Evaluation of Road Traffic Accidents (RTAs) on Hyderabad Karachi M-9 Motorway Section

Amir Detho  
Energy & Environment Department  
Quaid-e-Awam University of Engineering, Science & Technology  
Nawabshah, Pakistan  
aamir_detho@yahoo.com

Saleem Raza Samo  
Energy & Environment Department  
Quaid-e-Awam University of Engineering, Science & Technology  
Nawabshah, Pakistan  
sfaizsamo@yahoo.com

Kishan Chand Mukwana  
Energy & Environment Department  
Quaid-e-Awam University of Engineering, Science & Technology  
Nawabshah, Pakistan  
mukwana_99@yahoo.com

Kamran Ahmed Samo  
Electrical Engineering Department  
Quaid-e-Awam University College of Engineering, Science & Technology  
Larkana, Pakistan  
kamransamo2@gmail.com

Asif Ali Siyal  
Energy & Environment Department  
Quaid-e-Awam University of Engineering, Science & Technology  
Nawabshah, Pakistan  
asifsiyal2007@quest.edu.pk

Abstract—Pakistan is a developing country and its development depends upon its transports facilities. This paper describes the findings of a survey for the evaluation of road traffic accidents (RTAs) that focused on the Hyderabad-Karachi M-9 Motorway section. The objectives of the survey are the collection the data of traffic accidents including the human and property losses and the evaluation of RTAs causes. During a two year period (i.e. 2015 and 2016) it was revealed that 145 RTAs occurred on the motorway. In those RTAs, 109 persons died and 293 got injured and 251 vehicles were damaged. High risk percentages were recorded for both pedestrian and vehicle users.

Keywords—road traffic accidents; RTAs; evaluation; causes of RTAs

I. INTRODUCTION

In Pakistan, highways were initially used as feeders to railways that were the main transport utility for long distances and goods. Nowadays however, the use of highways has increased and their length has expanded from 249,972 km (in 2000-01) to 263,356 km (in 2015-16). A similar increase is recorded on the number of vehicles, from 4,701,600 (in 2000-01) to 17,317,600 (in 2015-16) [1]. The maintenance and construction of roads in Pakistan falls under the State Government and National Highway Department. For this research, an extensive literature survey was carried out to determine and learn the past findings in the area of RTAs. Authors in [2] state that road studies and road safety learning are very necessary, especially for those who are often directly involved in RTA injuries, for example students. They introduced the road safety concept for pre schooling students through animal world stories. It is concluded that it is needed to improve the driving skills, to adopt strict rules and regulations, to adapt more comprehensive rules and to use more traffic controlling devices. During the issuance of driving license to public transport drivers, first aid training must be undertaken.

Author in [3] states that the RTAs are the 8th main cause of deaths in the world. According to WHO (2004), RTAs will become the 3rd main cause of death by the year 2020, if not controlled properly. Furthermore, the available data is not trustworthy due to under reporting. Anyhow, RTAs are one of leading causes of death and injury worldwide. Author in [4] states that huge losses due to road accident were reported in Tanzania. In 1994, the (high) cost of accident losses was estimated and it was established that it kept increasing. Road safety issues are now been under consideration by the Tanzania government. The speed limit of the buses has been controlled. However, the RTAs still keep increasing. Therefore, a research was conducted by Swedish International Development Cooperation Agency (SIDA)/SAREC with the collaboration of the Department of Statistics at the University of Dar es Salaam. In this research, a survey was conducted to investigate the possible reasons of RTAs. In the survey, people (including drivers of buses, motorcyclist and pedestrians) were asked their opinion regarding the reasons on RTAs. It was identified that the mistakes done by the drivers were the main reason of the accidents. It was concluded that drivers should be well-trained before they are allowed to drive on the road.

Authors in [5] remind that accidents cause not only economic losses but also intangible consequences such as pain, grief etc. The increasing number of cars and other vehicles is one of the major causes of RTAs during the last two decades. For reducing the impacts of RTAs, many safety programs have been organized. They concluded that for reducing the number of accidents, the safety programs of developed countries should be implemented in their country. Author in [6] states that a little amount of research has been conducted on the road
II. RESEARCH METHODOLOGY

In order to achieve the mentioned objectives, a survey on Hyderabad-Karachi highway was conducted for two years (2015 and 2016). The data source was the National Highway & Motorway police (NH&MP). The two year RTAs data include the total number of accidents (i.e., fatal and non-fatal), the number of people who died and got injured and the number of damaged vehicles.

Table I. RTAs during 2015 and 2016

<table>
<thead>
<tr>
<th>Year</th>
<th>Total accidents</th>
<th>Fatal</th>
<th>Non-fatal</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>85</td>
<td>41</td>
<td>44</td>
</tr>
<tr>
<td>2016</td>
<td>60</td>
<td>31</td>
<td>29</td>
</tr>
</tbody>
</table>

B. Analysis of RTAs Occurred During 2015 and 2016

As mentioned above the total numbers of RTAs reported are 85 and 60 in years 2015 and 2016, respectively. The data collected were further sub-divided depending on the number of deaths, the number of injured and the number of damaged vehicles.

1) Number of Deaths

Figure 1 shows the number of deaths reported in fatal RTAs during 2015 and 2016. The horizontal axis shows the months while vertical axis represents the number of deaths. It can be seen from the Figure that 56 and 53 deaths occurred in 2015 and 2016, respectively. In 2015, the maximum number of deaths accrued in February. But in April, June and November only one loss of life was reported. In the following year, the maximum (i.e. 16) number of deaths occurred in April. However, no death occurred in last two months of the year. Comparing the years 2015 and 2016, the total number of deaths are more or less same.

Fig. 1. Number of deaths in RTAs reported in 2015 and 2016
2) **Number of Injuries**

Figure 2 illustrates the number of injured persons reported in non-fatal RTAs during year 2015 and 2016. It can be observed from the Figure that 170 and 123 number of injuries occurred in 2015 and 2016, respectively. In 2015, the maximum number of injured persons was reported in October. The minimum number of injured persons (i.e. 2) was reported in April. Among 123 reported injured persons in 2016, the highest number (i.e. 28) of injuries was documented in January. Two injuries (which is the least number for 2016) were reported in June and November. Among the 24 months 2015 and 2016, the RTAs’ data revealed that the maximum number of injuries occurred in October of 2015.

![Number of injured persons in RTAs reported in 2015 and 2016](image)

Fig. 2. Number of injured persons in RTAs reported in 2015 and 2016

3) **Number of Damaged Vehicles**

Besides the loss of human lives, it is necessary to look at the economic loss caused by accidents. For this reason the number of damaged vehicles was documented in the collected RTAs data. Figure 3 shows the number of damaged vehicles during each month of the years 2015 and 2016. It can be seen that the numbers of damaged vehicles were documented as 141 and 110 in 2015 and 2016 respectively. In 2015, the maximum number of damaged vehicles (i.e 18) was reported in July. The minimum was in February with five damaged vehicles reported. In the following year (i.e 2016), the maximum (i.e. 27) and minimum (i.e. 1) number of damaged vehicles were reported in April July respectively. It is evident that the loss of human lives and economic loss the maximum in April of 2016.

![Number of reported damaged vehicles in RTAs in 2015 and 2016](image)

Fig. 3. Number of reported damaged vehicles in RTAs in 2015 and 2016

4) **Causes of RTAs on highway**

The causes of accidents were also documented. Five different causes were identified at the accidents sites. These are (1) careless driving, (2) bursting of tyres of vehicles, (3) brake failure of vehicle, (4) bad road conditions and (5) pedestrian crossing. Data revealed that careless driving is the major cause of the RTAs on the motorway. Due to this reason, 29 and 19 people died in 2015 and 2016 respectively and total 293 people got injured in both the reported years. As for the economic loss 93 vehicles were damaged in 2015 and 110 vehicles were damaged are 2016. Besides human error while driving, the vehicle condition was another one of the reasons of RTAs. Tire bursting and brake failure belong in this category. Because of brake failure and tire bursting 48 deaths occurred in the reported period while 110 people got injured and 66 vehicles got damaged. The condition of the road/highway has been recognized as another reason for RTAs. Data have shown that 16 people died in accidents due to bad road conditions. Furthermore, 40 people got injured and 34 vehicles were damaged in the accidents which occurred due to bad road conditions. The numbers of loss of human lives and vehicles damaged in RTAs due to different reasons are summarized in Table II.

![TABLE II. HUMAN LIVES/ECONOMICAL LOSS AND THEIR CAUSES](image)

<table>
<thead>
<tr>
<th>Year</th>
<th>Deaths</th>
<th>Injuries</th>
<th>Vehicles damaged</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>56</td>
<td>170</td>
<td>141</td>
<td>367</td>
</tr>
<tr>
<td>2016</td>
<td>53</td>
<td>123</td>
<td>110</td>
<td>286</td>
</tr>
</tbody>
</table>

IV. **SUMMARY AND CONCLUSIONS**

Based on accident data collected from January, 2015 to December, 2016 on M9 Motorway, the following conclusions are drawn:

1. The findings indicate that human error (careless driving & pedestrian crossing), mechanical fault (tire burst and brake failure) and bad road condition were the major causes for the Motorway RTAs.
2. In 2015, the number of accidents (in percentage) due to careless driving, tire burst, brake failure, pedestrian crossing and bad road condition are 59, 20, 15, 1 and 5, respectively.

3. In 2016, the number of accidents (in percentage) due to careless driving, tire burst, brake failure, pedestrian crossing and bad road condition are 53, 15, 16, 3 and 13, respectively.

4. Based on collected accident data, 109 human lives were lost and 293 persons were reported as injured. In addition, 251 vehicles were damaged.

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