

PEDESTRIAN SIGNAL: A TECHNIQUE TO PREVENT ACCIDENT

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Abstract: Pedestrian signals are viable traffic control devices which helps pedestrian to cross intersections safely. Although the literature is extensive when dealing with pedestrian signals design and operations, very few studies have focused on the potential safety benefits of installing pedestrian signals at intersections throughout the worlds.

This article deals with the safety technique to prevent accident, which is common nowadays in worldwide mainly huge populated countries like India. One of the past technique is before-after study. Before-after (BA) safety evaluation techniques have suffer a lot in the methodological and statistics issues. Recent studies prefer the use of Crash Modification Function to avoid the drawback of before-after study. Crash modification factors (CMFs) are represented in single values, Crash Modification Function used for variable treatment location characteristics (heterogeneity). The use of observational Before-After framework to develop the CM Functions avoids the cross-sectional approach. Functions are derived based on a single time period and no actual treatment intervention.

Keywords: Pedestrian signal, Crash Modification Function, traffic control devises.

I. INTRODUCTION

Pedestrian signal is simply means that the traffic devices which helps pedestrian to cross safely at intersection. A before –after techniques is used in the signal. This signal installed in many places such as Hamilton (Canada), city of Edmonton, Tucson (Arizona). After installing the pedestrian signal, the collision rate or crash rate between the pedestrian and vehicles were declined by the higher percentage. After some point of time, before after technique is not more very fruitful as dealing with present scenario. Then Crash Modification Function is introduced from before after study. It is developed from cross sectional studies. This mostly used in the traffic control feature and different highway design.



Figure 1. Pedestrian Signal.

“It is a device which communicates information about pedestrian timing in non-visual format like audible tone, verbal messages, and/or vibrating surfaces.”

The benefits which entitled this technique are:

- More accurate judgment of when to begin crossing
- Reduction of crossings begun during the DON'T WALK
- Reduced delay
- More crossings completed before the pedestrian clearance ends

The illegal and unsafe behavior of pedestrians at signalized pedestrian crossings is a frequent occurrence and represents one of the most common circumstances of road crashes involving pedestrians.

II. LITERATURE REVIEW

A thorough literature review identified the existing methods for assessing the pedestrian signal technique. These include three main approaches Before-After technique, manual inspection, and Crash Modification system.

The Emanuele Sachi focuses on the safety impact of installing pedestrian signal at urban/suburban signalized intersection. In order to evaluate the effectiveness of pedestrian's signals, CMF was used [1]. The crash modification function is derived from the before after technique [1]. This “CM Function is a multiplicative factor which is used to compute the expected number of crashes after implementing the given countermeasure at specific site”. It is developed from cross sectional studies in which the function is derived based on the single time period. It is generally used in the traffic control devices and different highway designs. The mathematical approach is applied for evaluating the crash frequency by using poisson distribution and log normal distribution. Pedestrian signal is installed where there is high pedestrian demand and it is relatively far from existing crossing. It is implemented at mid-block locations. This evaluation requires two set of data: one is collision rate and other is traffic volume for, before and after period.

III. THEORY

Important issue in pedestrian safety is to provide accommodation for safely cross the road at traffic signal. There are two type of phasing introduced in this study: one is concurrent phasing and other one is exclusive phasing. In concurrent phasing, pedestrian and vehicle both are moving at the same time and pedestrian has much alert carefully to cross the road. In exclusive phasing, when pedestrian cross the road then all the vehicle stop and it takes longer delay for vehicle and pedestrian. This study conclude that the Exclusive phasing is more popular to improve the safety.

Another study is concerned with the analyzing the behavior of a driver speed while approaches Zebra Crossing. More than thousands of the pedestrian lose their lives and many of the pedestrian injured in the traffic related crash. So that's why this study was happen. Actually this is generally agreed that pedestrian-vehicle crashes are happen due to lack of driver attention and pedestrian safety at zebra crossing is depend on the speed of vehicle. If speed is higher,

chances of increasing occurs more accidents. There is a term TTZ which define the time left for the vehicle to arrive at zebra crossing and pedestrian arrive at the curb. This term is calculating by the ratio of distance of vehicle from the zebra crossing to the vehicle's speed when pedestrian arrives at the curb. On the basis of TTZ, there are two cases happens: one is Anticipatory avoidance and other one is Non- avoidance response. In the anticipatory avoidance, driver considers the presence of pedestrian, so he slows down. Pedestrian cross the road before the driver so this results the time loss for the driver. In the non-avoidance response, drivers maintain the same speed because he consider that he passes the crossing first. There are two conditions occurs:

- Driver passes first from the pedestrian so he saves the time to maintain same speed because he doesn't stop. This action is reward for a driver.
- Pedestrian considers as a competitive behaviors. So driver does not stop and it delays to avoid the braking so accidents occur.

Various research has been conducted that the highest probability for pedestrians to create conflict situations if they started and finished crossing during red light phase, but contrary, there were a significant number of conflict situations if pedestrians started crossing at red light phase and finished crossing at green phase. On the other hand, the analysis of the number of offenders shows that each fourth pedestrian who started and finished crossing during red light created conflict situations, while each fifteenth pedestrian who started crossing at red light phase and finished crossing at green phase were create conflict situations.

IV. DISCUSSIONS

The lowest probability for pedestrians to create conflict situations is when start crossing in the first or in the last period of 5s of red light, but in other intervals this probability is much higher. Those pedestrians' behavior represents potential danger for vehicles that use the last seconds of their green light to enter the intersection. It is also noticed that males are less patient to wait for green light and they start to become offenders after 50s of waiting, and small number of pedestrians made red light crossing between 15 and 50 s of red light phase, so it could be concluded that 50s is acceptable waiting time for pedestrians.

In low and middle income country there are significant problems in traffic safety, especially with pedestrian and with other vulnerable road users. The intersections are locations where the highest number of conflicts between pedestrians and vehicles occurs. Many measures are used for increasing pedestrian traffic safety. Among others, countdown displays are used, especially at the intersections. Most researches showed that counters have positive influence for pedestrian traffic safety, especially in reducing number of offenders. In this paper research indicated number of pedestrians who are offenders, and risk for pedestrian-vehicle accidents regard second after red light onset. Research also showed that pedestrians usually cross at red light during the last seconds of red light phase, or in the first seconds of red light phase, while the most conflict risk is in other periods of red light phase. The disadvantage of using the countdown displays is increasing the number of pedestrians who are offenders, because they start crossing about start or end of red light phase. On the other hand, at pedestrian crossing with countdown display information about time to start or finish red light phase are given to pedestrians, so they usually start cross besides the red light on. Those pedestrians who take maximum risk besides information available from countdown display.

The total number of male and female pedestrians showed that there is no significant difference between number of male and female pedestrians, but the male pedestrians more significant crossed at red light than female pedestrians, and male pedestrians created more

significant conflict situations than female pedestrians. The pedestrians both gender under 30 ages crossed at red light more often than older pedestrians, and they created significant more conflict situations than older pedestrians. The pedestrians both genders crossed at red light usually when they begin alone and they created the highest number of conflict situations compare than pedestrians in couple or group.

V. CONCLUSION

The illegal and unsafe behavior of pedestrians at signalized pedestrian crossings is a frequent occurrence and represents one of the most common circumstances of road crashes involving pedestrians. Nowadays time is precious than life. So this study will help people of all working class who are facing challenges while crossing roads in today's fast world. This is need of the people in India to install pedestrian signal so needy people can easily cross the road in rush areas like Bombay, Delhi which reduces the fatal incidents. It is seen from various surveys done in different countries that after installing the pedestrian signal, crash rate between the pedestrian and vehicles declined by the higher percentage. Overall, we hope that this innovative methodology develops the Crash Modification functions from before after studies will simulate the further investigation. And reduces the accidents.

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