A Major Challenge For Living: Road Traffic Accidents In Kerala, India In The Course Of Last Ten Years.

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Abstract: This study is an attempt to model and analyze the road traffic accident rates for the last ten years from 2008 to 2018 in Kerala state, India. We have done this study by pointing on the serious matter of the day by day increasing tendency of Road accidents in Kerala, even though many rules and regulations implemented from the government side. The researcher conducted personal interview with many vehicle drivers and pedestrians during this study period and included their vision and feelings in the conclusion part. The number of accidents and fatalities are consistently increasing; this may be due to quick expansion in motorization without adequate improvement in road safety strategies. For this study and interpretation of the data the researcher used Trend analysis .This paper focuses on forecasting the annual road accident rates in Kerala using the Time Series Models such as Auto-Regressive Integrated Moving Average (ARIMA) and Exponential Smoothing, the software package SPSS used for data analysis.

Index Terms: Road traffic accidents, Road safety, Accident rates, Forecasting.

1. INTRODUCTION

Numerous states in India is having issues related to street traffic concerns, for example, moderate moving traffic, higher mishap rates for recent years, and so on. The circumstance is getting intensified step by step because of the expanding populace. In India, alongside the populace development, different factors, for example, improved budgetary status brought about the expanded number of vehicles. This prompts an expanded number of street mishaps and their subsequent fatalities as a developing social and financial issue. The victims have to pay tangible and intangible costs. It is of immediate requirement to rectify this issue. Road accident statistics reveal that in India more than thirty percent of the accident victims are between twenty five and forty. So our nation is losing a group of enthusiastic people who can contribute to the growth and prosperity of the country. Moving to the scenario in Kerala it is much worse. So the question of how to reduce the number and intensity of mishaps remain unanswered. Tackling safety and crash issues from the basic level is an influential technique. Though the system tries to implement strategies in existing laws and situations they are not effective. We have to search and work for a permanent cure. Those short term strategies will show a change in the beginning and in the long run they are of no use. So to deal with the issue it is very important to have a detailed observation of the case and to make and implement effective and permanent strategies. As a result of a few changes in laws and improving road safety the nation witnessed a remarkable change in accident numbers in 2014. But eventually due to many other factors the numbers again saw the hike. Our motive is to bring out the seriousness of the issue and to suggest ideas or plans for a better existence. The ongoing pattern is likewise appearing pattern upward in the street mishaps in Kerala. It is toward this path that this paper is set up to examine the patterns, examples and gauge of streetcar crashes in Kerala.

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2 STATEMENT OF THE PROBLEM

In spite of the mindfulness battles on street wellbeing yielding outcomes, the state saw a higher number of traffic accidents in 2018 contrasted with the quickly going before the year, as indicated by information accessible with the police. While 4,199 lives were lost on the streets a year ago as against 4,131 of every 2017, the quantity of those unfortunately harmed in street mishaps additionally went up to 31,611 from 29,733 of every 2017. A sum of 91,444 people endured egregious wounds in road accidents that occurred in 2016, 2017 and 2018. In 2016, the Malapuram region saw 402 people losing their lives out and about. It could be seen as adding to the comprehensive and formative methodology because of the conceptualization execution of street security improvement programs in the investigation zone.

3 OBJECTIVES OF THE RESEARCH

1. To study the total number of road accidents, the persons injured, the persons died in Kerala from 2009 to 2018.
2. To study the number of road accidents related to the type of roads in Kerala during the year from 2009 to 2018.
3. To study the number of road accidents related to the type of vehicles in Kerala during the year from 2009 to 2018.
4. To study the number of road accidents in different districts of Kerala during the year from 2009 to 2018.
5. Utilizing the consequence of 2017 and 2018 an expectation of street mishaps in 2019, 2020, 2021 is predicted.

4 RESEARCH METHODOLOGY AND STATISTICAL DESIGN

This study shows a decade of 2009-2018 road accidents in Kerala among all districts of the state and analysis extended up to different types of roads and types of vehicles. It spells out the large scale level investigation and utilizing auxiliary wellsprings of information in the investigation region. Employing this study inspected the systematic approach of covering a table, Mean, Standard Deviation and Techniques utilized Time series analysis and predictions using trend lines. For analyzing (1) to (5) we have used the secondary data

provided in the government website. The modeling was done by constructing tables and figures using regression analysis.

5 RESULT ANALYSIS

*5.1 **Table (1)**: Total number of road accidents, the persons injured, the persons Died in Kerala during the period from 2009 to 2018.*

Year	Total accidents	Person injured	Person died
2009	35433	41401	3831
2010	35082	41473	3950
2011	35216	41379	4145
2012	36174	41915	4286
2013	35215	40346	4258
2014	36282	41096	4049
2015	39014	43735	4196
2016	39420	44108	4287
2017	38470	42671	4131
2018	40181	45458	4303
AVG	37048.7	42358.2	4143.6
SD	1996.369	1604.201	1604.21
RSD	5.388	3.787	3.828

AVG-Average, SD-standard deviation, RSD-Relative SD.

Figure (1):
Total number of road accidents, the persons injured, the persons Died in Kerala during the period from 2009 to 2018

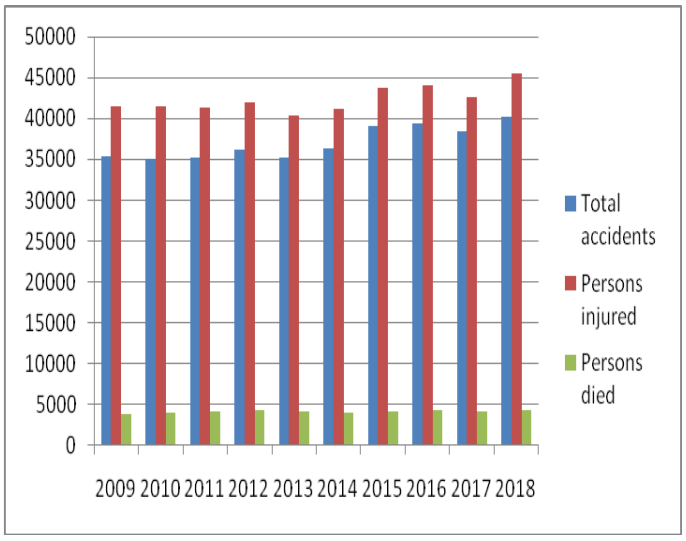


Table (1) shows there were an average number of 37048 fatal accidents reported from 2009 to 2018, an average of 42358 injured and 4143 death claimed during this period. In the year 2015 shows an increase of 7% accident when compared to the just previous year, 2016,2017,2018 shows an increase of 4%, 4,2%, 4,7% respectively compared to the preceding years. Relative standard deviation also calculated, it shows 5.3%, 3.8%, 3.8% dispersion from an average number of accidents, injured, death during this period, and the maximum number of accidents, death and injured claimed in the year 2018.

*5.2 **Table (2)**: Number of road accidents in National highways, State highways and other roads during the year from 2009 to 2018.*

Year	National highway	State highway	Other roads
2009	9425	6637	19371
2010	9473	6539	19070
2011	9519	6401	19296
2012	9375	6718	20081
2013	8911	6593	19711
2014	9006	6140	21136
2015	9442	6888	22684
2016	9209	7135	23076
2017	8993	7043	22434
2018	9161	7552	23468
AVG	8951.4	6764.6	21032.7
SD	907.48	404.29	21032.7
RSD	10.137	5.98	8.25

Figure (2):
Number of road accidents in National highways, State highways and other roads during the year from 2009 to 2018

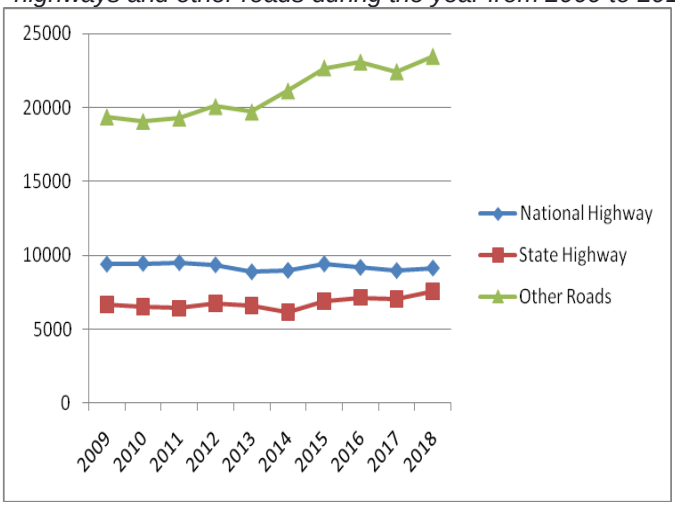


Table (2) shows there were an average number of 8951.4, 6764.6, 21032.7 fatal accidents reported from 2009 to 2018 in national highways, state highways and other roads respectively. Compared to national highway and state highway other road accidents seems to be very high and it shows a ratio of 1:0.8:2.9. Relative standard deviation also calculated it shows 10.13%, 5.98%, 8.2% dispersion from an average number of accidents in national highway, state high way, other roads, and there was a maximum number of accidents claimed in the year 2012, 2018, 2018 in national highways, state highways and other roads respectively.

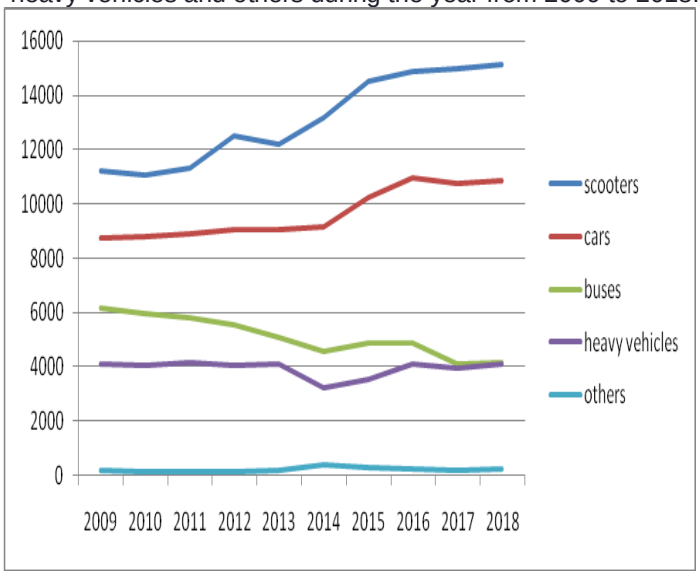
5.3 Table (3):

Number of road accidents regard to scooters, cars, buses, heavy vehicles and others during the year from 2009 to 2018.

Year	Scooters	Cars	Buses	Heavy vehicles	Others
2009	11219	8736	6186	4073	171
2010	11052	8786	5972	4041	143
2011	11303	8909	5813	4150	153
2012	12479	9024	5494	4045	143
2013	12209	9059	5091	4114	191
2014	13167	9169	4557	3216	413
2015	14482	10222	4865	3542	321
2016	14849	10975	4950	4082	245
2017	14967	10791	4106	3944	214
2018	15124	10845	4108	4079	256
AVG	13085	9652	5114.2	3928.6	225
SD	1656	937	741.33	304.4	87.4
RSD	2.12	3.17	4.21	4.35	1.22

Figure (3):

Number of road accidents regard to scooters, cars, buses, heavy vehicles and others during the year from 2009 to 2018.



Table(3) shows that the accidents due to scooter seems to be very high during 2009 to 2018. There were an average number of 13085 accidents due to scooter, 9651.6 accidents due to cars, 5114.2 accidents due to buses, 4079 accidents due to heavy vehicles and 256 accidents due to other vehicles. Among the total accidents during the study period, more than 40% of the accidents were due to scooter, 30% due to cars, 15% due to buses, 12.27% due to heavy vehicles and 0.7% accidents due to other vehicles.

5.4 Table (4):

Highest number of accidents in the study period regard to district and year.

Year	Trivandrum	Ernakulam	Trissur
2015	5066	6076	4294
2016	6615	6167	4261
2017	5259	5797	4266
2018	5529	5996	4407
AVG	4957	5672.5	4105.6
SD	667.14	282.05	198.64
RSD	13.45	4.97	4.83

Figure (4):

Number of road accidents in different districts of Kerala du ring the year from 2009 to 2018

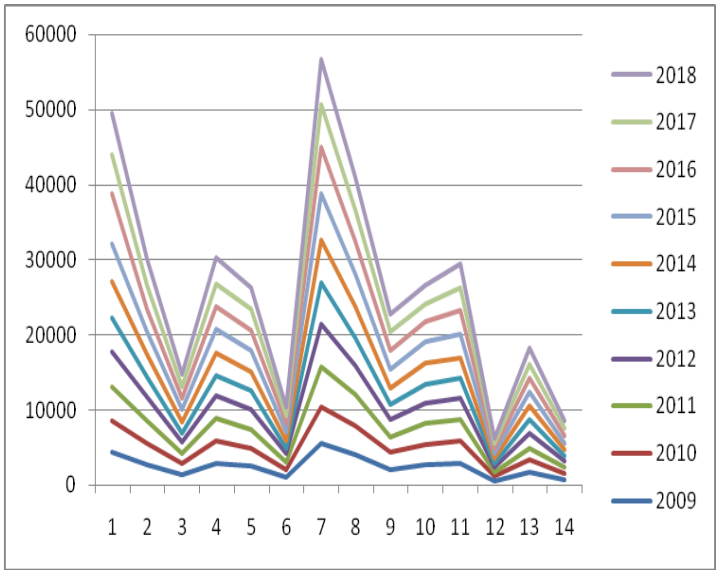


Table (4) in the study period 2015,2016,2017,2018 shows the highest number of accidents in Trivandrum, Ernakulum, Trissur district. Among all the districts of Kerala Ernakulum district shows the highest mishap rate. The figure shows the district wise accident from 2009 to 2018. Labeling 1 to 14 in figure (4) corresponds to districts of Kerala. 1-Trivandrum 2-Kollam 3-Pathanamthitta 4-Alapuzha5-Kottayam 6-Idukki 7-Ernakulam 8-Trissur 9-Palakkad 10-Malapuram 11-Calicut 12-Wayanad 13-Kannur 14-Kasargod

5.5 Table (5):

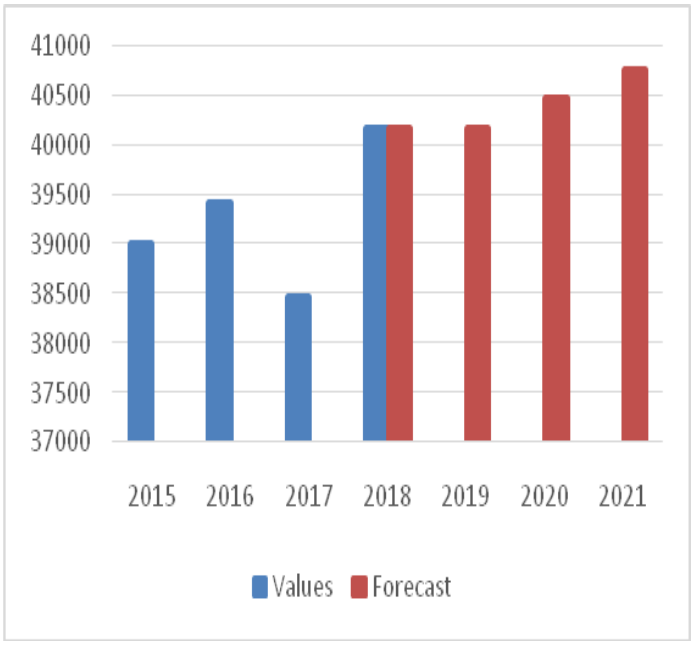
Forecasting total number of accident for the year 2019, 2020, 2021

Timeline	Values	Forecast
2016	39420	

2017	38470	
2018	40181	40181
2019		40181.922
2020		40473.947
2021		40765.972

The above data shows number of accidents is increasing every year. From 2019 to 2020 it shows 1.1% of increase and in 2021 shows 2% increase.

Figure (5):
Forecasting total number of accident for the year 2019, 2020, 2021

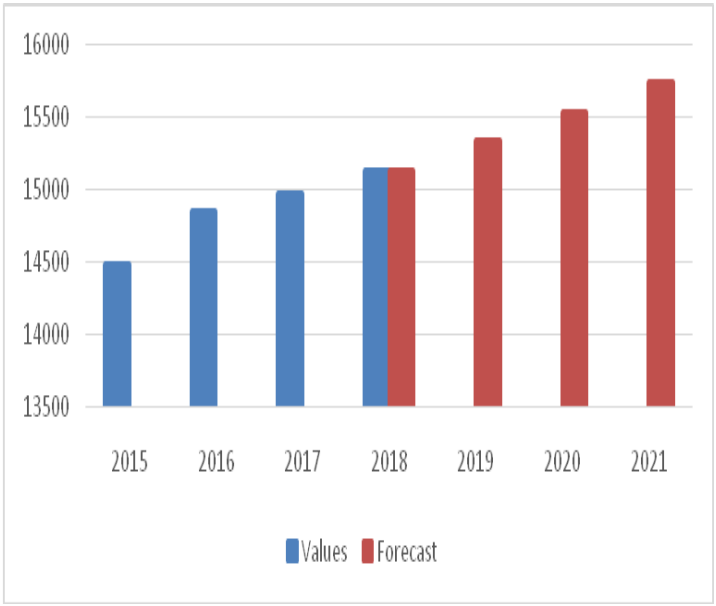


***5.6** Table (6):*
Forecasting scooter accidents- predicted number of accidents in 2019, 2020, 2021

Table (6) shows the forecast for scooter accidents during the year 2019, 2020, 2021. The trend pattern is increasing. Towards 2021 we can expect a count of 15740 scooter accidents. So we need to find out alternative strategies to control the number of accidents. That means the current solutions are not effective and more attention needed. The study claimed that around 50% of scooter accidents happened due to fast and negligence driving. Also, the majority of the victims are below 30 years.

Timeline	Values	Forecast
2016	14849	
2017	14967	
2018	15124	15124
2019		15336.95
2020		15538.819
2021		15740.688

Figure (6):
Forecasting scooter accidents-predicted number of accidents in 2019, 2020, 2021



***5.7 Figure (7)**:*
Forecasting the number of accidents in monthly basis

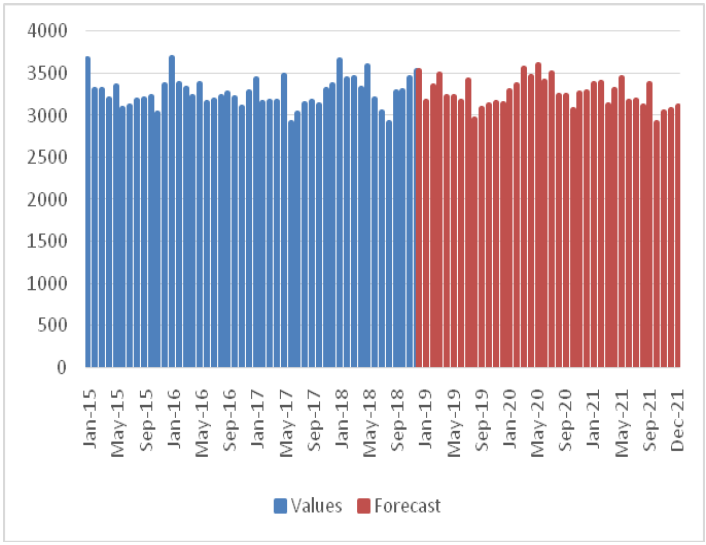


Figure (7) shows accident numbers in monthly basis. The count seems to be high in January month.

6 CONCLUSIONS

From the above results, the following conclusions are made:

1. The figures for the number of accidents and fatalities are consistently increasing. This may be due to rapid expansion in motorization without adequate improvement in road safety.
2. The number of accidents is high in Trivandrum, Ernakulam, Thrissur. Because the number of vehicles on the road are high in these cities.
3. Wayanad and Idukki have the lowest number of crashes.
4. Accident rates are very low in National highway compared to other roads.

5. Motorcycles/Scooters account for a large proportion of road traffic accidents. Driving without helmets causes serious injuries while traffic crashes.
6. Prediction using time series analysis shows the increasing trend line. So it is very late already to implement new strategies to save lives on the road. As per the discussion and personal interview with pedestrians and vehicle drivers we observe that before implementing traffic rules a deep study on road safety and drivers' eligibility and personality should be done.

7 SUGGESTIONS

1. Prefer the safest routes rather than the shortest ones.
2. Follow advisory speed limits.
3. Be vigilant to identify and choose low-risk modes of transportation.
4. Give preference to pedestrians and children while crossing the road.
5. Ensure the use of helmets while travelling in scooters.
6. Ensure the use of seat belts in cars.
7. Realize road safety is a basic right and be aware of what is our duty to avoid crashes in road.

8 REFERENCES

[1] Mandloi, D. and Gupta, R., (2003). 'Evaluation of accident black spots on roads using geographical information systems (GIS)', Map India Conference.

[2] Rokade, S., Singh, K., Katiyar, S.K. and Gupta, S., (2010). 'Development of accident prediction model', International journal of advances in engineering and technology, vol.1, pp. 25-40.

[3] Athipathi, G., Nagan, S. and Baskaran, T., (2017). 'Accident Prediction on national highways in India', International Journal of Theoretical and Applied Mechanics, vol. 12, no. 1, pp. 153-165.

[4] Kerala Police Force Department and Motor Vehicles Department. – Different case files from 2009 to 20185. Transport Research Wing 2015. "Road Accidents In India 2014". New Delhi: Ministry of Road Transport and Highways

[5] WHO. (2004). "World report on road traffic injury prevention".

[6] Bourgeon, J.M. and Picard, P. (2007). "PointRecord Driver's license and Road Safety: An Economic Approach". Journal of Public Economics 91, 235-258.