

Analysis of Incidents Recorded Data of in Kashan Fire Department During 1999-2016

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Abstract

Aims: Accidents are one of the most important noncommunicable diseases of the 20th century. Unfortunately in Iran, there is not enough information about accidents except traffic and work. Knowing the type, frequency, trend, and distribution of accidents can be helpful in preventing them. Therefore, in this study, a statistical analysis of accidents recorded in the Kashan Firefighting Department (KFD) over a 6-year period is carried out during 1999–2016. **Materials and Methods:** All records of accidents that have been kept in KFD archive in the years 1999, 2005, 2011, and 2016 are targeted. The recorded information is taken out, classified, and analyzed using descriptive statistical methods and analytical tests. **Results:** The frequency of accidents is 1160 (0.42% based on the population) and 1611 (0.53%) in 2011 and 2016, respectively. These are considerably more than the 311 (0.15%) cases in 1999. Furthermore, the frequency of recorded fires, in the mentioned years are 311 (0.15%), 485 (0.20%), 651 (0.23%), and 687 (0.23%), respectively. The ratio of injured per 1000 people was 0.7 in 1999 which rinsed to 1.2 per 1000 in 2016. It is found that the injury and death in men are more than women. **Conclusions:** Due to population growth, the increasing trend of accidents and fires are predictable over the years under the study. However, increase in intentional accidents, injuries and death caused by accidents that were mainly acquired in young people and workforce, need to pay more attention.

Keywords: Accidents, firefighting department, Kashan, trauma

INTRODUCTION

Accidents were one of the most important noncommunicable diseases of the 20th century. Furthermore, according to reports accidents are among the top five causes of death in different age groups around the world.

Accidents are unpredictable events with high direct and indirect costs. In addition, every year millions of people suffer from a physically challenged that is created by accidents. Hence, accidents have recently received much consideration as an epidemiological matter. Previously, many studies have been carried out on traffic accidents, work-related and occupational accidents, fire-related and household injuries.^[1,2] Epidemiological study of accidents and trauma in Qom Province close to Kashan

in 2010 showed that it was 27/1000.^[3] A household survey in Tehran showed that about 8.3% of participants had been injured during 2006 and 15% of injured people required medical care.^[4] A study on fatal injuries in 10 provinces of the Islamic Republic of Iran stated that the rate of deaths was 58/100,000 in 2001 due to the injuries. In addition, this study showed that 14.9% of all deaths and 26.9% of years of lost life come back to the injuries. According to the study, fatal injuries were predominantly unintentional (48.0/100,000) and the death rate due to traffic injuries was 30.0/100,000.^[5]

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In Europe, traffic accidents have caused 120,000 deaths and 2.4 million injuries each year, producing a huge economic burden of up to 3% of the gross domestic product in some countries.^[6] In Kashan city during a 5-year period (2007–2011), 260 death has been recorded among the referred injured patients to Beheshti Hospital, which 76% of them were related to traffic accidents.^[7] Around the world, occupation-related injuries are roughly growing due to the global increase of industrial activities. Work-related issues contain another major cause of mortalities and disabilities. According to the International Labor Organization (ILO), annually 1 of 10 workers suffers from injuries and 5% of national labor days are lost. In Iran, occupation-related accidents have been reported as the second main cause for human injuries. However, the matter is the fourth cause of disabilities and mortalities in the United States. A retrospective analysis of trauma registry data in Qatar showed that nonfatal and fatal occupational injuries rate were 37.34 and 1.58 per 100,000, respectively. In 1994, fatal occupational accident rate in the whole world was averagely estimated 14.0/100,000 workers. According to the ILO, more than 15 million work-related accidents take place every year around the world and the number is two million in the United States and Japan.^[8-15] Accidents in houses are an important cause of mortalities and disabilities in the childhood and senescence. About 75% of damages on the more than 65-year-old people in industrialized countries are due to domestic accidents. Often a child gets her/his first experience of accident at home. A study showed that home-related injuries were the second cause of trauma in Tehran. A study of Khosravi and Ghafari in urban and rural population area of Shahrekord in 1999 showed that 0.36% of the people had been injured by domestic accidents, these ratios were 0.17% and 0.19% for females and males, respectively.^[16,17] In most cases, injuries by accidents lead to physical, psychological, and social damages.^[18]

Health and economic damages from the accidents are enormous. Industrial- and work-related injuries, household, and traffic as well as intentional accidents and so on, create a wide range of diseases and disorders. Due to the importance of the matter, many contradictions about the contributing factors to the occurrence of accidents and the regional typicality of Kashan, the researchers believe that the recognition of the type, frequency, trend, and distribution of accidents can be effective on their prevention.

MATERIALS AND METHODS

First, in this study, the researchers asked for the necessary permissions from Kashan Municipality authorities. Then, the entire records of accidents of 1998–1999, 2004–2005, 2010–2011 and 2015–2016 that are kept in archive of Kashan Firefighting Department (KFD) were considered. The recorded information was then pulled out and classified. Finally, the information was analyzed using descriptive statistical methods and Chi-square test. The population of Kashan for the years was taken from the Iranian Statistical Center. For years which no census data were found the population was estimated by

geometric method based on the previous and subsequent census data. Main practicality concern was the lack of uniformity in recorded data in the targeted years. This was because of changes brought in to the Iranian Fire Department's Recording System after 2009. This problem was overcome by spending more time and by seeking the necessary help from the fire department staffs.

RESULTS

Results showed that the total number of accidents was 1160 (0.42% based on population) and 1611 (0.53%) in 2011 and 2016, respectively. These are considerably more than the 311 (0.15%) cases in 1998–1999. It should be noted that in 1998–1999 only fire-related accidents had been recorded by the fire department. Later many other cases, for example, sight of snake in the houses had been added to the report. As shown in Figure 1, the trends of total recorded accidents, fire-related accidents, and the population of Kashan have been compared. This plot shows that the trend of total accidents is ascended while the fire-related accidents are roughly same as the past.

The trend of absolute number of damaged people for the duration of the study was ascending [Figure 2]. The ratio of injured people was 0.7 per thousand in 1998–1999, which increased to 1.2 in 2016. Despite ascending trend of injured people, it is obvious that dead people number decreased from 0.15–0.039 per thousand in this period. Statistical analysis showed a significant difference between injured citizens in different years (photovoltaic [PV] < 0.05). Unfortunately, there was not found any record regarding the type and degree of trauma on injured people in the Kashan Fire Department.

There is a significant difference between intentional and unintentional fires in different years (PV < 0.001). The intentional cases significantly were increased from 1998 to 1999–2015–2016. Accidents with unknown causes were decreased during the under research years [Table 1].

As shown in Table 2, while in 1998–1999 the fire in the residential places was the major, it was decreased in the next years, and the other cases such as vehicles, warehouses, shopping centers, and workshops fires were increased. Statistical tests show that the frequency of fires in different places is different (PV < 0.001).

There was a significant difference between intentional fires in the first and second semesters (PV < 0.001). In other words, intentional cases occurred more in the first half of the years [Table 3].

Table 4 shows that only the damaged people have been classified in terms of age and sex in the years after 2010. The highest frequency of injured and dead people overlies on the young- and middle-age groups (18–30 and 30–50 year old). The least number of dead people sit on the age group of 12–18 years, and the least number of injured people is in the

Table 1: Distribution of intentionally and unintentionally fires in terms of the semesters

	First semester				Second semester			
	Intentional No. %	Unintentional No. %	Unknown No. %	Total No. %	Intentional No. %	Unintentional No. %	Unknown No. %	Total No. %
1998-99	12 (8.1)	115 (77.7)	21 (14.2)	148 (100)	8 (4.9)	137 (84)	18 (11)	163 (100)
2004-05	128 (46.9)	145 (53.1)	0 (0)	273 (100)	60 (28.3)	142 (67)	10 (4.7)	212 (100)
2010-11	179 (49.7)	177 (49.2)	4 (1.1)	360 (100)	147 (50.5)	138 (47.4)	6 (2.1)	291 (100)
2015-16	240 (58.5)	170 (41.5)	0 (0)	410 (100)	151 (54.5)	126 (45.5)	0 (0)	277 (100)
<i>P</i>		<0.001				<0.001		

Table 2: Frequency of the fires in terms of the location

	Residential NO. %	Commercial NO. %	Administrative & educational NO. %	Workplace & factory NO. %	Store NO. %	Therapeutic NO. %	Waste tires NO. %	Farm, Garden & harvest NO. %	Vehicles NO. %	Other NO. %	Total NO. %
1998-99	80 (25.7)	20 (6.4)	25 (8)	24 (7.7)	16 (5.1)	1 (3)	0 (0)	42 (13.5)	49 (15.8)	54 (17.4)	311 (100)
2004-05	75 (15.5)	41 (8.5)	7 (1.4)	41 (8.5)	15 (3.1)	2 (4)	12 (2.5)	18 (3.7)	57 (11.8)	217 (44.7)	485 (100)
2010-11	77 (11.8)	48 (7.4)	9 (1.4)	58 (8.9)	23 (3.5)	2 (3)	220 (33.8)	28 (4.3)	87 (13.4)	99 (15.2)	651 (100)
2015-16	113 (16.4)	51 (7.4)	4 (6)	33 (4.8)	10 (1.5)	1 (1)	242 (35.2)	40 (5.8)	88 (12.8)	105 (15.3)	687 (100)
<i>P</i>						<0.001					

Table 3: The Number of damaged citizens from the accidents in different semesters

	First semester			Second semester		
	Dead no. %	Injured no. %	Total no. %	Dead no. %	Injured no. %	Total no. %
1998-99	23 (14.3)	138 (85.7)	161 (100)	8 (42.1)	11 (57.9)	19 (100)
2004-05	20 (29)	49 (71)	69 (100)	11 (16.9)	54 (83.1)	65 (100)
2010-11	24 (18.5)	106 (81.5)	130 (100)	13 (15.9)	69 (84.1)	82 (100)
2015-16	10 (5.2)	183 (94.8)	193 (100)	2 (1)	189 (99)	191 (100)
<i>P</i>		<0.001			<0.001	

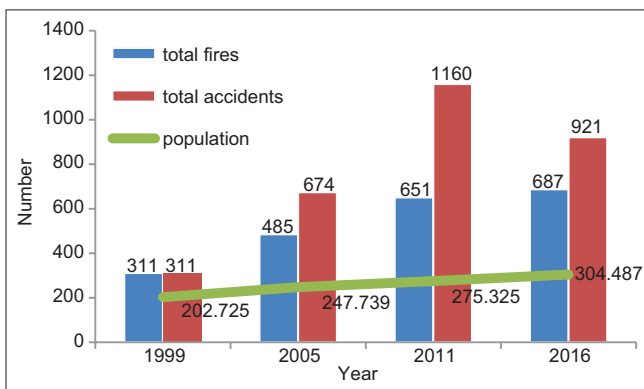


Figure 1: The trend of recorded accidents and firefighting in Kashan

children group. In general, the number of injured and dead men is more than women.

The frequency of recorded accidents for year 2015–2016 has been classified based on the months and causes [Table 5]. It can be concluded that the ratio of fire-related accidents is about 43%. Although the number of accident in December–June. Of the year 2015–2016 was less than the other months of the same year, but there was no a significant difference between accidents in different months for all of the understudy

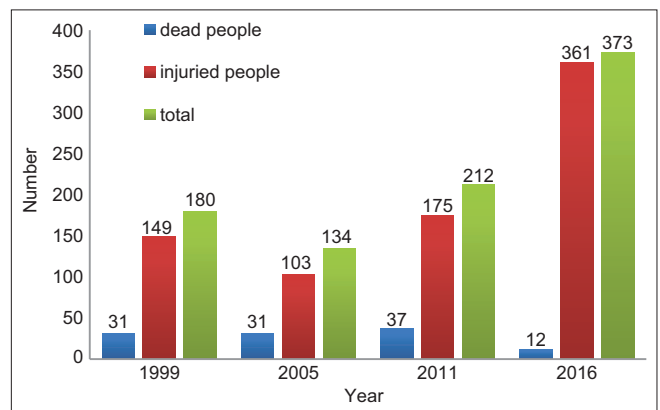


Figure 2: The trend of dead and injured people by accidents in Kashan during 1999–2016

years ($PV > 0.05$). The ratio of suicide and swallowing a ring in 2015–2016 has been calculated 3/100,000 and 31/100,000, respectively. Automobile accidents in August–September had been occurred more than the other months. Predominantly request for repulse nuisance animals (especially snake) has been recorded in April–September. Help for opening the locked doors average was 23.58 ± 6.02 cases in the month.

Table 4: Frequency of healthy, injured, and dead people in terms of sex and age in recently years

Age/sex	Degree of injury (years)	Healthy		Injured		Dead		Total
		Male	Female	Male	Female	Male	Female	
<12	2010-2011	8	29	7	3	2	0	49
	2015-2016	11	2	87	46	0	0	146
12-18	2010-2011	4	6	11	6	0	0	27
	2015-2016	4	2	23	23	3	0	55
18-30	2010-2011	14	14	26	21	7	2	84
	2015-2016	24	12	41	39	1	1	118
30-50	2010-2011	9	4	38	13	12	2	78
	2015-2016	41	12	39	40	2	1	135
>50	2010-2011	2	3	13	4	2	1	25
	2015-2016	14	6	12	11	4	0	47
Total	2010-2011	37	56	95	47	23	5	263
	2015-2016	94	34	202	159	10	2	501

DISCUSSION

The results show that in 1998–1999 the total number of recorded fires and accidents were the same. However, in the later, with the enlargement of KFD activity, the ratio of total number of accidents to fires was increased to 178% and 234% in 2011 and 2016, respectively. As a matter of fact, calls for giving help have been developed from fire cases to new cases, for example, request assistance for catching wild animals and attending to vehicle accidents. Averagely, about 30 citizens have died every year due to accidents in Kashan. Accident-based mortalities increased from 31 in 1998–1999 to 37 in 2010–2011 while the population of Kashan increased from 203,000 to 275,000 in those years. Hence, accident-based mortality rate was decreased from 15/100,000–13.5/1000,000. This shows a significant decrease in accident-based mortalities in 2016 (3.9/100,000).

Furthermore, accident-based injuries rate has been decreased, which it is a promising fact. By referral of the researchers to the KFA, it turned out that the time between the people's calls and the presence of firefighters, dropped to one-third since 1999; this could be one of the reasons for reducing injuries. In addition, no death was recorded for firefighter which is a promising matter. The number of recorded fires in the KFD in 2015–2016 is more than the other years. In overall, the rate of calls for help from KFD is increasing. It is compatible with results have been reported by Fazel *et al.* In the study, the authors stated which the rate of accident in Kashan was growing during 2004–2006.^[1] In addition, Babaii *et al.* stated that the number of accident in Tehran had increased in 2000 compared to the past 10 years.^[19]

The intentional fires had the minimum frequency (6.4%) in 1998–1999 while it was increased to 57% of total fires in 2015–2016. The intentional fires have been stated 2.8% in Tehran. Findings in Mazandaran Province showed that the intentional accidents were <11%.^[20,21] The intentional fires may be caused by some companies for getting compensations

from insurance companies. Furthermore, some others may be because of dissension between employers and employees. The rise of accidents in the workshops, factories, and commercial centers confirm this presumption [Table 2]. The number of injured people in the first semesters is less than the second. It can be related to the time of school holidays for students in Iran. Moreover, the number of accidents in the first semester is less than the second semester. Childish games in the summer increase the danger of fire so; more attention should be paid to fire prevention in these cases. The frequency of injured and dead people in terms of age and sex [Table 4] shows that young- and middle-age injured and dead people are more than the others. It maybe because these groups are more involved in fire extinguishing activities and helping processes. However, in the teenager group death rate is zero. These results are compatible with Akbarpor *et al.*'s findings which stated that the average age of dead people in the accidents was calculated as 36.69 years. In our study, the number of injuries and deaths in the men was more than those in the women. It is in agreement with the findings announced for men and women in Mazandaran (77% vs. 23%) also, (3 vs. 1) in Ghazvin Province.^[20,22] The maximum number of fires in 1998–1999 took place in the residential locations. It maybe resulted from this fact that in the past heating devices in homes were unsafe. Reasons to increase fires in places other than residential areas include increased access to cell phones, better fire department responsiveness, more modern accountability systems such as the use of call recording equipment and training given to fire department operators, as well as increased number of vehicles also, service establishments such as warehouses and shops. However, gradually in the later, it reduced, and the others such as vehicles, warehouses, shopping malls, and workshop were increased. A study on the patients admitted to Naqvi Hospital in Kashan in 1999–2000 showed that about 49.2% of the injuries were related to vehicles.^[23] Results showed that the rate of fire in residential locations of Kashan is more than the other cities. Hence, the identification of risk factors of fire in homes can help to reduce the risk of fire-related injuries and death in adult and children population.^[24,25] The

Table 5: Frequency of recorded accidents in Kashan Firefighting in different months in terms of causes in 2015-2016

	March-April	April-May	May-June	June-July	July-August	August-September	September-October
Fire	45	81	79	63	73	63	58
Downfall in a well	-	-	3	5	4	3	3
Landfall	-	-	-	1	1	-	-
Swallowing a ring	11	9	7	10	8	8	11
Downfall	1	-	-	-	1	2	2
Meat grinder injuries	-	-	-	-	-	-	-
Elevator	7	-	7	4	3	2	2
Automobile accident	3	7	7	4	2	10	4
Accident in mountain	-	-	1	-	-	-	-
Electric shock	-	-	-	-	-	-	1
Opening lucked doors	26	24	23	24	15	20	16
Gas fuel permeation	1	-	1	1	1	4	5
Nuisance animal repulse	16	39	45	38	42	41	27
Flood and inundation	7	8	4	7	1	5	1
Suicide	-	1	-	-	-	1	-
Earth subsidence	-	2	-	1	2	-	1
Sound discommodity'	1	1	-	-	-	-	-
Total	118	109	177	158	153	159	131

	October-November	November-December	December-January	January-February	February-March	Total
Fire	36	52	37	53	47	687
Downfall in a well	3	-	2	1	1	25
Landfall	1	-	-	1	1	5
Swallowing a ring	5	8	6	6	5	94
Downfall	-	-	1	-	1	8
Meat grinder injuries	-	-	-	-	1	1
Elevator	6	-	4	2	4	41
Automobile accident	3	7	2	2	6	57
Accident in mountain	-	-	-	1	-	2
Electric shock	-	-	-	-	-	1
Opening lucked doors	21	28	20	29	37	283
Gas fuel permeation	1	-	1	2	1	18
Nuisance animal repulse	25	12	10	14	16	325
Flood and inundation	6	1	3	3	1	47
Suicide	-	-	1	-	-	3
Earth subsidence	-	1	3	-	2	12
Sound discommodity'	-	-	-	-	-	2
Total	107	109	90	114	123	1611

socioeconomic damages from mortalities caused by accidents are horrible and need more attentions. The increasing deliberate accidents that can be attributed to the cultural status are risks that require more socioeconomic studies and adopting preventive programs. In addition, the high rate of accidents in the second semester of the year, especially during school holidays requires more studies and preventive methods. In addition, the highest number of death and injuries in young groups need more attention. The fatality in the groups puts the human investments at the risk in the future. Because young people have a high sense of responsibility at the time of the accidents, education program for these groups can prevent damages to them.

CONCLUSIONS

Because of population growth, increasing in accidents and fires for the duration of the study is tolerable. However, the growth of intentional accidents, intensification of injured people and deaths due to accidents which were occurred mainly in the young members of the labor force calls for special attention.

Suggestions

Based on the findings, the following suggestions are recommended:

- More notice for home-related accidents especially fire
- More precise inspection for recording time, causes of

accidents also, degree of injuries

- Since the accidents in the summer are more than the other seasons so, more effective measures are necessary to prevent the accidents
- To mobilize all facilities especially in the summer can be effective in reducing annual accident numbers
- The causes, type, and degree of injuries should be reordered at the time of completing of recording forms
- Recording the occurrence time of accidents in terms of the 24 h mandatory.

In addition, common recommendations based on KFD staffs comments are as below:

- Fire stations with more equipment should be developed
- Educational programs for unprofessional and professional people to reduce the accidents.

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Conflicts of interest

There are no conflicts of interest.

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