distance. A slower vehicle comes to halt immediately while faster one takes long way to stop and also skids a long distance due to law of notion. A vehicle moving on high speed will have greater impact during the crash and hence will cause more injuries. The ability to judge the forthcoming events also gets reduced while driving at faster speed which causes error in judgment and finally a crash.

ii. Drunken Driving:

Consumption of alcohol to celebrate any occasion is common. But when mixed with driving it turns celebration into a misfortune. Alcohol reduces concentration. It decreases reaction time of a human body. Limbs take more to react to the instructions of brain. It hampers vision due to dizziness. Alcohol dampens fear and incite humans to take risks. All these factors while driving cause accidents and many a times it proves fatal. For every increase of 0.05 blood alcohol concentration, the risk of accident doubles. Apart from alcohol many drugs, medicines also affect the skills and concentration necessary for driving. First of all, we recommend not to consume alcohol. But if you feel your merrymaking is not complete without booze, do not drive under the influence of alcohol. Ask a teetotaler friend to drop you home.

iii. Distraction to Driver

Though distraction while driving could be minor but it can cause major accidents. Distractions could be outside or inside the vehicle. The major distraction now a days is talking on mobile phone while driving. Act of talking on phone occupies major portion of brain and the smaller part handles the driving skills. This division of brain hampers reaction time and ability of judgment. This becomes one of the reasons of crashes. One should not attend to telephone calls while driving. If the call is urgent one should pull out beside the road and attend the call. Some of the distractions on road are:

• Adjusting mirrors while driving
• Stereo/Radio in vehicle
• Animals on the road
• Banners and billboards.

The driver should not be distracted due to these things and reduce speed to remain safe during diversions and other kind of outside distractions.

iv. Red Light Jumping:

It is a common sight at road intersections that vehicles cross without caring for the light. The main motive behind Red light jumping is saving time. The common conception is that stopping at red signal is wastage of time and fuel. Studies have shown that traffic signals followed properly by all drivers saves time and commuters reach destination safely and timely. A red light jumper not only jeopardizes his life but also the safety of other road users. This act by one driver incites other driver to attempt it and finally causes chaos at crossing. This chaos at intersection is the main cause of traffic jams. Eventually everybody gets late to their destinations. It has also been seen that the red light jumper crosses the intersection with greater speed to avoid crash and challan but it hampers his ability to judge the ongoing traffic and quite often crashes.

v. Avoiding Safety Gears like seat belts and helmets:

Use of seat belt in four-wheeler is now mandatory and not wearing seat belt invites penalty, same in
the case of helmets for two wheeler drivers. Wearing seat belts and helmet has been brought under law after proven studies that these two things reduce the severity of injury during accidents. Wearing seat belts and helmets doubles the chances of survival in a serious accident. Safety Gears keep you intact and safe in case of accidents. Two wheeler deaths have been drastically reduced after use of helmet has been made mandatory. One should use safety gears of prescribed standard and tie them properly for optimum safety.

When the occurrence of a traffic crash is brought to the notice of a police station (by anyone involved in the crash; anyone who knows about the crash; or a police officer who comes to know about the crash) the information reported is recorded in a First Information Report (FIR). This sets the process of ‘criminal justice’ in motion and the police take up investigation of the case. After an FIR has been filed the contents of the FIR cannot be changed except by a ruling from the High Court or the Supreme Court of India. After the investigation is complete a case file is prepared which records the details of the crash as determined by the police department (which need not necessarily tally with those in the FIR) and the ‘offending party’ (as determined by the investigation) is charged with offences under provisions of the Indian Penal Code and the Motor Vehicles Act of India 1988 (Ministry of Road Transport and Highways, 1988)[2].

Some of the relevant provisions are:

**Indian Penal Code**

- Section 279. Rash driving or riding on a public way.
- Section 304A. Causing death by negligence.
- Section 336. Act endangering life or personal safety of others.
- Section 337. Causing hurt by act endangering life or personal safety of others.
- Section 338. Causing grievous hurt by act endangering life or personal safety of others.

**Motor Vehicles Act**

- Section 185. Driving by a drunken person or by a person under the influence of drugs.
- Section 184. Driving dangerously.

The above provisions are the deciding factor in how a police officer has to assign blame to one of the participants in a crash (usually one of the drivers). This is an important issue, as the cause’ of the crash has to be recorded as a ‘fault’ of a driver under one or more of the above provisions in most cases. This procedure ensures that 80% or more of the cases get attributed to ‘human error’ and there is no place for understanding crashes as a result of a host of factors including vehicle, road and infrastructure design.

As per the report given Times of India[5] on September 14 205 over 11,000 people killed by potholes, speed breakers last year. Last year, about 11,400 people died in such cases with Uttar Pradesh topping the list. Another 4,100 people were killed in crashes on stretches under repair or under construction. Other states with a high number of fatalities on these counts included Madhya Pradesh, Bihar, Tamil Nadu, Karnataka and West Bengal. Maharashtra registered 368 deaths in crashes due to potholes, humps and speed breakers while another 224 persons died in crashes on roads under repair or under construction. According to the Road Accident Report (2014) published by the road transport and highways ministry, while 4,726 lives were lost in crashes due to humps, 6,672 people died in accidents caused due to potholes and speed breakers. Sources said the actual figure could be much higher since the data was not properly captured by local police while registering accidents and in many cases these are recorded as any other road crash. UP had the largest share with 4,455 lives lost in such accidents. In MP, 915 people died in crashes caused due to bad road conditions and in Bihar, the fatalities stood at 867. In a first, the government’s transport research wing has used data detailing about a dozen road conditions to classify crashes, fatalities and injuries across states.

Director of Indian Academy of Highway Engineers and former director general (roads) V L Patankar said most speed breakers on internal roads were “hugely dangerous”. None follow design, curvature and location when constructing speed breakers. In most cases, locals put up speed breakers. These are more dangerous for two-wheeler riders and passengers in three-wheelers, who are hardly protected. This has also exposed how such causes behind crashes and fatalities are largely neglected while preparing plans to improve road safety. Rohit Baluja, a road safety expert, said until road-owning agencies were held accountable for maintenance and booked for negligence, the menace of potholes won’t end. Hardly any cases of any action taken against such negligent officials/employees.

**IV. CONCLUSION**

This paper started by giving an insight into the road accidents that are happening in India. At least by looking into these statistics, awareness about road safety should be given to common people. This can be done by organizing safety awareness programs across the India. NGO’s and private sector institutions should join their hands with government for a better and safer India. The various reasons reflect mistake on both driver and Govt. Instead of wasting time and energy in trying to implement senseless bans, governments should focus on issues.
that are literally life-and-death for citizens. For deaths caused by potholes, governments must compensate the families of victims and hold contractors, government officials and ministers criminally liable for sub-standard roads. There is huge corruption in the award of road contracts, and it’s time those responsible for (a) looting taxpayer’s money and (b) killing people were brought to book. We should bear in mind that it’s those on two-wheelers who are at greatest risk.

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VI. REFERENCES


