

Pedestrians: The Vulnerable Forgotten Road Users

Transportation is an integrated part of our daily life. We are all pedestrians. Walking is a major type of transportation worldwide. In fact, all the trips made in the transportation system are accompanied by walking, at least in the first and the last part of it.^[1] In addition to being a method to get around, walking is also a good way to increase health conditions because it is one of the ways to increase physical activity, which can reduce cardiovascular and obesity-related diseases.^[2] In this regard, most countries have started to implement incentive policies for walking people as an important method of transportation.^[3,4] Regrettably, in some circumstances, increased walking can intensify the risk of injury to people.^[5] In fact, anyone who steps out of his/her house and uses the road is at risk of traffic accidents, followed by disability and even death. Nearly 1.3 million people die each year as a result of road traffic accidents and as many as 50 million are injured.^[6-8] As claimed by the World Health Organization (WHO), more than half of all road traffic deaths are among vulnerable road users: pedestrians, cyclists, and motorcyclists which are often overlooked in the design of road traffic systems in many countries.^[1] According to the global estimate of deaths due to traffic accidents in 2010, 273,000 pedestrians were killed as a result of injuries caused by these accidents. This is actually 22% of the total number of deaths due to traffic accidents.^[9] Moreover, based on the WHO, in 2018, more than 16,000 people were killed in traffic accidents in Iran, of which 22% belonged to pedestrians.^[1]

Pedestrian accidents, such as other traffic accidents, cause psychological, economic, social, and health costs. Traffic accidents consume a lot of financial resources that are needed for the development of countries. There is no global estimate of the economic impact of pedestrian traffic accidents, but it is estimated that road traffic crashes cost most countries 3% of their gross domestic product.^[1] The harmful social, physical, and psychological effects of such event affect pedestrians who survive traffic accidents, their family, friends, and caregivers.

The characteristics of pedestrians killed or injured in different countries may be different, but in general, human as well as vehicle, road, and environmental factors are involved in a traffic accident.^[5] However, the role of these factors in different societies may be varied. For example, a study (structural equation modeling analysis) in Iran showed that factors related to roads (coefficient: 0.968), vehicles (coefficient: 0.632), humans (coefficient: 0.306), and the environment (coefficient: 0.194) were, respectively, most important for pedestrian safety status. Concerning the road factors, three independent variables, including intersections, main roads, and ring roads, were very accident-prone areas. In addition, vehicles play a key role in pedestrian accidents and deaths, highlighting the

role of domestic automakers. Domestically built vehicles have problems such as braking flaws that play an important role in probable fatal accidents.^[10] Other key risk factors for traffic injuries among pedestrians include vehicle speed, alcohol consumption by drivers and pedestrians, poor visibility of pedestrians, lack of safe infrastructure for them such as pedestrian crossings, or poor prehospital rescue services.^[11] Elimination or reduction of the risks faced by pedestrians is one of the most important and achievable goals in health policies. Unfortunately, effective and proven interventions in many locations have not yet received enough attention regarding pedestrian safety.^[5] Speed management is an important factor in improving pedestrian safety. Key measures in speed management include setting speed limits of up to 30–40 km/h in residential and busy pedestrian areas, closely monitoring the implementation of speed limit laws, and generally implementing speed reduction measures on the road.^[1]

Insufficient visibility of pedestrians is another important factor in increasing the risk of accidents for them. Poor visibility of pedestrians arises from inadequate or lack of roadway lighting and using motor vehicles that not equipped with lights and obviously the use of dark clothes by pedestrians at night.^[5] On the other hand, based on the study in Iran, the coefficient of time variable covering the time interval between 12:00 and 18:00 shows that the majority of accidents have resulted in death in this time interval.^[10] However, in general, it could be stated that such accidents would occur at sunset.^[12]

In the case of pedestrians, two groups are of particular importance, the elderly because of reduced reaction time and walking speed and children due to inability to estimate the speed of vehicles and lack of information needed for crossing the street alone and safely.^[13] It is worthy to know that almost 50% of mortality due to the road traffic injuries in Iran were in pedestrians in age groups 1–4, 5–9, and over 65 years.^[14] There is a close correlation between the walking environment and pedestrian safety. The vulnerability of pedestrians increases much higher in places where traffic enforcement is not adequately monitored. For a variety of reasons, the expectation that all traffic accidents can be prevented may seem unrealistic. However, to design and implement effective interventions to improve the safety of pedestrians in any population, regional and local issues and problems related to the same population should be specifically studied, identified, and analyzed.

In conclusion, and according to available data, more than one-fifth of traffic accidents-related deaths in Iran are pedestrians. In addition, the children and the elderly are two age groups that face generally higher road traffic accident risks than other age categories. Lack of infrastructures and sharing the road between the drivers and pedestrians pose a

serious danger to pedestrians. Road-rule noncompliance by pedestrians and drivers, nonenforcement the regulations by the police, unsafe vehicles, and problematic roads are other factors that contribute to the vulnerability of pedestrians. Undoubtedly, it is time to take practical and urgent measures for reduction of the number of pedestrian accidents as the most vulnerable road users. Therefore, more efforts and programs are needed to develop and implement effective strategies to reduce pedestrian-related injuries and deaths. Proper education in schools as well as through the mass media can play a significant role in reducing pedestrian mortality, especially in children and adolescents. The following measures also can be very important in improving the safety of pedestrians: proper information to vehicle drivers and incentives to respect the rights of pedestrians, controlling the speed of vehicles and strict legislation enforcement by the police, restricting car traffic in residential areas, creating sidewalks, as well as crossing points for pedestrian crossing. Monitoring of traffic rules, installing appropriate traffic signs for pedestrians, building underpasses and overpasses, reducing unnecessary travel, raising vehicle standards for pedestrian safety, promotion of prehospital emergency care, and upgrading of hospital care are other measures that can help reduce the mortality of this group of road users. At the same time, the presence of conspicuous traffic police should not to be overlooked since it has led to improvements in driver behavior in both developed and developing countries.

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