Major Risk Factors Contributing to Pedestrian Crashes in Low and Middle-Income Countries

Ali Zayerzadeh[a], Hamed Marouf[b]

[a] Road Safety Pioneers NGO, Iran, [b] Department of Traffic Safety, RMTO, Iran

Abstract

Walking, an alternative mode of transport, is encouraged because of its health benefits and the reduction in vehicle use. The WHO global status report on road safety 2018, reports that low and middle-income countries (LMICs) have the worst road safety situation, being twice that of high-income countries (HIC's). Vulnerable road users (VRU's) including pedestrians, cyclists and motorcyclists comprise half of these fatalities. This research investigates the major risk factors which may cause fatal pedestrian crashes. 25 international road safety experts completed pedestrian safety related questionnaires. The results were analysed using Ishikawa and AHP methods and showed that street lighting, crossing facilities and proper land use design were among priorities which should be addressed to improve pedestrian safety.

Background

There are clear regional and national differences in the distribution of road user mortality. Vulnerable road users tend to account for a much greater proportion of road traffic deaths in LMICs, than in HICs. The type of traffic, the mix of different types of road users, and the type of crashes in LMICs differ significantly from those in HICs.

The WHO global status report on road safety, shows that LMICs have 90% of global road traffic deaths and fatality rates twice that of HICs (WHO, 2018). VRU's including pedestrians, cyclists and motorcyclists comprise half of these fatalities.

VRU's safety situation

Identifying ways to address VRU road safety is expected to lead to significant improvement in overall road safety, including VRUs. However, the likelihood of being killed in a traffic crash as a pedestrian varies by region, country and even state, as represented in Table 1. The African Region has the highest percentage of pedestrian deaths at 39% of all road traffic deaths and the lowest rating is South-East Asia with 13% (WHO, 2018).

Table 1. Percentage of Road traffic deaths by type of road user and WHO Region

	Pedestrians	Cyclists	2-3 wheelers	Car Occupants	Other
Europe	26	4	9	51	10
Eastern Mediterranean	27	3	11	45	14
South-East Asia	13	3	34	16	34
The Americas	22	3	20	35	21
Africa	39	4	7	40	11
Western Pacific	23	7	34	22	14
World	**22**	**4**	**23**	**31**	**21**

In the WHO report, 76 middle income countries have reported the percentage of pedestrian fatalities with the average being 31.7% ($\pm$13.66%). This demonstrates the magnitude of the problem.

(Sklet, 2002) Last year more than 4200 pedestrians died in road traffic crashes in Iran which accounts for 23.2% of all its road fatalities (RMTO, 2018). While Iran is a middle income country, because of the high rate of pedestrian fatalities, lessons may be learned from this research.

The average pedestrian victims' proportion for 48 high-income countries is 23.1 percent. 30 countries in the report are categorized as low-income and only 14 of them have reported pedestrian share of total traffic deaths. The average for these 14 countries is 29.6% with maximum of 49.1% reported by Malawi. The summary of described situation of pedestrians' fraction of total road deaths are presented in Table 2:

Table 2. Pedestrian Fatalities by Country Income Group

	Ave. Percentage of Pedestrian Fatalities	Total Countries in the Category	No. of Countries with Reported Percentage	Max. %
High-Income	23.1	52	48	50
Middle-Income	31.7	96	76	76.5
Low-Income	29.6	30	14	49.1

Method

To assess the different risk factors contributing to pedestrian crashes, a questionnaire was developed and was sent 35 road safety experts from 25 middle-income countries. Experts were selected based on their self-reported skills on LinkedIn and then those shortlisted were contacted to confirm their credentials 27 experts completed the questionnaire and after review for the re-focused second round, 25 complete forms were considered for analysis. In the questionnaire, they were asked in an open ended question to list all issues and factors that affect the safety of pedestrians in their country.

The important factors identified by the experts were synthesized to form a comprehensive list. Using the Ishikawa fishbone diagram, factors and issues were categorized into 6 main groups comprising Driver, Pedestrian, Post-crash, Vehicle, Management and Road related causes. Figure 1 shows the primary and secondary causes listed by these road safety experts. At the second round, experts were asked to prioritize these causes in each category using AHP method.
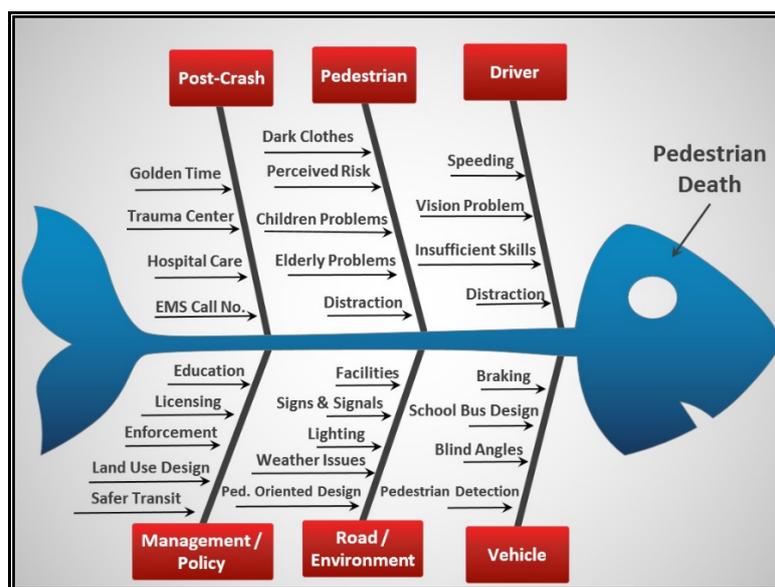

Figure 1. Fishbone diagram of pedestrian deaths root causes

Results and Conclusions

The study identified 6 categories as the most important factors impacting pedestrian related crashes. These were; efficient road safety education; road users' perceived risk; crossing facilities; land use design; timely emergency services and speed enforcement. The main difference between the level of pedestrian safety in LMICs and HICs arise from the quality of these reform activities and having a long-term plan to improve them. These findings are valuable as a road safety contribution to Iran and other LMIC's.

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