A HYBRID APPROACH FOR PRIORITISING ROAD SAFETY INTERVENTIONS IN URBAN AREAS

Sandra Vieira Gomes, Carlos Roque, João Lourenço Cardoso

Laboratório Nacional de Engenharia Civil,
Departamento de Transportes, Núcleo de Planeamento, Tráfego e Segurança
Av do Brasil 101, 1700-066 Lisboa, Portugal,
Tel: (+351) 218 443 528, Email: sandravieira@lnec.pt

ABSTRACT

Spatial organization in cities has often taken a special attention to the requirements of motorized vehicles, neglecting pedestrians and cyclists' needs. In order to privilege active modes, there is a need to ensure the safety of these vulnerable road users.

Pedestrians are known as the most vulnerable road users, which means their needs and safety require specific attention in strategic plans. In urban areas, where walking is an essential way of travel, this issue may rise to critical levels, since pedestrians are more susceptible to injuries compared to other road users. Portuguese urban areas are no exception: from 2010 to 2016, the average percentage of injured pedestrians in urban areas rounded 97%.

Walking in a safe environment is indispensable to promote the pedestrian mode. However, in the process of urbanization and motorization evolution, the built environment tends to become less friendly for pedestrians, making walking activities more vulnerable than ever, even in developed countries.

Pedestrian safety can be improved with the knowledge of the underlying factors involved in crash occurrence and resulting injuries. The consideration of variables related to built environment in explanation of crashes and injury outcomes is frequent and helpful. Several studies have examined the relationship between built environment factors and either pedestrian crash frequency or the severity of resulting injuries

In countries where good results have been achieved with corrective infrastructure intervention, the respective action programs include methods for technically and scientifically rigorous approach to the various stages of intervention. This includes the diagnosis of accidents in the area under consideration, in order to identify the areas where the road environment presents a higher influence on accidents occurrence.

This was performed for the city of Lisbon, through the development of models for estimating accident frequency, using the Generalized Linear Modelling (GLM) approach with a Poisson-gamma distribution. The results were improved afterwards though the application of the Empirical Bayes Method (EBM), and used for the detection and hierarquization of accident black spots.

More recently, but also for Lisbon, pedestrian severity models were developed using a Multinomial Logit structure, to identify the main factors involved. Amongst them it was possible to identify some related to the urban environment, namely office areas and abrupt

manoeuvres of the drivers, which, according to the model, increased the probability of death of pedestrians.

This information was combined with the one previously obtain through the accident prediction models in a geocoded database, allowing for a hybrid identification of high accident risk sites. This tool contributes to support the intervention in road safety in what concerns the decision about the choice of places for intervention, the characterization of the accidents at each location and the respective safety problems, the selection of the proper corrective interventions to do as well as the assessment of the effects obtained with the interventions.