Research Paper: A Comparison of Nowruz 2016 and Nowruz 2017 Accidents Data in Iran

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ABSTRACT

Background: Road traffic accidents are currently among the most essential public health issues. According to the World Health Organization, given the rapid growth of road transport globally, road traffic accidents could be the third leading cause of death and disability in the world by 2020. This article examined the role of the human factor in road accidents during the Nowruz holidays, as a major cultural event in Iran.

Materials and Methods: We explored the data of road accidents that occurred in Nowruz in 2016 and 2017 in Iran. Traffic accident data concerning the Nowruz holidays of 2016 and 2017 were collected by census method of sampling and based on the report of highway police. Additionally, the frequency of these accidents was analyzed according to travel time, accident type, gender, age, education, and vehicle type in different provinces.

Results: The present study findings suggested that among human factors affecting Nowruz accidents in 2016 and 2017, the highest frequency belonged to unnecessary speeding. As in 2016 and 2017, it was the main responsible characteristic for 56.42% and 55.01% of accidents, respectively. In Nowruz 2016, the provinces of Tehran, Khorasan Razavi, Isfahan, Fars, and Khuzestan; in Nowruz 2017, the provinces of Tehran, Isfahan, Khorasan Razavi, Fars, and Gilan encountered the highest rates of accidents leading to injuries and deaths.

Conclusion: To control unnecessary speeding and regulations disregard, planning for culturizing and the community-level education are suggested. Besides, increasing the quality and intelligence of vehicles and the construction of sliders, vertical lines on the road, warning signs, and billboards could help reduce the rate of accidents. Creating a working group of experts in psychology, traffic, etc., to study the pathology of dangerous behaviors, useless haste, and disregard for regulations and providing solutions could also be effective.

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1. Introduction

Road traffic accidents are presently among the most critical public health issues. According to related organizations, such as the World Health Organization (WHO), due to the high growth rate of global road transport, road traffic accidents could be the third leading cause of death and disability in the world by 2020 [1, 2]. Unfortunately, the accident rate, due to inattention to safety principles and the factors affecting it has always been high and concern in Iran. The current figures also reflect the deterioration of the situation. A report was published in 2012 by the WHO on the situation in different countries of the world (according to the index of the rate of deaths per 100000 population); Iran, with 20.5 deaths per 100000 individuals, was among the countries in the red region, i.e., dangerous in road driving [3, 4]. In addition to wasting valuable human capital in road accidents, extensive accident costs are imposed on society. Globally, the cost of these accidents is about $518 billion annually; of which, the share of low- and middle-income countries is about $65 billion [5].

In Iran, traffic accidents are the main cause of premature death. Accordingly, it accounts for 29% of the total deaths in the country, based on previous estimates [6]. According to the statistics, this factor causes a loss of 1.3 million years of Iranian life with a ratio of 5 to 1 for the male to female [7]. In terms of financial costs imposed on society, the average cost of death due to traffic accidents is estimated to be about 3 billion Rials. Moreover, the average cost of a permanent disability induced by it is calculated to be about 4 billion Rials.

Concerning the main issues in studying traffic accidents, the severity of accidents, and how different factors affect their incidence rate and severity are noticeable. For instance, Zhang et al. (2015) examined various fatigue-induced factors in causing traffic accidents. They analyzed the data from 2006-2010, available in the Department of Social Security of China. They examined factors, such as drivers' characteristics, vehicle type, as well as road and environmental conditions of the reported fatigue-caused accidents and their severity; based on the impact of these characteristics, they explained some control policies and strategies [8].

The highest rate of road accidents belongs to holidays due to the increase in road traffic load; Nowruz holidays in Iran, due to its special features, witnesses numerous traffic accidents and casualties. Considering the volume and extent of the problem, road traffic accidents have the priority of accident prevention in the country. Furthermore, accidents prevention requires recognizing and analyzing all risk factors.

According to the WHO, the main activities for the prevention of traffic accidents are focused on the human intervention; speed, alcohol consumption, substance abuse, driver's fatigue, and drowsiness, seat belts and helmets for motorcyclists, child seats, mobile phone use while driving, and environmental factors, including the lighting situation and road defects [4].

There is a lack of reliable information on the role of human factors and the impact and severity of each of these characteristics in creating traffic accidents in the country. Thus, prioritizing interventions to provide a suitable dataset to determine prevention and control strategies is necessary.

2. Material and Methods

The present study is applied research in terms of purpose and a descriptive survey in terms of data collection. The required data were collected through the census of the highway police accident report records and the reports of the forensic medicine organization. This study covers traffic accidents that occurred in the country during Nowruz 2016 and Nowruz 2017. In terms of spatial territory, the country is divided into 31 provinces. Besides, in terms of time, the research is divided into three periods, as follows: March 16 to March 19th, March 20th to March 25th, and March 26th to April 2nd. According to the mentioned points of the studied population, the accidents occurred from March 16th to April 2nd in the two consecutive years of 2016 and 2017. The total rate of accidents was 28390 and 27516 cases in 2016 and 2017, respectively.

The incident report sheet of highway police was used to extract the necessary data. According to these sheets, the frequency of traffic accidents by age, gender, education, vehicle type; as well as the human factor influencing the accident, including disregard for regulations, unnecessary speeding, fatigue and drowsiness, alcohol and substance use, and other causes were extracted. The frequency of accidents in different provinces was also investigated according to the mentioned factors.

3. Results

The present study aimed to investigate and prioritize the human factors affecting Nowruz accidents in Iran (exploring and comparing Nowruz accident data in 2016 and 2017). The obtained data could help to increase the effectiveness of control measures.

To provide a more accurate investigation based on the time of the incident, the accidents were divided into three intervals. Accordingly, the dates of March 16-19, March 20-25, and March 26 to April 2, formed the time classification of accidents. We reviewed the rate of Nowruz 2016 accidents in terms of travel time. The relevant data indicated that the total rate of accidents in that period, based on the analysis of the highway police accident report sheet, was equal to 28390 accidents with a daily average of 1577.22 cases. The highest daily average rate of accidents in Nowruz 2016 belonged to April 7-14 with 1618.12 cases.

Furthermore, the accident report of Nowruz 2017 revealed that the total rate of accidents was 27516 in terms of travel time. This information was based on the forms completed by highway police. Besides, accidents had a daily average of 1448.22 cases. Concerning the travel time, the highest daily average rate of accidents occurred between March 20th and 25th with 1582.33 cases.

According to the police accident report sheet, the total rate of fatal accidents in 2016 was 428; the total rate of accidents leading to injury was 11685, and the total rate of accidents leading to damage was 16277. A proportion of injured individuals in traffic accidents lose their lives. Moreover, such death rates increase, compared to the police accident report sheet. Thus, deaths and injuries were considered as one factor and damage as another factor, in data analysis. The total rate of fatal accidents according to the highway police accident report sheet in Nowruz 2017 was equal to 372 cases. Besides, the total rate of accidents leading to injury was 11497 cases. The total rate of accidents leading to damage was also 15647 cases (Table 1).

The total rate of accidents in Iran in Nowruz 2017 was 27516 cases, of which 25485 (92.61%) and 1891 (6.87%) drivers were males and females, respectively [9, 10]. We also examined the total rate of accidents in Iran in Nowruz 2016, which accordingly, 28390 accidents occurred. Of these incidences, 26,375 (92.90%) and 1945 (6.85%) drivers were male and female, respectively [11, 12]. Comparing age-related statistics of drivers revealed that 674 cases out of 874 cases in 2017 aged <36 years. The share of this decrease in the rate for <36 years was measured as 77.11%. Comparative statistics of age classification were provided in Table 2. The highest rate of accidents in both explored years occurred by 26- to 35-year-old drivers.

Comparing the drivers' age in accidents leading to injuries and deaths between Nowruz 2017 and Nowruz 2016 demonstrated a 244 decrease in such accidents. The total reduction rate in accidents in Nowruz 2017, compared to Nowruz 2016 was 874 cases of which, there were 244 cases decrease in accidents leading to deaths and injuries. Therefore, there was a total of 27.91% reduction in accidents leading to injuries and deaths.

Data on drivers' educational level in Nowruz 2016 accidents revealed that 16016 individuals with a high school diploma caused the highest share in accidents. More details are presented in Table 3.

Comparing the drivers' educational level in Nowruz accidents indicated a decrease in the frequency of individuals with a diploma degree in Nowruz 2017, compared to Nowruz 2016 (i.e., from 57.25% to 56.41%). In general, there was no significant difference in the proportion of changes in the educational level in accidents. In other words, in both the Nowruz holidays, drivers with a diploma degree had the highest share of accidents, followed by the group of below diploma degree.

We studied the vehicle type affecting Nowruz accidents; the following classification was determined: cars, including all personal cars and taxis; light trucks, including all pickups; heavy trucks, including trucks, lorry, two trucks, and trailer truck, as well as public transport vehicles, including buses and minibusses. Other vehicles included ambulances, bicycles, police cars, fire trucks, road construction equipment, agricultural equipment, and unspecified vehicles. The relevant data suggested that the largest share in accidents in the country belonged to cars, followed by motorcycles. Moreover, comparing the statistics of Nowruz 2017 versus Nowruz 2016 accidents indicated that the largest decrease was observed in car accidents by 544 cases (Table 4).

The rate of injuries and deaths of Nowruz 2016 equaled 12113 cases, where cars with 7530 cases formed the highest rate of accidents among all vehicles, followed by motorcycles with 2999 cases. Given the average daily rate of accidents leading to injuries and deaths in 2016, 418.33 cases concerned cars. Furthermore, 166.61 cases formed the average daily rate of accidents leading to injuries and deaths in Nowruz 2016. Nowruz statistics for 2017 are listed in Table 4.

On average, the daily reduction in the rate of vehicles affecting accidents resulting in injuries and deaths was 17.33 cases for cars in Nowruz 2017, compared to Nowruz 2016. The largest decrease related to motorcycles with a daily decline of 17.66 cases in Nowruz 2017, compared to Nowruz 2016 in accidents leading to injuries and deaths.

The total rate of accidents in Nowruz 2017 has decreased by 874 cases, compared to the previous year; however, according to Nowruz 2016 data, the highest share of hu-

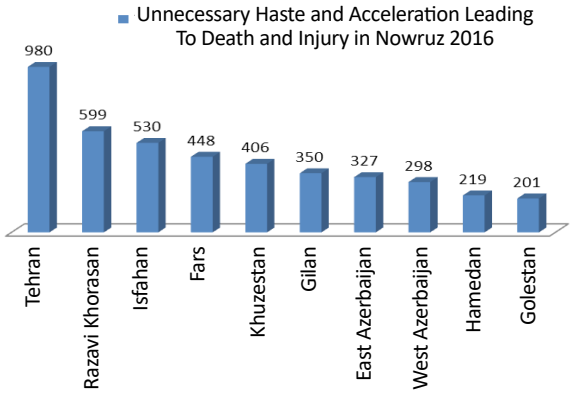

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Figure 1. Ranking of the top 10 provinces with the highest rate of human factors including unnecessary speeding leading to death and injury of Nowruz 2016 accidents

man factors in accidents was related to haste; unnecessary speeding formed 16018 cases, which included 56.42% of all human factors involved in accidents. Next, the largest share belonged to a factor other than the human; the rate of which equaled 7157 (25.20%) cases. Remarkably, the rate of hurries and accelerations in 2017 has decreased by 879 in Nowruz 2017, compared to that of Nowruz 2016.

We also explored the human factors influencing accidents that have resulted in injuries and deaths. As per the below figure, the cause of unnecessary haste and acceleration has accounted for 56.42% of the total accidents of Nowruz 2016, i.e., a significant and large share. Furthermore, 12113 cases were detected concerning the human factors that led to fatal accidents and injuries. Of these cases, 6849 were related to haste and acceleration, which ranked first for human factors effective in accidents leading to injuries and deaths. Unnecessary haste and acceleration ranked first as the human factors effective in accidents leading to injuries and deaths in Nowruz 2017 and 2016 holidays (Table 5).

The total rate of Nowruz 2016 accidents was 28390. In total, 12113 of them concerned accidents resulting in injuries and deaths, i.e., 42.66% of the total Nowruz 2016 accidents. Furthermore, accidents leading to injuries and deaths included 43.13% of the total accidents of Nowruz 2017. Besides, the total rate of accidents leading to injuries and deaths was 11869 cases.

The rate of accidents caused by unnecessary speeding that led to injuries and deaths in Nowruz 2016 was 6849 cases. This share included 24.12% of the total rate of accidents. Figure 1 shows the ranking of the top ten provinces with the highest rate of human-caused accidents and unnecessary speeding leading to death and injury from all accidents in Nowruz 2016.

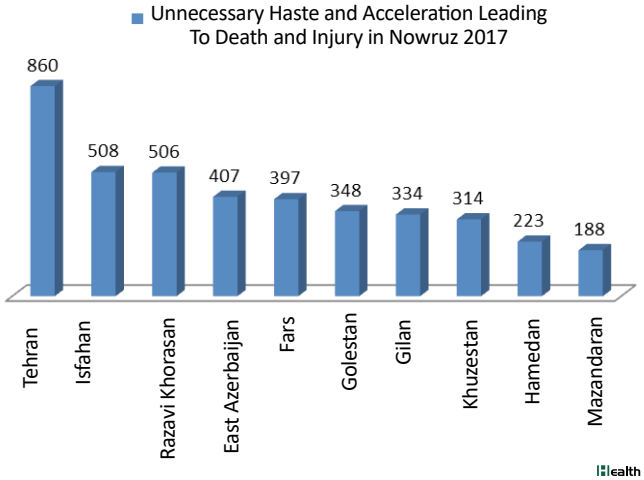

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Figure 2. Ranking of the top 10 provinces with the highest rate of human factors including unnecessary speeding leading to death and injury of Nowruz 2017 accidents

Table 1. Nowruz 2016 and 2017 accident statistics based on the accident type and travel time

Rates/Indices	Type/Year/No.							
	Death		Injuries		Damages		Total	
	2016	2017	2016	2017	2016	2017	2016	2017
Before Nowruz	85	94	2163	2410	3678	3609	2248	2504
1-6	148	118	4036	3638	5335	5739	4184	3756
7-14	195	160	5486	5449	7264	6299	5681	5609
Total	428	372	11685	11497	16277	15647	12113	11869
Average daily rate /accident type	22.52	20.66	615	638.72	856.68	869.27	637.52	624.68

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Table 2. Comparing the frequency distribution of the drivers' age in Nowruz accidents (total accidents in the country)

Age (y)	No. (%)			
	Accident		Injuries and Deaths	
	2016	2017	2016	2017
<18	319 (1.12)	337 (1.22)	298 (2.46)	309 (2.60)
18-25	4496 (15.83)	3929 (14.27)	2477 (20.44)	2126 (17.91)
26-35	9528 (33.56)	9403 (34.17)	3862 (31.88)	3890 (32.91)
36-45	6554 (23.08)	6377 (23.17)	2436 (20.11)	2369 (19.95)
46-55	3694 (13.01)	3645 (13.24)	1304 (10.76)	1292 (10.88)
56-65	1680 (5.91)	1603 (5.82)	591 (4.87)	583 (4.91)
>66	547 (1.92)	552 (2)	207 (1.70)	207 (1.74)
Uncertain	1572 (5.53)	1670 (6.06)	938 (7.74)	1093 (9.20)
Total	28390 (100)	27516 (100)	12113 (100)	11869 (100)

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Table 3. The educational level of the country's drivers in Nowruz 2016 and 2017 accidents

Year	Below Diploma			Diploma	Above Diploma					Unknown	Total
	Illiterate	Primary	Guidance School	Diploma	Associate Degree	Undergraduate	Masters	Doctorate	Seminary	Uncertain	Total
2016	678	1507	3606	16016	838	1444	245	100	24	3932	28390
		5791		16016			2651			3932	28390
2017	618	1498	3489	15755	794	1354	248	83	26	3651	27516
		5605		15755			2505			3651	27516

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Table 4. Comparing the vehicle type effective in Nowruz accidents in Iran

Variables	Vehicle Type						
	Sedan	Lorry	Truck	Public Passenger	Motorcycle	Other	Total
Accidents 2016 No. (%)	21230 (74.77)	2060 (7.25)	1317 (4.63)	290 (1.02)	3266 (11.50)	227 (0.79)	28390 (100)
Injury and death	7530	915	388	90	2999	191	12113
Average daily rate	418.33	50.83	21.55	5	61.166	10.61	672.94
The ranking of the effective vehicle in accidents	1	3	4	6	2	5	-
2017 No. (%)	20686 (75.17)	1901 (6.90)	1319 (4.79)	282 (1.02)	3139 (40.11)	189 (0.68)	27516 (100)
Injury and death rate of 2017	7619	799	374	92	2830	155	11869
Average daily rate	401	42.05	19.68	4.84	148.94	8.15	624.68
The ranking of the effective vehicle in accidents	1	3	4	6	2	5	-
Comparison status	-544	-159	2	-8	-127	-38	-874
Decrease/increase	Decrease	Decrease	Increase	Decrease	Decrease	Decrease	Decrease

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The total rate of Nowruz 2017 accidents was 27516 cases, of which 15139 (55.01% of all accidents) cases were caused by unnecessary speeding. Of this rate, the number of accidents caused by unnecessary speeding that resulted in injuries and deaths was 6244. Accordingly, it accounted for 22.69% of the total accidents. Figure 2 shows the ranking of the top 10 provinces with the highest share of human factors of unnecessary speeding leading to death and injury from all Nowruz 2017 accidents.

4. Discussion

According to the WHO, the rate of mortalities in traffic accidents in Iran in 2013 was 24896; the relevant Average Daily Rate (ADR) equaled 68.20. Nowruz 2016 data revealed that the most accidents occurred from April 28th to March 5th with an ADR of 1618.12. However, in Nowruz 2017, most accidents occurred between April 21st and April 28th with an ADR of 1582.33. Comparing the ADR of Nowruz accidents suggested that this rate has decreased from 1577.22 cases in 2016 to 1448.22 cases in 2017.

The rate of accidents that resulted in injuries and death in Nowruz 2016 was 12113 cases. This rate has decreased to 11869 cases in 2017. The ADR of accidents resulting in injuries and deaths in Nowruz 2016 was 637.52 cases. This number has decreased to 624.68 cases in Nowruz 2017.

Studies identified males as most victims of traffic and road accidents. Besides, young drivers were responsible for more accidents (mainly car accidents). Men also drive more carelessly. This could be due to their greater curiosity, compared to young women. Males also reach extremes in presenting their driving skills, therefore, they are at higher risks [13, 14].

The statistics of Nowruz 2016 accidents in Iran revealed that 50.51% of accidents were related to <36-year-olds, which has decreased to 49.66% in 2017. The highest accident statistics in 2006 were related to individuals with under diploma education (47.6%).

Recent studies on the drivers' educational level demonstrated that the highest rate of accidents in both Nowruz of 2016 and 2017 was related to drivers with diplomas; it reflects an increase in the level of literacy in the whole society. Overall, it affected reducing the rate of accidents this year, compared to the previous years.

Table 5. Ranking of human factors affecting accidents that resulted in death and injury in Nowruz 2016 and 2017 holidays

The Human Factor Influencing Accidents	No.	%	No.	%	Rank
	The Total Rate of Accidents	The Share of the Human Factor in the Total Rate of Accidents	The Rate of Accidents Resulting in Death and Injury	The Human Factor Contributing to Accidents Resulting in Death and Injury	The Effective Human Factor in the Accidents Resulting in Death and Injury
Unnecessary haste and acceleration in Nowruz 2016	16018	56.42	6849	56.54	1
Unnecessary haste and acceleration in Nowruz 2017	15139	55.01	6244	52.6	1
None 2016 Nowruz	7157	25.20	2940	24.27	2
None 2017 Nowruz	7579	27.54	3471	29.24	2
Unknown, Nowruz 2016	2280	8.03	950	7.84	3
Unknown, Nowruz 2017	1801	6.54	698	5.88	3
Ignoring the rules, Nowruz 2016	1778	6.26	856	7.06	4
Ignoring the rules, Nowruz 2017	1901	6.9	904	7.61	4
Fatigue and sleep deprivation, Nowruz 2016	692	2.43	303	2.50	5
Fatigue and sleep deprivation, Nowruz 2017	729	2.64	365	3.07	5
Other causes, Nowruz 2016	421	1.48	191	1.57	6
Other causes, Nowruz 2017	364	1.32	174	1.46	6
Alcohol and substance consumption, Nowruz 2016	44	0.15	24	0.19	7
Alcohol and substance consumption, Nowruz 2017	30	0.1	13	0.10	7
Total Nowruz 2016	28390	100	12113	100	-
Total Nowruz 2017	27516	100	11869	100	-

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Concerning the vehicle type, most accidents were related to passenger cars. They accounted for approximately 75% of the accidents in both the Nowruz holidays and after that. Motorcycles formed the largest share with about 11% of accidents.

In 2003, various studies considered the human factor as the most frequent characteristic in causing accidents [15]. Statistics published in 2006 also suggested that the highest percentage of the impact of human factors on the severity of road accidents, with a share of 64.5%, was related to the ignorance of regulations [16]. However, in both Nowruz holidays, unnecessary haste and acceleration covered the largest share in accidents caused by human factors.

5. Conclusion

A characteristic involved in accidents is the human factor; thus, educating traffic regulations through the media, pro-

viding training programs, and public information by campaigns and non-governmental organizations could lead to appropriate measures and preventing high-risk behaviors. This is especially true in the younger age groups.

Considering that unnecessary haste and acceleration were among the main causes of accidents, developing road sliders, vertical lines on the road, warning signs, billboards, speedometers, installation of traffic signs, and warning signs in accident hotspots could create more awareness about the danger. Consequently, the driver slows down and it could be effective in reducing accidents caused by unnecessary haste and acceleration.

It is also suggested that a specialized working group, consisting of psychology and traffic experts be set up for exploring the pathology of risky behaviors respecting unnecessary haste and acceleration and disregard for regulations. Accordingly, up-to-date solutions could be provided.

Ethical Considerations

Compliance with ethical guidelines

All ethical principles are considered in this article.

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Authors' contributions

All authors contributed in preparing this article.

Conflict of interest

The authors declared no conflict of interest.

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