

Causes of accident on Mumbai-Pune Expressway

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ABSTRACT

Transportation on road is more year by year, but the rate of accident also increase with it. India is well developinf countries and here rate of road accidents are high and also recording the accident specifically as per month, time, age and gender and also the types in that road traffic accident is on the top and here also thing to mention is day time accidents are more than the night time accidents road traffic accidents claim over a million lives every year in the world. As per World Health Organization (WHO), it is one of the leading causes of death. India, a rapidly developing country with an expanding economy, has its issues regarding road traffic accidents.

Records from 2018 show that there is one death every 3.05 minutes because of road accidents. In 2020, there were around 138 thousand deaths due to road accidents in India.

Planning, working upon it, various ideas road infrastructure should give priority to the safety and comfort of road users. Thus, this paper aims to tackle this issue and to explore the main factors contributing to the increase in car accidents rate.

1. INTRODUCTION

1.1 General

The term accident has been defined as an occurrence in a sequence of events that usually produces unintended injury, death, or property damage. Today accidents are among the leading causes of death.

As per government data road accidents are the leading cause of hospitalization deaths and disabilities in the country. On average, about 1,50,000 people perish due to road accidents in India annually.

1.2 Historical development

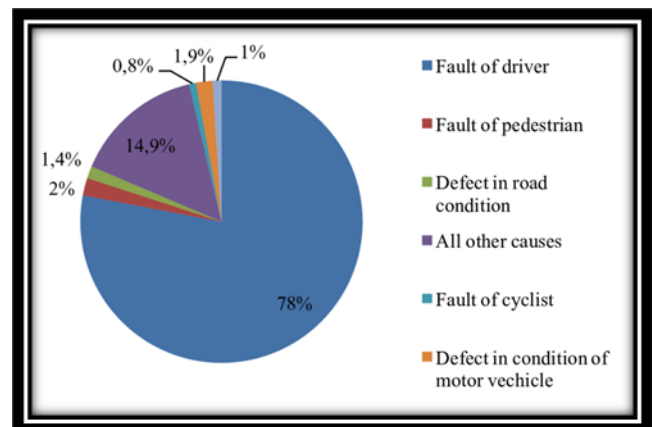
PUNE The number of fatalities on the Pune-Mumbai Expressway has seen an overall reduction of 52% since 2016, when the "Zero-Fatality Corridor" project, a joint initiative of the Maharashtra State Road Development Corporation Limited (MSRDC), Maharashtra Highway Police, Mahindra & Mahindra, and Save life Foundation was launched to reduce road fatalities.

The expressway had witnessed a 43% reduction in the road-crash fatalities, from 151 fatalities in 2016 to 86 fatalities until December 31, 2019. In 2021, the expressway reported 66 fatalities in 63 accidents, according to data collated by the Save Life Foundation.

As many as 91 people lost their lives while 175 others were injured in a total of 352 road accidents on the Mumbai-Pune Expressway in the year 2019, as per the data prepared by the Maharashtra Highway Police.

During the same period, a total of 32,876 road accidents had occurred in Maharashtra, killing 12565 people and seriously injuring 19175 others. A total of 9723 people escaped with minor injuries. As compared to 2018, the number of accidents and fatalities on the six-lane expressway went down in the year 2019, it stated.

In the year 2018, a total of 359 accidents occurred on the expressway, killing 114 people while 174 people were grievously injured, it stated. A senior highway police officer blamed the high speed of vehicles as one of the major reasons for accidents on the 95- km highway in 2019.



1.3 Aim

Our project aim is to solve the road congestion problem & prevent future accidents by this project we initiate towards the safety of humans by reducing accidents and taking sures during driving vehicles

1.4 Objective of the work

To know the cause and the risk factors leading to the accident, to study the various types of accidents, to study various problems regarding accidents and their solutions

1.5 Scope of the work

It reduces the percentage of accident on highways, it helps to maintain traffic volume on highways, it helps to maintain consistency of speed in limit and reduces injuries, travelling any season is possible

2. LITERATURE REVIEW

2.1 General

This literature review is the methodological investigation of all published sources for information about the causes and types of accidents. It is a series of searches conducted across all possible resources of causes accidents and a list of resources that have been identified as relevant to the topic which is arranged alphabetically and details mentioned in topic 2.2. The result of the literature search is compiled and structured to understand the scope and breadth of the literature on the view of such causes of accidents on the highway.

2.2 Literature review

Dinesh Mohan (March 30, 2009): They studied that road traffic facilities have been increasing at about 8% annually for the last 10 years and show no sign of decreasing. Two modeling exercises have attempted to predict the period when we might expect facility rates to start the decline in a range of countries. Cropper and copies predicted that facilities in India would reach a total of about 198000 before starting to decline in 2042 and koornstra predicted an earlier date of 2030 for the peak traffic facilities in India. If we assume that the present growth rate of 8% per year decline in a linear manner to 0% by 2030, we can expect about 260,000 facilities by 2030. Neither of these projects dated (2042 and 2030) can be accepted as road safety goals for the country.

Manisha Ruikar et. al. (2014): They observed Road Traffic Accident (RTA) can be defined as, 'An event that occurs on a way or street open to public traffic; resulting in one or more person's being injured or killed, where at least one moving vehicle is involved. Thus, RTA is a collision between vehicles; between vehicles and pedestrians; between vehicles and animals; or between vehicles and geographical or architectural obstacles.' Road traffic accidents are a human tragedy. They involve high human suffering and socioeconomic costs in terms of premature deaths, injuries, loss of productivity, and so on.

3. DATA COLLECTION

3.1 General

In this data collection, the information is related to the various types of accident as mentioned in topic 3.2. These various types of accidents give knowledge about it and how those types of accidents are actually caused.

In the below table, the information is related to the number of accidents with the information of numbers of fatal, grievous injury, minor injury, without injury and total number of accidents that happened in between 2019 to 2021.

3.2 Various types of accident

1. *Single-car accident*
2. *Multiple vehicle collision*
3. *Vehicle rollover*
4. *Rear-end collision*
5. *Side impact collision*
6. *Sideswipe collision*
7. *Head-on collision*
8. *Accident due to DUI*
9. *Distracted driving*
10. *Hit and Run*
11. *Chain Reaction Driving*
12. *Failure to yield*
13. *Accident at low speed*

4. METHODOLOGY

4.1 General

The information is related to the survey conduction in the initial stage as mentioned in 4.2 and 4.3 which is based on the public response and point of view of drivers of the vehicle. The basic questions involve normal speed, road symbols, traffic rules, and regulations for driving.

There are many factors contributing to road accidents and to be able to pinpoint the main reason causing those accidents, a thorough survey is to be conducted to understand how each factor affects the rate at which road accidents happened

4.2 Primary methodology

On the Mumbai-Pune expressway, we are going to ask or collect information from vehicle operators or drivers about what are they thinking ten minutes before this halt or stop on the signal or halt point or wherever they take rest, and below are the questions which we are going to ask them with traffic police permission.

Questions are

- What were you thinking while driving 10 minutes ago?
- Did you encounter any obstacles while driving on this expressway?
- Were you listening to any song 10 minutes ago?
- Have you ever driven faster than 100 mph?
- Do you follow traffic rules on the expressway?
- Do you ever use a cell phone while driving?
- Do you take any precautions for safe driving?
- Are your documents as per RTO rules?
- Do you regularly service/maintain the vehicle?
- Do you think the road is safe from a safety point of view?

4.3 Secondary methodology

Visibility issue: At any point on the expressway if the road is not visible to the vehicle operator for a like U-turn or any turning point then there, we can provide a provision mirror. Any also if the divider is already provided then we can reduce its size for more space. If the vehicle speed is more than the design speed there, we can apply the method by using CCTV at any particular point on the expressway if CCTV is not provided and the accident rate is more at that point then there, we can apply this method.

Also, we can take look at if a truck accident happens on the expressway and then road traffic happens due to a block of the road then there, we can also provide some prevention to tackle this kind of situation. also, at some of the places, if barriers are not provided where the rate of accidents more on the expressway then there, we could provide barriers.

We can check the road design aspect to reduce accidents on expressways

4.3.1. Location

After the analysis we conclude that we are required to adopt various technique. in Mumbai-Pune expressway. By collecting previous accidents data, we decided to do a survey at Mumbai-Pune expressway. The Mumbai-Pune expressway (officially Yashwant Rao Chavan expressway) is India's first 6 lane wide concrete access control, tolled expressway. Its span distance of 94.5km connecting, the capital of Maharashtra and the financial capital of India, with Pune, the cultural and educational capital of Maharashtra. The expressway, which was fully operationalize in 2002, introduced new level of speed and safety in auto mobile transportation to Indian roads it is the one of the India's busiest roads.

4.3.2. Road survey

We have selected Mumbai-Pune expressway because it is connecting two important major cities of Maharashtra. Many vehicles ply on this road for the purpose of education, industry finance, etc. It is also important tourist place in Maharashtra. Being such an important road, it is quite an accident-prone road so we decide to install a speed guns, implement rolling barriers, prevention mirror, road safety signs, etc.

4.3.2. Causes of accident

Because of presence fog in rainy and winter season driver can't see the front vehicle, the visibility is very less. Another major cause is overspeeding or rush driving hence, many people get injured and even lose their lives life due to clashing of vehicle. At some of the place's barriers are not provided for preventing the vehicle from derailing of the lane. These the main reason why accidents are caused. After doing research and analysis we collected the accidental data of the past three years from RTO. In the past three years many accidents have occurred.

5. CASE STUDY

5.1 Introduction

Mumbai Pune expressway is dangerous expressway in Maharashtra. The Mumbai-Pune expressway (officially Yashwant Rao Chavan expressway) is India's first 6 lane wide concrete access control, tolled expressway. Its span distance of 94.5km. In Nov 18, 2022 the SUV car carrying nine passengers hit container on the expressway near khopoli area of Raigad at around 11.40pm after the driver lost control due to overspeeding.

5.2 Problem on Mumbai pune expressway

ON 23 FEB 2023 we started a survey of that road or ghat around 10 am we found there are stiff slopes on curves and also at some places the presence of black or blind spots therefore visibility on roads is very less, some curves are more than 80-degree curve because of intense turns driver can't see properly lane.

As heavy vehicles came from long distances due to the continuous running of vehicles the brake liners and mechanical part of the vehicle get heated and the vehicle is travel through a ghat section they put the vehicle on neutral gear and continue the use of break, leading to breaking failure

5.3 Location of most accidental areas

5.3.1. Amrutanjan point

This point is on the Mumbai Pune expressway 45km from the start point of the expressway the lane width of the Amrutanjan point is short and there are very big S curves and slopes due to sharp turns and slopes it's very difficult to

see the vehicles in front and to control the vehicle due to this reason the driver loses control over the vehicle hence accidents are high.

5.3.2. Anda point

Khopoli to Lonavla also runs at the This point is 41km from the start point of the Mumbai Pune expressway is a very dangerous point and most accidents see at this place. Due to dangerous turns and lack of correct direct drivers get confused. Also, the old Mumbai Pune road is connected to the expressway at the same place, and the route from same place.



5.3.3. Adoshi tunnel

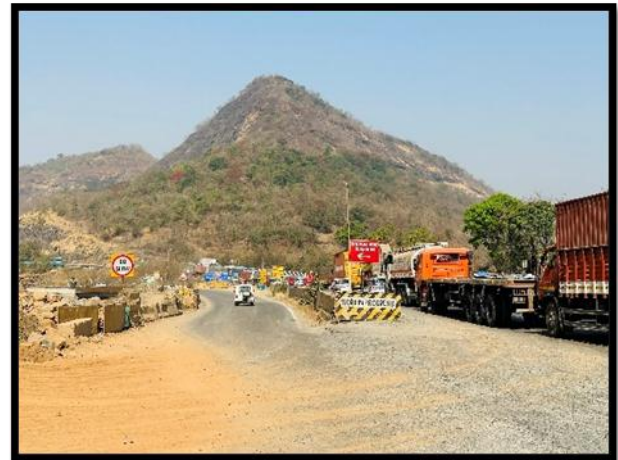
This point is on from the start point of the Mumbai Pune expressway at this point slope is a very steep incline of about 1km and a 90-degree curve and immediately leads to the tunnel, also there are no lights in the tunnel visibility is less.



5.3.4. Khopoli exit point

This is an accidental area, the distance from the start point is 38km, and the way out for Khopoli is not readily apparent

due to the steep hills vehicles traffic lane width is very less for two roads as road work is going on the way out is not readily visible.



6. COMPARISION

6.1 Introduction

The purpose of literature review is a search and evaluation of the available literature in our subject or choose topic area. It documents the state of the arts with respect to subject or topic that we are writing about.

The literature review is a focused on providing background information and enabling historical interpretation of the subject of analysis is relation to the research problem the case is intended to address. Sources covered in the review may include scholarly journal **articles, books, government** reports, website, etc. the literature review provides description, summery and evaluation of each source.

6.2 Aim of study

Roads and roadways are the primary mode of transport across the globe. Connectivity through roads help movement of humans, animals and materials. It thus shapes and develops the world at large by facilitating movement - movement for socio-cultural exchanges and economic progress. While there is a constant endeavor to increase roads and enhance road infrastructure, a lot more attention has to be given to keep our roads safe for all road users. It is quite disturbing to acknowledge that every year, the world loose over 1.35 million people due to road accidents

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6.3 Objective of literature review

It surveys the literature in your chosen area of study , it critically analysis the information gathered by identifying gaps in current knowledge; by showing limitations of theories and points of view; and by formulating areas for further research and reviewing areas of controversy

6.4 Objective of case study

Describe an individual situation (case), e.g., a person, business, organization, or institution, in detail

7. RESULT AND ANALYSIS

7.1 General

On 14 august 2022 the accident took place at near Madapur tunnel close to Khalapur toll plaza. That SUV was in the second of the six-lane expressway, the driver lost control of the car after truck changes lane, in that Ex-MLC Vinayak Mete died.



7.2 Calculation

Calculation of questions that we ask

YES = 170
NO = 130

Average of answer = $\frac{\text{Total Answer in Yes / No}}{\text{Total Vehicle}} \times 100$

YES = $\frac{170}{300} \times 100 = 56.66 \%$
NO = $\frac{130}{300} \times 100 = 43.33 \%$

7.3 Result

Result of average of answers of YES

| Question Number | Percentage |
|-----------------|------------|
| 1 | 56.66 |
| 2 | 20 |
| 3 | 33.33 |
| 4 | 26.66 |
| 5 | 96.66 |
| 6 | 43.33 |
| 7 | 80 |
| 8 | 100 |
| 9 | 100 |
| 10 | 26.66 |

8. CONCLUSION

1 As per our opinion, 2022 Mate's SUV accident took place on straight road. If you look at this road portion the road is continuous straight about 5 km and because of that speed of vehicle increases due to that drivers lost control of the car after truck changes lane.

2. If there another extra lane is provided for heavy vehicles to overtaking so we could minimize the accident due to lane cutting.

3. The accident is the case of human error or natural phenomenon.

4. India is a developed country in infra and transportation section. As an engineer we construct the roads, highways, express ways, but also we have to concentrate on the safety of the roads, to minimize the total accidents.

5. On 36/500-point visibility of road is very less due to no lights on that portion. So, there we can provide lights and some extra lane. The lights are of solar poles in those specific points.

6. In the portion of Anda Point (NH-48) divider can be provide and also provide proper instruction and direction sign to avoid accidents.

7. On the Adoshi Tunnel the road is very steep and 90° curve and immediately leads to the tunnel. In that tunnel visibility is less because of there are no lights. So here we can provide rolling barriers in the car section. To control vehicle speeds we can provide rumble strips and also provide the lights in the tunnel for visibility.

8. In Khopoli exit point construction work is going on so that's why traffic happens. Visibility less because of construction work. So here we can provide direction and signs.

9. For heavy vehicles we can provide halt station at Malavali area to cool down that vehicles. So that the vehicles liners and gearboxes may cool down. So that chances of failure of mechanical parts and chances of accident is less.

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