Shri Swami Vivekanand Shikshan Santha's Kolhapur

Lal Bahadur Shastra College Of Arts, Science And Commerce, Satara.

DEPARTMENT OF STATISTICS

(2020- 2021)

Project On

" Statistical Analysis of Road Accidents In India "

By

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CERTIFICATE

Department of statistics (B.Sc.-III)

This is to certify that, **Shrikant Avinash Muley.** Have does the PROJECT entitled,

“Statistical Analysis Of Road Accidents In India”

In the partial fulfillment of requirement of B.Sc.-III statistics practical during the year 2020-2021. This project represents the sincere work carried out under my guidance. This project work is satisfactory.

Teacher in charge Examiner Head of Department

Acknowledgement

We wish to thank Department of Statistics (Lal Bahadur Shastra College Of Arts, Science And Commerce, Satara.) for giving us an opportunity to do a project.

This report has been prepared under the guidance of Asst.Prof.Mr.S.D.Kanase We would like to express our profound gratitude towards him for his guidance we constructive throughout this project.

Also we would like to thank head of department Prof.Mr.T.B.Adsul and all faculty members. Also we would like thank to Asst.Prof.Mr. Pramod Borate for their support, suggestions and guidance for this project.

Finally we would like to thank non-teaching staff and of our Department for their valuable co-operation in this project.

INTRODUCTION

Road Accident is a 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 user are quite well aware of the general rules and safety measure while using roads but it is only laxity on part of road users, which cause of accidents and crashes. Main cause of accidents and crashes are due to human errors. Road safety also depends on the safety of road infrastructure. Although the majority of accidents are caused by drivers, their behaviour is often influenced by the traffic environment.

Data source:-

The data required for the project work has been collected from online website www.google.com and from the PDF of 'MINISTRY OF ROAD TRANSPORT AND HIGHWAYS TRANPORT RESEARCH WING' of India.

Objectives:-

1) Analyse data for the factors, which can impact accident rates (e.g. light condition, weather, over-speeding , drunken driving , driving on wrong side , jumping red light , use of mobile phone etc.)
2) Determine type of road classes with highest and lowest amount of accident rates from analysing tables of road accident statistics and charts created from the database.
3) Suggest appropriate measures for the factors and the road class determined the most dangerous.
4) To study number of road accidents in India.

Statistical Tools:-

1) Graphical Representation
2) Growth test
3) Time series
4) Frequency Tables

Statistical Softwares :-

1) Ms - Word
2) Ms – Excel

As per the World Health Organization (WHO) , accident related deaths , are known to be the eighth leading cause of death and the first largest cause of death among children aged 5 – 14 and adults in the age 15 – 29. Globally , 54% of accident related deaths are pedestrians, cyclists and motor cyclists. This results in considerable economic losses not only to individuals, their families, but also to the nations as a whole.

The losses are on account of cost of treatment as well as lost productivity for those killed or disabled by their injuries, loss of productivity of family members who need to take time off work or school to care for the injured etc. Road accidents in India kill almost 1.5 lakh people annually. Accordingly , India accounts for almost 11% of the accident related deaths in the world.

ANALYSIS & FORECASTING

The study is done for five categories and each for five Indian states. Categories are listed below:

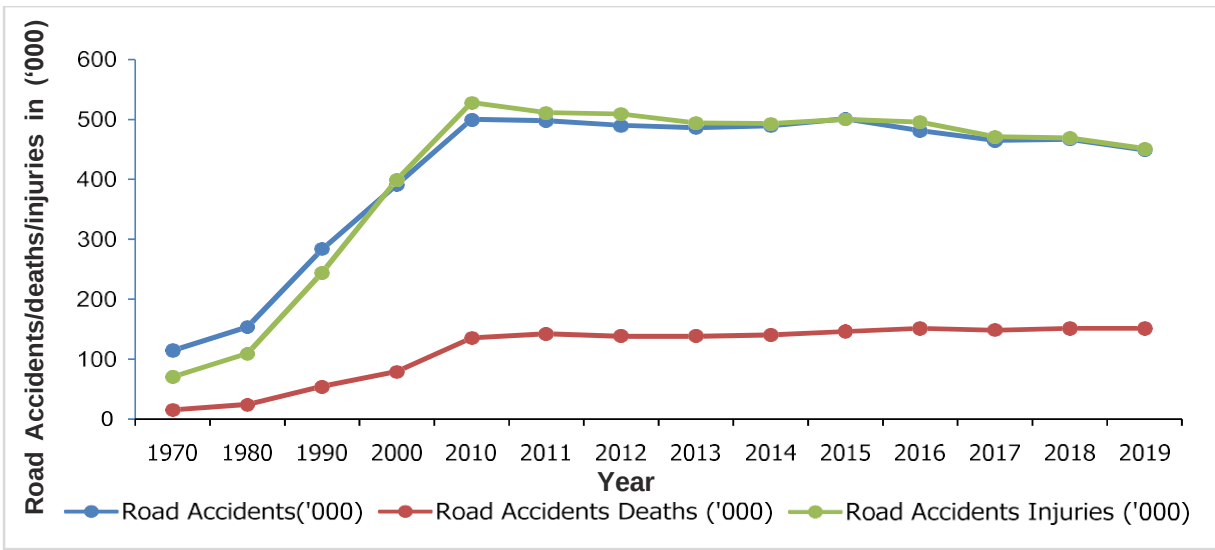
- Total no. of road accidents
- Total no. of people injured in road accidents
- Total no. of people killed in road accident
- Total no. of people killed in road accidents happened on national highways
- Total no. of people killed in road accidents happened on state highways

Table 1 : Road Accidents, Registered Vehicles and Road Length in India (1970-2019)

Year	Road Accidents ('000)	Road Accidents Deaths ('000)	Road Accidents Injuries ('000)	Registered Vehicles ('000)	Road Length (000 km)	Fatality rate (no. of accident deaths per 10,000 vehicles)	Vehicle density (no. of vehicles per km of road)
1970	114	15	70	1401	1,189	103.5	1.18
1980	153	24	109	4,521	1,492	53.1	3.03
1990	283	54	244	19,152	1,984	28.3	9.65
2000	391	79	399	48,857	3,316	16.2	14.73
2010	500	135	528	1,27,746	4,582	10.5	27.88
2011	498	142	511	1,41,866	4,677	10	30.33
2012	490	138	509	1,59,491	4,865	8.7	32.78
2013	486	138	494	1,81,508	5,232	7.6	34.69

2014	489	140	493	1,90,704	5,402	7.3	35.3
2015	501	146	500	2,10,023	5,472	7	38.38
2016	481	151	495	2,30,031	5,603	6.6	41.05
2017	465	148	471	2,53,311	5,898	5.8	42.95
2018	467	151	469	2,72,988^	6,215	6.2	39.78
2019	449	151	451	2,97,190^	N.A	5.7	NA
CAGR 2010-19	**-1.2**	**1.3**	**-1.7**	**9.8**	**3.6$**		

Chart 1 : Trends of Road Accidents, Deaths and Injuries



The above graph reveals a consistent increase in road accidents, accident related deaths and road injuries up to 2010 after which all three categories of accidents, deaths and injuries have stabilized with marginal fluctuations and slight decrease in 2019.

Table 2 : Accidents, Killed & Injured in North East States during the calendar year 2019

S.No	States/UTs	Accidents	% share	Killed	% share	Injured	% share
1	Arunachal Pradesh	237	0.1	127	0.1	309	0.1
2	Assam	8,350	1.9	3,208	2.1	7,473	1.7
3	Manipur	672	0.1	156	0.1	1,055	0.2
4	Meghalaya	482	0.1	179	0.1	222	0.0
5	Mizoram	62	0.0	48	0.0	56	0.0
6	Nagaland	358	0.1	26	0.0	246	0.1
7	Sikkim	162	0.0	73	0.0	318	0.1
8	Tripura	655	0.1	239	0.2	816	0.2
Total North East		**10,978**	**2.4**	**4,056**	**2.7**	**10,495**	**2.3**

As far as the North East is concerned, it may be seen from the Table 2 below that North East accounted for about 2.4% of accidents, 2.7% of accident related killings and 2.3% of the Injured.

Table 3 : Number of accidents, Number of persons killed and those injured by the category of Roads in 2019

Category of Roads	Length as on 31.3.18 (P)		Accidents		Persons killed		Persons injured	
	Kms	% age share in total	Number	% age share in total	Number	% age share in total	Number	% age share in total
National Highways	1,26,350	2.03	1,37,191	30.55	53,872	35.65	1,37,549	30.47
State Highways	1,86,908	3.01	1,08,976	24.27	38,472	25.46	1,11,831	24.78
Other roads	59,00,858	94.96	2,02,835	45.17	58,769	38.89	2,01,981	44.75
Total	**62,15,797**	**100**	**4,49,002**	**100**	**1,51,113**	**100**	**4,51,361**	**100**

It will be seen from the above that National Highways which comprises of 2.03 percent of total road network accounted for 30.6 per cent of total road accidents and 35.7 per cent of road accident related deaths in 2019. State Highways which account for 3.01% of the total road length accounted for 24.3 percent and 25.5 percent of accidents and road accident fatalities, respectively. Other Roads which constitute about 95 % of the total roads were responsible for the balance 45 % of accidents and 38% road accident fatalities, respectively.

Highways (both National and State) which accounted for about 5% of total road

network witnessed a disproportionately large share of accidents of 55 % and accident related fatalities of 63% during the year 2019 and naturally become the focus of our attention. More accidents on these have been attributed to higher vehicles speeds and increasingly higher volume of traffic on these roads.

CAUSES OF ROAD ACCIDENTS

Road accidents are multi-causal and are the result of an interplay of various factors. These can broadly be categorized into those relating to (i) human error, (ii) road environment and (iii) vehicular condition.

These factors act in an interactive manner to cause road accidents. Any strategy for designing the counter measures for accidents should therefore be based on a safe systems approach which simultaneously recognizes the importance of traffic legislation for promoting safe road user behaviour, safe road designs (lane width, shoulder presence, number of lanes, median, vehicle design, etc) and safe vehicle design.

The data presented in this chapter is based on the response to questionnaires/formats received from Police Departments of State Government/UTs

Human Error

Accidents caused by human error include (i) cases of accidents caused by traffic rule violations, (ii) driving without valid driver license and (iii) non-use of safety devices .

Traffic rules violations

Road accidents during 2018 and 2019 attributable to various types of traffic rules violations is given in **Table 4** below while State wise details for the year 2019 is presented in **Annexure 35**

Table 4: Road accidents by type of traffic rules violation during 2018 and 2019

S. No	Traffic rules violation	Number of accidents	Persons Killed	Persons injured	Number of accidents	Persons Killed	Persons injured	% change in accidents in 2019 over 2018	% change in persons killed in 2019 over 2018	% change in persons injured in 2019 over 2018
		2018			2019					
i	**Over-speeding**	3,10,612	97,588	3,16,421	3,19,028	1,01,723	3,26,850	2.7	4.2	3.3
	% share of total	66.5	64.4	67.4	71.1	67.3	72.4			

ii	**Drunken driving/consumption of alcohol & drugs**	12,018	4,188	9,944	12,256	5,325	10,564	2.0	27.0	6.0
	% share of total	2.6	2.8	2.1	2.7	3.5	2.3			
iii	**Driving on wrong side/ Lane indiscipline**	24,781	8,764	24,100	24,431	9,201	24,628	(1.0)	5.0	2.0
	% share of total	5.3	5.8	5.1	5.4	6.1	5.5			

Table 4 Contd ...

S. No	**Traffic rules violation**	**Number of accidents**	**Persons Killed**	**Persons injured**	**Number of accidents**	**Persons Killed**	**Persons injured**	**% change in accidents in 2019 over 2018**	**% change in persons killed in 2019 over 2018**	**% change in persons injured in 2019 over 2018**
		2018			**2019**					
iv	**Jumping red light**	4,441	1,545	4,126	4,443	1,797	4,006	0.0	16.0	-3.0
	% share of total	1.0	1.0	0.9	1.0	1.2	0.9			
v	**Use of mobile phone**	9,039	3,707	7,878	10,522	4,945	8,144	16.0	33.0	3.0
	% share of total	1.9	2.4	1.7	2.3	3.3	1.8			
vi	**Others***	1,06,150	35,625	1,06,949	78,322	28,122	77,169	-26.0	-21.0	-28.0
	% share of total	22.7	23.5	22.8	17.4	18.6	17.1			
vii	**Total**	**4,67,041**	**1,51,417**	**4,69,418**	**4,49,002**	**1,51,113**	**4,51,331**	-4.0	0.0	-4.0

****Others is a residual category for tying up the totals and would include accidents /fatalities happening on account of reasons other than human error listed above and included under the category of road environment and vehicular condition.***

The data in **Table 4** reveals that like in 2018, over speeding is the main violation associated with accidents, accident related deaths and injuries in 2019 with over speeding accounting for71.1 percent of the road accidents, 67.3 percent of total deaths and 72.4 percent of totalinjuries.

Driving on the wrong side / lane indiscipline is the second most important cause accounting for 5.4 percent of the road accidents, 6.1 percent of total deaths and 5.5 percent of total injuries.

Drunken driving/ consumption of alcohol & drugs, jumping of red light and use of mobile phones taken together accounted for 6.0 percent of total accidents and 8.0 per cent of total deaths. The others category which would include reasons like road environment, vehicular condition etc. accounted for almost 17-18% of the accidents, accident related deaths and injuries.

What is most significant is that in 2019, accidents, deaths and persons killed on account of over speeding, drunken driving, jumping red light using mobile phone, all registered

an increase compared to 2018 which underlines the need for stricter enforcement of the Motor Vehicle Act-2019.

Road accidents in urban and rural areas

The trend of road accidents in urban and rural areas over the last five years (i.e. 2015 to 2019) is presented in **Table 5** while the State wise data is at **Annexure 39**.

Table 5 : Number of road accidents, persons killed and injured in Rural and Urban areas-2015 to 2019

Year	Urban Area			Rural Area			Total		
	Total Accidents	Persons Killed	Person Injured	Total Accidents	Persons Killed	Persons Injured	Total Accidents	Persons Killed	Persons Injured
2015	2,31,894	56,978	2,04,545	2,69,529	89,155	2,95,734	5,01,423	1,46,133	5,00,279
	(46.25)	(38.99)	(40.89)	(53.75)	(61.01)	(59.11)			
2016	2,16,813	57,840	2,12,346	2,63,839	92,945	2,82,278	4,80,652	1,50,785	4,94,624
	(45.11)	(38.36)	(42.93)	(54.89)	(61.64)	(57.07)			
2017	1,95,723	51,334	1,83,703	2,69,187	96,579	2,87,272	4,64,910	1,47,913	4,70,975
	(42.10)	(34.71)	(39.00)	(57.90)	(65.29)	(61.000			
2018	1,90,956	51,379	1,76,785	2,76,088	1,00,038	2,92,633	4,67,044	1,51,417	4,69,418
	(40.89)	(33.93)	(37.66)	(59.11)	(66.07)	(62.34)			
2019	1,78,062	49,715	1,66,608	2,70,940	1,01,398	2,84,753	4,49,002	1,51,113	4,51,361
	(39.66)	(32.90)	(36.91)	(60.34)	(67.1)	(63.09)			

Note: Figures in parenthesis indicate the share in Total

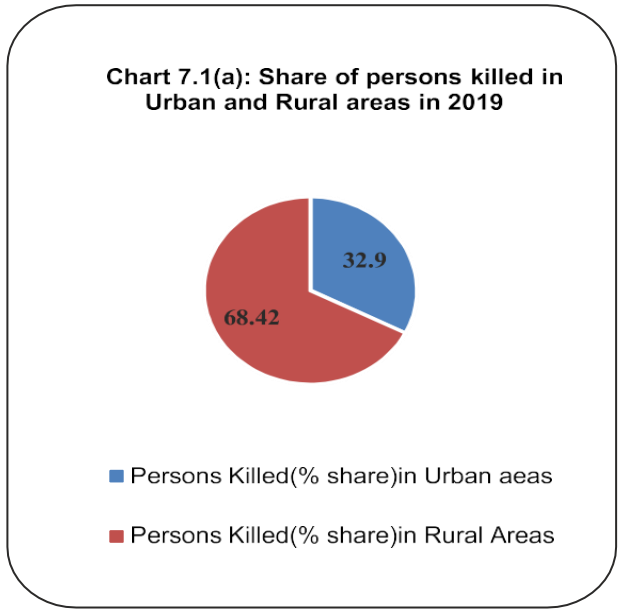


Chart 7.1(a): Share of persons killed in Urban and Rural areas in 2019
32.9
68.42
Persons Killed(% share)in Urban aeas
Persons Killed(% share)in Rural Areas

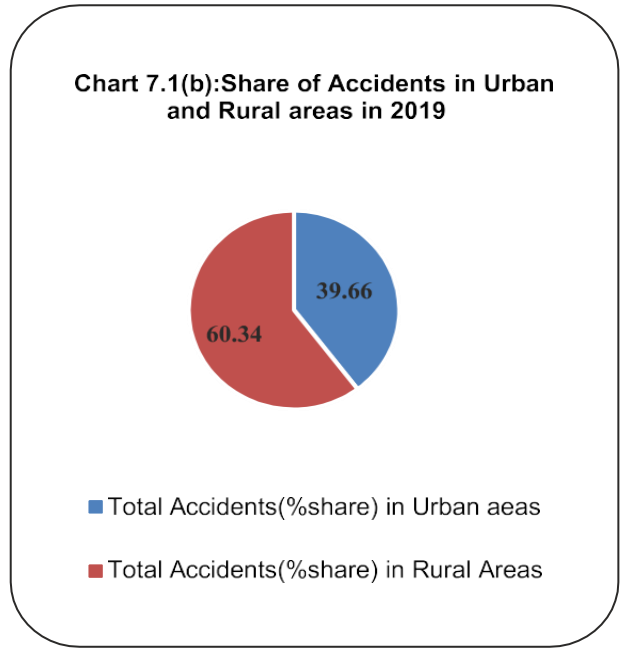


Chart 7.1(b):Share of Accidents in Urban and Rural areas in 2019
39.66
60.34
Total Accidents(%share) in Urban aeas
Total Accidents(%share) in Rural Areas

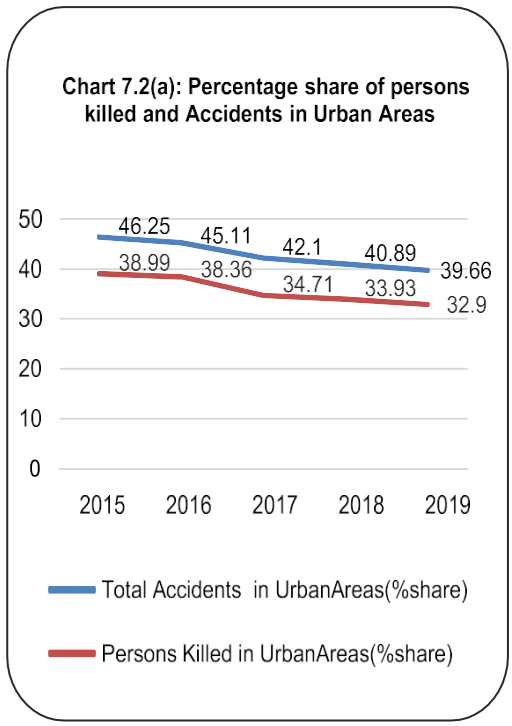
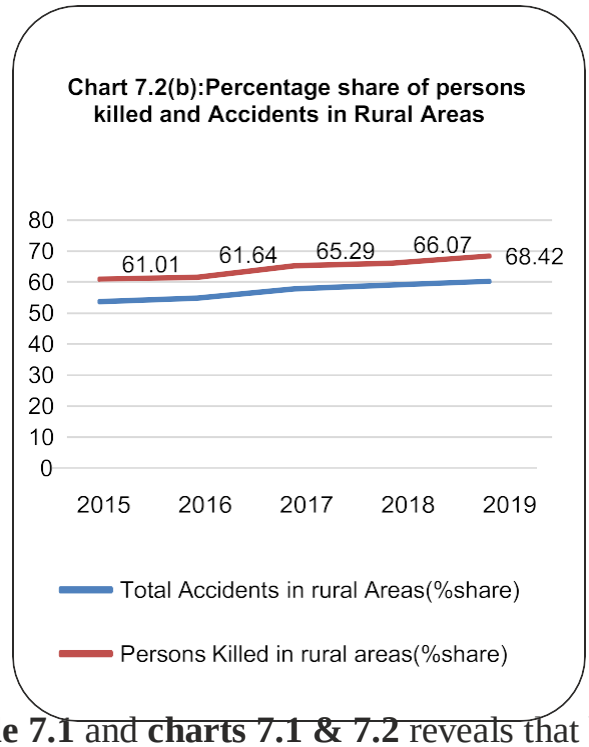


Chart 7.2(a): Percentage share of persons killed and Accidents in Urban Areas
50
40
30
20
10
0
46.25
45.11
42.1
40.89
39.66
38.99
38.36
34.71
33.93
32.9
2015
2016
2017
2018
2019
Total Accidents in UrbanAreas(%share)
Persons Killed in UrbanAreas(%share)



7.0.1

The data in **Table 7.1** and **charts 7.1 & 7.2** reveals that both road accidents and accident related killings are more a rural phenomenon than an urban phenomenon. Thus in 2019, the share of number of person killed in urban and rural area was 32.9 percent and 67.1 per cent, respectively while that of road accidents in urban and ruralarea was 39.7 per and 60.3 per cent respectively.

Further, the share as well as the number of persons killed and accidents in Urban areas has declined as compared to the respective shares in rural areas which has increased over the period 2015-19(**chart 7.2** above refers).

International Comparison of Road accidents

A comparison of select indicators published in World Road Statistics, 2018[3] of International Road Federation has been undertaken with the objective of positioning India viz-a-viz other countries in terms of road accidents and corresponding number person killed, injured and rates per lakh people.

The details of Accidents, person killed and persons injured in respect of top 20 countries by total injury accidents is presented in **Table 6**

Table 6 : Country wise number of injury accidents, persons killed and injured with rankings percountry

Country	Accidents			Persons Killed			Persons injured	
	Number	Rank	per Lakh people	Number	Rank	per Lakh people	Number	World Rank
United States	22,11,439	1	684	37,461	3	12	31,44,000	1

Japan	4,99,232	2	393	4,698	21	4	6,14,155	2
India	4,80,652	3	36	1,50,785	1	11	4,94,624	3
Germany	3,08,145	4	374	3,206	34	4	3,96,666	6
Chinese Taipei	3,05,556	5	1302	1,604	57	7	4,03,906	5
Iran, Islamic Rep.	2,93,305	6	365	15,998	7	20	3,63,531	7
Korea, Rep.	2,20,917	7	431	4,292	24	8	3,31,720	8
China	2,12,846	8	15	63,093	2	5	2,26,430	11
Turkey	1,85,128	9	233	7,300	11	9	3,03,812	9
Italy	1,75,791	10	290	3,283	33	5	2,49,175	10
Russian Federation	1,73,694	11	120	20,308	6	14	2,21,140	12
United Kingdom	1,36,621	12	208	1,792	55	3	1,79,592	13
Canada	1,17,673	13	324	1,898	52	5	1,60,315	14
Indonesia	1,06,129	14	41	26,185	4	10	1,44,108	15
Spain	1,02,362	15	220	1,810	54	4	1,40,390	16
Morocco	80,680	16	229	3,785	27	11	1,19,162	17
Brazil	60,228	17	29	6,398	14	3	86,672	18
France	57,522	18	86	3,477	28	5	72,645	19
Belgium	40,096	19	354	637	87	6	51,190	22
Austria	38,466	20	440	432	104	5	48,393	23

Source: World Road Statistics,2018 published by International Road Federation Geneva (data is for the year 2016)

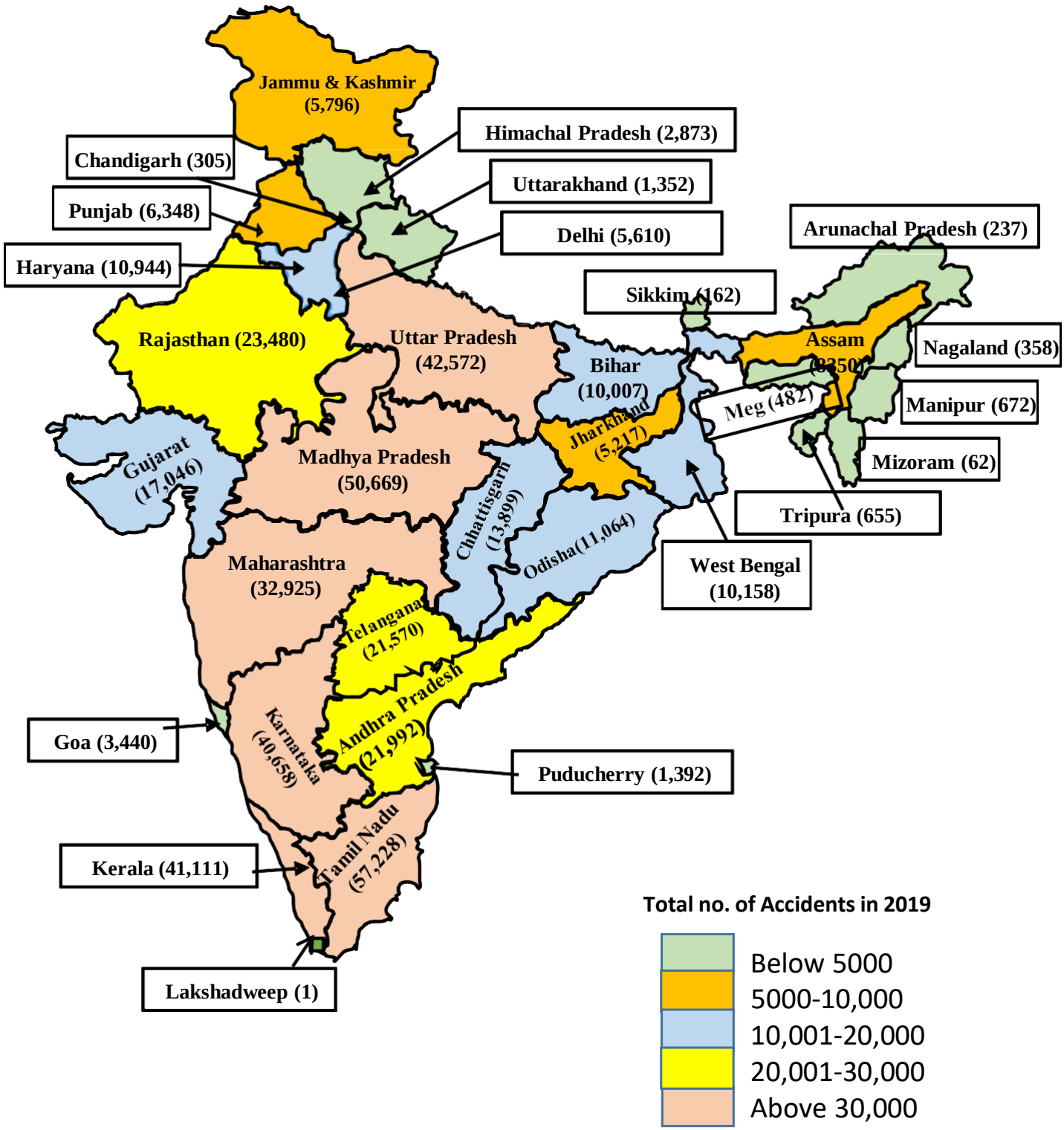
data in **Table 6** reveals that India ranks 3rd in terms of total accidents, across 199 countries as reported in the World Road Statistics, 2018. India's incidence of accidents is 36 per lakh people which is much lesser than that of USA (684), and Japan (393).

India ranks 1st in number of person killed across the 199 countries reported in the World Road Statistics, 2018.

India ranks 3rd in terms of persons injured after United States of America and Japan.

Country wise number of persons killed per lakh of population in respect of the top 20 countries as per World Road Statistics.

Road Accidents in 2019 - State-Wise



ROAD ACCIDENTS BY AGE PROFILE OF FATAL VICTIMS

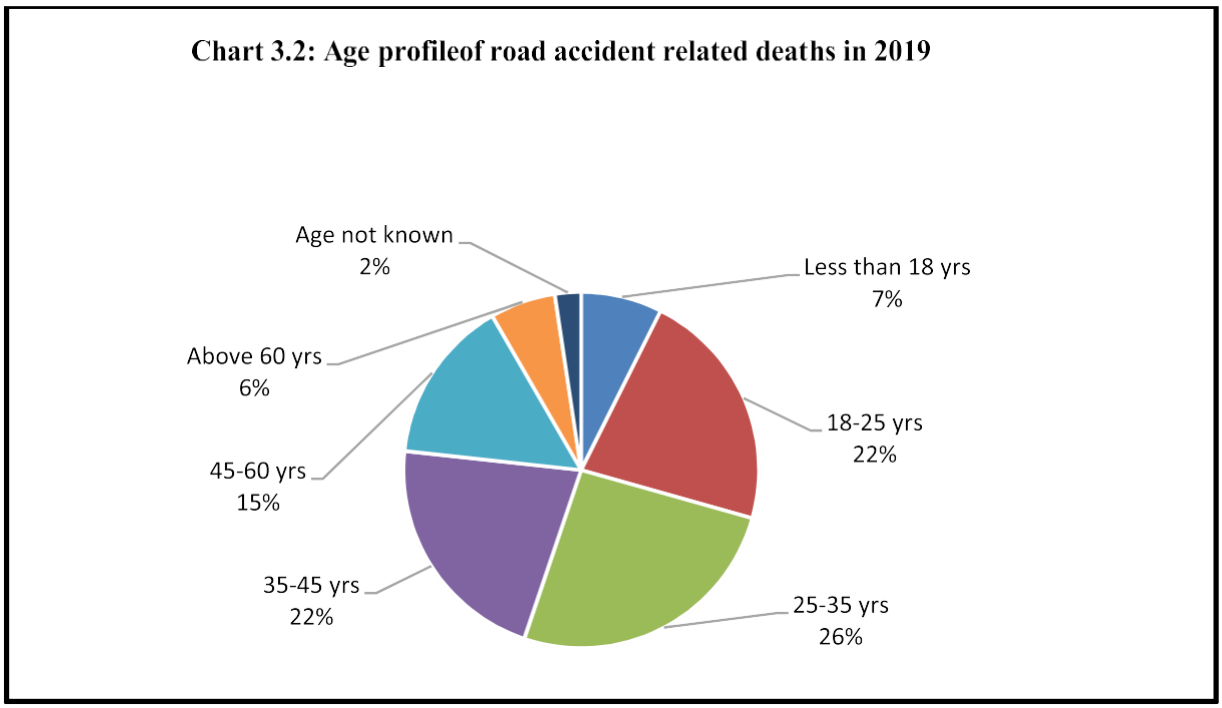
The age profile of accident related deaths during the years 2017 to 2019 are presented in **Table 7** below:

Table 7: Age profile of road accident related deaths during 2017 to 2019

Age-group	Number of Persons killed			%-age change in 2018 over 2017	%-age change in 2019 over 2018
	2017	2018	2019		
Less than 18	9,408	9,977	11,168	6.05	11.94
% Share in total	6.4	6.6	7.4		
18-25	34,244	32,777	33,206	-4.28	1.31
% Share in total	23.2	21.6	22.0		
25-35	39,549	39,960	39,023	1.04	-2.34
% Share in total	26.7	26.4	25.8		
35-45	32,788	32,672	32,509	-0.35	-0.50
% Share in total	22.2	21.6	21.5		
45-60	22,462	22,798	22,612	1.50	-0.82
% Share in total	15.2	15.1	15.0		
Above 60	9,384	9,075	9,004	-3.29	-0.78
% Share in total	6.3	6.0	6.0		
Age not known	78	4,158	3,591	5,230.77	-13.64
% Share in total	0.1	2.7	2.4		
Total	**1,47,913**	**1,51,417**	**1,51,113**	2.37	-0.20

The data in **Table 7** reveals that road accident victims largely constitute young people in the age groups of 18 - 25, 25 - 35 and 35 - 45 and this age profile has remained the same in all the three years i.e. 2017, 2018 and 2019 underscoring major implications on economic cost of road accidents, apart from their emotional and psychological impact. During 2019, like the previous two years young adults in the age group of 18 - 45 years accounted for nearly 69.3 percent of road accident victims. The working age group of 18 - 60 accounted for a share of 84.3 percent in the total road accident deaths. Graphical presentation of age profile wise share in road accidents victims is presented in **Chart**

Chart 3.2: Age profile of road accident related deaths in 2019



Conclusion :-

In the above project , statistical analysis of road accidents from 1970 to 2019 is mentioned. We can also see the causes of accidents statewise as well as the no. of accidents in each state. There are many different points mentioned in the above project like – road accidents by type of traffic rules violation, road

accidents in rural and urban areas , road accidents by age profile, etc. Therefore , through this project, we can understand that road accidents are the product of reckless driving without any road sense. We also get to know that lots of people lose their lives on the roads and it is very difficult to resolve this problem which affects almost to the whole world. Thus , we should follow the traffic rules.

Reference:-

1) Website :- **www.google.com**
2) 'MINISTRY OF ROAD TRANSPORT AND HIGHWAYS TRANPORT RESEARCH WING' of India.