

Comparison of motorcycle accident data between low- or middle-income and high-income countries

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I. INTRODUCTION

The frequency of severe injuries and fatality rates in motorcycle accidents is rapidly increasing in Low- and Middle-Income Countries (LMICs), especially in Bangladesh. On the other hand, there has been a significant decrease in the number of severely injured individuals and fatalities over the last few decades in Europe [1]. Motorcycle accident victims in developing countries of South Asia have fatality rates twice as high as those in developed countries, such as North American or European countries [2]. Given the significant differences between LMICs and European countries in terms of the number of accidents and their characteristics, this research aims to provide a comparative analysis of injury severity and injured body parts between an LMIC (Bangladesh) and a high-income European country (Germany or Ireland).

II. METHODS

A database comprising 300 datasets sourced from recently collected accident data in Bangladesh, spanning the period from October 2023 to March 2024, was analysed. The motorcycle accident data of Bangladesh were collected from the casualty departments of the two primary hospitals in the capital city, Dhaka, that deal with emergency response to accidents. The admitted patients involved in the motorcycle accidents or the relatives of the deceased victims were queried about the overall incident through questionnaire-based interviews, and their responses were recorded. The severity of injuries in different body regions was scored between 1 and 6, based on the Abbreviated Injury Scale (AIS).

To facilitate comparison with European accident data, a study based on German accident characteristics and influencing parameters was considered, where the AIS scale was used for injury severity [1]. The German data were collected by a scientific research team of GIDAS (German In-Depth Accident Study) for the years from 2000 to 2013. The data were used to compare accident severity and affected body regions with those recorded in Bangladeshi accident data.

Furthermore, the Bangladeshi accident data were compared with Irish accident data, where 704 cases of motorcycle trauma were identified [3]. The data were collected from the national registry data of motorcycle-related trauma in Ireland over a six-year period starting from 2014. The injury severity of the patients was assessed using the Injury Severity Score (ISS). ISS scores were classified as low, moderate, and severe, with scores ranging from 1 to 8 indicating low severity, scores from 9 to 15 indicating moderate severity, and scores exceeding 15 considered severe [3].

III. INITIAL FINDINGS

In Fig. 1 (left), the comparison between Bangladesh and Ireland data illustrates that limbs (hands and legs) showed the highest occurrence of injury in both countries, indicating that a majority of motorcycle accident patients sustained injuries to their hands and legs in both nations. In Bangladesh, 63.91% of motorcycle accident patients sustained limb injuries, while the figure was 35.78% in Ireland. In Bangladesh, less than 10% of total injuries were observed in the chest, head, spine, and abdomen. However, a significant number of chest injuries (21.55%) were recorded in Ireland. Additionally, 31.20% and 19.54% of multiple body parts injuries were observed in Bangladesh and Ireland, respectively, indicating that injuries across multiple body regions are common occurrences in both nations. In Fig. 1 (right), it is evident that injuries of medium severity based on the ISS scale are highest in Bangladesh, whereas Ireland observed more high-severity injuries.

Figure 2 compares the frequency of injuries in different body regions and the severity level of injuries between

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Bangladesh and German data. The AIS0 and AIS6 were assigned for no injury and fatal injury to a specific body region, respectively. For instance, in Bangladesh, there were no leg injuries in 16.78% of total accidents, while 48.95% of total patients sustained leg injuries with an AIS score of 3 and above (AIS3+). In Germany, only 6.60% of total patients had AIS3+ leg injuries, highlighting a substantial disparity between the two countries. Moreover, 14.69% of total patients in Bangladesh had AIS3+ injuries in the arms, whereas a mere 0.30% of patients in Germany experienced the same level of severity due to arm injuries. Neck injuries with an AIS3+ were relatively minor in both countries, while thorax injuries showed a similar number of frequencies in both Germany and Bangladesh. Overall, it is evident that AIS3+ injuries for all body regions are less common in Germany. On the other hand, in Bangladesh, a significant proportion of patients suffered AIS3+ injuries, particularly in cases of leg and arm injuries.

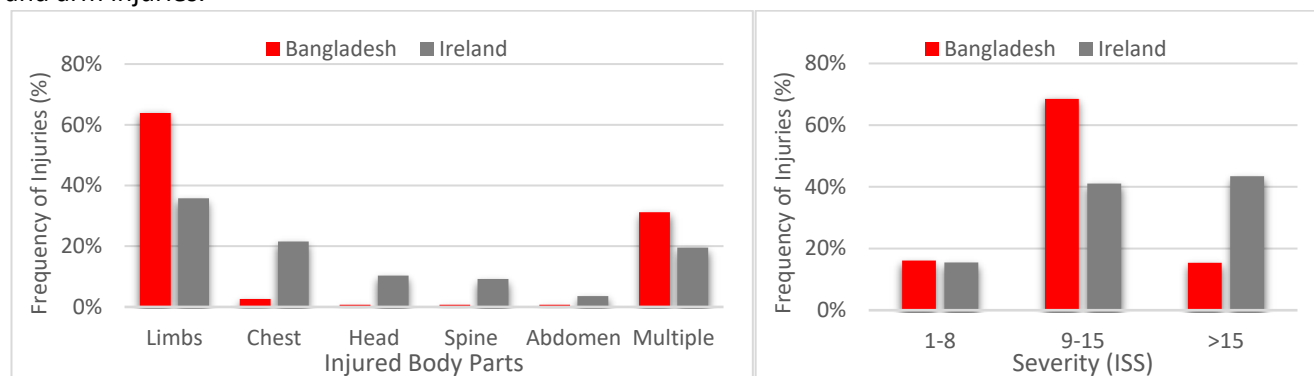


Fig. 1. Comparison between Bangladesh and Ireland data: frequency of injuries vs. injured body parts (left) and frequency of injuries vs. severity (right).

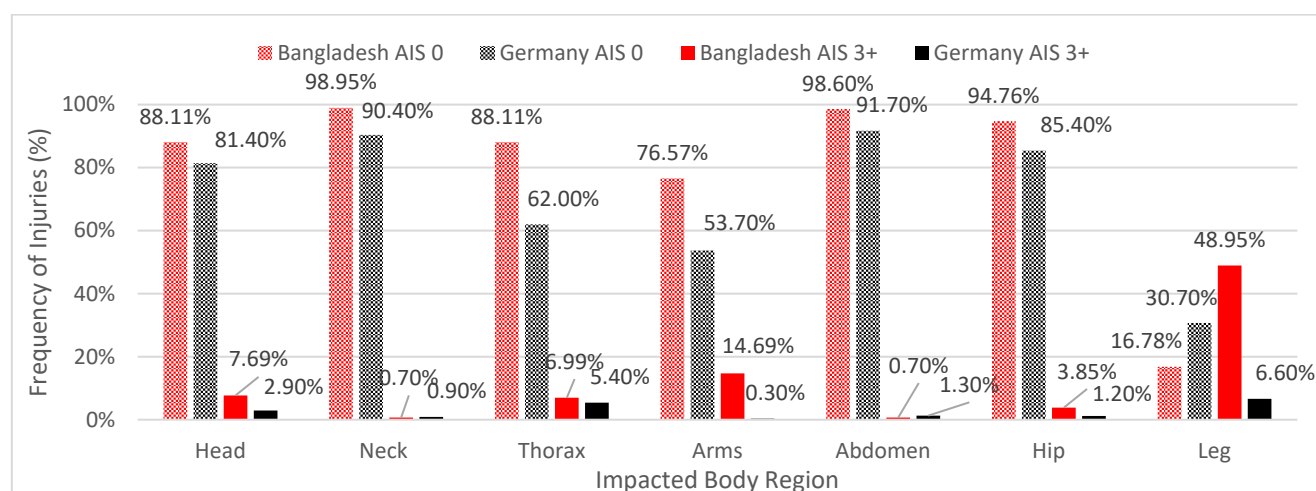


Fig. 2. Comparison of accident severity (in AIS scale) on different body regions between Bangladesh and Germany data. Here, AIS0 and AIS3+ injuries of a specific body region mean that the body region did not sustain any injury and sustained severe to fatal injuries, respectively.

IV. DISCUSSION

When comparing the severity of injuries between Ireland and Bangladesh, motorcycle accident patients in Bangladesh mostly experience medium severity according to the Injury Severity Score (ISS), whereas in Ireland, patients predominantly fall into the high severity range. Similarly, when compared with Germany, the frequency of AIS3+ injuries to different body regions in Bangladesh shows a different pattern. In conclusion, it is evident from this research that the injury severity and its characteristics in a LMIC like Bangladesh differ significantly from those in developed European countries. The main factors behind these phenomena are presumably due to differences in road use policies and loading mechanisms.

V. REFERENCES

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- [3] Hession, E., *et al.*, *Trauma*, 2022.