Epidemiologic analysis of pedestrian crashes in Türkiye

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Abstract

Background: Pedestrian crashes have become a major concern in Türkiye, accounting for 22% of traffic-related fatalities.

Aim: To examine the major risk factors increasing the fatality of pedestrian crashes in southern Türkiye.

Methods: We collected and analysed crash data for 2018–2023 in 3 cities along Türkiye's Mediterranean coast from the General Directorate of Security, and demographic data from the Turkish Statistical Institute. We used skewed logistic regression to identify major factors affecting the severity of pedestrian injuries. A total of 14 893 pedestrian crashes involving 15 116 injuries were included in the analysis.

Results: In total, 831 pedestrians were killed and 15 116 were injured. The main causes of the crashes were over-speeding (24%), failure to give way to pedestrians (14%) and pedestrians crossing the road carelessly (13%). Most crashes (96%) occurred in urban areas and male drivers were involved in 90% of the crashes. Fatality rate was higher among males than females. Fatality risk increased with pedestrian age and was higher in rural areas, at locations without street lighting, after midnight, and at ≥50 km/h speed.

Conclusion: Our findings show that over-speeding, poor lighting, large vehicles, as well as poor driver and pedestrian behaviours increased the risk of pedestrian fatalities. To improve pedestrian safety in Türkiye, speed limits should be enforced alongside better street lighting. Public awareness campaigns are needed to educate pedestrians and drivers about road safety, including special programmes for the elderly.

Keywords: pedestrian crash, pedestrian injury, pedestrian crossing, traffic safety, traffic crash, fatality risk, over-speeding, Türkiye

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Introduction

In modern life, walking is promoted as a healthy and sustainable mode of transportation, benefiting both physical and mental wellbeing (*1,2*). Regular walking is crucial for preventing chronic diseases such as obesity and cardiovascular disease, while also contributing to the strengthening of social bonds and the overall health of the community (*3,4*). However, urbanisation and increasing motor vehicle traffic have compromised pedestrian safety, because city planning often prioritizes vehicle movement over pedestrian-friendly infrastructure (*5*). The lack of safe walking spaces has resulted in an increase in pedestrian crashes, making pedestrian safety an increasing concern worldwide (*6*). Since pedestrians are more vulnerable in collisions, these crashes frequently result in severe injuries, disabilities or deaths (*7*).

Pedestrians constitute 21% of all traffic-related fatalities (*8*). They constitute 19% in the European Union and 18% in the highly motorised United States of America (*9,10*). The situation is better in Great Britain and Australia, where the rates are 15% and 12%, respectively (*11,12*). Pedestrian crashes cause injuries and fatalities as well as high economic costs, indicating the need for safer pedestrian infrastructure (*13*). Effective road safety strategies require an understanding of the key risk factors contributing to pedestrian crashes.

Türkiye, a middle-income country in the European Region, has a population of a little over 85 million, which is increasing at a rate of 1.1% per year (*14*). Traffic accident is one of the most important social and economic problems in the country. In 2023, there were around 1.3 million crashes, leading to 6548 deaths and more than 350 000 injuries. Pedestrians made up 22% of these deaths (*15*). In the last 10 years, the number of traffic crashes in Türkiye has been increasing steadily, partly due to the increasing rate of car ownership. Enhancing traffic safety and reducing the number of crashes is a primary objective of Türkiye's transportation policies. A significant action taken in this regard focuses on raising public awareness about pedestrian safety and reducing pedestrian crashes. The Ministry of Interior declared 2019 as the "Year of Pedestrian Priority" with the slogan "Priority is Life, Priority is Pedestrians". However, pedestrian crashes and related fatalities continue to increase. In 2023, there was a 14% increase in the number of pedestrians killed, compared to 2019 (*15*).

This study analysed pedestrian crashes in 3 major cities along the Mediterranean Coast of Türkiye between 2018 and 2023. It examined the distribution of pedestrian crashes and identified key risk factors influencing the severity of pedestrian injury. The findings provide valuable insights for improving pedestrian safety.

Methods

This study was conducted in 3 provinces located along the Mediterranean coastal strip in southern Türkiye: Antalya, Mersin and Adana. As of 2024, the combined population of these provinces was 6.9 million. On average, there were 0.20 cars per person in the provinces, which is almost the same with the national average of 0.19. In 2023, deaths due to pedestrian crashes accounted for 23% of all traffic-related deaths in these provinces, compared to the national average of 22%. Sixty-nine percent of the population in these provinces resides in urban areas, closely aligning with the national average of 68% (*14–16*). These figures indicate that the selected provinces are representative of Türkiye's broader traffic patterns and pedestrian crash characteristics, while also reflecting specific regional characteristics that make them relevant for studying pedestrian crashes.

We used data on 15 144 pedestrian crashes from Antalya, Mersin and Adana from the General Directorate of Security (GDS) for 2018–2023, which contains detailed information about each reported pedestrian crash. To ensure the quality and consistency of the dataset, we applied a series of basic data cleaning procedures prior to analysis. These included plausibility checks (e.g. verifying that pedestrian and driver age values were within realistic ranges), the removal of incomplete or inconsistent records (e.g. cases with missing crash location, time or land use), and the verification of variable coding to ensure compatibility with the modelling framework. After these exclusions, 14 893 pedestrian crashes, involving 15 947 pedestrians, were included in the analysis. Some incidents involved more than one pedestrian.

The data obtained did not include any personal information such as names, surnames or other identifiable details, ensuring confidentiality and anonymity of the dataset. Obtained variables included pedestrian and driver characteristics (gender, age, injury severity), road characteristics (road system, road type), crash characteristics (date, time, vehicles, location), driving behaviour (speeding), and environmental conditions. The GDS uses 30-day post-crash data to describe the injury classification of each pedestrian as injured or killed.

To better understand the patterns of pedestrian crashes, various crash attributes were examined. Pedestrian crash and fatality frequencies were analysed by age group and gender, while crash and fatality rates per 100 000 population were calculated using demographic data from the Turkish Statistical Institute (TurkStat). Additionally, the temporal distribution of pedestrian crashes and fatalities was investigated at different hours of the day and months of the year.

Significant factors affecting the severity of pedestrian injuries (injured or killed) were identified. Typically, binary logistic regression is used when the dependent variable has 2 classes. However, when these classes have an asymmetrical distribution (e.g. 95% injured and 5%, as shown in Table 1), binary logistic regression may produce biased estimates of marginal effects. Skewed logistic regression overcomes this problem and was therefore used in this study:

$$Y_i = \mu + \beta X_i \quad (1)$$

where Xi represents a vector of explanatory variables for person i, β represents a vector of parameters to be estimated and μ represents a random disturbance term which has a Burr-10 distribution (*17*). The findings from both the descriptive analyses of crash patterns and the skewed logistic regression model are discussed in detail in the next section.

Results

Crash and fatality patterns

In total, 831 pedestrians were killed and 15 116 were injured (Table 1). The main causes of fatal crashes included over-speeding (24%), failure to yield to pedestrians (14%) and pedestrians crossing carelessly (13%). Most crashes (96%) occurred in urban areas and male drivers were involved in 90% of the crashes, highlighting a significant gender disparity in driver-related pedestrian crashes (Table 1).

Males accounted for 52% of pedestrians involved in the crashes and the median age was 30 years. Among them, 37% were ≤19 years while 20% were ≥60. Fatality rates remained low among younger pedestrians and increased sharply with age (Figure 1). Among seniors aged ≥60 years, 6.9 pedestrians per 100 000 population died in the crashes. This figure increased to 10 for the 70–79 years age group and 13.1 for pedestrians aged ≥80, indicating a substantial increase in fatality risk with age. The probability of being killed increased gradually across age groups. On average, 1 in every 19 pedestrians involved in a crash was killed. Among younger pedestrians (0–19 years old), this ratio was one in 46, while for adults (20–39 years), it was 1 in 26. The fatality likelihood was 1 in 18 for middle-aged pedestrians (40–59 years), and 1 in 8 for seniors aged ≥60 years, confirming that older pedestrians face a disproportionately higher fatality risk.

There were significant differences between male and female pedestrians. Although men and women were equally involved in the crashes, the men had higher fatality rates in every age group. The difference was more pronounced among older pedestrians, where more male than female pedestrians were likely to be killed in the crashes.

Figure 2 shows the monthly distribution of pedestrian crashes and the percentage of fatalities for each year. The number of crashes remained relatively stable throughout the year, but there were seasonal variations. Crashes were more frequent during the spring and fall months and lower during winter, particularly in January and February. The percentage fatality among involved pedestrians generally peaked during late summer and fall, with variations across years. The lowest percentages were typically observed during winter, especially in February.

Table 1 **Pedestrian crashes in southern Türkiye, 2018–2023 (*continued*)**

Variables	Levels	Frequency	
		n	%
Pedestrian			
Severity	Injured	15 116	94.8
	Killed	831	5.2
Gender	Female	7591	47.6
	Male	8356	52.4
Age (years)	<18	5318	33.4
	18–24	1669	10.5
	25–54	4964	31.1
	55–64	1,566	9.8
	≥65	2430	15.2
Pedestrian at fault	Yes	8947	56.1
	No	7000	43.9
Driver			
Gender	Female	1901	12.8
	Male	12,992	87.2
Age (years)	<18	1258	8.4
	18–24	2740	18.4
	25–64	10 201	68.5
	≥65	694	4.7
Driver at-fault	Yes	7089	47.6
	No	7804	52.4
Over-speeding	Yes	3598	24.2
	No	11 295	75.8
Temporal			
Time	12 am–6 am	418	2.8
	6 am–12 am	2892	19.4
	12 pm–6 pm	7364	49.4
	6 pm–12 pm	4219	28.3
Season	Spring	3886	26.1
	Summer	3669	24.6
	Fall	4051	27.2
	Winter	3287	22.1
Crash			
Intersection	Yes	7636	51.3
	No	7257	48.7
Crossing	Yes	1817	12.2
	No	13 076	87.8
Speed limit (km/h)	≤30	797	5.4
	31–50	10 182	68.4
	51–70	3239	21.7
	71–90	268	1.8
	91–110	340	2.3
	>110	67	0.4
Vehicle	Bicycle/Scooter	745	5.0
	Bus	991	6.7
	Motorcycle	2269	15.2
	Pick Up/Truck	3033	20.4
	Automobile	7855	52.7

Table 1 Pedestrian crashes in southern Türkiye, 2018–2023 (*concluded*)

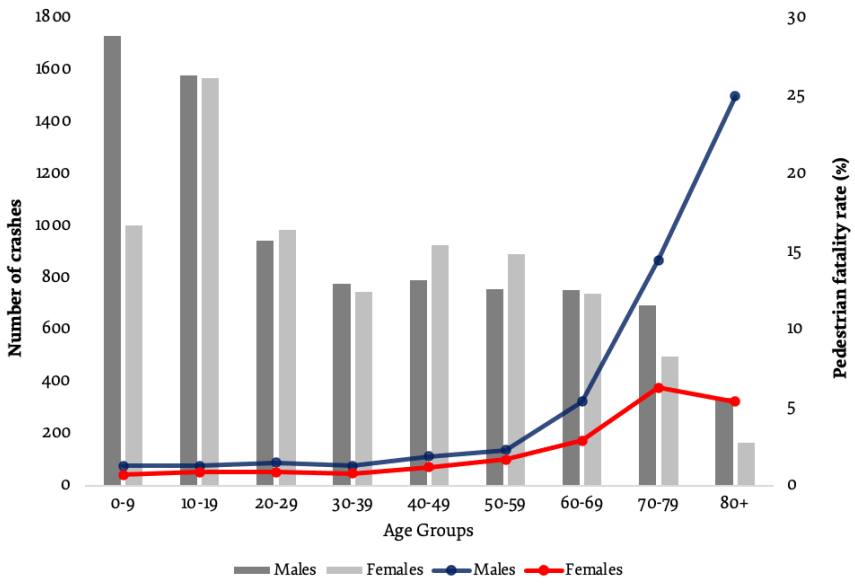
Variables	Levels	Frequency	
		n	%
Environmental			
Land use	Urban	14 326	96.2
	Rural	567	3.8
Streetlight	Yes	10 701	71.9
	No	4192	28.1
Weather	Clear	13 408	90.0
	Foggy	450	3.0
	Rainy	1 035	6.9
Light condition	Daylight	9881	66.3
	Dark	4569	30.7
	Twilight	443	3.0
Road surface	Dry	13 513	90.7
	Wet	1 380	9.3

Figure 3 presents the hourly and monthly distribution of pedestrian crashes and fatalities. Crashes were highly concentrated between 12 pm and 6 pm, accounting for 50% of all crashes, with a peak between 4 pm and 5 pm. However, fatal pedestrian crashes were more frequent between 6 pm and 10 pm, making up 40% of all fatalities. This suggests that although most crashes happened during the day, crashes occurring in the evening were more likely to be fatal. The seasonal pattern also varied. During fall and winter, most fatalities occurred between 6 pm and 10 pm, while during summer, the peak shifted between 9 pm and 12 am.

Modelling results

Table 2 presents the results of the skewed logistic regression, identifying significant factors affecting the severity of pedestrian injuries. Variables that were not statistically significant at the 5% level were excluded. The analysis confirmed that pedestrian gender and age, pedestrian fault in the crash, over-speeding, vehicle type, land use, lighting, and crash time significantly impacted the risk of fatality. Other parameters listed in Table 1, such as driver gender and age, driver fault in the crash, crash season, whether the crash occurred at an intersection or a pedestrian crossing, as well as weather, light and road surface conditions at the time of the crash

Figure 1 Age and gender distribution of pedestrians involved in crashes and fatality rates per 100 000 population, 2018–2023



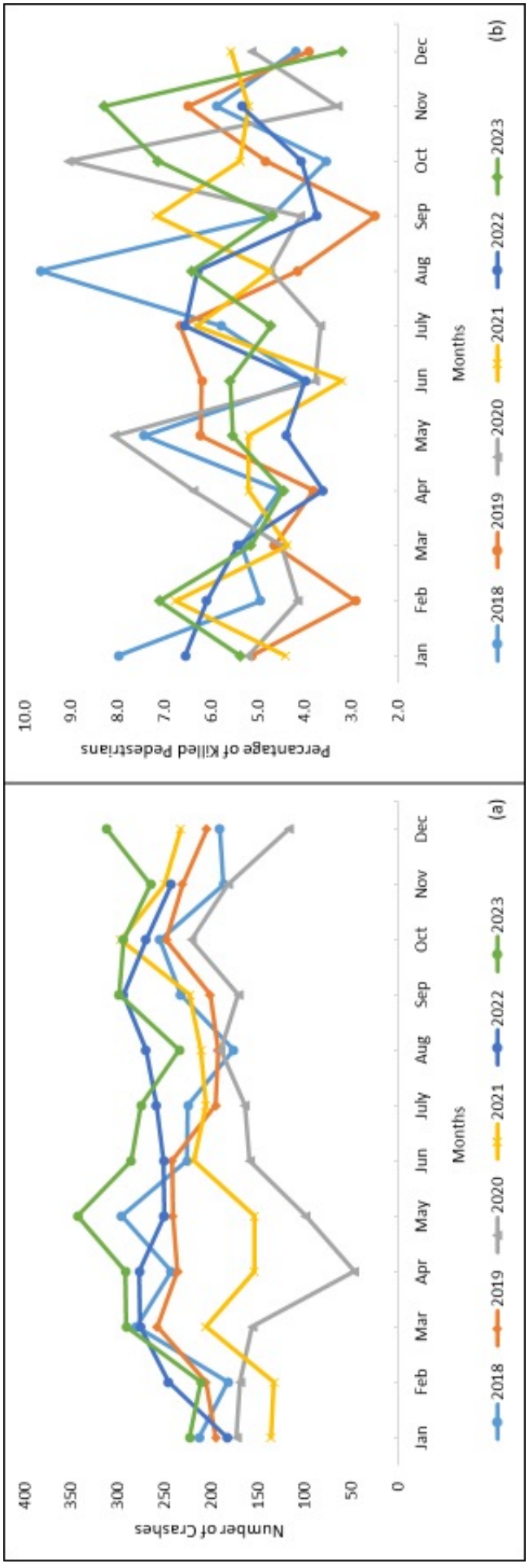


Figure 2 Monthly variation in pedestrian crash frequency and percentage of fatalities, 2018–2023

were not found to have significant effects on the severity of injuries.

The gender and age effects align with previous findings. Men were 1.24 times more likely to be killed in a crash than women (OR = 1/0.807). Compared to the 25–54-year age group, pedestrians aged <18 years had a lower risk of fatality, while those aged 55–64 and ≥65 years faced significantly higher risks. Specifically, pedestrians aged ≥65 years were 4.110 times more likely to be killed than those aged 25–54 years. Pedestrian faults in crashes increased the risk of fatality by 1.4 times compared to cases where pedestrians were not at fault.

Speed limit was a major determinant of fatality risk. There was no significant difference in pedestrian fatality risk between speed limits below 30 km/h and between 30 and 50 km/h. However, speed limits of 50 km/h more than doubled the risk of pedestrian fatality, while the likelihood of fatality was more than 6 times higher at speed limits of 110 km/h. Over-speeding increased the risk of pedestrian fatality by 2.251 times.

Vehicle type played a significant role in the crashes. Pedestrians hit by bicycles, scooters or motorcycles were significantly less likely to be killed than those hit by cars. In contrast, being hit by a pickup, truck, or a bus dramatically increased the risk of being killed. For example, pedestrians hit by bicycles or scooters were 8.265 times less likely to be killed than those hit by a car (OR = 1/0.121).

Environmental and land use factors were also critical. Crashes occurring in rural areas were 2.429 times more likely to result in fatalities than those in urban areas. Locations without street lighting increased the likelihood of a pedestrian being killed by 1.5 times (OR = 1/0.667). The likelihood of a fatal injury was higher during all time periods than in the afternoon (12 pm–6 pm). The highest increase was observed after midnight, when the risk increased 3.712 times.

Discussion

This study provides a comprehensive analysis of pedestrian crashes in 3 major cities along Türkiye's Mediterranean coast between 2018 and 2023. The findings highlight key risk factors influencing pedestrian fatality, including pedestrian age and gender, vehicle type, speed limits, land use, lighting conditions, and crash time. These results offer critical insights into pedestrian safety and contribute to a broader understanding of pedestrian crash patterns.

Figure 3 **Hourly and monthly distribution of pedestrian crashes (a) and fatalities (b), 2018–2023.**

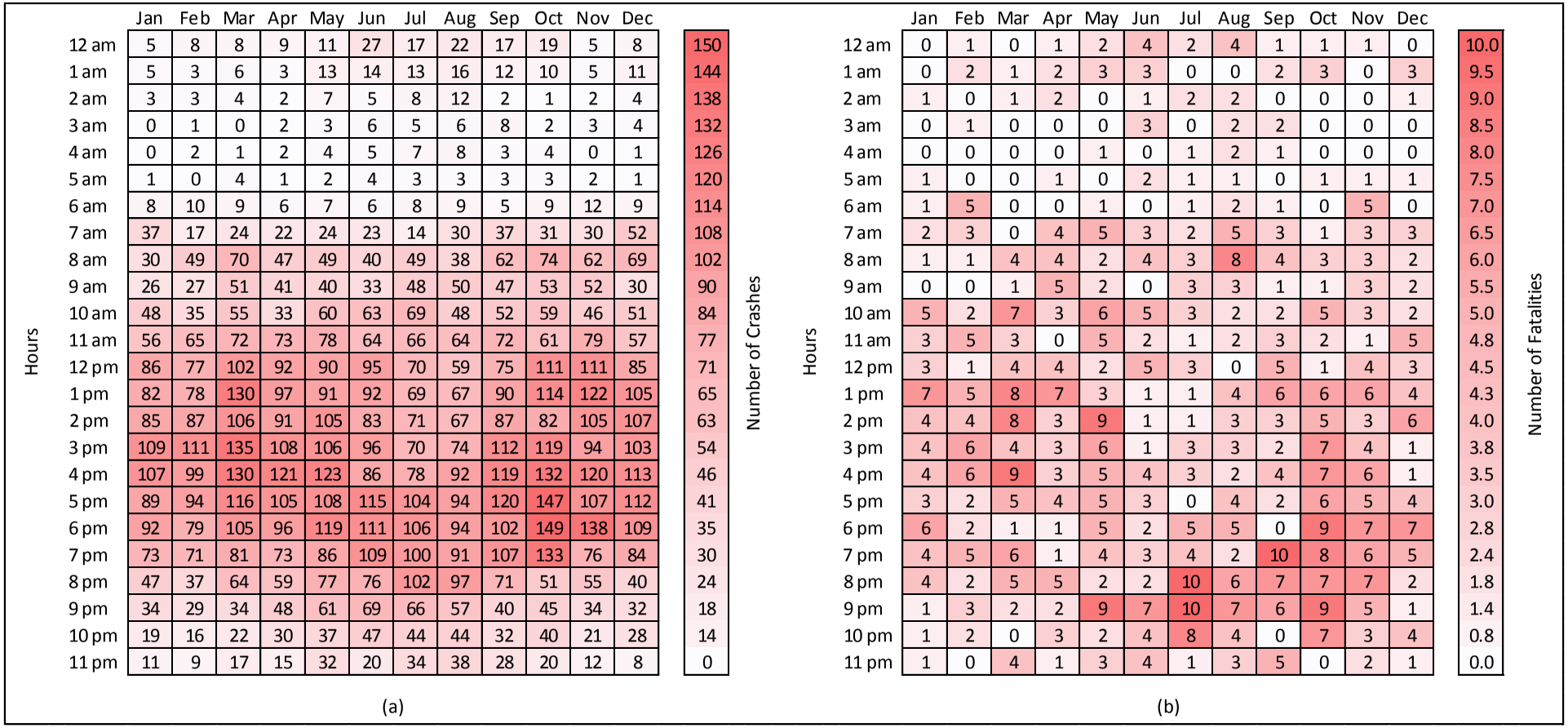


Table 2 Estimated coefficients and odds ratios from the skewed logistic regression model on severity of pedestrian injuries

Variables	Classes	Coeff.	SE	Sig.	OR
Pedestrian					
Gender					
	Male*				
	Female	-0.215	0.080	0.007	0.807
Age					
	25–54*				
	<18	-0.480	0.124	0.000	0.619
	55-64	0.641	0.125	0.000	1.899
	65+	1.413	0.099	0.000	4.110
Pedestrian fault					
	No*				
	Yes	0.337	0.080	0.000	1.400
Driver					
Over-speeding					
	No*				
	Yes	0.811	0.102	0.000	2.251
Crash					
Speed limit (km/hour)					
	≤30*				
	51–70	0.786	0.197	0.000	2.194
	71–90	1.138	0.298	0.000	3.121
	91–110	0.778	0.291	0.007	2.178
	>110	1.828	0.341	0.000	6.222
Vehicle					
	Automobile*				
	Bicycle/Scooter	-2.110	0.506	0.000	0.121
	Motorcycle	-0.563	0.139	0.000	0.570
	Pick Up/Truck	0.368	0.090	0.000	1.445
	Bus	0.584	0.131	0.000	1.793
Environmental					
Land use					
	Urban*				
	Rural	0.888	0.191	0.000	2.429
Streetlight					
	No*				
	Yes	-0.405	0.083	0.000	0.667
Temporal					
Time					
	12 pm–6 pm*				
	6 am–12 am	0.235	0.102	0.021	1.264
	6 pm–12 pm	0.579	0.092	0.000	1.784
	12 am–6 am	1.312	0.164	0.000	3.712
Observations			15.947		
Degrees of freedom			22		
Log-likelihood			5483.153		
Constant			-3.914 (P = 0.000 < 0.05)		

**Base category; SE = standard error; OR = odds ratio*

Most pedestrian crashes occurred in urban areas, where pedestrian activity is higher. In this study, 96% of crashes happened in urban regions, similar to reports from the United States of America, where most pedestrian deaths occur in cities. However, in the European Union, only about half of pedestrian deaths happen in urban areas, suggesting a different urban-rural distribution (*9*,*11*). Although fewer crashes happened in rural areas, the risk of fatality was higher. Studies suggest that this is due to higher vehicle speeds and longer emergency response time in rural locations (*18*). These findings indicate that although urban areas require better pedestrian safety measures due to higher exposure, rural roads demand stricter speed control and improved emergency response systems to reduce the risk of fatality.

Pedestrian age was a key factor for fatality risk. Although younger pedestrians were involved in more crashes, they were less likely to be killed. In contrast, older pedestrians, especially those aged ≥65, faced a higher risk of fatality. This pattern has been observed in different

countries, showing that aging increases vulnerability in traffic crashes. A study in California found that younger individuals were more frequently involved in crashes (*19*), while studies in Ethiopia (*20*) and the United States of America (*21*) confirmed that injury severity increases with age. The higher fatality risk among older pedestrians can be attributed to their slower movement, weaker physical resistance and reduced ability to evaluate crash risk. These results highlight the need for age-friendly infrastructure, such as longer pedestrian crossing time at traffic lights and improved visibility at intersections, to better protect elderly pedestrians.

Gender differences were also evident, with male pedestrians being more likely to be killed in crashes than female pedestrians. This finding may be because men take more risks when crossing the streets, while women are more cautious. However, the relationship between gender and pedestrian fatality risk is not consistent across different regions. For example, researchers in Hong Kong and South Korea found that female pedestrians had a higher fatality risk (*22*,*23*). These differences suggest that pedestrian behaviour, cultural factors and road infrastructure influence safety outcomes.

Our modelling results showed that pedestrians being at fault increased the likelihood of fatality, similar to a study in China (*24*). On the other hand, only driver fault did not significantly affect pedestrian fatality risk, however, over-speeding increased the severity of pedestrian injuries. Speed limits above 50 km/h were associated with a higher probability of pedestrian fatalities. Given that 96% of crashes occurred in urban areas, speed limit in cities is crucial for pedestrian safety. Numerous studies have reported the impact of speed on the severity of pedestrian crashes, therefore, reducing speed limits in pedestrian-dense areas is widely recommended (*25*).

Driver age was not found to be a significant factor in this study. However, it should be noted that the legal age to obtain a driver's license in Türkiye is 18. Research in other countries has indicated that driver age can influence the outcomes of pedestrian crashes (*26*,*27*).

Vehicle type was an important factor in fatality risk. Pedestrians hit by larger vehicles were more likely to suffer severe injuries or be killed. Studies have shown that SUVs, pickups and heavy-duty vehicles constitute more danger for pedestrians and cyclists because of their height, weight and hard front-end design (*28*). Although these vehicles are riskier, more people prefer using them, and SUV sales are breaking records worldwide every year (*29*). In 2024, SUVs made up more than half of all car sales in Türkiye, which could make pedestrian safety a bigger problem in the future (*30*). One issue in Türkiye is that SUVs are recorded as regular passenger cars in crash reports, which makes it difficult to study their exact effect on pedestrian safety. A better classification system could help experts understand how different vehicles affect pedestrian injuries and deaths.

Crashes that occurred in areas without street lighting were associated with a higher risk of pedestrian fatality. This finding is supported by earlier studies. Ferenchak et al (*31*) found that pedestrians in unlit areas were 2.4 times more likely to suffer fatal injuries. In our study, the highest fatality risk was observed between 12 am and 6 am, which matches reports from China showing that severe pedestrian injuries were most common during the early morning hours (*32*). This higher risk may be due to poor visibility, lower driver alertness and reduced pedestrian awareness at night. For this reason, improving street lighting in dangerous areas should be a priority for city planners. Better lighting can help pedestrians see clearly and make it easier for drivers to notice them, which may reduce fatal crashes. In contrast, the lowest fatality risk was recorded between 12 pm and 6 pm, similar to a report from Ohio (*26*), where crashes between 10 am and 4 pm showed lower injury severity.

Conclusion

Pedestrian crashes are a serious issue worldwide, but most of the available research studies on the issue focus on high-income countries. This is mainly because these countries have better crash reporting and more detailed data systems. Pedestrian crash risks and factors influencing them may be different in middle-income countries because of the differences in infrastructure, law enforcement and road user behaviours. Understanding these differences is important for developing effective safety policies. The findings of this study show that speeding, poor lighting and large vehicles increase the risk of pedestrian fatalities. To improve pedestrian safety, lower speed limits should be enforced in urban areas, especially in places with high pedestrian activities. Strict enforcement of speed limits can also help reduce the number of crashes. Better street lighting is needed, particularly at crosswalks and high-risk areas, to improve visibility at night. Since older pedestrians are more at risk, local transport authorities should consider longer crossing time at traffic lights and safer intersections. Public awareness campaigns can help educate pedestrians and drivers about road safety. Large vehicles like SUVs and pickups are more dangerous for pedestrians, so promoting the use of smaller, safer vehicles and improving vehicle design could help prevent severe injuries.

The findings of this study would be useful to the General Directorate of Security and other relevant agencies in in Türkiye in identifying high-risk periods and in developing targeted interventions. More research on pedestrian crashes is needed, especially in middle-income countries, to develop better policies and interventions. Future studies should explore the interaction between crash timing, monthly trends, and rural-urban differences in pedestrian crashes, to support more targeted and more effective safety strategies.

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Competing interests: None declared.

Analyse épidémiologique des accidents de piétons en Türkiye

Résumé

Contexte : Les accidents de piétons sont devenus une préoccupation majeure en Türkiye, représentant 22 % des décès liés à la circulation.

Objectif : Examiner les principaux facteurs de risque augmentant la mortalité liée aux accidents de piétons dans le sud de la Türkiye.

Méthodes : Nous avons recueilli et analysé des données sur les accidents survenus entre 2018 et 2023 dans trois villes situées le long de la côte méditerranéenne de Türkiye obtenues auprès de la Direction générale de la sécurité, ainsi que des données démographiques de l'Institut turc de la statistique. Nous avons utilisé une régression logistique prenant en compte des données déséquilibrées afin d'identifier les principaux facteurs influençant la gravité des blessures des piétons. L'analyse a porté sur 14 893 accidents de piétons impliquant 15 116 blessés.

Résultats : Au total, 831 piétons ont été tués et 15 116 blessés. Parmi les principales causes des accidents figurent la vitesse excessive (24 %), le non-respect de la priorité aux piétons (14 %) et la traversée imprudente des piétons (13 %). La plupart des accidents (96 %) se sont produits en milieu urbain, et les conducteurs masculins étaient impliqués dans 90 % des cas. Le taux de mortalité était plus élevé chez les hommes que chez les femmes. Le risque de décès augmentait avec l'âge des piétons et était plus élevé en milieu rural, sur des sites dépourvus d'éclairage, après minuit et à des vitesses supérieures ou égales à 50 km/h.

Conclusion : Nos résultats indiquent que la vitesse excessive, l'éclairage insuffisant, les véhicules volumineux, ainsi que les comportements inadéquats des conducteurs et des piétons, augmentent le risque de décès des piétons. Pour renforcer la sécurité des piétons en Türkiye, il convient de faire respecter les limitations de vitesse et d'améliorer l'éclairage public. Des campagnes de sensibilisation sont nécessaires pour informer les piétons et les conducteurs sur la sécurité routière, y compris des programmes spécifiques pour les personnes âgées.

تحليل وبائي لحوادث التصادم مع المشاة في تركيا

مراد أوزين، نهاد كان كارابولوت

الخلاصة

الخلفية: أصبحت حوادث التصادم مع المشاة مصدر قلق بالغ في تركيا، إذ تتسبب في ٪22 من الوفيات الناجمة عن حوادث المرور.

الأهداف: هدفت هذه الدراسة الى دراسة عوامل الخطر الرئيسية التي تزيد الوفيات الناجمة على حوادث التصادم مع المشاة في جنوب تركيا.

طرق البحث: جمعنا وحللنا بيانات من مديرية الأمن العام عن التصادمات التي وقعت في المدة من عام 2018 إلى عام 2023 في 3 مدن على طول ساحل تركيا على البحر الأبيض المتوسط، وبيانات سكانية من معهد الإحصاء التركي. واستخدمنا انحدارًا لوجستيًّا مائلاً لتحديد العوامل الرئيسية التي تؤثر في شدة إصابات المشاة. وشمل التحليلُ ما مجموعه 14893 حادث تصادم مع المشاة، وقد أسفرت تلك الحوادث عن 15116 إصابة.

النتائج: بلغ إجمالي عدد الوفيات من المشاة 831، وبلغ إجمالي عدد المصابين 15116. وكانت الأسباب الرئيسية للتصادمات هي تجاوز السرعة (٪24)، وعدم إفساح الطريق للمشاة (٪14)، وعبور المشاة للطريق باستهتار (٪13). ووقعت معظم التصادمات (٪96) في المناطق الحضرية، وكان السائقون من الذكور في ٪90 من التصادمات. وكان معدل الوفيات أعلى بين الذكور منه بين الإناث. وكانت احتمالية الوفاة تزيد مع تقدم المشاة في السن، كما كانت أعلى في المناطق الريفية، وفي المواقع التي تخلو شوارعها من إضاءة، وبعد منتصف الليل، وعند بلوغ السرعة 50 كم/ ساعة أو أعلى.

الاستنتاجات: تشير نتائجنا إلى أن تجاوز السرعة، وسوء الإضاءة، وكبر حجم المركبات، فضلاً عن السلوكيات السيئة للسائقين والمشاة، تزيد خطرَ تعرُّض المشاة للوفاة. ولزيادة الحفاظ على سلامة المشاة في تركيا، يجب تطبيق حدود السرعة، إلى جانب تحسين إنارة الشوارع. ويلزم تنفيذ حملات توعية عامة لتثقيف المشاة والسائقين بشأن السلامة على الطرق، ومنها برامج خاصة للمسنين.

References

1. World Health Organization. Global action plan on physical activity 2018-2030: More active people for a healthier world. Geneva: World Health Organization, 2018. https://www.who.int/publications/i/item/9789241514187
2. Useche SA, Llamazares FJ, Marin C. Good for the planet... and for you too? Comparing five travel and health-related outcomes among active, motorized, and public transport commuters. J Transp Health 2024;38:101893. doi: 10.1016/j.jth.2024.101893.
3. Lee IM, Buchner DM. The importance of walking to public health. Med Sci Sports Exercise 2008;40(7):512-518. doi: 10.1249/MSS.0b013e31817c65d0.
4. Friedman A. The Sustainable Digital City. Springer Nature; 2023:202. doi: 10.1007/978-3-031-25488-8.

5. World Health Organization. Pedestrian safety: A road safety manual for decision-makers and practitioners. Genevra: World Health Organization, 2023. https://www.who.int/publications/i/item/9789240072497.
6. Abou-Senna H, Radwan E, Mohamed A. Investigating the correlation between sidewalks and pedestrian safety. Accid Anal Prev. 2022;166:106548. doi: 10.1016/j.aap.2021.106548.
7. Niebuhr T, Junge M, Rosen E. Pedestrian injury risk and the effect of age. Accid Anal Prev. 2016;86:121-128. doi: 10.1016/j.aap.2015.10.026.
8. World Health Organization. Global status report on road safety 2023. Genevra: World Health Organization, 2023. https://www.who.int/teams/safety-and-mobility/global-status-report-on-road-safety-2023.
9. European Commission. Facts and figures: Pedestrians. European road safety observatory. Brussels: European Commission, Directorate General for Transport, 2021. https://road-safety.transport.ec.europa.eu/system/files/FF_pedestrians_20220209.pdf
10. National Highway Traffic Safety Administration. Traffic safety facts 2022 Data: Pedestrians. National Center for Statistics and Analysis. New Jersey: National Highway Traffic Safety Administration. https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813590.
11. Department for Transport. Reported road casualties in Great Britain: Pedestrian factsheet 2022. Department for Transport, 2022. https://www.gov.uk/government/statistics/great-britain-pedestrian-factsheet-2022.
12. National Road Safety Strategy. Fact sheet: Vulnerable road users. National Road Safety Strategy, n.d. https://www.roadsafety.gov.au/nrss/fact-sheets/vulnerable-road-users
13. Zhang G, Yau KK, Zhang X. Analyzing fault and severity in pedestrian–motor vehicle accidents in China. Accid Anal Prev 2014;73:141-150. doi: 10.1016/j.aap.2014.08.018.
14. Turkish Statistical Institute. Population and demography. Istanbul: Turkish Statistical Institute, 2023. https://data.tuik.gov.tr/Kategori/GetKategori?p=nufus-ve-demografi-109&dil=2.
15. Turkish Statistical Institute. Road traffic accidents. Istanbul: Turkish Statistical Institute, 2023. https://data.tuik.gov.tr/Bulten/Index?p=Road-Traffic-Accident-Statistics-2023-53479.
16. Turkish Statistical Institute. Road Motor Vehicles. Istanbul: Turkish Statistical Institute, 2023. https://data.tuik.gov.tr/Bulten/Index?p=Motorlu-Kara-Tasitlari-Aralik-2024-53463.
17. Tay R. Comparison of the binary logistic and skewed logistic (Scobit) models of injury severity in motor vehicle collisions. Accid Anal Prev. 2016;88:52-55. doi: 10.1016/j.aap.2015.12.009.
18. Pour-Rouholamin M, Zhou H. Investigating the risk factors associated with pedestrian injury severity in Illinois. J Safety Res. 2016;57:9-17. doi: 10.1016/j.jsr.2016.03.004.
19. Schneider RJ, Diogenes MC, Arnold LS, Attaset V, Griswold J, Ragland DR. Association between roadway intersection characteristics and pedestrian crash risk in Alameda County California. Transp Res Record 2010;2198:41-51. doi: 10.3141/2198-06.
20. Tulu GS, Washington S, Haque MM, King MJ. Injury severity of pedestrians involved in road traffic crashes in Addis Ababa, Ethiopia. J Transp Safety & Sec. 2017;9:47-66. doi: 10.1080/19439962.2016.1199622.
21. Sun M, Sun X, Shan D. Pedestrian crash analysis with latent class clustering method. Accid Anal Prev 2019;124:50-57. doi: 10.1016/j.aap.2018.12.016.
22. Tay R, Choi J, Kattan L, Khan A. A multinomial logit model of pedestrian–vehicle crash severity. Inter J Sust Transp. 2011;5:233-249. doi: 10.1080/15568318.2010.497547.
23. Sze NN, Wong SC. Diagnostic analysis of the logistic model for pedestrian injury severity in traffic crashes. Accid Anal Prev 2017;39:1267-1278. doi: 10.1016/j.aap.2007.03.017.
24. Zhang G, Yau KK, Zhang X. Analyzing fault and severity in pedestrian–motor vehicle accidents in China. Accid Anal Prev 2014;73:141-150. doi: 10.1016/j.aap.2014.08.018.
25. Hussain Q, Feng H, Grzebieta R, Brijs T, Olivier J. The relationship between impact speed and the probability of pedestrian fatality during a vehicle-pedestrian crash: A systematic review and meta-analysis. Accid Anal Prev 2019;129:241-249. doi: 10.1016/j.aap.2019.05.033.
26. Uddin M, Ahmed F. Pedestrian injury severity analysis in motor vehicle crashes in Ohio. Safety 2018;4:20-30. doi: 10.3390/safety4020020.
27. Saha B, Fatmi, MR, Rahman MM. Pedestrian injury severity in Dhaka, Bangladesh: a latent segmentation-based logit modeling approach. Transp Dev Econ. 2021;7:1-11. doi: 10.1007/s40890-021-00132-5.
28. Hu W, Monfort SS, Cicchino JB. The association between passenger-vehicle front-end profiles and pedestrian injury severity in motor vehicle crashes. J Safety Res 2024;90: 115-127. doi: 10.1016/j.jsr.2024.06.007.
29. Laura Cozzi. International Energy Agency, 28 May 2024. https://www.iea.org/commentaries/suvs-are-setting-new-sales-records-each-year-and-so-are-their-emissions.
30. Ali Canberk Özbuğutu. Anadolu Ajansı, 3 Decmber 2024. https://www.aa.com.tr/tr/ekonomi/otomotiv-satislari.
31. Ferenchak NN, Gutierrez RE, Singleton PA. Shedding light on the pedestrian safety crisis: An analysis across the injury severity spectrum by lighting condition. Traffic Inj Prev. 2022;23:434-439. doi: 10.1080/15389588.2022.2100362.
32. Xue G, Wen H. Pedestrian-injury severity analysis in pedestrian-vehicle crashes with familiar and unfamiliar drivers. Transportmetrica A: Transp Sci. 2024;20(1):2120784. doi: 10.1080/23249935.2022.2120784