



# Investigation of Death Rate due to Type 2 Traffic Accidents and Non-Traffic Accidents in Iran during 2013-2018

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## Abstract

**Background:** In the classification of road accidents, type 2 traffic accidents and non-traffic accidents are not considered and in Iran so far no special study has been done in the field of type 2 traffic accidents and non-traffic accidents, so we aimed to investigate the incidence of type 2 traffic accidents and non-traffic accidents in Iran.

**Methods:** This cross-sectional was conducted on all individuals referred to Forensic Medicine Organization (FMO) from all over Iran who suffered from non-traffic accidents and type 2 traffic accidents during 2013-2018. Demographic information, accident information and other information including the location of the impact, the final cause of death and the date of the accident were examined. The information received from the FMO was first checked and then analyzed using Stata 11 statistical software.

**Results:** During the 6-year study period, 10882 people lost their lives in type 2 traffic accidents (4779 people) and non-traffic accidents (5287 people). In terms of age, the highest incidence of type 2 traffic accidents and non-traffic accidents was observed in the age group over 65 years. The incidence of type 2 traffic accidents has not been increasing, while the trend of non-traffic accidents has been increasing.

**Conclusion:** With respect to the high rate of deaths due to traffic accidents, including type 2 traffic accidents and non-traffic accidents, it is necessary for the national media and relevant agencies to educate the people about first aid and also inform about free relief services, timely presence is important.

**Keywords:** Traffic; Accidents; Non-traffic accidents; Iran

## Introduction

The increase in various accidents and injuries is one of the most important threats to human life in different regions and countries, which causes the death of more than 6 million people annually in the world (1). Among these, traffic accidents are one of the most common accidents that an-

nually cause death of approximately 1.35 million people and injuries of 20-50 million people in the world (1, 2). According to the WHO in 2020, the costs of traffic accidents in most countries account for 3% of GDP (2). Traffic accidents are



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the leading cause of death for children and young adults between the ages of 5 and 29 (3).

Approximately, 93% of the world's road casualties occur in low- and middle-income countries, while they account for approximately 60% of the world's vehicles (2). The Eastern Mediterranean region has the second highest number of deaths due to traffic accidents in the world and Iran has the highest rate of traffic accidents among the countries in this region (3).

According to the Forensic Medicine Organization (FMO), the death rate due to traffic accidents in Iran per 100,000 population in 2015 and 2016 was 32.6 and 25.6, respectively. In addition, in Iran, 500 people per day are injured due to traffic accidents (4). In general, traffic accidents are the second leading cause of death in terms of number of victims, after cardiovascular diseases, and more than one third of hospital beds are allocated to the victims of these accidents (5). First, in terms of the number of years lost due to premature death in the country (6).

Due to the high rate of deaths due to traffic accidents in Iran and also that in the classification of road accidents, type 2 traffic accidents and non-traffic accidents are not included, but because a vehicle was involved in the occurrence of these accidents on public or private roads. It is important to review the statistics, events and trends. By conducting research and investigation in these cases, it is possible to suggest corrective and control measures to reduce these accidents, not mentioned in the traffic accident statistics. No specific study has been conducted in Iran in the field of type 2 traffic accidents and non-traffic accidents, and as far as we know, no article has been published in this field, which raises the importance of the present study shows the events in Iran in recent years.

We aimed to investigate the incidence of type 2 traffic accidents and non-traffic accidents in Iran.

## Materials and Methods

The present cross-sectional study was performed on all individuals referred to FMO from all over

Iran who suffered from non-traffic accidents and type 2 traffic accidents during 2013-2018. The study was approved by Ethics Committee of the local organization (IR.SBMU.RETECH.REC.1398.361).

All people who had an accident in any place other than the public roads of the country were classified in the group of non-traffic accidents, which include three categories: non-traffic accidents 1: including work accidents, non-traffic accidents 2: the location of the accident outside the public roads in intercity, sub-urban and rural areas (such as private places, yards and parking lots of houses and offices, inside factories, farms, parks, gardens, etc.) and non-traffic accidents 3: Driving accident has occurred abroad. Some specific cases of non-traffic accidents include suicide and other road killings, deaths from chases, and deaths on the roads during human trafficking. Moreover, people who were more than 30 days old after their death were included in the group of type 2 traffic accidents.

In data mining, data collection forms related to deaths due to traffic accidents of the Forensic Medicine Organization were used. Forensic data includes demographic information and accident information. Demographic information including age, gender, level of education, occupation, marital status, color of clothing, accident information including type of vehicle used, type of vehicle involved with pedestrian or involved in the deceased vehicle, place of death, accident, lighting status and location (intercity or suburban) and other information included the location of the impact, the ultimate cause of death, the date of the accident, the date of death, the time of death and the time of the accident.

After obtaining the license, some of the required information was received from the FMO of the country and other required information was extracted from the Statistics Center of Iran and the WHO, which is available electronically. The information received from the FMO was first checked and then analyzed using Stata 11 statistical software.

In this study, first demographic information and other studied variables were described, then the

incidence of non-traffic accidents was calculated using the country's population by age and sex.

In order to calculate the incidence of the number of people who had experienced that particular outcome (during 2013-2018) divided by the total population and expressed as the amount per 100 thousand people. In order to study the trend of deaths, linear regression was used and in order to calculate the standardized age of deaths, the population of 2000 of the WHO was used.

## Results

During the 6-year study period, 10882 people lost their lives in type 2 traffic accidents (4779 people)

and non-traffic accidents (5287 people). Out of 4779 deaths due to type 2 traffic accidents, 3785 (79.2%) were male and the rest were female. The average incidence of type 2 traffic accidents was 0.99 per 100,000 people. The highest incidence rate was observed in 2017 with an incidence rate of 1.05 per 100,000 people. The average incidence in men and women was 1.57 per 100,000 and 0.42 per 100,000, respectively. The highest incidence was observed in men in 2017 and in women in 2016 (Table 1). In terms of age, the highest incidence was observed in the age group over 65 yr (on average 5.06 per 100,000 people) (Table 1).

**Table 1:** Incidence of type 2 traffic accidents by gender and age groups in Iran in the years 2013 to 2018

Variable		2013	2014	2015	2016	2017	2018	Total
Sex								
Male	N	580	597	596	636	694	679	3782
	Rate* (per 100000)	1.49	1.51	1.49	1.57	1.69	1.63	1.57
Female	N	150	190	148	196	151	158	993
	Rate* (per 100000)	0.39	0.49	0.38	0.5	0.38	0.39	0.42
Total	N	730	787	744	832	845	837	4775
	Rate* (per 100000)	0.95	1	0.94	1.04	1.05	1.02	1
Age								
<15	N	30	30	31	38	33	20	182
	Rate* (per 100000)	0.16	0.16	0.16	0.2	0.17	0.1	0.16
15-24	N	102	90	96	128	115	92	623
	Rate* (per 100000)	0.75	0.69	0.77	1.08	1.02	0.85	0.85
25-34	N	95	114	89	117	118	109	642
	Rate* (per 100000)	0.59	0.7	0.54	0.7	0.69	0.63	0.64
35-64	N	265	312	260	320	334	343	1834
	Rate* (per 100000)	1.09	1.24	0.99	1.18	1.18	1.17	1.14
≥65	N	229	226	264	226	245	273	1463
	Rate* (per 100000)	5.08	4.89	5.56	4.64	4.9	5.3	5.06
Total	N	721	772	740	829	845	837	4744
	Rate* (per 100000)	0.94	1	0.94	1.04	1.05	1.02	1

\*Average Rate

Out of 5287 deaths due to non-traffic accidents, 4513 cases (85.5%) were male and the rest were female. The average incidence in men and women was 2.15 per 100,000 and 0.38 per 100,000, respectively. The highest incidence was observed

in men and women in 2017 (Table 2). In terms of age, the highest incidence was observed in the age group over 65 yr (on average 1.82 per 100,000 people) (Table 2).

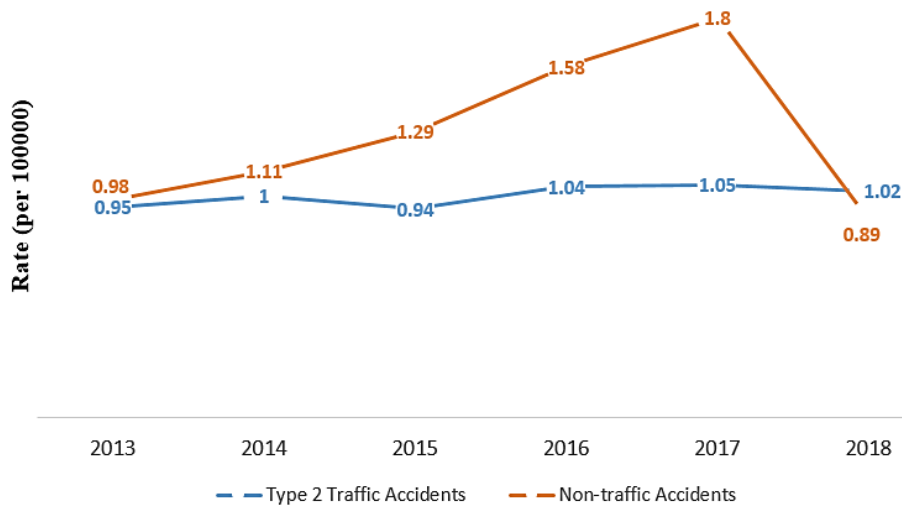
**Table 2:** Incidence of non-traffic accidents by gender and age groups in Iran in the years 2013 to 2018

Variable		2013	2014	2015	2016	2017	2018	Total*
Sex								
Male	N	642	748	872	1075	1243	620	5200
	Rate* (per 100000)	1.65	1.9	2.18	2.65	3.03	1.49	2.15
Female	N	113	118	146	190	213	109	889
	Rate* (per 100000)	0.29	0.3	0.37	0.48	0.53	0.27	0.38
Total	N	755	866	1018	1265	1456	729	6089
	Rate* (per 100000)	0.98	1.11	1.29	1.58	1.8	0.89	1.27
Age								
<15	N	90	116	134	156	206	104	806
	Rate* (per 100000)	0.49	0.63	0.71	0.81	1.05	0.52	0.7
15-24	N	137	200	256	260	286	108	1247
	Rate* (per 100000)	1	1.53	2.06	2.19	2.53	1	1.7
25-34	N	171	178	221	260	310	154	1294
	Rate* (per 100000)	1.06	1.09	1.34	1.55	1.81	0.89	1.29
35-64	N	277	283	319	448	505	293	2125
	Rate* (per 100000)	1.14	1.12	1.22	1.65	1.79	1	1.32
≥65	N	68	67	79	106	143	63	526
	Rate* (per 100000)	1.5	1.45	1.66	2.17	2.86	1.22	1.82
Total	N	743	844	1009	1230	1450	722	5998
	Rate* (per 100000)	0.98	1.11	1.29	1.58	1.8	0.89	1.27

\*Average Rate

The trend of incidence (per 100000 people) of type 2 traffic accidents and non-traffic accidents in Iran from 2013 to 2018 shows that deaths due to type 2 traffic accidents have not increased,

while the trend of non-traffic accidents from 2013 to 2018 is increasing. It has increased so that from 0.98 per 100,000 people in 2013 to 1.8 per 100,000 people in 2017 (Fig. 1).



**Fig. 1:** The trend of incidence (per 100000 people) of type 2 traffic accidents and non-traffic accidents in Iran from 2013 to 2018

In terms of marital status, 71.5% (3397 cases) of people in type 2 traffic accidents and 57.5% (3004 cases) of non-traffic accidents were married and in terms of residence, 71.9% (3406 cases) of type 2 traffic accidents and 50.3% (2620

cases) of non-traffic accidents were related to the city. The highest frequency of type 2 traffic accidents (17.6%) and non-traffic accidents (24.2%) were observed in 2018 and 2017, respectively (Table 3).

**Table 3:** Distribution and trend of non-traffic accidents and type 2 traffic accidents in Iran in 2013-2018

<i>Type of accident</i>	<i>2013</i>	<i>2014</i>	<i>2015</i>	<i>2016</i>	<i>2017</i>	<i>2018</i>	<i>Total</i>
traffic type 2	731 (15.3)	787 (16.5)	744 (15.6)	832 (17.4)	845 (12.5)	840 (17.6)	4779 (100)
Chase	38 (16.9)	32 (14.2)	11 (4.9)	65 (28.9)	50 (17.7)	29 (12.9)	225 (100)
Railroad	52 (18)	40 (13.8)	31 (18.7)	67 (23.2)	41 (22.2)	58 (20.1)	289 (100)
Non-traffic 1	189 (23.4)	174 (21.6)	151 (29.6)	203 (25.2)	-	89 (11)	806 (100)
Non-traffic 2	268 (13.2)	418 (20.6)	603 (17)	745 (36.6)	-	-	2034 (100)
Non-traffic 3	18 (11.8)	14 (9.2)	26 (17)	36 (23.5)	30 (19.6)	29 (19)	153 (100)
non-traffic (total)	743 (12.4)	844 (14.1)	1009 (16.8)	1230 (20.5)	1450 (24.2)	722 (12)	5998 (100)

The highest frequency of type 2 and non-traffic accidents occurred in autumn and summer, in terms of daylight, in terms of death status in pedestrians and drivers, respectively, and in terms of place of death, respectively, in hospital and accident site (Table 4).

The highest frequency of type 2 and non-traffic accidents in terms of occurrence were related to the collision of the vehicle with the deceased pedestrian and the overturning of the vehicle carrying the deceased, respectively, and in terms of the vehicle involved and the vehicle used was related to Conventional or Pickup (Table 4).

**Table 4:** Frequency distribution of non-traffic accidents and type 2 traffic accidents by season, condition of the deceased and place of death in Iran in the years 2013 to 2018

<i>Variables</i>	<i>Category</i>	<i>Type 2 traffic accidents</i>	<i>Non-traffic accidents</i>	<i>Total</i>
Season	Spring	1040 (21.8)	1377 (26)	2417 (24)
	Summer	1212 (25.4)	1662 (31.4)	2874 (28.6)
	Autumn	1295 (27.1)	1319 (24.9)	2614 (26)
	Winter	1232 (25.8)	929 (17.6)	2161 (21.5)
Lighting status	Day	2729 (61.5)	3165 (63.4)	5894 (62.5)
	Night	1224 (27.6)	1345 (26.9)	2569 (27.2)
	At sunrise and sunset	485 (10.9)	483 (9.7)	968 (10.3)
	Total	4438 (100)	4993 (100)	9431 (100)
Status of the deceased	Driver	1556 (32.9)	2023 (38.7)	3579 (36)
	Pedestrian	1862 (39.4)	1439 (27.6)	3301 (33.2)
	Passenger	1223 (25.9)	1646 (31.5)	2869 (28.8)
	Unknown	90 (1.9)	114 (2.2)	204 (2)
Death Location	Scene	126 (2.7)	3180 (60.9)	3306 (33.2)
	During transfer to the hospital	65 (1.4)	430 (8.2)	495 (5)
	Hospital	3739 (78.9)	1536 (29.4)	5275 (53)
	Home	779 (16.4)	23 (0.4)	802 (8.1)
	Unknown	27 (0.6)	54 (1)	81 (0.8)

## Discussion

Most of the victims of type 2 traffic accidents and non-traffic accidents during the 6-year study period were men, which is generally similar to the results of a large number of studies on traffic accidents in Iran (5-7-11) and other parts of the world (11-13). According to the United Nations, 73% of deaths due to traffic accidents occur in men (14). Men have more accidents than women for reasons such as men being more at risk due to job characteristics, social maps and car ownership, women being more cautious than men, as well as the country's cultural conditions and legal restrictions on bicycle use by women.

In this study, in terms of age, the highest 5-year average incidence of death due to type 2 traffic accidents and non-traffic accidents was observed in the age group over 65 yr, which was similar to the study conducted in Semnan (15). Various studies in the provinces of the country have reported the highest rate or frequency of deaths in different age groups, 15 to 30 yr in Fars, Kerman and Khuzestan provinces (8, 16, 17) and 21-40 yr in Tehran (18), however, in Hamedan Province, among accidents, traffic accidents are the most common type of accident in the elderly (19). According to the forecasts of studies conducted in Iran, the elderly population will reach 11.3% in 2025 and 31% of the total population in 2050, which indicates the serious need for proper planning for more education and effective interventions to reduce traffic accidents and consequences in this age group (20). Sedentary lifestyle and reduced response to risk factors due to old age, use of certain drugs, mental and physical condition and chronic diseases of the elderly are among the factors that are effective in the occurrence of accidents in this high-risk age group. Therefore, by providing facilities to facilitate the mobility of the elderly, construction of pedestrian bridges suitable for the elderly, providing preventive facilities to reduce risk factors such as increasing light and safety of roads, deployment of skilled personnel in related medical centers and

the inclusion of safety and precautionary traffic advice in the service packages of the age groups of the Ministry of Health can cause more illnesses and reduce the number of deaths (21, 22).

The results of this study showed that the incidence of deaths due to type 2 traffic accidents did not increase, while non-traffic accidents had an increasing trend. The incidence of deaths due to traffic accidents had not increased (8), while the incidence of deaths due to traffic accidents has shown a decreasing trend (23). Due to the increase in vehicles and as a result of the increase in vehicle traffic on the country's roads, the steady trend of deaths due to type 2 traffic accidents during the years 2013 to 2018 can be attributed to possible factors such as increased traffic control and police, speeding up rescue forces. He attributed the rescue of the victims to the increase in the effectiveness of the mass media in the field of traffic warning warnings and the increase in the level of public awareness (22).

The highest frequency of type 2 and non-traffic accidents in terms of time was in autumn and summer, respectively, which is similar to studies conducted in Iran (9, 22). The results of another study are also in line with the results of the present study and showed that the highest chance of traffic accidents was related to the autumn season (24). The high number of victims in the summer season with the start of summer trips and in the fall can be associated with the end of summer school holidays and the reopening of educational centers, resulting in a sudden increase in traffic and return from summer trips.

In this study, the highest frequency of type 2 and non-traffic accidents in terms of the deceased statute was in pedestrians and drivers, respectively. In the study of Rahmani et al., the highest frequency of fatalities was in drivers (10). The effect of traffic accidents is not in a favorable situation and it is estimated that about one or two percent of the country's GDP is always spent on the costs of death due to traffic accidents on pedestrians (25). Allocation of suitable and special infrastructure for pedestrians, including overpasses, underpasses and pedestrian lines, was mentioned.

The highest frequency of type 2 and non-traffic accidents occurred in terms of lighting conditions during the day, which was similar to another study (15). The probable cause of this problem can be the drowsiness of drivers in the early hours of the day due to excessive driving at night. The highest frequency of type 2 and non-traffic accidents in terms of place of death was in the hospital and the place of death, respectively, which could be due to the severity of accidents and the severity of injuries at the scene, which is similar to the results of some studies in Iran (9, 15). Therefore, it is necessary to pay attention to all aspects affecting the death of traffic victims, and in this regard, one of the important issues is to pay attention to pre-hospital care and especially the timely presence of relief forces (10). The highest frequency of type 2 and non-traffic accidents in terms of occurrence were related to the collision of the vehicle with the deceased pedestrian and the overturning of the vehicle carrying the deceased, respectively, similar to another study (15). In terms of the vehicle involved and the vehicle used, it was related to Conventional or Pickup, which was similar to other studies study (10, 15).

## Conclusion

Due to the high rate of deaths due to traffic accidents in Iran, including type 2 traffic accidents and non-traffic accidents, it is necessary for the national media and relevant agencies to educate people about first aid and also provide information about free services for relief workers. The importance of their timely presence in the early hours of the accident scene to take extensive measures to minimize injuries from accidents and reduce deaths. Besides, taking measures such as constructing pedestrian stairs suitable for traffic, providing preventive facilities to reduce risk factors such as increasing light and securing roads, deploying skilled and specialized personnel in related medical centers, and including safety and driving advice in special service packages for groups. The age of the Ministry of Health can be

reduced to some extent to cause more illnesses and deaths. On the other hand, removing the statistics of type 2 traffic accidents and non-traffic accidents from the annual statistics of traffic accidents leads to indifference to the changes caused by the trend of this type of accidents and not paying attention to the implementation of prevention programs.

## Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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## Conflict of interest

The authors declare that there is no conflict of interests.

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