Journal of Current Medical Research and Opinion
Received 03-05-2025 | Revised 19-05-2025 | Accepted 16-06-2025
CMRO 08 (06) 4275-4283 (2025)
DOI: https://doi.org/10.52845/CMRO/2025/8-6-7
www.cmro.in
CMRO
ISSN (O) 2589-8779
(P) 2589-8760

Review Article

A review About Pedestrian Behavior of Road Traffic Accidents in Kurdistan Region of Iraq: Analytical Retrospective Study

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Abstract:

Background: Road traffic accidents are responsible for killing more than a million and one-third of individuals were more than half of them were pedestrians and cyclists. Iraqi victims considered this rate, composed of children and old ages, Kurdistan Region Country (KRI) the highest proportion of victims reported in Erbil and Sulaymaniyah.

Objective: This study aimed to identify influenced pedestrians to Road Traffic Accidents (RTAs) in the Kurdistan Region of Iraq (KRI), and to explore a new strategy to reduce this subject as a whole.

Methods: A systematic review of collecting studies in the field of KRI influence pedestrians in particular, with identifying risk factors. In this systematic review, numerous risk factors were should be found to be responsible for traffic accidents on pedestrians such as speeding, accident location, alcohol over drink, distraction, law enforcement issues, crossing safely, socioeconomic features and age problems. A new strategy should have been adopted for reducing road traffic accidents, like sharing by teams' ministries of education, entry, health, higher education and organizations to make an applicable proposal to manage and treat this subject.

Conclusion: Environmental and socioeconomic factors, destruction, speed, recklessness, and carelessness, considered a fundamental role in traffic accidents in the KRI.

Keywords: Pedestrian, Road, Traffic, Accidents, Safety.

Introduction:

Worldwide, 1.35 million people die on the roads each year. Every day, around 3,700 people worldwide die in accidents involving cars, buses, motorcycles, bicycles, trucks or pedestrians. More than half of those killed were pedestrians and cyclists or cyclists. Accidental injuries are estimated to be the eighth leading cause of death worldwide for all age groups and the leading cause of death for children and youths ages 5 to 29 (1). The death toll in car crashes in low-income countries is three times higher than in high-income countries. Although they own about 60% of the world's cars, 93% of the world's deaths occur in low- and middle-income countries (2). The death rate in low- and middle-income countries is 3.4 times higher than in high-income countries. There is evidence of a relationship between income inequality and health outcomes, especially in developing countries (3). Most of those killed in car accidents are children and teenagers. Nearly half of the deaths in Iraq are pedestrians, almost twice that of a neighboring country (4). In a study of road deaths in Iraq from 2010 to 2013, which included Erbil and Sulaymaniyah in the Kurdish region, the two provinces had the highest number of deaths compared to the rest of Iraq. Mortality rates are very high among children, adolescents and young adults. In Erbil, the capital of the Kurdish region, where RTAs are the second leading cause of

death, these estimates are high, especially given the lack of region-wide coverage (5). In countries where there is a strong movement by walking and cycling, collisions between pedestrians and cyclists or drivers are a major concern (6). Pedestrians are often referred to as easy road users because they lack protective structures, and the height difference makes them vulnerable to injury in the event of an accident with a motor vehicle. These are difficult to maintain because the infrastructure is often designed for vehicles that are not very comfortable to pay for, for pedestrians who want to drive or walk, cross the street or change the direction shown at an intersection. However, the increase in population activities will lead to pedestrian accidents. Most countries with high physical activity reported decreases in mortality, while countries with low physical activity reported continued increases in mortality (7). A lot of previous studies have identified many factors that affect people (for instance, behaving, population, roads, traffic, health, infrastructure and land use) of RTAs (Abdulla et al., 2023 (8); Rashid and Ismail, 2022 (9); Mahmood et al., 2020 (10); Sarsam et al., 2015 (11). Many factors affect pedestrian accidents, such as compliance with traffic rules, visibility distance, crossing safety, intervention, children and the elderly, alcohol and other substances, the field area, and the end of health status. This study aimed to assess the factors associated with pedestrian road traffic accidents in the KRI based on recent research.

Objectives:

To identify studies conducted in the Kurdistan Region of Iraq (KRI) due to the impact on pedestrians from RTAs behavior. To put an applicable strategy, reduce and minimize the number of road traffic accidents impacting pedestrians.

Methodology:

Study area: The Kurdistan Region of Iraq (KRI) is an autonomous region in the North run by the Kurdistan Regional Government (KRG). The KRI comprises four governorates, Erbil (the capital), Sulaymaniyah, Duhok, and Halabja (Figure 1). The KRI has a population of 5.2 million, and in addition, there are currently 1.8 million forcibly displaced people who fled from Syria and other parts of Iraq due to armed conflicts.

Figure 1: Kurdistan Region of Iraq map

Data collection: The collected data by traffic offices are based on studies about road traffic accidents (RTAs) conducted in KRI, written by researchers and experts in the field. These studies

comprise information about pedestrian behavior, location of RTAs, speeding, alcohol use, and safety rules, conducted in the previous years.

Study design and setting: An investigation of studies of RTAs in KRI conducted up to date, through meta-analysis review, examining the impact of road accidents on pedestrians, and their outcomes rate of injuries/fatalities.

Ethical approval: The Higher Degrees, Research and Ethics Committee of Al-Qalam University College approved this systematic review, which is embedded in a bigger project titled Road Accidents in Iraq: Short and Long Solutions. For the systematic review, as only existing publications were examined, we did not require obtaining written or verbal consent.

Eligibility criteria: We included pedestrians of all ages and excluded cyclists, skaters, scooter drivers, bicyclists, and those taking part in motorized or vehicle traffic (automobile drivers and passengers, public transport riders, and motorcyclists). We also excluded all studies that did not disaggregate results by road user type, i.e., whether data on pedestrians and drivers or other road users were combined. Also, studies or reports related to pedestrians were conducted in Iraq.

Data sources: We searched the following electronic databases: CDC, NHTSA, MEDLINE, Web of Science, WHO, Global Health Index, Transport Research International Documentation (TRID) and Clinical Trials. We considered all original research studies that met the criteria, published in English, regardless of their publication status and with no restriction on the year of publication.

Study selection: Each part/sentence was reviewed at the title/abstract phase with two independent reviewers to identify eligibility. Any disagreements between the two reviewers were deliberated and determined by agreement, and where required, a third reviewer was consulted. For all studies deemed potentially eligible or unclear at the title and abstract screening stage, we retrieved the full texts, and these were assessed for eligibility, analogous to the process described above.

Data extraction: For all studies meeting the inclusion criteria, the data collection for study designs, study population, characteristics of the intervention and comparison groups, statistical analysis, outcomes and effects. Where important data were not available to extract (e.g., related to outcomes and/or effects) of injuries and deaths of pedestrians, requesting the relevant data.

Key risk factors:

Speeding:

The increase in average speed is directly related to the occurrence of the accident and the severity of its consequences. For example, every 1% increase in average speed results in a 4% increase in the risk of a fatal accident and a 3% increase in the risk of a serious accident. For pedestrians struck by an oncoming car, the risk of death increases rapidly (4.5 times increase from 50 km/h to 65 km/h). In a car-to-vehicle accident at 65 km/h, the risk of death for occupants is 85% (2). According to a study conducted at a hospital in Erbil, the highest rate of RTA occurred elsewhere in Sulaymaniyah, in 599 (25%) out of 2225 RTA patients admitted to the hospital's emergency department (9). Mania (8) showed that speeding drivers accounted for more than 71% of 573 accidents. While the family rescue study in Erbil shows that urgency is reported third in the RTAs (9), a six-month study at the Sulaymania Emergency Hospital notes, that the main cause of traffic accidents is speed (10). Most studies and studies examined in the KRI (5) and major cities such as Duhok (12) show direct and indirect acceleration. Finally, a study of 400 medical students at Hawler Medical University found that speeding was the second most dangerous behavior in about one-third (30.4%) (13). Finally, a study by Mohammed et al., in 2019 (14) stated that traffic data show that about 60% of accidents are due to speeding, the rest due to reckless driving, ignoring road signs and aging particularly young. To improve public safety on the road, traffic police impose traffic fines to prevent violations and reckless driving. Finally, a hospital survey of Sulaymaniyah RTA survivors revealed that speed was the main reason, accounting for about half (48%) of injured people (10).

Location:

Higher speeds can cause pedestrians to crash into cars and cause serious injury. The majority of Crosswalk mortalities occur inside cities (9), on roads away from intersections (where there is heavy traffic), and at night. But by 2020, pedestrians aged 65 and over will account for one-fifth of all pedestrian deaths. One in five children (20.4%) who died in traffic accidents under the age of 15 in 2020 was a pedestrian. However, 17% of those aged 15 and over who die

in car crashes are pedestrians (1). On throughways and in a few ranges, the chance of being murdered or harmed in a mishap is higher than somewhere else, as street security has changed in NOI. Compared to other parts of Iraq, this locale had the foremost casualties between 2010 and 2013. The most noteworthy increment in the number of harmed and casualties in mishaps happened in Erbil (15). Another portion of the geometric show is drawn from a ponder (Jrew et al., 2017)16 in Erbil, which utilized measurable investigation and self-observation to analyze and assess the causes of the activity mischances affiliation between 2010-2012, and concluded that: bridges and long intersections on the street area add up to it causes several mischances and more harm, individuals do not care almost people on foot and drivers do not allow need to people on foot passing by since they do not know how to do it. to spread. drivers and people on foot Gökækuş et al. in 2020 (15). Geometric structure (for example, sharp twists or certain bearings, or activity sign requests) causes the fourth street and comes about in an RTA of 2%.

Alcohol consumption:

Alcohol was involved for the driver and/or pedestrian in nearly half (46%) of crashes that resulted in a pedestrian death in 2019. In these crashes: more than one-tenth (13%) involved a driver with a blood alcohol concentration (BAC) of at least 0.08 grams per deciliter (g/dL) a level that is illegal for adults aged 21 and older in all U.S. states (Note: Utah has a BAC limit of 0.05 g/dL). About one-third (32%) involved a pedestrian with a BAC of at least 0.08 g/dL.3 (1). Several studies in KRG showed a statistically significant relationship (P<0.001) reported between Alcohol consumption and injury fatalities (17) out of 183 alcoholic injured outpatients seeking treatment in hospitals of Erbil, the death proportion was 43(23.5%) over one year of a prospective study. Another household survey for the years (2017-2019) showed that among 3473 participants, alcohol drinking was from 157 individuals and nearly half of them, 75(47.8%), documented traffic accidents (Rashid and Ismail, 2022)9. While another study in Erbil reported that driving after a mild to moderate intake of alcohol was 4.5 percent, and drunk driving was 6.4 percent (13).

Crossing Safely:

Crosswalks should be used by pedestrians whenever possible and delay movement for a harmless break in traffic, earlier crossing the street. crossing or Jaywalking in regions not chosen for pedestrian intersections upsurges the hazard of accidents. It is important to make eye contact with drivers and ensure they have seen you before crossing. A study in Erbil by Sarsam and Abdulameer in 2015 (11) aimed to assess pedestrians and their walking characteristics, has showed that local pedestrians walk more leisurely than other pedestrians in advanced countries. The mean free movement walking rapidity of Erbil pedestrians that have been witnessed was 51.31 m/min and which is relatively leisurely than that of other nations. On the other hand, old pedestrians (50 years or older) were leisurely among others, with a normal walking speed of close to 20 m/min. The stability of standards and guidelines produces combined geometry control and highway traffic strategy, which pay for consistency on the roads, which is significant for driver recognition respect, and consideration, besides for a suitable response throughout the driving procedure (18). Another noticeable shortcoming is its confidence in out-of-date standards, guidelines, and manuals like the British Standards (BS) of the 1960s and 1970s, instead of the 2007 version for traffic sign specifications (Minister of Construction and Housing, 2007, general specification for roads and bridges, Minister of Construction and Housing). Most of the official guidelines and manuals in developed countries are updated continuously to include new instructions and engineering standards based on research, but this approach is generally missing in Iraq and the KRI specifically. For instance, neither HGDC nor GSRB has any guidelines or standard requirements for work zones (14).

Lack of pedestrian facilities in roadway design and land-use planning:

Pedestrian hazard is bigger when roadway land-use planning and design fail to the proposal provide facilities like adequate consideration or sidewalks for pedestrian access at intersections. Traffic control and highway facilities mechanisms that distinguish pedestrians from vehicles and allow walkers to cross streets without harm are vital mechanisms to guarantee the safety of pedestrians, accompanying motor vehicle rapidity and highway system control. These features, along with the planning and policy improvements that

provision the safety of pedestrians (19), Although the specified objective of the Highway Geometric Design Code (HGDC) of 2015 as the new version is "to make the construction in Iraq excellent in specifications and conditioning concerning planning, execution, supervision, and application," The code is unreachable to researchers, policymakers, engineers, planners, and concerned government universities and institutes in both KRI and Iraq. As a result of the lack of postal systems and covered banking, receiving and buying a copy of the code involves an individual going to Baghdad and paying cash. Without electronic versions of the code, making the code out of reach represents a main gap, which obstructs application and prevents unified standards from being developed. The standardization of guidelines for traffic signs and the geometry of the road may have an optimistic influence on refining traffic safety and mobility (14).

Sociodemographic characteristics:

After the war of 2003 in Iraq, the Kurdistan Region of Iraq (KRI) observed rapid economic development as reflected in an improved quantity of vehicles driving on the main highways, from 200-500/day in 2003 to 5,000-8,000/day in 2013. This fast motorization shared with reckless attitudes, mainly by young drivers, has created the highways "death roads," as labelled by the local population. A report illustrated that drivers are responsible for 65-77% of all road crashes. According to local traffic police, aggressive road behavior by young male drivers at the age of < 33 years old is one of the main reasons for injuries and fatalities (5). A study by medical students in Erbil identified several risky driving behaviors exhibited by younger drivers; these include speeding, failure to use seat belts and texting/calling while driving (13). These findings suggest that the behavior of drivers is the principal cause of accidents and that an effective street security education program is immediately necessary. Suggestions of studies found a strong relationship between road accidents and the risk of social status. Studies show that individuals with low social status are more often involved in crashes than individuals with high social status. Variables of social disparities in road accident risk include education, income, quality, and characteristics of a residential area, or any combination of these variables, although these data are not currently described for the crashes in the KRI (14).

Distraction:

Before the advent of cell phones and portable electronics, traffic distractions were often associated with distracted drivers who focused on stimuli and activities unrelated to the driver (for instance, watching traffic lights while driving or reading the newspaper). It is generally accepted that a person cannot drive safely unless they concentrate on driving and follow driving instructions. (Tapiro et al., 2020)20. Scopatz and Zhou (2016)21 reported that researchers defined distracted pedestrians as " those wearing headphones, talking on a cell phone, eating, drinking, smoking, or talking with another pedestrian as they crossed the street". Trained observers noted pedestrian behaviors at the crosswalk, including looking left and right, staying within the marked crosswalk, waiting on the curb until the signal indications turned green, and not entering the crosswalk after the pedestrian indication had switched to the orange pedestrian signal. In 2012 a hospital study from 2004-2010, showed that more than 1,500 pedestrians nationwide were treated in emergency rooms as a result of being injured while walking and engaged in cell phone conversations, which was more than twice the number reported in 2005, even though the total number of pedestrian injuries dropped during that period (Nasar and Troyer, 2013)22. However, underreporting of emergency room admissions due to distracted walking is likely, so the true number of pedestrian injuries attributable to cell phone conversation-related distractions is potentially much higher than 1,500 per year. Studies of pedestrian distraction have generally been accomplished on a small scale with limited support for broader generalisation to other populations and environments. For distracted pedestrians, there are very few studies that can quantify the effects of any single source of distraction on distraction in general and define any relationship with characteristics. Thus, there is a strong need to understand the relationship between pedestrian safety and the use of electronic devices among drivers and pedestrians to improve safety nationwide. This reiterates the importance of this research in determining the risk associated with distraction due to electronic devices among pedestrians and drivers (21). In Erbil, a household survey (Rashid and Ismail, 2022) it was found that nearly one-fourth of the

causes of RTAs were from distraction. In another hospital-based study in 2020 at Erbil Hospital the fourth reason for RTAs reported distraction and there was a significant association between injuries/deaths incidence and distraction (P<0.001), finally, a survey among 386 medical student drivers in Erbil reported that they had been always in distraction by 13.2% while driving (13) and more than one-third (35.9%) percentage was played loud music during driving, in our opinion the rate is more than this the reason that human nature is complex and as defense mechanism their denied or protect themselves from mistakes to commit the crime, even they done.

Age High-risk groups:

Children and Older adults are at higher risk of dying as pedestrians in an accident. Adults over age 65 make up one-fifth of all pedestrian accident deaths. Children under age five account for 20.4% of pedestrian accident deaths Because pedestrians do not have a vehicle or safety equipment to protect them from the impact of a motor vehicle, injuries in pedestrian accidents are often extremely severe (Bieber and Ramirez, 2023) (23), Even with all of these regulations, pedestrian fatalities continue to occur. While all pedestrians are at risk, the National Highway Traffic Safety Administration (Burnell, 2008) (24), finds that young boys between the ages of 5-9 years old are most likely to be involved in a pedestrian crash, while older people, though less likely to be hit, are more prone to suffer a fatality. The Highway Traffic Safety Administration (NHTSA) also finds that speeding contributes to about one-third of fatal crashes, and alcohol is involved in approximately forty per cent. With an estimated 70,000 pedestrians killed yearly worldwide in motor vehicle collisions, the importance of firm laws, proper signage, and careful attention is clear. According to a prospective hospital study conducted in Erbil city to assess the incidence of RTA for one year among 2225 victims about 40% of victims were young males (<19 years old), and 22.6% of them were pedestrians (17) and a prospective house-survey reported that among 675 victims of RTA in Erbil between 2017-2019 the pedestrian vulnerable was more than one-tenth ratio (9).

Crossing the street can be a highly challenging assignment for older pedestrians for many reasons. The challenge of deciding when it is safe to cross the street is receiving and interpreting visual and audio information within a certain period. This leads to a high demand for perception (seeing, and hearing) and data (like seeing, focusing, and accelerating). Both directions of the road must be checked, vehicles and their speed must be detected and processed, and pedestrians must predict when a vehicle has reached the intersection. Pedestrians should also provide the vehicle with an estimated time of arrival and travel speed to determine how far they are to safely road crossing. This visual and cognitive process decides whether to cross the street or to let the vehicle pass and wait for the next opportunity (25). In addition, the location display should be updated while crossing, and in case of a wrong decision, the cruising speed should be changed to the correct vehicle.

Behavior:

Historically, the aim of several studies around the globe focused on virtual reality settings (Dommès and Cavallo, 2011(26); Lobjois and Cavallo, 2009 (27); Jäger et al., 2015 (28); Lobjois R, Cavallo, 2007 (29). Virtual reality presents, primarily, the benefit of providing the participants with the sensation of engagement in the virtual environment and, consequently, a realistic involvement. Moreover, it is cost-effective, safe, and permits to use of consistent experimental situations, with powerful experimental control over the tasks. Conversely, virtual reality has definite difficulties. The participants have to submerge themselves in the simulated act, and it is not certain if the speed and reserves of vehicles are apparent in a similar approach as in the consistent real-life location. Eye-tracking is an additional tool frequently secondhand to calculate visual and cognitive abilities (25). To cross, it will be essential to achieve three fundamentals: the risks, the limited resources, and the costs. An analysis of the condition will therefore be well thought-out, the criterion for diagnosis discontinuing being the decision-making will be to select the suitable seconds when to cross. This procedure is grounded on the discovery of some features of the eye, like the shape of the pupil, that differ from the eye activities and that may be noticed by a camera. The direction of gaze is removed via image examination systems and then diagramed to arrive at the facts on the passage where the eye viewed the surrounding. Certainly, head and eye activities are a reliable and valid performance to evaluate visual discovery performance, and

deliver visions into the highway crossing judgment procedures (25). However, to the best of our information, no research has explored the visual exploration behavior of younger and older pedestrians during a street crossing task. Accepting awareness of individuals' safety in walking surroundings is significant in promoting pedestrian protection. People can select to prevent walking altogether in situations they observe too great a hazard of traffic injury or other dangers to individual safety. Pedestrians' insights of danger in the larger surroundings affect their highway use performance, including whether or not they choose to use pedestrian facilities and roads (19).

Strategies:

The team organizing from the ministries of higher education, health, education, and interior as well as related organizations, to work and evaluate periodically to increase awareness of the risks of traffic accidents, to change the knowledge, beliefs, and attitudes for enhanced understanding, practising and behaving when using the road as pedestrians and occupants. This can be accomplished by a safe community health education program (massive media coverage, direct interviews, social media, and posters) about traffic rules, risk factors, safety precautions, and first aid training in primary schools (crossing roads, road signs) and for novice drivers, particularly, and a training course on safety promotion measures such as seatbelts, helmets, children's front seats for ≤12 years, door locks, and careful parking.

Law enforcement by the government comprises speed enforcement, medical capability, blood inspection of alcohol concentration, inspection of riskier or older vehicles (tires, lighting, brakes), and licensing of driving tests. Prevention of violations when occupying a vehicle like eating, smoking, alcohol consumption, unnecessary talking, playing the radio, using mobile, marking danger points on roads, performing road improvement, and most importantly limiting speeds, by the formation of detachments, control points on external and internal highways, continuously and periodically, by the Traffic Police Directorate. Lastly, to decrease congestion, reduce the number of road traffic lights and change them to allow for road turns and tunnels. For registering a young age (<18) for a new license paper, a new approach must expenditure to reduce reckless driving, decrease over-speeding, and distraction of highway users by field experts (30,31).

A wide range of actual precautionary methods, and organized safety methods like affording emergency post-crash health care facilities, mainly during rush hours. Moreover, rehabilitation facilities are necessary to prevent permanent disability or handicapping, done by training rehabilitation centers and supporting them with courses for equipment and staff. Lastly, for accessible health facilities, it's essential to increase the number of emergency governmental hospitals in other geographical parts of Erbil.

More studies on greater samples in diverse portions of Iraq must be directed (32), to collect accurate data, counting risk factors, event chain, climate effects, highway situations, and the conditions of all mishaps, in addition to investigating new methodologies, to alter individual attitudes and modify environments for healthier RTA control suitable to world standards.

Conclusion:

Besides environmental and socioeconomic factors, mistakes such as destructive behavior (speed, recklessness, and carelessness) and distraction had a fundamental role in traffic accidents in the Kurdistan Region of Iraq (KRI), even though pedestrian-published articles are rare or absent for this purpose.

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