

Background

The impact of real-time traffic parameters on road safety is of great importance and has recently gained considerable attention from researchers and practitioners. Such data were mainly utilized in order to analyze accident likelihood and severity (Oh et al., 2001; Christoforou et al., 2010; Yu and Abdel-Aty, 2014a, 2014b; Lee et al., 2003; Zheng et al., 2010). Although a few studies investigate accident likelihood on urban expressways (Hossain and Muromachi (2012 and 2013), it is observed that the vast majority of studies focus on freeways and therefore relevant research on urban arterials is very limited.

Objectives

The main objective this research is the examination and detection of potential statistical differences in a) mean values of speed and b) mean values of occupancy when examined separately by i) severity level and ii) by accident type, one hour prior to accident occurrence.



Data

The required accident data were collected from the Greek accident database SANTRA, which is provided by the Department of Transportation Planning and Engineering of the National Technical University of Athens. The study area included the Kifisias and Mesogeion avenues in Athens, Greece.

Accidents were classified as severe (accident including at least one seriously injured or killed person-KSI) or slight (accident including only slightly injured persons-SI). Moreover, it was examined whether the likelihood of Powered-Two-Wheeler (PTW) to be involved in an accident is influenced by traffic conditions. Therefore, another binary variable is created with values 0 (accident without a PTW) and 1 (accident involving a PTW). Accident type was also considered (head-on, collisions with pedestrians, side, sideswipe and rear-end collisions).

Traffic data (speed and occupancy) were extracted from the database of the Traffic Management Center in Athens. In this study, the closest upstream as well as the closest downstream detector to the accident location. A mesoscopic analysis approach was followed, where the raw 5-min raw traffic data were aggregated in order to obtain averages in the 1-hour interval prior to the accident occurrence.



Methods

In order to explore the existence of potential Analysis of variance (ANOVA) was applied in order to highlight potential statistical differences in speed and statistical differences in occupancy by severity level and by accident type, one hour prior to accident occurrence.

Results

Difference between severity groups			
Variable	F-test	P-value	Significant
Occupancy upstream	9.979	0.00167	yes
Occupancy downstream	11.76	0.00065	yes
Speed upstream	7.56	0.00617	yes
Speed downstream	10.11	0.00156	yes

Difference between accident type groups			
Variable	F-test	P-value	Significant
Occupancy upstream	5.495	0.00006	yes
Occupancy downstream	5.591	0.00005	yes
Speed upstream	8.461	0.00000	yes
Speed downstream	8.963	0.00000	yes

- There is a consistent statistical difference in the mean values of occupancy and speed between severe and non-severe accidents.
- This is observed for both upstream and downstream measurements
- The same trend is also observed for all accident type groups.
- All effects were found significant at a 95% level.

The findings suggest that there is an existence of a consistent effect of traffic parameters on road safety outcomes, because accident severity and accident type seem to be strongly dependent on speed and occupancy values, upstream and downstream, of the accident locations.

Conclusions

Overall, several significant differences are observed, either when accident severity or the type of accident is explored. This implies that traffic parameters can significantly influence the severity as well as the type of the accident. The findings of the study justify the need to further explore the effect of real-time traffic parameters on traffic safety on urban arterials.

References

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