

# Traffic Volume and Accidental Studies on State Highway-19 between Ghumarwin to Kuthera District Bilaspur, Himachal Pradesh

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**Abstract** — In India, where there is a vast population and a high vehicle traffic density, road accidents is a particularly important issue. The majority of road accident occurs as a result of driver negligence, with only a few accidents occurring as a result of vehicle technical error. In the present study, a section of 10.6 km in length was chosen between Ghumarwin to kuthera on State Highway-19 for the identification of traffic volume and accidental studies. On 14 days, the peak traffic flow on State Highway-19 was observed at both side traffic flow counts. The process involved making a manual count of the vehicles passing on state highway-19. The study was also involved in identifying the ‘Black Spot’, which refers to those stretches on Ghumarwin to Kuthera of State Highway-19 with the highest number of accidents. Primary data is used for observing the road conditions, and secondary data is used to find accident black spots. An accident black spot is a point or a place on the road where road accidents repeatedly occur one after another, which is known as an accident black spot. The accident data for the study area has been collected for the past two years at Police Station Ghumarwin. To identify these black spots, we use the Weighted Severity Index (WSI) Method for determining the most proven accident black spots. The state highway-19 is in a hilly area and it has blind curves and black spots that increase the chance of road traffic accidents. In the past two years, road traffic accidents have been increasing on state highway-19 between Ghumarwin to Kuthera, and this study deals with the identification of major issues causing road traffic accidents. The research work helps to improve the road safety on State Highway-19 between Ghumarwin to Kuthera because in this study the analysis has been done to identify the major problem responsible for gradually increasing road accidents. We calculate the accident density and accident rate in the region of ‘Black Spot’ and, based upon those results, suggest suitable remedial measures to prevent such accidents in the future by installing light poles, speed breakers, fluorescent sign boards, convex mirrors, and sign boards on the road, to help prevent accidents like this in the future. For other researcher who wishes to conduct their own research on problems of similar kind, the research work serves as an overview.

**Index Terms** — Traffic Volume and Accidental Studies, Blackspots, State Highway-19, Ghumarwin to Kuthera District Bilaspur, Himachal Pradesh

## I. INTRODUCTION

Road accidents are on the rise in India and have become a global emergency. As mobility increases, the probability of accidents also increases. The basic elements in traffic accidents are road users, vehicles, the road and its condition, road geometry, environmental factor etc. The fatality rate is higher in development countries as compared to developed countries. The critical reason of road accidents are drunk driving, Carelessness and Rash Driving, over speeding, sudden breaking, Traffic rule violation, sudden twists and turns of the vehicle. Road accidents cannot be absolutely prevent/stop, however by means of the use of appropriate visitors engineering, safety layout and administration measure, the accident rate can be decrease. One of the most important factors to reduce traffic accidents is identification of hazard locations. In Himachal Pradesh, an average of 1350 traffic accidents occur on national highways in which around 34.3 people killed per 100 people. Of these 100 accidents, 83 traffic accidents have occurred due to defects in road condition. Traffic Volume is study is also defined as the survey of the number of vehicles and pedestrians crossing a section of road per unit during any selected period. Black spot is a place on a road that is considered to be dangerous because several accidents have happened there. Accidents happened they're because of variety of reason, such as a sharp curve in a straight road, or poor or concealed warning signs at cross-roads. The main focus of this study is to reveal the methodology development and find relation with population and accidents. Environment factor also plays a big role in cause of accidents on roads like fog in winter seasons etc. The first step is to take that good and real data to be collected with real crashes on roads.

## II. STUDY AREA

The State Highway -19 commonly referred to as HP SH-19, is normal state highway that run through Bilaspur and Mandi district of Himachal Pradesh. This state highway touches the cities of Ghumarwin, Kuthera, Baldwara, Jahu, Sarkhaghat, and Dharmpur. The total length of SH-19 from Ghumarwin- Jogindarnagar is about 83 kms. A section of 10.6 km between Ghumarwin to Kuthera on SH-19 is taken as a study area. It takes 13 minutes to travel from Ghumarwin to Kuthera. Approximate driving distance is 11 kms or 6.8 miles or 5.9 nautical miles. 1 mile is about 1609 meters, and 1 nautical mile is exactly 1852 meters.

Fig. 1- The picture of study area at State Highway-19 between Ghumarwin to Kuthera



21 min (10.6 km)

### III. OBJECTIVES OF THE STUDY

The study on Ghumarwin to Kuthera at State Highway-19 has been taken up with the following objectives:

1. To identify the Peak Traffic Time on the State Highway-19 between Ghumarwin to Kuthera in district Bilaspur.
2. To identify the Black spot on the State Highway-19 between Ghumarwin to Kuthera in district Bilaspur.
3. To identify the number of the accidents in past Two Years on the State Highway-19 between Ghumarwin to Kuthera in district Bilaspur.
4. To identify the condition of the road on the State Highway-19 between Ghumarwin to Kuthera in district Bilaspur.
5. To identify the maintenance data of the road on the state Highway-19 between Ghumarwin to Kuthera in district Bilaspur.
6. To Identify the Socio-economic issues of the road on the State Highway-19 between Ghumarwin to Kuthera in district Bilaspur.
7. To understand the pattern of the accidents of the road on the State Highway-19 between Ghumarwin to Kuthera in district Bilaspur.
8. To suggest various recommendations based on this analysis for reducing accidents on State highway-19 Between Ghumarwin to kuthera in district Bilaspur.

### IV. METHODOLOGY OF RESEARCH WORK

The study aims to understand the behaviors of accidents in the State Highway-19 between Ghumarwin to Kuthera District Bilaspur. The Data collected mainly includes type of road, name of road, and length of road. Also includes road condition traffic volume and maintenance of the road. In this study first step is to choose a suitable study area which carries all kinds of vehicles loads throughout the Study period and second step is collection of data (i.e. primary and secondary data). The primary data is collected by the field visits and secondary data is collected from near police station and public work department. The primary data collected mainly includes types of road, name of road, and length of road. The other things which are included in this primary data are road condition traffic condition/Volume and maintenance of the road. To collect traffic accidents data also questionnaire survey is conducted at different locations.

### V. RESULT AND OBSERVATIONS

#### 1. To identify the Peak Traffic flow volume on the State Highway-19 between Ghumarwin to Kuthera in District Bilaspur:

In the traffic volume study, the traffic is classified and the volume of each class of traffic i.e. cars, utility vehicle, two wheeler, mini buses, trucks, tractor, cycle, earth movement found separately. In this study 14 days traffic volume count has been conducted to understand traffic intensity. In this study 14 days traffic volume count has been conducted to understand traffic intensity. Traffic volume count has been conducted for 12 hours each day of the week (7:00AM to 7:00PM). In this study the 7 days the traffic counts on kuthera to Ghumarwin on state highway-19 at Luharwin bus stop, and next 7 days the traffic counts on Ghumarwin to kuthera on state highway-19 at same place. In this study, the peak flow of traffic on state highway-19 between Kuthera to Ghumarwin is 8:00 to 9:00 AM, because the maximum flow of students and daily office workers comes to Ghumarwin for their work and studies. In other hand, from Kuthera to Ghumarwin, the peak traffic flow on State Highway-19 is 3:00 to 4:00 PM, because of the maximum flow of student back to home.

#### 2. To identify the Black Spot on the state highway-19 between Ghumarwin to Kuthera in District Bilaspur:

To identify the most proven accident black spot between Ghumarwin to Kuthera section we use Weight Servity Index Method. The Formula of WSI Method is below:

$$\text{Weight severity Index (WSI)} = (5 * K) + (3 * GI) + (1 * MI)$$

Where: K= Number of person killed in road accident.

GI= Number of persons injured during accidents.

MI= Number of minor injured persons during road accidents.

Now by Applying WSI formula on secondary data i.e. (collected on Police Station Ghumarwin) we can find most proven black

spot Places on State Highway-19 between Ghumarwin to Kuthera.

There are different black spot places derived by the WSI:

Loharwin: - The WSI Value of Black spot Loharwin is given below:

$$\text{WSI Value} = (5 \times 2) + (3 \times 12) + (1 \times 10) = 56$$

Silh: - The WSI Value of Black spot Silh is given below:

$$\text{WSI Value} = (5 \times 0) + (3 \times 11) + (1 \times 9) = 42$$

Paniala:- The WSI Value of Black spot Paniala is given below:

$$\text{WSI Value} = (5 \times 0) + (3 \times 8) + (1 \times 6) = 30$$

Masour Mod: - The WSI Value of black spot Masour Mod is given below:

$$\text{WSI Value} = (5 \times 1) + (3 \times 9) + (1 \times 8) = 40$$

Kuthera: - The WSI Value of black spot kuthera is given below:

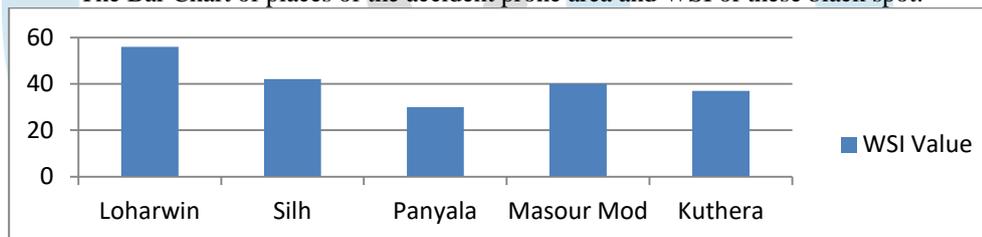
$$\text{WSI Value} = (5 \times 0) + (3 \times 10) + (1 \times 7) = 37$$

In the above the Five Black spot places are found between Ghumarwin to Kuthera on state highway-19 by using WSI method. The Places of the Black spot with their Accident and WSI Value is table shown below:

Place of Accident	Number of accident	WSI value
Loharwin	5	56
Silh	5	42
Paniala	3	30
Masour Mod	4	40
Kuthera	3	37

**Table 1: Places of the Black Spot with their Accident and WSI Value**

The Bar Chart of places of the accident prone area and WSI of these black spot:



**Graph 1: Bar Chart of Accident prone area and WSI Value**

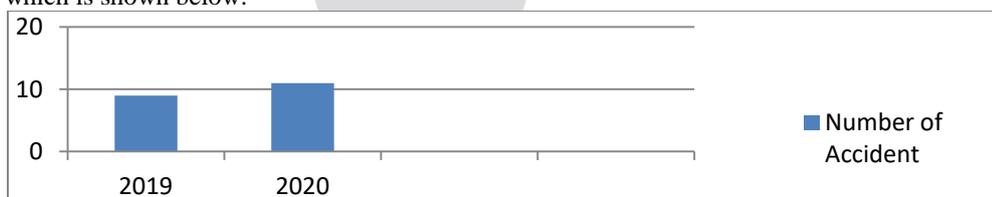
**3. To identify the number of accident in past two years on the State Highway-19 between Ghumarwin to Kuthera:**

In this study the Past two year accidental data was collected at Ghumarwin Police Station. The year-wise accident data of the State Highway-19 between Ghumarwin to Kuthera is shown below:

Year	Number of Accident
2019	9
2020	11
Total	20

**Table 2: Accident data on State Highway-19 in the past two years**

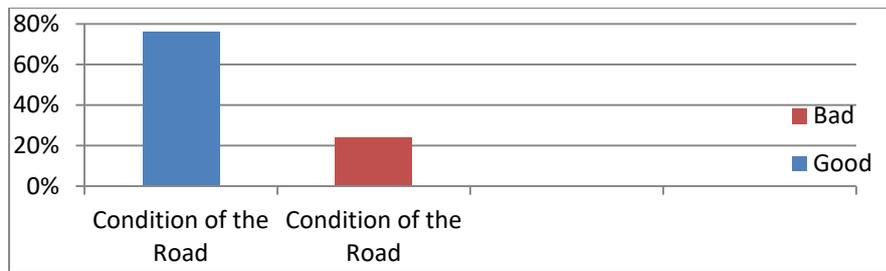
This table shows that 20 accidents took place in the past two years on state highway-19 from Ghumarwin to kuthera, and in 2020 there will be fewer accidents as compared to 2019. From the bar chart, it easy to understands the accident variation between Ghumarwin to kuthera, which is shown below:



**Graph 3: Bar Chart shows year-wise variation of the number of accident on State Highway-19**

**4. To identify the condition of the road on the state highway-19 between Ghumarwin to Kuthera in District Bilaspur:**

The condition of State Highway-19 between Ghumarwin to kuthera is collected by a questioner’s survey of various people. From the bar chart, it’s easy to understand the condition of the road at State Highway-19 between Ghumarwin to kuthera. The bar chart is shown below:



**Graph 4: Bar Chart between the conditions of the road at State Highway-19**

In the bar chart, it is clear that 76% of people say good and 24% of people say bad conditions of the road on state highway-19 between Ghumarwin to kuthera.

**5. To identify the Maintenance Data of the road on the State Highway-19 between Ghumarwin to Kuthera in District Bilaspur:**

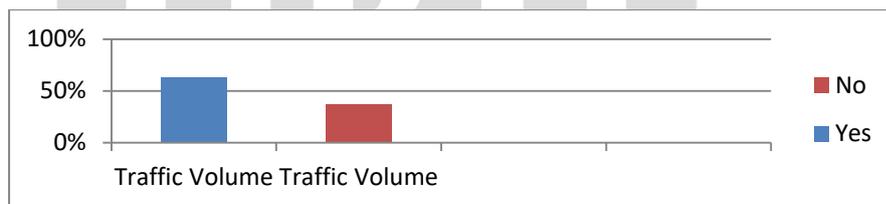
The maintenance data of the road at various black spots identified on State Highway-19 is collected by HPPWD Ghumarwin. The details of the measures adopted the various points are shown below the table:

Name of Place	Distance	Cause of Accident	Problems	Measure adopted
Loharwin	2.5 Km from Ghumarwin	Rash Driving	Narrow curve	Curve has been widened by HPPWD
Silh	3 Km from Ghumarwin	Rash Driving	Narrow curve	Curve has been widened by HPPWD
Paniala	6.5 Km from Ghumarwin	Rash Driving	Narrow curve	Curve has been widened by HPPWD
Masour Mod	9.5 km from Ghumarwin	Rash Driving	Blind curve	No Work
Kuthera	10.6 distance from Ghumarwin	Rash Driving	Blind curve	Curve has been widened by HPPWD

**Table 3: Summary of Maintenance data at Black Spot on State Highway-19**

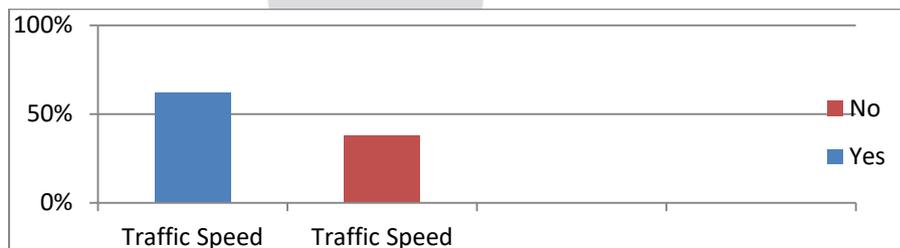
This table to show the Accidental Place and the reason of the accident and maintenance data on the black spot is including the table. The main reason of the accident on the state highway-19 is narrow curve is provided due to the topography of the area.

**6. To Identify the Socio-economical survey of the road on the State Highway-19 between Ghumarwin to Kuthera in district Bilaspur:** This study, which includes the reviews of people, related to the traffic problems on the State Highway-19 between Ghumarwin to Kuthera. In this survey which includes the road condition and also safety condition of the people. The bar charts of the following questionere survey related to study area are shown below.



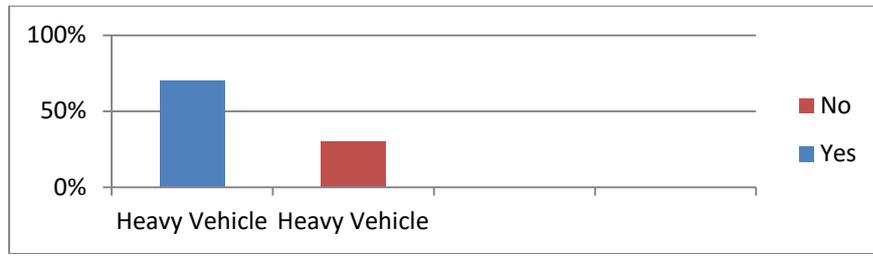
**Graph 5: Bar Chart of Traffic Volume on State Highway-19**

This Bar chart shows that 63% of people say yes and 37% say no to traffic volume on State Highway-19.



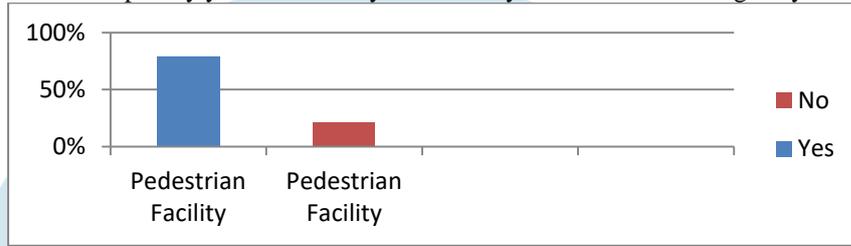
**Graph 6: The Bar Chart of Traffic Speed on State Highway-19**

This bar chart shows that 62% people say yes and 38% say no to Traffic speed on State Highway-19.



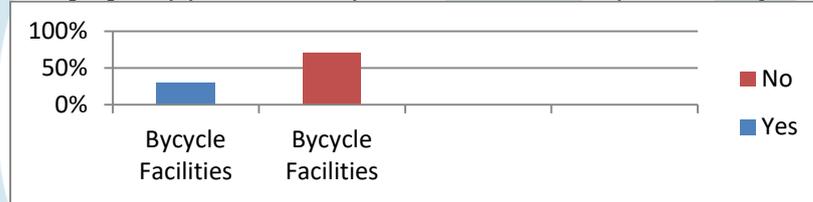
**Graph 7: The Bar Chart of Heavy Traffic on State Highway-19**

This Bar Chart shows that 70% of People say yes and 30% say no to Heavy Vehicle on State Highway-19.



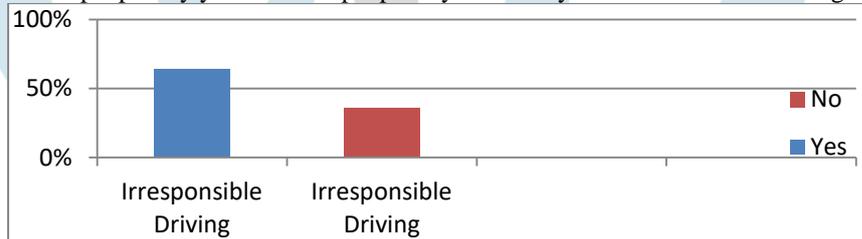
**Graph 8: The Bar Chart of Pedestrian Facility on State Highway-19**

This Bar Chart shows that 79% of people say yes and 21% say no to Pedestrian Facility on State Highway-19.



**Graph 9: The Bar Chart of Bicycle Facilities on State Highway-19**

This bar chart shows that 30% of people say yes and 70% people say no to Bicycle Facilities on State Highway-19.



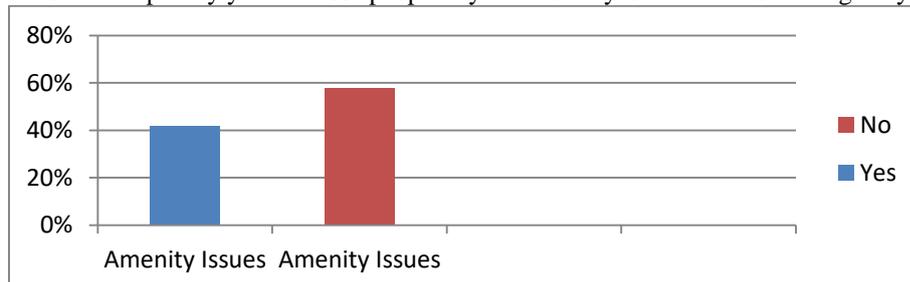
**Graph 10: The Bar Chart of Irresponsible Driving on State Highway-19**

This Bar Chart shows that 64% of people say yes and 38% say no to Irresponsible Driving on State Highway-19.



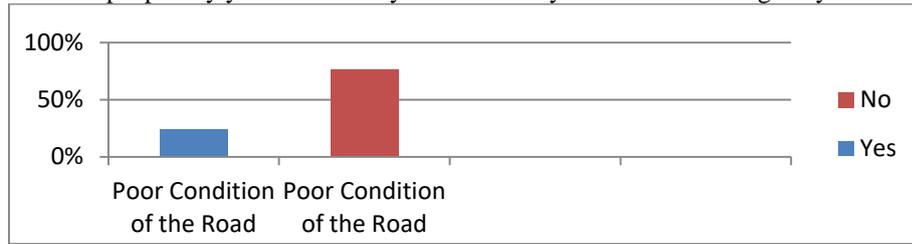
**Graph 11: The Bar Chart of Safety Concerns on State Highway-19**

This bar chart shows that 74% of People say yes and 26% people say no to Safety Concern on State Highway-19.



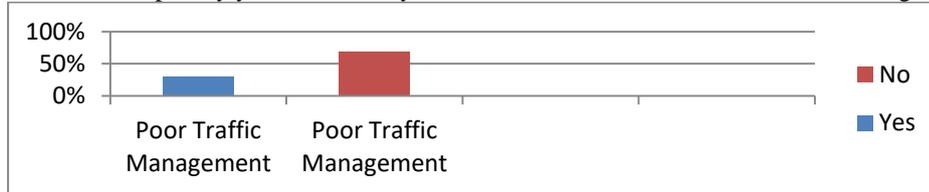
**Graph 12: The Bar Chart of Amenity Issues on State Highway-19**

This bar chart shows that 42% of people say yes and 58% say no to Amenity issues on State Highway-19.



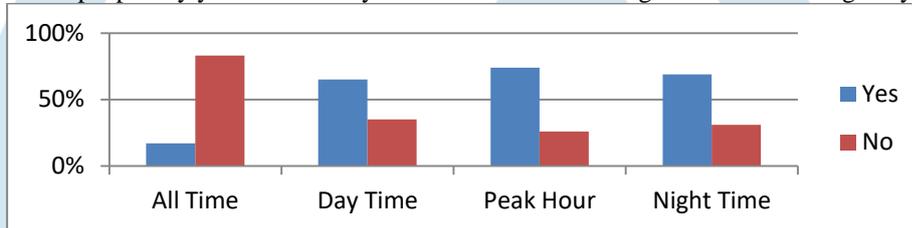
**Graph 13: The Bar Chart of Poor Condition of the Road on State Highway-19**

This bar chart shows that 24% of People say yes and 76% say no to Poor Condition of the Road on State Highway-19.



**Graph 14: The Bar Chart of Poor Traffic Management on State Highway-19**

This bar chart shows that 31% people say yes and 69% say no to Poor Traffic Management on State Highway-19.



**Graph 15: Bar Chart of Problems occurs at what time on State Highway-19**

In the bar chart given above, it has been said that at which time there would be more Problems in Traffic on the State Highway-19.

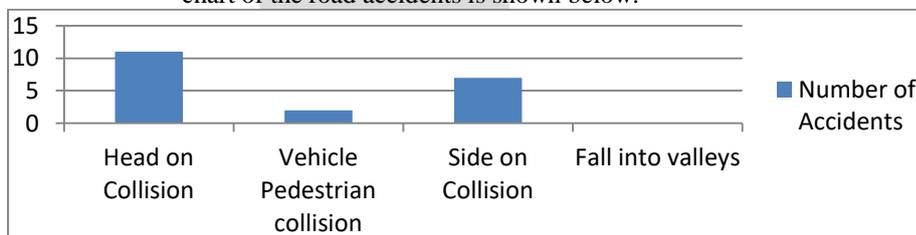
**7. To understand the pattern of the accidents of the road on the State Highway-19 between Ghumarwin to Kuthera in district Bilaspur**

From the data collected, the accident pattern is studied, and the causes of accidents along the road stretches are identified. The pattern of the road accidents on State Highway-19 is shown below:

S. No	Type of Collision	Number of Accidents
1.	Head on collision	11
2.	Vehicle Pedestrian collision	2
3.	Side on Collision	7
4.	Fall into valleys	0
Total		20

**Table 4: The Accident Pattern on State Highway-19**

This table indicates that head-on collision is the most common type of accident pattern, followed by side-on collision. The bar chart of the road accidents is shown below.



**Graph 16: The Bar Chart of Pattern of the Accident Pattern on the State Highway-19**

This bar chart shows the type of collision with the number of accidents on State Highway-19. This bar chart indicates that head-on collisions are the most common type of accidents collision.

**8. To suggest various recommendations based on this analysis for reducing accidents on State highway-19 Between Ghumarwin to kuthera in district Bilaspur.**

The various recommendations are based on this analysis for reducing accidents on state highway-19 between Ghumarwin to Kuthera. In this study, it's clearly observed that there is an absence of road safety awareness among the people. Here are some of the various recommendations from the study:

1. There is a need to install speed-breakers, strong parapets, and retaining walls alongside the road. These things will

improve road safety and reduce the chance of road accidents.

2. On State Highway-19, provides speed limits sign boards.
3. Provide a zebra crossing near the bus stop and junction for safe crossing of pedestrians.
4. Proper lighting should be provided during the night on the road.
5. Provide proper parking so that vehicles cannot stand on the side of the road, which creates a problem for pedestrians and for vehicles also.
6. Wearing a helmet and seat belt on four vehicles should be strictly checked.
7. Some sign boards are hidden due to trees, make them visible to the drivers.
8. Provide proper road marking on the road.
9. Some places on State Highway-19, the right edge of the road has more height as compared to the left edge of the road. This may be due to the super elevation.
10. Take suitable enforcement measures to reduce the speed of vehicles on state highway-19.
11. Traffic lights should be installed at junctions such as IPH Chowk, Kothi, and Kuthera.
12. To improve visibility on blind curves, we must widen them so that vehicles can be seen from both sides of the curves, reducing the likelihood of the road traffic accidents on state highway-19 curves.

## VI. CONCLUSION

In the present work, it is tried to study the traffic volume and accidental analysis in the study area of Ghumarwin to Kuthera. Most of the road accidents on State Highway-19 are caused by the carelessness of drivers and foggy weather. This study was an attempt to find out the most vulnerable accident location “Black Spot” on the State Highway-19. The top five spots were selected as black spots as per the WSI value from the collected data and suggested some alternative measures to improve the transportation system. The maximum accidents on the State Highway-19 are wrong overtaking of vehicles and rush driving. Majority of two-wheelers do not wear helmets and drive at excessive speeds. Overall study concludes that to suggest installations of road safety guards like convex mirrors, fluorescent sign boards, light poles and retaining walls.

## REFERENCES

- [1] Nikhil Chauhan, Rajat Sharma, Ameren Khatun (2020), “Identification of Road accidents by using Black spot method between Panthaghati to Dhali Road”, International Journal of Recent Technology and Engineering(IJRTE),(Vol.9,issue.2).
- [2] Krishnamurthy k, Anjaneyula (2010), “Black spot identification analysis and improvement measures on selected National Highway stretches in Kerala India”, Journal of the Indian road congress (vol.5 0.1.11).
- [3] M Nagarajan and M Cefil(2012), “Identification of Black spot and accident analysis on NH-45 using Remote sensing and GIS”, International Journal of Civil Engineering and science (vol.1,pp 1-9).
- [4] R.Pawan Vyas, B.L Bala Krishna (2014), “Identification of black spot for safe commuting using WSI and GIS”, 3RD World conference on applied Science, Engineering and Technology, Kathmandu Nepal.
- [5] Rajiv Gaungly, Ashok Kumar Gupta, Mudit Mishra (2014), “Traffic Volume and Accidental Studies on NH-22 between Solan and Shimla”, Indian Journal of Science and Technology (vol.9, no.44).
- [6] Arun Kumar, Ajay Singh Chauhan, Abhishak Thakur, Kushpreet Singh, Aditya Tiwary(2016), “Black spot Analysis on NH-21A”, Indian Journal of Science and Technology (vol.9 no. 44,DOI: 10.17485/ijst/2016/vai44/105250).
- [7] Shelendra kumar, Hemant Kumar Agrawal (2016), “A study on NH-11 to find out the causes and High accident zone between Jaipur to Sikar”, International Journal of scientific development and research, (vol.1, issues 5).
- [8] Sandeep Panchal, Lalit Singh Rawat (2017), “Pattern of Road Traffic Accident: A case study of Hamirpur District in Himachal Pradesh (H.P)”, International Journal of Mechanical Engineering and Technology (IJMET) (Vol.8, issue2, pp.194-197 Article ID: IJMET-08-02-023).
- [9] Athira Mohan, Dr. V.S. Landge (2017), “Identification of Accident Black spot on National Highway”, International Journal of civil engineering and technology, (vol.8, issue 4, pp: 588-596).
- [10] Shahid Mushtaq Bhat, Manish Goel, Pooja Sharma (2019), “Accident analysis of Jalandhar to Phagwara road stretch (NH-44), International Journal of scientific development and research (IJS DR), (Vol.4, issue.6).
- [11] Avinash kour Khalsa, P.Y Pawade (2019), “Study on accidental risk analysis and preventive measures for road safety”, International Journal of Advance Research Ideas and Innovations in Technology (vol.5, issue.3).