

Presentation title

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Keywords: keyword, keyword, keyword (max 6)

TITLE: Interaction between pedestrians, formal transport and road infrastructure: A safe system perspective on urban road safety in Lusaka , Zambia

Background

Pedestrian road traffic injuries remain a major public health challenge in many low- and middle income countries, particularly in rapidly urbanizing African cities (WHO, 2018). In Zambia, pedestrians account for a significant proportion of road traffic fatalities and serious injuries, driven by high vehicle speeds, inadequate pedestrian infrastructure, unsafe road environments, and weak traffic enforcement (RTSA, 2022; WHO, 2023). Informal public transport systems, especially minibuses, often operate in pedestrian-dense areas such as markets, bus stops, and residential zones, where frequent stopping and aggressive competition for passengers increase pedestrian exposure to risk (Kumar & Barrett, 2019; Peden et al., 2020). Despite ongoing road safety initiatives, limited empirical evidence exists on how road environment factors, speed limits, road types, and vehicle characteristics interact to influence pedestrian injury severity in urban Zambian contexts. Understanding these dynamics is essential for developing targeted, context-appropriate interventions aligned with the Safe System approach (OECD, 2019).

Aim

To examine the determinants of pedestrian injury severity in urban Zambia, with a particular focus on the role of vehicle type, especially informal public transport, road type, speed limits, and spatial risk environments such as bus stop areas..

Method .

A mixed-methods research design was adopted, consistent with recommendations for road safety research in low- and middle-income countries (Creswell & Plano Clark, 2018; WHO, 2021). Quantitative data were obtained from 272 pedestrian crash records collected from traffic police and hospital sources in an urban Zambian setting. Variables analyzed included injury severity (fatal, serious, and minor), vehicle type, road type, speed limit, and proximity to bus stops. Descriptive statistics and cross-tabulations were conducted using SPSS to examine patterns and associations between variables (Field, 2018). ² In addition, qualitative data were collected through key informant interviews with traffic officers, transport operators, urban planners, and road safety practitioners. Thematic analysis was used to identify recurring themes related to pedestrian risk factors, enforcement challenges, and infrastructure conditions (Braun & Clarke, 2006).

Results

The analysis showed that serious injuries were the most common outcome across all roads. Arterial roads recorded the highest number of serious injuries (49 cases), while local roads recorded the highest number of fatal injuries (29 cases), reflecting the influence of road design and traffic management on injury severity (Elvik, 2017). Speed limit analysis revealed that higher speeds were associated with increased injury severity. At 80 km/h, the highest number of fatal injuries (22) and a high number of serious injuries (33) were recorded, supporting evidence that pedestrian fatality risk increases exponentially with vehicle speed (WHO, 2018; Rosén & Sander, 2009). Even at lower speed limits (40–60 km/h), serious injuries remained prevalent, indicating persistent pedestrian vulnerability across the road network. Vehicle type analysis demonstrated that minibuses were involved in nearly half of all pedestrian crashes (46.3%), followed by private cars (32.7%). Spatial analysis showed that 50% of pedestrian crashes occurred near bus stops, while the remaining 50% occurred elsewhere. High pedestrian activity, frequent vehicle manoeuvres, and inadequate crossing facilities around bus stops are known to increase crash risk (OECD, 2019). Qualitative findings identified four key themes: unsafe minibus operational practices, inadequate pedestrian infrastructure, weak traffic law enforcement, and poor road user behavior.

Conclusions

Pedestrian injury severity in urban Zambia is strongly influenced by road type, vehicle speed, and the dominance of informal public transport operations. High-speed environments and arterial roads pose the greatest risk for serious injuries, while local roads present elevated fatality risks due to poor infrastructure and limited traffic control. Minibuses play a disproportionate role in pedestrian crashes, reflecting systemic issues in informal public transport regulation and operations (Kumar & Barrett, 2019). The findings underscore the need for integrated, system-oriented interventions, including speed management, safer road design, and formalization of public transport operations, improved pedestrian infrastructure, and stronger enforcement mechanisms. Aligning pedestrian safety strategies with the Safe System approach can significantly reduce injury severity and improve urban road safety outcomes in Zambia (OECD, 2019; WHO, 2023).