

A General Study on Safety of Vulnerable Road Users of Alappuzha District

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Abstract:- Conventional traffic and transport studies focus on vehicular movement rather than the Vulnerable Road Users (VRUs). Vulnerable road users are mainly those unprotected by an outside shield, namely pedestrians and two-wheelers, as they sustain a greater risk of injury in any collision against a vehicle and are therefore highly in need of protection against such collisions. This work mainly concentrates on the safety of VRUs of Alappuzha district. The Alappuzha district is selected because it is a low lying district in the state of Kerala such that the number of VRUs is also high. For this the accident data for the past three years is collected from the District Crime Records Bureau of Alappuzha district. Also the road inventory data and a questionnaire survey were done. A detailed analysis of the data was done and based on the data analyzed inferences and suggestions for improving the safety of VRUs were made.

Keywords:- *Vulnerable Road Users; District Crime Records Bureau .*

I. INTRODUCTION

A nation's development lies in the progress of its transportation infrastructure. Nowadays the population is increasing drastically it normally increases the number of vehicles on roads. VRUs are those road users, who have a high casualty rate because on road they do not have any outer protecting layer. Due to this reason the VRU groups are the majority victims of road accidents. Ensuring safety to the VRUs is a greatest challenge to the field of Transportation planning and designing. In order to understand fully the road safety problems experienced by VRUs, it is essential to view accidents as the effects of interactions between road users and their environment. To analyze these interactions, both the specifications of vulnerable road users and the characteristics of the traffic environment have to be known. VRUs are especially affected by underreporting of accidents and mis reporting of severity of injury (Olszewski et al., 2015). This work will help to provide us with the unidentified data regarding to the VRUs in Alappuzha roads. It will provide with the data on which group of VRU is contributing towards the road accidents and what all factors lead them to the crash, in what period of time the more VRU crashes are happening, what are parameters to be taken into account to ensure the safety of VRUs on Alappuzha road. Pedestrians,

Two-Wheelers, Cyclists and Pillion riders were considered in the study. There interactions among each other and to the other heavy vehicles on road lead to severe accidents (Sharma and Abhishek, 2017).

II. RELATED WORKS

Various studies were taking place regarding the VRUs in India as well as in the other countries. Majority studies deals with the implementation of Intelligent Transportation System (ITS) (Scholliers et al., 2017), vehicle-vehicle interactions, vehicle-VRU interaction and all. In some studies, architectures are prepared for the VRUs that will help the other vehicles to detect the presence of VRUs (Scholliers et al., 2017)

In some studies, measures to improve the quality of accident data are proposed such as including pedestrian falls in accident statistics, precisely defining minimum injury and combining police accident records with the hospital data. (Mohan, 2004). Some studies provide an overview of the mobility patterns and accident characteristics of VRUs based on available travel surveys and national statistics. The challenges to improve the safety situation of vulnerable road users lie with a better understanding of their accident patterns, it varies from place to place. The behavior of VRUs are different at signalized and unsignalized crossings (Daniels, et al., 2015) Studies show that in many developed and developing countries including, road safety situation is generally improving, but our country India faces a worsening situation (Kumar Singh, 2017).

III. METHODOLOGY

- Initially the review of literatures was done for getting a basic idea of the work.
- Secondly the study area was selected and a pilot survey was conducted.
- Thirdly the data collection was done. For this questionnaire survey, collection of accident data from District Crime Records Bureau (DCRB) and a collection of road inventory data from the selected sites were done.
- Based on all these data analyses were made and inferences and conclusions were obtained for ensuring safety of VRUs of the selected study area.

IV. BASIC DATA OBTAINED FROM ANALYSIS

The rate of VRU accidents are not decreasing from the previous years initially it is increasing then there is a gradual decrease in the VRU accident and again it increased. This trend of accident data of VRUs says that the VRUs are the majority victims in the road accidents.

Another analysis of the accident data and all gives the data on various factors regarding the VRUs like which VRU group is the most vulnerable category in Alappuzha district, then which gender group is majority contributing towards VRU accident, type of VRU casualty, during which period of time the majority VRU crash is happening, during what season and all. The basic data obtained are mentioned below with the help of graphical data:

- The fig 1, victim vehicle highlights which VRU group is the majority victim group and it is found that the Two-wheeler group holds the position. The severity of VRU injuries is also higher than those of four-wheelers (Constant A et al., 2010)

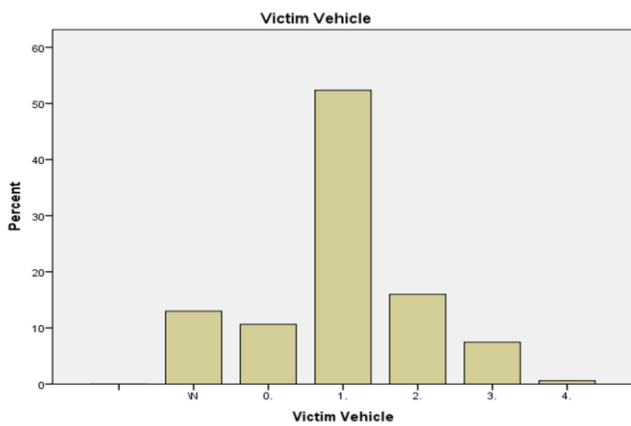


Fig 1:- Victim Vehicle

- The fig 2 type of casualty, gives what is the majority type of casualty for the VRUs and it is found as the grievous injury.

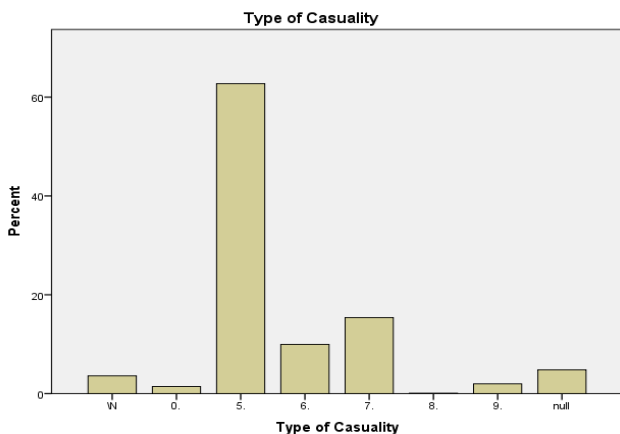


Fig 2:- Type of casualty

- The monthly distribution of VRU accident in fig 3 gives a description about which month contributes more towards VRU accident and it is found to be the month of January.

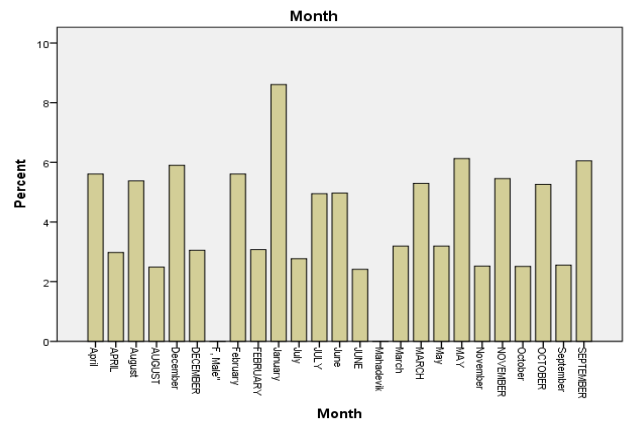


Fig 3:- Monthly distribution of VRU accident

- Similarly the gender group suffering as the majority VRUs is also found and they are the male VRUs.
- The roads in Alappuzha are good but the conditions become very pathetic when the rainy season starts and the type of road contributing more towards the VRU accidents in Alappuzha District is OR roads followed by the NH and SH. The figure 4 shows which type of road contributes more in VRU accident.

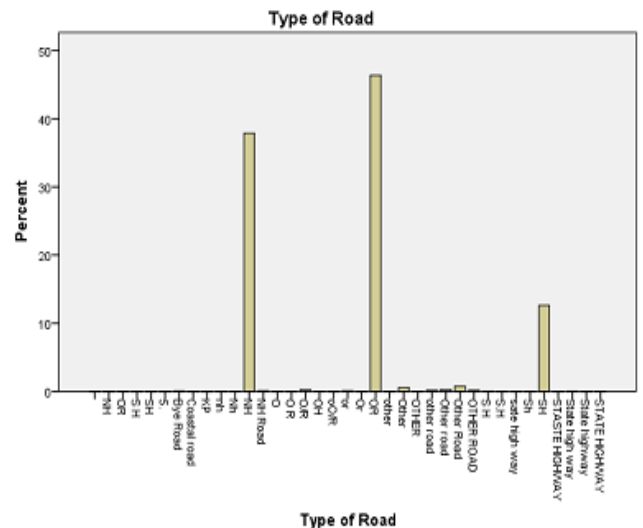


Fig 4:- Type of Road

- The figure 5 explains the preliminary assessment of the VRU accidents for the easiness of reporting data by the police officials the analysis says that it is the fault of the driver.

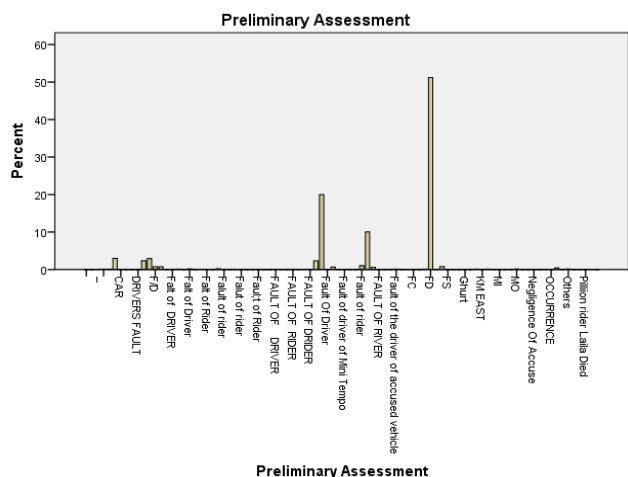


Fig 5:- Preliminary Assessment

➤ Similarly, the analysis also gives data on whether the accident is taking place during day or night time and it is found that during the day time majority VRU accident is taking place.

➤ It also gives an idea about the police station were large number of VRU accident are reported and it is found the traffic at Alappuzha followed by Kayamkulam.

From the above made analysis of accident data and eight sites were selected for further studies. Road inventory studies and a questionnaire survey were done at these places for better understanding of VRU problems of these areas; so that it can be corrected with suitable measures thereby the safety of VRUs can be provided.

V. EIGHT SELECTED SITES THEIR LIMITATIONS AND CORRECTION MEASURES.

The eight selected sites are as follows Krishnapuram, Kayamkulam, Kottukulangara, Nangiarkulangara, Haripad, Karuvatta, Thottappally, Ambalappuzha. All these selected sites belongs to a straight stretch of road and covering a total distance of about 35-40 km each stretch is 5km apart. Only this much area is selected because of the reliability of work.

Selected sites	Common Characteristics features			
	footpath	Road markings	Street lights	Edge obstructions
Krishnapuram	NO	YES	YES	YES
Kayamkulam	NO	YES	YES	YES
Kottukulangara	NO	NO	NO	YES
Nangiarkulangara	NO	YES	YES	YES
Haripad	NO	NO	YES	YES
Karuvatta	NO	NO	NO	NO
Thottappally	NO	YES	YES	YES
Ambalappuzha	NO	YES	YES	YES

Table 1:- common features of selected sites

The above mentioned are some of the common features of the selected sites and all these features contribute lots to the safety point of view of VRUs. Majority of the sites not even have the footpath facilities there is problem of edge obstructions and from the field analysis the edge obstructions are of the form commercial, agricultural, roadside dwellers and all. Lots of issues and problems were there in these selected sites each and every single points were identified carefully and the suggestions for improving the facilities were made.

SUGGESTIONS

The suggestions for selected sites are provided below:

❖ *For Krishnapuram*

➤ There are road side dwellers a fish market is also there in the entrance portion of T-junction to the NH. During the peak hours especially in the evening time this junction is more congested. On this time period for

ensuring safety of two wheelers provision of cameras should be ensured.

- Zebra crossing can be provided for the pedestrians now it is absent at Krishnapuram.
- Proper parking facilities for the vehicles can be provided without interrupting the traffic flow since it's a spot of interest.
- Traffic lights can be provided.

❖ *For Kayamkulam*

- An effective traffic signal is a necessary at Kayamkulam and it is not there now.
- Road side parking should be avoided. Now when a KSRTC bus turns towards the Alappuzha direction it is difficult to them due to the roadside dwellers and the parking in front of the shops.
- Speed limiting provisions are there but from a certain distance other than the ones provided now can be constructed because as it is mentioned in the above point that there will be the need of taking very big U-turns by the vehicles coming from the bus stands and

the eastward side there is the chance of getting hit with the fast coming two wheelers. By the provision of speed limiting parameters such as speed bumps, humps, speed tables, rumble strips etc.

- Here also there is lack of foot path for the pedestrians so proper a foot path facility for pedestrians is an important thing.
- Since the widening of the roads are going to take place the materials required for the construction of road is placed on the sides. At some points these materials create disturbance to the traffic in most cases the two wheelers and cyclists are becoming the victims. This situation can be avoided.
- Do not allow illegal placing of political parties' flags and big posters in the median.
- It is better to change the parking of auto rickshaws from road side near the bus stand below the over bridge because it creates problems to the VRUs.
- Clearing of the road side vegetation's is one of the best suggestions for kayamkulam. Due to the vulgar growth of vegetation's on the sides of road it is a place of waste dumping.
- There are so institutions like Govt. Polytechnic, other degree colleges so the majority of the road users are students and most of them are pedestrians. So their safety can be ensured by the above said parameters.

❖ *For Kottukulangara*

- First and the foremost thing to be considered is the level difference between the road and the sides. There are three byroads giving entrance to the national highway and this level difference may lead to accidents. The difference in the levels is due to the improper maintenance done on the pavement. Instead of adding pavement finishing to the existing roads every year it is better to adopt the pavement reclamation techniques so that it will become more economical and safe.

❖ *For Nangiarkulangara*

- In this road stretch there are three fuel pumps; vehicles entering and leaving from these pumps are not safe especially the two wheeler riders since the road is a straight stretch vehicle on the highways are with speed more than the limited speed. Numbers of VRU accidents have been occurred due to this reason. So it is suggested that it is better to provide with speed limiting aids before and after the fuel pumps.
- Before getting to Nangiarkulangara there are some important VRU accident spots and their names are Kareelakulangara, Cheppad. Both these spots are referred under the second order blackspot based on district wise ASI values (source: identification and prioritization of accident blackspot in Kerala-NATPAC). The spots are shown below in the from the questionnaire survey also these spots were highlighted by many of the respondents. As per the visual analysis the basic reason of accidents in these regions is over speed.

- Kareelakulangara is having a market on the side of the national highway and majority of the vehicles are parking on the two sides of the NH creating disturbance to the whole traffic. Cheppad have byroads to the NH and vehicles coming from the NH are with very high speed and there are no speed limiting aids present at all. So provision of speed limiting aids is one suggestion for these spots.
- The condition of roads is also not good in some areas and the public is saying that it is due to improper maintenance of road surfaces. So proper study should be done on these spots to find the exact reasons behind the deterioration of road surfaces.

❖ *For Haripad*

- The condition of medians should take into account.
- Provide a traffic signal.
- Remove the advertisement boards from the medians.
- Compulsory checking of wearing helmet should be done.
- Turning of vehicles in between the central median should be with the direction of traffic police since there is no traffic signal.

❖ *For Karuvatta*

- Along the road stretch there are educational institutions and here majority of the students come to the schools by means of cycle. So provision of enough cycle paths is a very necessary.
- For Thottappally and Ambalappuzha the same suggestions as said above can be applied.

SUMMARY

The main aim of the project is to identify the problems of VRUs of Alappuzha district with the help of Accident data and questionnaire survey method and to prepare a detailed report on the safety issues of VRUs. For this initially the accident data for the previous three years is collected from DCRB and they were analyzed and graphs are plotted using the SPSS software. From this the data on month, gender, preliminary assessment, victim vehicle, type of road etc. in which VRU accidents are more is identified.

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