

## SHORT ARTICLE

# Situational Analysis of Road Traffic Accidents- A case of Madurai District rural areas, Tamil Nadu

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## Article Cycle

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## Abstract

**Background:** Road traffic accidents (RTAs) have emerged as a major public health concern due to the growing number of motorized vehicles all over the world. In India, the burden of road traffic accidents is increasing and from 1991 to 2011, the number of fatal deaths has more than doubled. Madurai district is among road accident-prone regions of the state of Tamil Nadu. **Objective:** This paper aims to examine and understand trends and patterns of RTAs in rural areas of Madurai District between 2014-2018. **Methods:** The researchers collected RTAs data from Madurai District Crime Records Bureau. we have considered time-series data from 2014 to 2018 and the number and percentage of deaths by the distribution of relevant factors such as timing, gender, road type, and vehicles to understand holistic patterns of RTAs. **Results:** Totally 9950 road accidents were reported by Madurai District Crime Records Bureau between 2014 and 2018 and on an average over 1990 accidents have occurred every year. Nearly 40 per cent fatal accidents occurred between 15-21 h. Men were the victims in 87 per cent of deaths and men died 6.8 times higher than females during 2014-2018. Over 57 per cent of fatalities have occurred in National Highways. The proportion of two-wheelers contributed to road deaths is 28 per cent and two-wheelers caused maximum road deaths than other vehicles. **Conclusion:** The study shows a decreasing trend in road accidents and fatalities in Madurai district. However, a significant number of men dying in road accidents highlights the difficulties of their families.

## Keywords

Road Safety, Road Traffic Accidents, Road injuries, Madurai district, Crime records bureau

## Introduction

Road traffic accidents (RTAs) have emerged as a major public health concern due to the growing number of motorized vehicles all over the world. According to the World Health Organization, nearly 1.35 million individuals die every year, and between 20 and 50 million suffer non-fatal injuries, with many incurring a disability (1). Despite having just 50 per

cent of vehicles, low and middle-income countries experience 90 per cent of the world road deaths (2). In India, the burden of road traffic accidents is increasing and from 1991 to 2011, the number of fatal deaths has more than doubled (3). In Indian roads, an average of 1317 accidents and 413 fatalities occur every day, which further translates into 55 accidents and 17 fatalities every hour (4). Victims of fatal road accidents are mostly young

people in groups of active age. Persons in the 18-60 years working-age group accounted for 87.2 per cent of the total deaths from road accidents (5).

Two-wheeler riders and pillions, pedestrians and motorcycles account for approximately 80% of road deaths and injuries. Indian Highways makes up only 4.84% of total road length yet amounts to 52.4% of road traffic accidents and 63% of traffic deaths. With the current scenario, India will experience more than 2,00,000 deaths annually by 2030 (6). Tamil Nadu had the greatest number of road accidents in India in 2017 (5). Madurai district is among road accident-prone regions of the state. Research on RTA trends and patterns are quite appropriate in this context.

### Aims & Objectives

This paper aims to examine and understand trends and patterns of RTAs in rural areas of Madurai District of Tamil Nadu between 2014-2018.

### Material & Methods

**Study Type:** Secondary data analysis

**Process of Data Collection:** Traffic police, like in most nations, is the source of government's official statistics on road traffic accidents in India. Police stations send statistical data summarizing key information of road traffic accidents to their District Crime Records Bureau (DCRB), from which aggregated statistical data flow up to the State Crime Records Bureau, and the National Crime Records Bureau (NCRB), which publishes the country's official statistics (7).

**Data Source:** The researchers collected RTAs data from Madurai District Crime Records Bureau located in the Office of Superintendent of Police.

**Statistical Procedure:** The patterns of RTAs is assessed through the number of fatalities and severity index. The severity index is the number of deaths per cent accidents in a given year in the rural areas of Madurai district. The percentage of fatal accident occurrences by vehicles is calculated to get an idea of which type of vehicle is more responsible for accidental deaths. The researchers also considered the number and percentage of deaths by the distribution of factors such as timing, gender (male and female), and road type (National Highways, State Highways and other roads) to understand holistic patterns of RTAs.

**Ethical Considerations:** The secondary data did not contain any identifiable information and did not require an assessment by the ethics committee.

## Results

**Trends in RTAs in Madurai district rural areas during 2014-2018:** Totally 9950 road accidents were reported by Madurai District Crime Records Bureau between 2014 and 2018 and on an average over 1990 accidents have occurred every year. 2287 road accident deaths happened in Madurai district rural areas which translates that on an average over 457 people have died each year during the study period which is very alarming. From the [Table 1], it is obvious that the severity of RTAs in Madurai district rural areas in the year 2014 was about 24.9 per cent. It means about 25 people died out of a hundred accidents in the year 2014. The severity marginally declined to 21.6 in the year 2015 but it increased again and raised to 25.7 in the year 2017. By the year 2018, the severity of RTAs in Madurai district rural areas declined to 18.6. There is about 7 per cent point decrease in the severity between 2017 and 2018.

**Fatal Road Accidents in Madurai district rural areas by timing:** The Fatal Road Accidents by timing are presented in [Figure 1]. As per the classification of the timing of accidents, it is observed that 394 fatal accidents occurred between 15-18 h and 433 fatal accidents have occurred between 18-21 h respectively during the study period. About 21 per cent fatal accidents happened during 18-21 h of timing and about 19 per cent of accidents happened during 15-18 h. In other times of the day, the accidents are spread somewhat uniformly.

**Road accident deaths in Madurai district rural areas by Gender differences:** The Road accident deaths by gender differences are presented in [Figure 2]. Significantly more number of men are killed than women in road accidents each year. During the study period 1994 males have died and on an average over 399 males have died each year. And 293 females have died and on an average over 59 females have died each year. It is worth mentioning that men were the victims in 87 per cent of deaths and men died 6.8 times higher than females during 2014-2018.

**Road Accident Deaths in Madurai rural areas by road type:** Road accident deaths take place more in National Highways than in State Highways and Other roads. During the study period 1305, 542 and 440 people have died in National Highways, State Highways and Other roads respectively. Over 57 per cent of fatalities have occurred in National Highways.

State Highways and other roads contribute to about 24 and 19 per cent of deaths respectively.

**Fatal Road Deaths in Madurai rural areas by Vehicles:** The road deaths by type of vehicle in Madurai district rural areas between 2016 and 2018 is presented in [Figure 3] to understand the involvement of different types of vehicles in the contribution of road deaths. The graph shows that the involvement of two-wheelers is maximum between 2016 and 2018 and the proportion of two-wheelers contributed to road deaths is 28 per cent and two-wheelers caused the death of 381 people. Car, Jeep, Taxi and Tempo together contributed to about 27 per cent of deaths. The trucks and lorries involved in 17 per cent of deaths it caused deaths of 224 people. In addition, government buses contributed to 9 per cent of deaths. The involvement of other vehicles (other than two-wheelers, car, bus and truck) in road deaths in Madurai district is 13 per cent.

## Discussion

Madurai district rural areas recorded about 13 per cent decrease in total RTAs from 2014 to 2018 and it is encouraging to see that this decrease from 2017 and 2018 is about 11 per cent. All India accident severity showed an increase of 0.6% in 2018 over 2017 [8]. However, in Madurai district, the accident severity declined by about 7 per cent from 2017 and 2018. It shows that road safety measures taken in the Madurai district over the last few years are reducing accidents and fatalities.

The study also shows that about 40 per cent of fatal accidents occurred between 15-21 h and 827 fatal accidents have occurred on that time-ranges during the study period. These are the time-ranges during which traffic speed is high and there is also a risk of low visibility conditions and alcohol drunk driving. According to Aygencel et al. [9], these times refer to the time period that people drive and then return to their homes after work. Vyawahare and Giri [10] observed being the most frequent time-range for fatal road accidents between 6 pm and 12 midnight. But a New Delhi study [11] showed that most road injuries occurred between midnight and morning. The higher incidence of accidents in that study between midnight and morning can be attributed to the culture of nightlife in larger urban centres such as New Delhi.

It is important to note that 87 per cent of victims of road accident deaths were men. The loss of the male

family member can impact the mental health of those respective families. Similarly, a male high prevalence was found in another Indian study [12] where males significantly exceeded females, with a ratio of 6:1. Similar findings were also found in research by Zhang et al. [13] in China that males accounted for 73.0 per cent of injuries. They linked this problem to the observation that in China as in India and other developing countries males are much more likely to be drivers compared with females. In the present study, Male high proportion may be due to more males in the Indian social system taking income responsibilities for the household and moving out for employment than females

1305 people have died and about 57 per cent fatalities have occurred in National Highways between 2014 and 2018 in Madurai District which explains that National Highways has been unsafe for road users. In a study [14] conducted in Uttar Pradesh, however, maximum accidents were reported on state highways (46%) followed by national highways (36%) and other roads (18%). In the present study, the higher incidence of fatalities on National Highways can be attributed to high-speed vehicles. National Highways pass through several villages that make the village population vulnerable to accidents. Installing speed camera in National Highways to track vehicle speed will compel drivers of motorised vehicles to adhere to speed limits. The deployment of speed cameras could result in a substantial 18 per cent decrease in accidents [15].

The study also points out that two-wheelers contribute to maximum road deaths and trucks involved in 17 per cent deaths between 2016 and 2018. Another African research [16] found similar results to our research in which victims involved in most cases were motorised two-wheelers (53.4 per cent). Full-body exposure to traffic crash makes motorcycle riders vulnerable to road fatalities. Seethalakshmi et al. [17] found that head Injuries became the main cause of death in the event of motorized two-wheeler users' deaths as they did not wear helmets during the accident.

## Conclusion

The study shows a decreasing trend in road accidents and fatalities in Madurai district. However, a significant number of men dying in road accidents highlights the difficulties of their families. The motorcycle-user focused intervention is needed as

the study indicate their vulnerability to road deaths. More focus on traffic management between 15-21 hour can help in the reduction of fatalities because nearly 40 per cent of fatal accidents occur during this period. Efficient speed calming mechanisms in National Highways can also substantially reduce fatalities. Improvement in road safety can result in enhancement of People's health.

### Recommendation

The study result indicated that the involvement of two-wheelers in road deaths is maximum. Further studies relating to the travel behaviour of motorcycle riders and corrective measures to reduce motorcycle fatalities can help gain deep insight into this silent epidemic.

### Limitation of the study

The secondary data used in this research may have an under-reporting bias.

### Relevance of the study

In rural India, nearly 80% of accidents and 88% of deaths happen. Most of India's road safety discourse is more of an urban phenomenon, and rural India still needs to be associated and involved (6). In this context, research on trends and patterns of RTAs in rural areas is needed to understand the severity of the road safety issues so that it can lead to effective policy formulation to address this public health issue.

### Authors Contribution

VSA worked in literature search, data acquisition, statistical analysis and manuscript preparation. Dr SP contributed in concepts, editing and reviewing of the manuscript.

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**Tables**

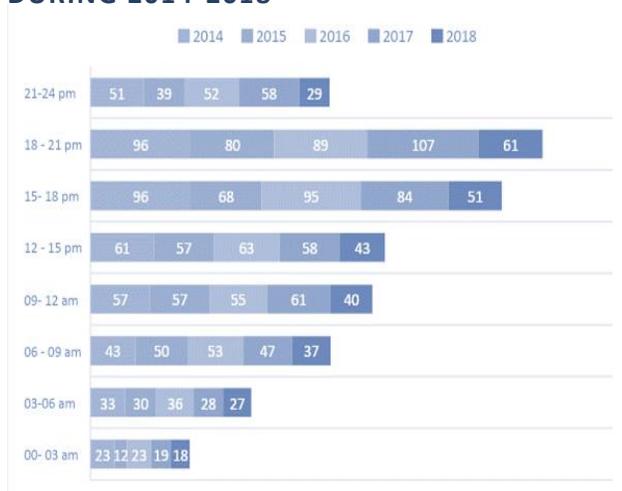
**TABLE 1 TRENDS IN ROAD TRAFFIC ACCIDENTS AND DEATHS IN MADURAI DISTRICT RURAL AREAS DURING 2014-2018**

Year	Total Number of Accidents	Persons died	Accident severity index
2014	2039	507	24.9
2015	1967	424	21.6
2016	2174	514	23.6
2017	1993	512	25.7
2018	1777	330	18.6

(Data Source: District Crime Records Bureau, Madurai District Police Office, Madurai)

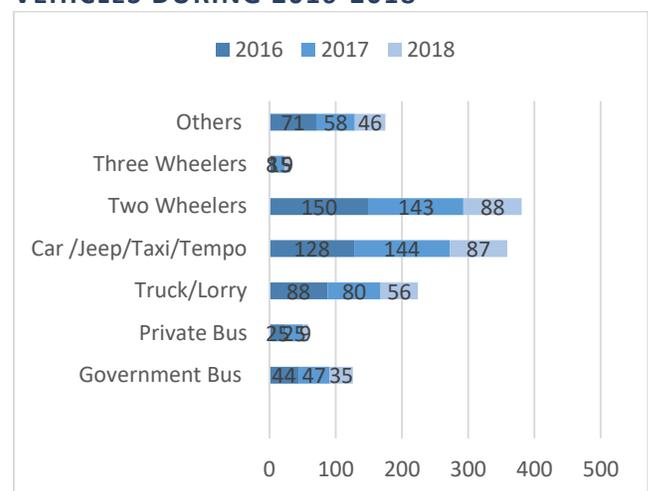
**Figures**

**FIGURE 1 ROAD ACCIDENT DEATHS IN MADURAI DISTRICT RURAL AREAS BY TIMING DURING 2014-2018**



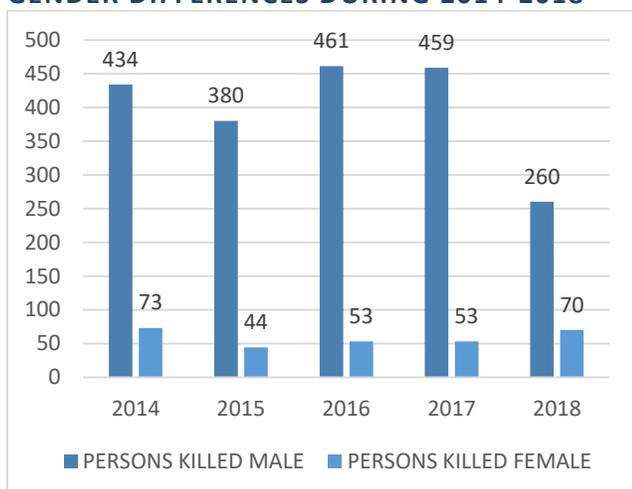
(Data Source: District Crime Records Bureau, Madurai District Police Office, Madurai)

**FIGURE 3 ROAD ACCIDENT DEATHS IN MADURAI DISTRICT RURAL AREAS BY VEHICLES DURING 2016-2018**



(Data Source: District Crime Records Bureau, Madurai District Police Office, Madurai)

**FIGURE 2 ROAD ACCIDENT DEATHS IN MADURAI DISTRICT RURAL AREAS BY GENDER DIFFERENCES DURING 2014-2018**



(Data Source: District Crime Records Bureau, Madurai District Police Office, Madurai)