

Analyzing traffic conflicts and the behavior of motorcyclists at unsignalized three-legged and four-legged intersections in Cartagena, Colombia

H. Ospina Mateus; L. Quintana Jiménez; F.J. López Valdés

Abstract-

Introduction

The global motorcycle market has grown significantly, with over 770 million vehicles estimated to be in use worldwide. Motorcycle-related road traffic deaths in low and middle-income countries (LMICs) like Colombia are concerning, comprising 30% of all reported fatalities. Cartagena has an average of 70 motorcycle-related deaths annually between 2019 and 2022, making it a high-risk area for motorcyclists.

Objective

The study aimed to identify factors associated with motorcyclist safety at unsignalized three-legged and four-legged intersections in Cartagena by observing the behavior of the motorcyclists and the analysis of the potential traffic conflicts. The observational analysis focused on the access of motorcyclists from a secondary road to a main road since it is the behavior offered by the most significant road interaction and the potential risk of traffic conflicts due to crossing.

Methods

The observational process was consolidated at ten three-legged intersections and seven four-legged intersections. Thirty-six hours of videos were collected considering different time slots and weekdays randomly distributed during September 2019 and March 2020. The selection of the intersections included different vehicular flows and road safety conditions. The variables considered in the study were: interaction with other road users, motorcyclist behavior, vehicle handling, potential distractors, and safety elements. The study used the Swedish Traffic Conflict Technique to analyze conflict analysis, incorporating the Post Encroachment Time (PET) measurement. The analysis was developed with descriptive and inferential statistical techniques. The collected variables were analyzed individually (frequency analysis), and contrasts were conducted with the PET values. The study evaluated associations between motorcycles and other motorized road actors at intersections about behaviors and crossroads.

Results

In the Records, 10,281 motorcycle accesses at three and four-Legged Intersections were interactions with other road users, where 2417 and 1903 resulted in potential traffic conflicts, respectively. Average potential conflicts per hour were

115 and 127 at three and four-legged intersections. At the two intersections, the average PET values in motorcycles were between 2.09 and 2.10 s, while in the other motorized road users, it averaged around 2.67 to 2.71 s. In the road conditions, it was identified that intersections with a traffic flow of<10,000 vehicles/day and poor visibility to the left of the intersection lead to more unsafe conditions for motorcyclists. Motorcycle taxi drivers were the user group most frequently involved in traffic conflicts. Actions on the part of motorcyclists, such as risky behaviors, not using helmets, not using turn signals, and not waiting patiently for access, showed a relationship with the potential for traffic conflicts. Finally, turns to the left, particularly the indirect turn to the left on the opposite road, showed a greater risk of traffic conflicts.

Conclusions

The study found that motorcycles exhibit more severe traffic conflicts than motorized vehicles at intersections. Infrastructure conditions significantly impact the risk of intersection conflicts. Individual behaviors such as not stopping at intersections and driving recklessly increased the risk of traffic conflicts. The study recommends improving infrastructure such as visibility and signaling and implementing separators to reduce travel speed and traffic conflicts for motorcycles.

Index Terms- Motorcyclist; Powered two-wheelers; Traffic BehaviorTraffic Conflicts; Observational Study; Vulnerable Road Users; Road Safety

Due to copyright restriction we cannot distribute this content on the web. However, clicking on the next link, authors will be able to distribute to you the full version of the paper:

[Request full paper to the authors](#)

If your institution has an electronic subscription to Accident Analysis & Prevention, you can download the paper from the journal website:

[Access to the Journal website](#)

Citation:

Ospina-Mateus, H.; Quintana Jiménez, L.; López-Valdés, F.J. "Analyzing traffic conflicts and the behavior of motorcyclists at unsignalized three-legged and four-legged intersections in Cartagena, Colombia", Accident Analysis & Prevention, vol.191, pp.107222-1-107222-14, October, 2023.