International Journal of Science and Research (IJSR)
ISSN: 2319-7064
ResearchGate Impact Factor (2018): 0.28 | SJIF (2019): 7.583

Investigation on Impact of Junctions on the Frequency of Road, Case of Uttar Pradesh

Divyansh Srivastava[1], Dr. Subhrajit Banerjee[2], Dr. Indrani Chakraborty[3]

[1]Student, Faculty of Architecture & Planning, AKTU, Lucknow, India

[2]Associate Professor, Faculty of Architecture & Planning, AKTU, Lucknow, India

[3]Professor and Dean, Faculty of Architecture & Planning, Integral University, Lucknow, India

Abstract: ***The huge financial and societal cost associated with traffic crashes and the fact that more than half of them occur at junctions, revealed the need for further research in the field of junction safety. This research aims to investigate the quantitative impact of junctions in relation to other selected parameters, on the frequency of road crashes in urban areas in the State of Uttar Pradesh. Mathematical models were developed with the use of log linear analysis method for different traffic volumes in and out of junction. In addition, sensitivity analysis was performed in order to better understand the impact of selected parameters to the total number of crashes. The analysis has led to several conclusions such as that angle and left turn collisions have much higher probability of occurrence at junctions and that crashes which occur at junctions are much more probable for low and medium volumes compared to no-junctions. Road transport is the dominant mode of transport in India, both in terms of traffic share and in terms of contribution to the national economy. To meet the demand for road transport, the number of vehicles and the length of road network have increased over the years. A negative externality associated with expansion in road network, motorization and urbanization in the country is the increase in road accidents and road crash fatalities. Today, road traffic injuries are one of the leading causes of death, disabilities and hospitalization in the country imposing huge socio-economic costs.***

Keywords: Road junction, Road intersection, Traffic lights

1. Introduction

- Road Accidents is a negative externality associated with expansion in road network, motorization and urbanization in the country. Road traffic injuries are recognized, globally, as a major public health problem, for being one of the leading causes of deaths, disabilities and hospitalization, imposing huge socio-economic costs. In Uttar Pradesh, Road Injuries is one of the top four leading causes of death and health loss among persons of age group 18-45 years.
- During the calendar year 2018, the total number of road accidents is reported at 42568 causing injuries to 22256 persons and claiming 29664 lives in Uttar Pradesh. This would translate, on an average, into 117 accidents and 61 accident deaths taking place on Indian roads every day; or 5 accidents and 2 deaths every hour.
- Age profile of road accident victims for the calendar year 2018 reveals, that the youth of age group 18 - 45 years accounted for high share of 65.2 per cent (14519 persons) in the total road accident fatalities.
- There has also been an increase in the number of fatal accidents, i.e., accident involving at least one death. A total of 52.2% accidents were reported in 2018 due to over speeding. Constructive steps towards curbing the exponential rise of road accidents are being undertaken in the state. One such step is the fitting of speed limiting devices in the vehicles, which will be a deterrent for over speeding vehicles.
- The National Highways passing through the state of Uttar Pradesh accounted for 38.5% of total road accidents deaths in the year 2018. Similarly, the State Highways and other roads constituted for 32.3% and 28.1% accidents respectively.
- When we look at various vehicle categories involved in road-accidents, the Motorized two-wheeler category tops the chart with the total of 28.8% accidents and 27.8% fatalities in 2018. The light vehicle category consisting of cars, jeeps and taxis acquires the second place in this list with total accidents standing at 18.2% and total fatalities at 17.9%
- Intake of alcohol/drugs by drivers resulted in 3595 road accidents (13.6 per cent) and 1824 fatalities (13.6 per cent) in 2018. The act of talking on mobile phones while driving has become one of the causes of road accidents. It has resulted in 3828 road accidents, 1956 road accident deaths and injuries to 2821 number of persons during the calendar year 2018.
- In districts, Lucknow stood on top in road accidents and Kanpur stood top in persons killed in the road accidents in the entire UP with a percentage share of 3.8 per cent and 3.1 per cent respectively.
- Month-wise distribution of road accidents during the calendar year 2018 reveals that the highest number of accidents occurred in the month May, (4260) and followed by the month of June (3903) and March (3853). Higher accident rates are observed during the hours, 15:00 to 18:00 hrs (14.3 percent) and 09:00 to 12:00 (14.1 percent) of the day.
- The Government of Uttar Pradesh has formulated the State Road Safety Policy. The government has formulated a multi-pronged strategy to address the issue of road safety based on 4 ‘E’ viz. Education, engineering measures (both road and vehicle), enforcement of safety laws and emergency care to road accident victims.
- The Government of Uttar Pradesh recognizes that the road accidents involve roads, road users and motor vehicles so road safety demands a holistic approach.

- Government of U.P feels that reduction in road accidents, injuries and fatalities is the joint responsibility of both State and Central Government.
- In the light of this, the Government of UP, states its commitment to bring about a significant reduction in mortality and morbidity resulting from road accidents.

An overview of road length, motor vehicles and accidents on Indian roads

A long term trend of increase in road length and motor vehicles along with changes in total number of fatal accidents, total number of road accidents, number of persons killed in road accident are given at Table 1.1. Communication: Internet, Mass media, Mobile.

Table 1.1: Road Length, Motors Vehicles and Road Accidents (2012-2018)

Year	Road Length (in kms)	Total Number of Registered Motor Vehicles (in numbers)	Total Number of Fatal Accidents (in numbers)	Total Number of Road Accidents (in numbers)	Total number of Persons killed (in numbers)
1	2	3	4	5	6
2012	403102	13287232	13293	29972	16149
2013	435969	17048184	13077	30615	16004
2014	397224	19114692	13842	31034	16287
2015	415383	21635530	15218	32385	17666
2016	422412	23879973	16164	35612	19320
2017	428055	26265246	17706	38783	20124
2018	432698	29394816	19364	42568	22256

Sources: According to Statistical Diary Year 2012-18

Accidents on Road Junctions

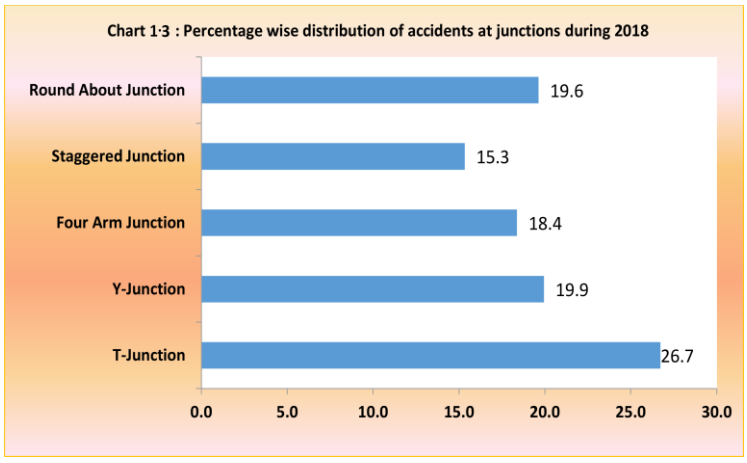
Road junctions are points of traffic merging and hence are prone to accidents.

Table 1.2 gives the number of accidents, persons killed and injured at traffic junctions.

	Accidents	Killed	Injured
T-junction	5343	2740	3855
Y-junction	3987	2079	2823
Four Arm junction	3675	2000	2584
Staggered junction	3065	1734	2241
Round About Junction	3924	1984	2604

The highest number of accidents occurred at T-Junctions during the calendar year 2018 causing 5343 accidents with a share of 26.7 percent of the total road accidents on Junctions. The details regarding total accidents, persons killed and injured at above junctions are given in

The percentage wise distribution of accidents at junctions is depicted at Chart 1.3.



Accident at traffic / police controlled area

65 accidents with a share of 68.3 percent in road accidents at Traffic controlled/Police Controlled areas. The details regarding road accidents at Traffic Controlled/ Police controlled areas indicating the number of accidents; persons killed and injured are given in Table 3.3. Chart 3.3 depicts the percentage distribution of accidents at Traffic Controlled/ Police controlled areas. The machinery and equipment but also requires the following. Energy, skilled manpower, management, banking, insurance and transportation services are crucial.

Promotion of investment

Infrastructural development is definitely a pre-condition got increasing economic investment. Those areas with the sound infrastructural base may succeed in attracting all the more capital for investment.

Improvement in productivity

Infrastructural development such as education and transportation facilities increases the productivity. Development of science and technology is more important in improvising the economic productivity.

Employee generation

Infrastructure plays a important role in the generation of employment opportunities. They improve mobility, efficiency and productivity of labour. Moreover, the larger investment, development of industry and agriculture create all the more employment opportunities.

Severity of Road Accidents

A very important indicator to monitor road accidents is the extent of road accident severity (road accident deaths per 100 accidents). It has remained more or less stable over the period 2012-18. During the year 2018, it varies from a low of 35.4 in Lucknow to a high of 72.3 in Amroha.

Table 1.4: Percentage change of total number of road accidents, total number of persons killed and injured during 2013-2018

Year	Percentage change in total No. of Road Accidents	Percentage in total No. of persons killed	Percentage change in total No. of persons injured
2013	215	-0.90	3.92
2014	1.37	1.77	-2.98
2015	4.35	8.47	3.89
2016	9.96	9.36	8.15
2017	898	4.25	9.61
2018	9.68	10.50	7.84

Road Safety Initiatives by the Government of Uttar Pradesh

Road Safety Initiatives by the Government of Uttar Pradesh

- The Government has approved a State Road Safety Policy. This Policy outlines various policy measures such as promoting awareness, establishing road safety information data base, encouraging safer road infrastructure including application of intelligent transport, enforcement of traffic laws etc.
- The Government has constituted the State Road Safety Council as the apex body to take policy decisions in matters of road safety.
- The Government has formulated a multi-pronged strategy to address the issue of road safety based on 4 'E's viz. Education, Engineering (both of roads and vehicles), Enforcement and Emergency Care.
- Road safety has been made an integral part of road design at planning stage.
- Road Safety Audit of selected stretches of Highways has been taken up.
- High priority has been accorded to identification and rectification of black spots (accident prone spots) on highways.
- Setting up of model driving training institutes in States and refresher training to drivers of Heavy Motor Vehicle in the unorganized sector.
- Advocacy/Publicity campaign on road safety through the electronic and print media.
- Tightening of safety standards for vehicles like Seat Belts, anti-lock braking system etc.

State Road Safety Policy

Based on the globally accepted multi-pronged strategy and the safe-system approach for improving road safety, the State Road Safety Policy outlines the initiatives to be taken by the Government at all levels. The policy is outlined as under: -

Preamble 1.

- The Government of Uttar Pradesh is highly concerned about the steep rise in the number of road accidents, injuries and fatalities in recent years. It is the ground reality that road accidents have now become a public health issue and the victims are mainly from poor sections of the society.
- The Government of Uttar Pradesh recognizes that the road accidents involve roads, road users and motor vehicles so road safety demands a holistic approach. Government of U.P. feels that reduction in road accidents, injuries and fatalities is the joint responsibility of both State and Central Government.
- In the light of this, the Government of U.P. states its commitment to bring about a significant reduction in mortality and morbidity resulting from road accidents.

2. Conclusion

In order to achieve a significant improvement in road safety, Government of UP has to take initiative:

Raise Awareness about Road Safety Issues

The Government would increase its efforts to promote awareness about the various aspects of road safety, the social and economic implications of road accidents and what needs to be done to curb the rising menace of road accidents. It will facilitate various stakeholders of State for planning and promoting road safety. Awareness among citizens will enable them to treat it as important state problem.

Strengthening Institutional Arrangements

The Government will make effective institutional arrangement and shall create state Road Fund with the objective of strengthening road safety and implementation of road safety measures in Uttar Pradesh.

Establish a Road Safety Information Database

The Government will provide assistance to local bodies, Union Territories and States to improve the quality of crash investigation and of data collection, transmission and analysis. To achieve this goal, it will seek the help and assistance of Government of India as provided in national road safety policy.

Ensure Safer Road Infrastructure

The Government will take steps to promote conscious planning for safe design of roads. Government will ensure that best practices should be incorporated in designing the roads. Government will adopt the accident reduction strategy for existing roads through black spots improvement programs.

Safer Vehicles

The Government will take steps to ensure that safety features are built in at the stage of design, manufacture, usage, operation and maintenance of both motorized and non-motorized vehicles in line with international standards and practices in order to minimize adverse safety and environmental effects of vehicle operation on road users (including pedestrians and bicyclists) and infrastructure.

Safer Drivers

The Government will strengthen the system of driver licensing and training to improve the competence and capability of drivers.

Safety of Vulnerable Road Users

The design and construction of all road facilities (rural and urban) will take into account the needs of non-motorized transport and the vulnerable and physically challenged in an appropriate manner. The Government will seek to disseminate 'best practices' in this regard to town planners, architects, and highway and traffic engineers.

Road Safety Education and Training

Road safety knowledge and awareness will be created amongst the population through education, training and publicity campaigns. Road safety education will also focus on school children and college going students, while road safety publicity campaigns will be used to propagate good road safety practices among the community. The Government will encourage all professionals as well as NGOs to actively participate in road safety programs. It will cover both urban and rural areas.

Enforcement of Traffic Laws

The Government will seek to improve the quality of enforcement in order to ensure effective and uniform implementation of safety laws. The Government will take appropriate steps to ensure that the enforcement agencies are adequately manned, trained and equipped to carry out their functions.

Emergency Medical Services for Road Accidents Victims

The Government will strive to ensure that all persons involved in road accidents benefit from speedy and effective trauma care and management. The essential functions of such a service would include the provision of rescue operation and administration of first aid at the site of an accident and the transport of the victim from accident site to nearby hospital. **Hospitals alongside the National Highways and State Highways would be adequately equipped to provide for trauma care and rehabilitation.**

3. Research for Road Safety

Government will wherever possible support Union Government to improve road research activities and seek to ensure that any problem areas in the state receive appropriate attention in the research activities. Efforts will be made to ensure that research establishment in Uttar Pradesh are given fair support to enhance research activities.

It is thus our responsibility to discuss the issues of smart city and really be smart to implement that is beneficial for human living. All the parties involved in issues related to social and environmental development should come together to maintain a balance between environmental protection, sustainable development and social relations.

References

[1] www.uptransport.upsdc.gov.in
[2] Investigation of the impact of junctions on the frequency of road crashes in urban areas, Florida Atlantic University Boca Raton, Florida May 2014.
[3] Public Works Department of Uttar Pradesh, A Guide on Geometric Design of Roads.
[4] Text Book by Kadiyali. L .R. (2009), "Traffic Engineering and Transport Planning" Khanna publisher's 7th edition
[5] Text Book by Nicholas J. Garber. (2007), "Traffic and Highway Engineering" 4th Edition.
[6] Traffic Signal Timing and Coordination Manual March 2009; Minnesota Department of Transportation.
[7] Hossain. M. (2001), "Estimation of saturation flow at signalized intersections of developing cities: a micro-simulation modeling approach", Transportation Research Part – A 35.
[8] Text Book by Papacostas.C.S and Prevedouros.P.D, "Transportation Engineering and Planning", Third Edition
[9] Text Book by Sreehari M.N, "Traffic Engineering and Road Safety in India", November 2004.
[10] Text Book by Pignataro. Louis J. "Traffic Engineering Theory and Practice"