

REVIEW OF SCHOOL FIRES IN IRAN: THE CAUSES, CONSEQUENCES AND LESSONS LEARNED

FEUX D'ÉCOLES EN IRAN: CAUSES, CONSÉQUENCES ET LEÇONS RETENUES

Rezabeigi Davarani E.,¹ Nekoei-Moghadam M.,¹ Daneshi S.,² Khanjani N.,¹✉ Kiarsi M.¹

¹Kerman University of Medical Science, Kerman, Iran

²Jiroft University of Medical Science, Jiroft, Iran

SUMMARY. Fire in Iranian schools has led to death, serious injury and disability for dozens of students and teachers. The aim of this study was to explore the causes, consequences and lessons learned from school fires in Iran. The available literature, including scientific texts, previous research and media reports, was searched using English and Persian keywords. The keywords were: “students, school, Iran, fire, burn and incidents”. No time limitation was imposed. Results showed that 62 school and student dormitory fires have been reported in Iran, of which 14 school fires and 2 student dormitory fires led to human injuries or casualties (25.8%). In these incidents, thirty students (19 girls and 11 boys) and one teacher died. More than 60 students, 8 teachers, and 2 staff suffered burn injuries or disabilities. The main causes of the fire incidents were use of non-standard kerosene heaters (38.7%) and faulty electrical wiring (35.4%). Lack of knowledge about dealing with accidents, inappropriate physical conditions of the school building, lack of fire extinguishers in the building, and carelessness were the main reasons for the deaths and injuries. In conclusion, it is essential to reduce the incidence of fire and prevent its casualties with proper management and standardization of school buildings.

Keywords: fire incidents, schools, students, causes, consequences, lessons learned

RÉSUMÉ. Les incendies dans les écoles iraniennes ont tué, gravement blessé et handicapé de nombreux enfants et enseignants. Cette étude a pour but d'explorer les causes, conséquences et implications de ces accidents. Nous effectués une recherche bibliographique, dans les revues scientifiques comme générales, à partir des mots « élèves, école, Iran, incendie, brûlure, accident », sans limite temporelle. Nous avons ainsi trouvé 62 incendies d'école ou de dortoir dont 25,8% responsables de victimes (14 écoles et 2 dortoirs) parmi lesquelles 30 élèves (19 filles, 11 garçons) et 1 enseignants sont morts. Plus de 60 élèves, 8 enseignants et 2 autre membres de l'encadrement ont été brûlés ou handicapés. Les 2 origines les plus fréquentes sont les chauffages à kérosène (38,7%) et les réseaux électriques défectueux (35,4%). Les accidents corporels étaient le plus souvent liés à la méconnaissance des consignes en cas d'incendie, à la vétusté de l'école, à l'absence d'extincteurs, au défaut d'entretien général des bâtiments. La réduction de l'incidence des incendies d'école passe par une réglementation appropriée sur la construction et l'entretien des bâtiments.

Mots-clés : incendies, écoles, élèves, causes, conséquences, prévention

✉ Corresponding Author: Prof Narges Khanjani, Department of Epidemiology and Biostatistics, School of Public Health, Kerman University of Medical Sciences, Kerman, Iran. Tel/Fax: +98 (0)34 3132 5102; email: n_khanjani@kmu.ac.ir
Manuscript: submitted 20/09/2019, accepted 20/09/2019

Introduction

Burn injuries are a major public health issue, and can cause mortality, disability, physical complications and psychological consequences such as anxiety, depression, post-traumatic stress disorder and impaired self-esteem in children and adolescents. They can also cause economic problems for their families.¹⁻³ Parameters such as lifestyle, the energy source, and the social, economic and cultural level of the society can affect the amount and the type of burning.¹ The consequences of a fire incident also depend on the behaviour of the building's occupants.^{4,5} Studies have shown that human unsafe behaviour is a major cause of most fire incident consequences.⁵⁻⁷

Globally, more than 300,000 people die each year from fire-related burns^{8,9} and more than 95% of deaths caused by burn occur in developing countries.^{1,2,9}

Iran is one of the countries with a high rate of burn incidents.¹ About 725 thousand burns happen each year in Iran. After traffic accidents, burn injury is the second cause of death among children in Iran.¹⁰

Children are a high-risk group for burn injuries and have the highest mortality.^{8,10-12} Children younger than 14 years are more vulnerable to the effects of hazardous environmental exposures,¹² because they have less knowledge about dangerous situations and a limited ability to react promptly and properly.⁸ They also panic easily and become difficult to manage in the event of an emergency or crisis.¹³

Several school fire incidents with tragic consequences have happened in recent years in Iran.^{7,14} These incidents have also been reported from other countries including Kenya, South Korea, China, Saudi Arabia, India and Russia, where more than a hundred children and adolescents have died or become injured,^{15,16} despite the fact that educational buildings should be safe places for them¹⁷ as they spend one-third of their daily time at school.¹⁸

Most burns are preventable with simple safety measures and preventive programs.^{1,2,8} Developed countries have successfully decreased burn rates over the past 30 to 40 years.⁸ Careful planning to provide safe conditions in schools is one of the most important tasks of the Ministries of Education and the health services system of countries.¹⁷

Information about the causes of school fire incidents

can improve school safety conditions and offer cost-effective solutions for prevention. The results of this study can be useful for managers and policy makers to make appropriate decisions and policies to prevent school fire incidents.

The aim of this study was to explore the causes, consequences and lessons learned from school fires in Iran.

Materials and methods

It is difficult to determine the total number of school fire incidents because there is no specific database for them.⁷ Therefore, in this study, in order to obtain a description of school fire incidents, their causes and consequences in Iran, the available literature, including scientific texts, previous research and media reports, was searched using English and Persian keywords. The keywords were "students, school, Iran, fire, burn and incidents". No time limitation was imposed.

Results

Fifty-six school fires and 6 student dormitory fires have been reported from 1995 to 2019 in urban and rural areas of Iran. Of these, 14 school fires and 2 student dormitory fires had human injuries or casualties (25.8%).

Fifty fires occurred while students were in the school building (80.6%). In most schools, adverse consequences have been prevented with immediate evacuation and fire extinguishing by teachers, school staff and firemen (84%). In 16 buildings, fire extinguishing and evacuation of the students was carried out by teachers and school staff, and there was not much damage to the buildings and equipment (32%). It was not possible to evacuate students at 4 schools due to the exit routes being blocked (8%).

In these incidents, 30 students (19 girls and 11 boys) and 1 teacher died in total. More than 60 students, 8 teachers, 2 staff and 3 firemen suffered burn injuries. Of these, 2 teachers and 21 students suffered severe burn injuries or disabilities (29.4%). Also, partial and severe damage happened to 46 buildings. Most fire incidents with human injuries and casualties occurred in rural areas (62.5%). Most fire incidents happened in Sistan & Baluchestan (11.3%). A total of

45.1% of deaths (13 students and one teacher) were related to the Sefilan fire incident, and 29.03% were related to fire incidents in the Sistan & Baluchestan province. The most severe injuries and disabilities were related to the Shin Abad (52.1%) and Droodzan (34.8%) fire incidents. The cause of death was smoke inhalation in three students (9.7%), and the other

deaths were due to severe burns (90.3%).

The frequency of fire incidents, and their causes and consequences in Iranian schools are listed in *Table I*.

A summary of Iranian school fire incidents, with their human injuries and casualties, has been listed in *Table II*.

Table I - Frequency of fire incidents, causes and consequences in Iranian schools

Province, Year	Number of fires reported	Fires with human injuries and casualties	Number of deaths	Number of injuries	Number of severe injuries or disabilities	Cause				
						Kerosene heating system	Faulty electrical wiring	Unknown	Defects in central heating system	Others
Sistan and Baluchestan 2019 ^{44,55,65} 2018 ¹⁴ 2016 ⁶⁷ 2011 ⁴³ 2010 ⁴²	7	4	9	16 (burn & poisoning)	1	3	4	0	0	0
Gilan 2019 ⁶⁴ 2016 ³⁴ 2014 ³⁶ 1998 ³⁷ 1996 ²⁰	5	4	6	17	1	2	2	0	1	0
Western Azerbaijan 2018 ⁴⁹ 2017 ⁷² 2013 ⁷⁴ 2012 ^{7,40}	5	2	2	29 (burn) 1 (fall)	12	4	1	0	0	0
Tehran 2019 ^{61,32} 2018 ^{77,29} 2017 ⁵⁷	5	1	0	4	0	0	3	1	1	0
Razavi Khorasan 2017 ^{33,23} 2016 ³¹ 2014 ²²	5	0	0	0	0	1	0	4	0	0
Lorestan 2019 ²⁸ 2018 ⁵² 2017 ^{53,25}	4	0	0	0	0	1	1	1	0	1
Ardebil 2018 ⁶³ 2017 ⁶⁰ 2016 ³⁸ 2013 ⁷⁰	4	1	0	1	0	2	2	0	0	0
Fars 2018 ²¹ 2015 ²⁴ 2006 ⁴⁶	3	1	0	8	8	1	0	1	1	0
Mazandaran 2019 ⁴⁷ 2012 ⁹¹ 2007 ³⁹	3	1	0	1	1	1	2	0	0	0
Kerman 2019 ⁵⁴ 2014 ⁶⁸	2	0	0	0	0	0	2	0	0	0
North Khorasan 2017 ⁴⁸ 2008 ⁷⁶	2	0	0	0	0	2	0	0	0	0
Bushehr 2018 ³⁵ 2015 ⁵⁰	2	1	0	1 (severe poisoning)	0	1	0	0	0	1
Kermanshah 2017 ⁵¹ 2016 ⁶⁶	2	0	0	0	0	1	1	0	0	0
Khuzestan 2019 ^{56,26}	2	0	0	0	0	0	1	0	0	1
Golestan 2019 ⁷⁵ 2017 ⁵⁹	2	0	0	0	0	1	1	0	0	0
Kurdistan 2017 ³⁰ 2016 ⁷³	2	0	0	0	0	0	1	1	0	0
Southern Khorasan 2012 ⁷¹	1	0	0	0	0	1	0	0	0	0
Hormozgan 2017 ²⁷	1	0	0	0	0	0	0	1	0	0
Kohkiluyeh and Boyerahmad 2018 ⁵⁸	1	0	0	0	0	0	1	0	0	0
Hamedan 2017 ⁶²	1	0	0	0	0	1	0	0	0	0
Markazi 2019 ⁹²	1	0	0	0	0	0	0	0	0	1
Eastern Azerbaijan 2015 ⁶⁹	1	0	0	0	0	1	0	0	0	0
Chehar Mahal Bakhtiari 2005 ⁴¹	1	1	14	0	0	1	0	0	0	0
23	62	16	31	78	23	24	22	9	3	4

Table II - Summary of Iranian school fire incidents with casualties or human injuries

Date	Province	Location	Urban/ Rural	Type of school	Number of students killed		Number of students injured		Teachers, Staff and Firemen	
					Girls	Boys	Girls	Boys	Killed	Injured
1996	Gilan ^{20,78}	Rasht	Urban	Private, Primary School	6	0	1	0	0	0
1998	Gilan ^{37,78}	Bijar sar	Rural	Public, Primary School	0	0	0	11	0	1
2005	Chehar Mahal Bakhtiar ^{41,19}	Sefilan	Rural	Public, Primary School	7	6	0	0	1	0
2006	Fars ⁴⁶	Droodzan	Rural	Public, Primary School	0	0	6	2	0	0
2007	Mazandaran ³⁹	Nosratkala	Rural	Public, Primary School	0	0	0	0	0	1
2010	Sistan & Baluchestan ⁴²	ChahRahman	Rural	Public, High School Dormitory	0	1	0	14	0	0
2011	Sistan & Baluchestan ⁴³	Chabahar	Urban	Public, High School Dormitory	0	4	0	1	0	0
2012	Western Azerbaijan ⁷	Shin abad	Rural	Public, Primary School	2	0	27	0	0	1 staff 1 teacher
2012	Western Azerbaijan ⁴⁰	Etehad	Rural	Public, Primary School	0	0	0	0	0	1 fireman (fall)
2014	Gilan ³⁶	Rezvanshahr	Urban	Public, Primary School	0	0	0	0	0	3
2016	Gilan ³⁴	Mousakala	Rural	Public, Primary School	0	0	0	0	0	1
2016	Ardebil ³⁸	Hammamlou	Rural	Public, Primary School	0	0	0	0	0	1
2018	Bushehr ³⁵	Abpakhsh	Urban	Public, Primary School	0	0	0	0	0	1 (severe poisoning)
2018	Sistan & Baluchestan ^{45,14}	Zahedan	Urban	Private, Primary School	4	0	0	0	0	0
2019	Tehran ³²	Tehran	Urban	Private, Primary School	0	0	0	0	0	3 firemen 1 staff
2019	Sistan & Baluchestan ⁴⁴	Polegi	Rural	Public, Primary School	0	0	0	1	0	0
Total	16		Urban=6 Rural=10	Public=13 Private=3	19	11	34	29	1	15

The main causes of the fire incidents were use of non-standard kerosene heaters (38.7%) and faulty electrical wiring (35.4%). Other causes were defects in the central heating system (4.8%), welding, laboratory fire, exposure of inflammable material to gas heaters (6.4%) and unknown (14.5%). Most of the fires were in primary schools (65.5%).

Lack of knowledge about dealing with accidents, inappropriate physical conditions of the school building, lack of fire extinguishers in the building, and carelessness were the main reasons for the deaths and serious injuries.

The causes and factors related to injuries, and a description of the incidents, are listed in *Table III*.

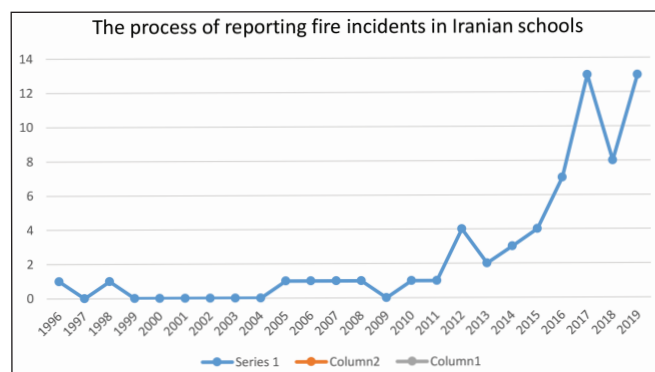
**Fig. 1** -The process of reporting fire incidents in Iranian schools

Table III - The causes of incidents and security measures that were violated in these incidents

School fire incident	Cause	Security measures that were violated
Rasht (1995) ^{20,78}	Lack of a standard and safe heating system (kerosene heater)	No fire extinguishers
Bijar sar (1998) ^{37,78}	Lack of a standard and safe heating system The kerosene heater was turned over by the wind	1. The class door got shut and it didn't have an inside handle 2. No fire extinguishers
Sefilan (2005) ^{41,19}	A faulty kerosene heater	1. Teachers and staff were not trained in dealing with this incident and the heater on-fire was transferred to the school corridor 2. Two 20-litre kerosene containers were located near the classrooms xx 3. No fire extinguishers 4. The class exit route was blocked by fire 5. Fence on class windows blocked the students' evacuation from the window
Droodzan (2006) ⁴⁶	Lack of a standard and safe heating system A student's dress hit the kerosene heater and overturned it	1. Crushed nylon was used instead of the kerosene tank door 2. Students were not evacuated on time 3. There were no fire extinguishers 4. Fence on class windows blocked students' evacuation from the window 5. The class exit route was blocked by fire
Nosratkela (2007) ³⁹	A faulty kerosene heater	No fire extinguishers
ChahRahman (2010) ⁴²	Faulty electrical wiring	1. Electrical wires had not been inspected. A short circuit started the fire 2. The fire happened at bedtime and there were no fire alarms to wake people
Chabahar (2011) ⁴³	Faulty electrical wiring	1. Improper use of an electricity outlet caused a circuit 2. The fire happened at bedtime and there were no fire alarms to wake people
Shin abad (2012) ⁷	A faulty kerosene heater	1. Students were not evacuated on time 2. Portable fire extinguisher had expired 3. No training on how to use the fire extinguisher 4. Teachers and staff were not trained in dealing with the incident 5. The flaming stove was carried out of the classroom by the staff instead of them evacuating the students, and the stove fell on the exit route 6. Fence on class windows blocked the students' evacuation from the window
Etehad (2012) ⁴⁰	Faulty electrical wiring	No inspection had been done by authorities on the electricity system of the school building
Rezvanshahr (2014) ³⁶	Faulty electrical wiring	No inspection had been done by authorities on the electricity system of the school building
Mousakela (2016) ³⁴	A defect in the central heating system	No inspection had been done by authorities on the central heating system of the school building
Hamamlou (2016) ³⁸	A faulty kerosene heater	Not removing kerosene heaters from schools
Abpakhsh (2018) ³⁵	Laboratory fire and carbon monoxide emissions	-
Zahedan (2018) ^{45,14}	Lack of a standard and safe heating system (kerosene heater)	1. Inappropriate building, with wooden partitioning between classes that caused a rapid spread of fire 2. The class' exit route was narrow and was blocked by fire 3. Evacuation was not done on time 4. A gallon of kerosene was laid beside the heater 5. No inspection had been done by authorities on the physical condition of the school building 6. The teachers and staff had not been trained on how to deal with these incidents 7. Students did not have knowledge or training about the appropriate actions they should take during these incidents
Tehran (2019) ³²	A defect in the central heating system Gas leak in the engine compartment and a minor explosion	No inspection had been done by authorities on the central heating system of the school building
Polegi (2019) ⁴⁴	Lack of a safe and standard heating system (kerosene heater)	1. The student had refuelled the kerosene heater 2. School safety regulations were neglected

Discussion

Until now, 62 school fire events have been reported in Iran^{7,14,19-77} (Fig. 1). Fire in Iranian schools has led to death, serious injury and disability in dozens of students and teachers, and has created serious psychological and social complications for the victims and their families.^{7,14,19,32,34-46}

The causes of fire in Iranian schools were use of kerosene heaters and non-standard heating systems, faulty wiring and/or improper use of electricity devices.^{7,14,19,36-77}

Inappropriate and unsafe buildings, neglecting school safety regulations, lack of supervision on the physical condition of the school building by officials, not training teachers and staff about dealing with fire incidents and proper decision-making, not teaching students about appropriate action at the time of an incident, blockage of the class exit by fire, not evacuating students on time, not having intact fire extinguishers, or not knowing how to use them, lack of an alarm system, and installing a metal fence on class windows were the most important causes of the incidents.^{7,14,19-79}

Knowledge about dealing with accidents, timely evacuation of students, existence of fire extinguishers, and timely extinguishing of the fire by teachers, school staff and firemen had been able to prevent deaths and injuries in most of the fires.^{33-39,63-72} Authorities at the Department of Education must learn from these incidents and reduce the likelihood of injury with proper management.

Fire safety management includes activities and programs that prevent damage from fire. Elements of a fire safety management program are inspection, education, fire suppression, emergency services, evaluation of fire possibility, fire prevention, reporting, record-keeping and communication.¹³

Since 2013, standardization of heating systems has begun in Iran.⁷⁸ In spite of measures taken to prevent fires in schools, fire incident reports have increased in recent years. This is probably due to more accurate reporting of events.

According to a statement from the Head of Schools' Equipping and Renovating Organization on 19th December 2018, more than 40% of schools were not equipped with standard heating systems.⁷⁹ In a

2013 report, 30% of schools, which were mainly located in the disadvantaged areas of Iran, used non-standard kerosene heaters to warm classrooms.⁷ The Ministry of Education, as the most important institution for training human resources and generating social capital, needs financial support to equip schools.

As international standards prohibit the direct use of gas or kerosene heaters in classrooms,⁷⁸ central heating systems are the most suitable option for heating classrooms because students cannot interfere with their settings. In areas where this system cannot be used, other safe and standard heating appliances should be used.^{78,80} In Iran, according to an official report, all newly established schools in the cities are equipped with a central heating system.⁸⁰ Also, in order to prevent fire from faulty electrical systems, the school's electricity system should be safe and standard, and it should be installed by qualified technicians or specialists.¹³

In some of the fires in Iranian schools, rescue operations were delayed due to the exit route being blocked, and to the metal fences that covered the windows. In Shin Abad, the metal fences were broken by local rescuers to rescue the children, but because of the delay, students were injured before rescue.⁷ According to the fire department report, the design of some school buildings in Iran is such that fire engines cannot enter, and this delays the extinguishing of the fire.²⁵

Educational buildings should be designed appropriately and according to international standards. These buildings and the materials used in them must be resistant to fire. School buildings must get inspected, must obtain a safety certification from the fire department, and should enforce building codes. Emergency evacuation is possible in a short time. Extra things such as desks, shelves, etc. should be removed from the exit routes. The doors of all classes must have a suitable handle and open to outside. Windows must not have a fence and must open easily in emergencies. All schools should be equipped with fire alarm systems for early detection of fires.^{13,80}

In the pre-school and elementary school fire in Zahedan, the students had taken shelter under their desks and in the corner of the classroom instead of

leaving. Students must receive the necessary training and knowledge about protective measures and the actions they should take at the time of a fire.⁸¹ Studies have shown that safety programs and training have a major impact on knowledge and accident prevention behaviours of students.⁸¹⁻⁸⁶

In the Shin Abad accident, there was fire-fighting equipment but it had either expired or the staff didn't know how to use it.⁷ All schools should be equipped with intact fire extinguishers for rapid fire-fighting. This equipment should be checked regularly and replaced. An emergency evacuation plan should be prepared beforehand and roles and responsibilities should be defined clearly. Fire preparedness exercises should be conducted at least once a year to identify strengths, weaknesses and challenges, and facilitate knowledge transfer among staff and students.⁸⁷ Emergency evacuation maps should be prepared, the escape routes must be clearly marked and all fire exit signs should be located in places that clearly indicate escape routes.¹³

In the elementary school fire in Bijar sar, proper and timely evacuation by the teacher prevented the severe injury or death of thirty students. But he himself was locked in the classroom because the door had no inside handle. His head, face and hands suffered severe burns. This devoted teacher lost his life in 2012 after years of suffering from burns and disabilities.³⁷

In the Sefilan fire, despite timely evacuation of students by the teacher, with a wrong decision, the heater that was on fire was transferred out of the classroom and put close to kerosene gallons. The fire then spread to other classrooms.¹⁹ Teachers and school staff, being those who have a major role in dealing with the fire, must have the necessary training for proper and correct decision-making at the time of the incidents, and know how to work fire-fighting equipment.

Fire affects students' physical, psychological and social health and even students who don't get injured may suffer from these consequences. They may face problems such as "acute stress disorder" or "post-traumatic stress disorder". Parents and teachers need to be aware of the range of symptoms that children and adolescents may show after a fire incident and receive the necessary training. The

traumatized students should be identified and followed up. Teachers and other school staff also need psychological support because of exposure to stressful conditions, and all school students should be counselled.^{19,88}

After the Shin Abad school fire, the national plan of "a student ready for hard days" was developed and implemented in Iran. This plan is offered to first-year secondary school students, who have the ability and time to learn relief skills. During the 6 years of implementation of this plan, students at 8,000 schools have been trained in basic relief lessons across the country. The training is conducted by Red Crescent educators. So far, over one million students have received relief training. This plan is funded by the Red Crescent, but it is not enough, and other institutions and agencies should be involved to assist more students in relief education.⁸⁹

In the 20th century, 73 major United States fire or burn disasters have occurred; but with the lessons learned from each fire, the number of fatalities per incident has steadily decreased.⁹⁰

In Iran, the Fire-fighting and Safety Services Organization has provided school safety guidelines in three sections of building safety, safety in fire-fighting facilities and equipment, and in cooperation with the Ministry of Education has implemented this plan in all schools. It also has school-specific activities by conducting safety training and fire-fighting exercises. Also, a school safety checklist is now used by the Ministry of Education to check and control security and safety issues in schools nationwide.⁸⁰

Conclusion

The causes of the fire incidents in Iranian schools and dormitories were mainly use of non-standard kerosene heating systems and electrical defects.

Various factors, most of them preventable and related to human behaviour, have led to the death, severe injury, or disability of dozens of students and teachers in Iran. It is essential to reduce the incidence of fires and prevent their casualties with proper management and standardization of buildings.

BIBLIOGRAPHY

- 1 Hashemi SS, Sharhani A, Lotfi B, Ahmadi-Juibari T et al.: A systematic review on the epidemiology of pediatric burn in Iran. *J Burn Care Res*, 38(6): e944-e51, 2017.
- 2 Torabian S, Saba MS: Epidemiology of paediatric burn injuries in Hamadan, Iran. *Burns*, 35(8): 1147-51, 2009.
- 3 Esselman PC: Burn rehabilitation: an overview. *Archives of physical medicine and rehabilitation*, 88(12): S3-S6, 2007.
- 4 Kobes M, Helsloot I, De Vries B, Post JG: Building safety and human behaviour in fire: a literature review. *Fire Safety Journal*, 45(1): 1-11, 2010.
- 5 Khorasani-Zavareh D, Shokouhi M: Collapse of the Plasco Building due to fires and its lessons learnt. *Safety Promotion and Injury Prevention*, 5(3): 120-4, 2018.
- 6 Ballard JE, Koepsell TD, Rivara FP, Van Belle G: Descriptive epidemiology of unintentional residential fire injuries in King County, WA, 1984 and 1985. *Public Health Reports*, 107(4): 402-8, 1992.
- 7 Ostad Taghizadeh A, Mowafi H, Ardalan A: School fire in Iran: simple actions save lives. *Ann Burns Fire Disasters*, 26(1): 44-47, 2013.
- 8 Arifuzzaman M, Muhammad F, Farahnaz S, Chowdury A et al.: Burn prevention and first aid knowledge among high school students in Bangladesh. *Daffodil Int Univ J Allied Health Sci*, 3(1): 41-9, 2016.
- 9 Stander M, Wallis LA: The emergency management and treatment of severe burns. *Emergency Medicine International*, 2011.
- 10 Kazemzadeh J, Vaghardoost R, Dahmardehei M, Rabiepoor S et al.: Retrospective epidemiological study of burn injuries in 1717 pediatric patients: 10 years analysis of hospital data in Iran. *Iranian Journal of Public Health*, 47(4): 584-590, 2018.
- 11 Berber G, Arslan MM, Özdeş T: Childhood deaths resulted from burn injuries in Diyarbakır. *Eur J Gen Med*, 6(1): 25-7, 2009.
- 12 Mondozi MA, Harper MA: In search of effective education in burn and fire prevention. *J Burn Care Rehabil*, 22(4): 277-81, 2001.
- 13 Nadzim N, Taib M (eds.): Appraisal of fire safety management systems at educational buildings. *SHS Web of Conferences, EDP Sciences*, 2014.
- 14 Heidari M, Jafari H, Heidari S: Zahedan school fire: endless fire incidents in Iranian schools. *Disaster Medicine and Public Health Preparedness*, 2019: 1-4, 2019.
- 15 Kholshchikov V, Samoshin D, Parfenenko A (eds.): Pre-school and school children building evacuation. *Proceedings of the Fourth International Symposium on Human Behaviour in Fire*, 2009.
- 16 Walia A, Satapathy S: Review of Kumbakonam school fire in India: lessons learned. *J Emerg Med*, 5: 58-62, 2007.
- 17 Dehghani M, Rozzstami F, Javaheri MR, Shahsavani S, Shamse-dini N: The survey on the physical school environmental health conditions in Kazeroon from 2013 to 2014: an analytical descriptive study. *International Journal of School Health*, 2(2): e23679, 2015.
- 18 Hoseini R, Azhdarpoor A: Assessment of environmental health and safety status of public and private schools in Shiraz City in educational year of 2014. *International Journal of School Health*, 3(2); e27698, 2016.
- 19 Omidvari S: Crises in schools: outcomes and the future actions. *Payesh*, 11(6): 777-783, 2012.
- 20 Khabarfarsi.com: School fires from Soodeh Rasht to Osveh Hasaneh Zahedan. [https://khabarfarsi.com/u/63706725], December 2018.
- 21 Yjc: A school fire was extinguished in Kazeroon [https://www.yjc.ir/fa/news/6473291], March 2018.
- 22 Akharinkhabar: Accidents / A girls' boarding school was on fire in Gonabad [http://akharinkhabar.ir/social/1258684], December 2014.
- 23 Irna: fire at a school lab in Sabzevar [https://www.irna.ir/news/82565722], June 2017.
- 24 Dana: The chapel of a school was on fire in Sepidan [http://www.dana.ir/news/433937.html], September 2015.
- 25 Tasnimnews: Details of the fire at Khorramabad Zeinabieh school [https://www.tasnimnews.com/fa/news/1396/08/23/1574367], November 2017.
- 26 Mehrnews: Details of the fire at Shadegan boarding school [https://www.mehrnews.com/news/4507900], January 2019.
- 27 Isna: Fire at Imam Khomeini School in Kurriyeh Village [http://khalijefars.isna.ir/default.aspx?NSID=5&SSLID=46&NID=46949], October 2017.
- 28 Iribnews: A fire broke out at an elementary school in Tapeh Mola village in Borujerd [http://www.iribnews.ir/fa/news/2318475], January 2019.
- 29 Mashreghnews: Fire at a high school in Tehran [https://www.mashreghnews.ir/news/850352], April 2018.
- 30 Isna: The school fire had no casualties in Banizaran village of Baneh [https://www.isna.ir/news/95110604201], January 2017.
- 31 Irna: Fire at a Boys' High School in Mashhad [https://www.irna.ir/news/82280309], October 2016.
- 32 Irna: There were four injuries at a school gas leak in Tehran west [https://www.irna.ir/news/83280174], April 2019.
- 33 Yjc: Fire at a school auditorium [https://www.yjc.ir/fa/news/6085632], May 2017.
- 34 Rankoohnews: Fire at Valiasr school in Musa Kela [http://rankoohnews.ir/news/31583], February 2016.
- 35 Mashreghnews: A teacher saved the lives of 27 students [https://www.mashreghnews.ir/news/908104], November 2018.
- 36 Tasnimnews: A fire-injured of Rezvan Shahr school fire was taken to the Anzali hospital [https://www.tasnimnews.com/fa/news/1392/12/18/307758], March 2014.
- 37 Tasnimnews: A teacher burned in the fire because of the love of his students [https://www.tasnimnews.com/fa/news/1393/05/04/442674], July 2014.
- 38 Salamatnews: fire at a school / Again a teacher sacrificed himself [http://www.salamatnews.com/news/200743], December 2016.
- 39 Aftab: Save the lives of 37 students by a dedicated teacher [https://www.aftabir.com/news/view/2007/jan/10/c9c116843090_5_adventure_iran_fire.php], January 2007.
- 40 Farsnews: A partial fire at Salmas Etehad school [https://www.farsnews.com/news/13910917000612], December 2012.
- 41 Yjc: Anniversary of the fire incident at a village school in Lordgan Sefilan [https://www.yjc.ir/fa/news/6782282], January 2019.
- 42 Mehrnews: The fire killed a student at a boarding school [https://www.mehrnews.com/news/1188693], November 2010.
- 43 Hamshahronline: the fourth student died in Chabahar fire incident [https://www.hamshahronline.ir/news/150856], November 2011.
- 44 Asrehamoon: Third consecutive school fire in Sistan & Baluchistan / One boy student burned [http://www.asrehamoon.ir/fa/doc/interview/107098], January 2019.

- 45 Irna: The shock of a private school fire in Zahedan [https://www.irna.ir/news/83139506], December 2018.
- 46 Salamatnews: A bitter report of a fire incident at the Fars Druzen School [http://www.salamatnews.com/news/89607/interview-18], December 2013.
- 47 Yjc: Fire at a school in Mahmoudabad [https://www.yjc.ir/fa/news/6904721], April 2019.
- 48 Tasnimnews: The fire at a Shirvan classroom had no casualties [https://www.tasnimnews.com/fa/news/1395/10/28/1298830], January 2017.
- 49 Isna: No students were injured in the Khoj Googerd school fire incident [https://www.isna.ir/news/96121407301], March 2018.
- 50 Mashreghnews: Details of the fire at a rural school in Bushehr [https://www.mashreghnews.ir/news/509231], December 2015.
- 51 Mehrnews: Fire at Hajar Girls' School in West Islamabad [https://www.mehrnews.com/news/3887432], January 2017.
- 52 Yjc: Fire at Girls' School in Kuhdasht [https://www.yjc.ir/fa/news/6459518], March 2018.
- 53 Tasnimnews: Details of a school fire in Lorestan province [https://www.tasnimnews.com/fa/news/1395/11/23/1325175], February 2017.
- 54 Khabarfoori: Fire at a boy's high school in South Rudbar [https://www.khabarfoori.com/detail/874690], February 2019.
- 55 Iribnews: Fire at a school library in Zahedan [http://www.iribnews.ir/fa/news/2395342], April 2019.
- 56 Iribnews: the fire was extinguished at School in Sarhanieh [http://www.iribnews.ir/fa/news/2329858], January 2019.
- 57 Irna: fire closed an elementary school in Tehran [https://www.irna.ir/news/82674973], September 2017.
- 58 Sobhezagros: A girls' elementary school was on fire in Gachsaran Dale village [http://sobhezagros.ir/News/113388.html], December 2018.
- 59 Iribnews: A school was on fire in Ghodna village of Kalaleh [http://www.iribnews.ir/fa/news/1544416], March 2017.
- 60 Mehrnews: A girls' school fire in Meshkinshahr / 300 students are uncertain [https://www.mehrnews.com/news/4081544], September 2017.
- 61 Isna: A school fire in west Tehran [https://www.isna.ir/news/97122915216], March 2019.
- 62 Isna: A fire broke out at a school in Seif Abad village [https://www.isna.ir/news/95111913250], February 2017.
- 63 Irna: A fire was extinguished in a student dormitory in Garmi [https://www.irna.ir/news/83152358], December 2018.
- 64 Isna: A fire was extinguished in one of the schools in Rasht [https://www.isna.ir/news/97111609128], February 2019.
- 65 Khabaronline: fire at a Pre-school in Zahedan [https://www.khabaronline.ir/news/1218350], January 2019.
- 66 Yjc: a devoted teacher prevented a class fire [https://www.yjc.ir/fa/news/5913017], December 2016.
- 67 Dana: a human disaster was prevented by the timely action of firefighters [http://www.dana.ir/news/961157.html], November 2016.
- 68 Mehrnews: Ali Abad village school fire due to faulty electrical wiring/The students were saved [https://www.mehrnews.com/news/2209515], January 2014.
- 69 Isna: Again the kerosene heater of the school caused an accident [https://www.isna.ir/news/94090805429], November 2015.
- 70 Irna: A fire was extinguished at a rural school with no casualties in Meshkinshahr [https://www.irna.ir/news/80486751], January 2013.
- 71 Khabaronline: Fire at a elementary school in Tabasin village in South Khorasan [https://www.khabaronline.ir/news/264513], December 2012.
- 72 Yjc: The fire at Sardasht rural school had no casualties [https://www.yjc.ir/fa/news/6032820], April 2017.
- 73 Kurdtoday: A rural school fire in Kurdistan due to faulty electrical wiring [http://kurdtoday.ir/news/13808], February 2016.
- 74 Irna: Heater fire in a rural school classroom in Mahabad [https://www.irna.ir/news/80964199], December 2013.
- 75 Akharinkhabar: The Kurdkouy Rastegaran School was on fire [http://akharinkhabar.ir/local/5320893], June 2019.
- 76 Mehrnews: Details of the fire at Qaleh Jaq school were described [https://www.mehrnews.com/news/782272], November 2008.
- 77 Yjc: an exceptional school fire in Narmak [https://www.yjc.ir/fa/news/6761190], December 2018.
- 78 Irna: Standardization of schools' heating system, a necessity for accident prevention [https://www.irna.ir/news/82697588], October 2017.
- 79 Iran Online: 42% of school classrooms do not have standard heating system [http://www.ion.ir/news/434111], December 2018.
- 80 Mirsaedie E: Architectural design solutions to increase the safety of schools, against Fire. Disaster Prevention and Management Knowledge Quarterly (DPMK), 8(2): 103-118, 2018.
- 81 Azeredo R, Stephens-Stidham S: Design and implementation of injury prevention curricula for elementary schools: lessons learned. Injury Prevention, 9(3): 274-8, 2003.
- 82 Morrongiello BA, Schwebel DC, Bell M, Stewart J, Davis AL: An evaluation of The Great Escape: can an interactive computer game improve young children's fire safety knowledge and behaviors? Health Psychology, 31(4): 496, 2012.
- 83 Kendrick D, Groom L, Stewart J, Watson M et al.: "Risk Watch": Cluster randomised controlled trial evaluating an injury prevention program. Injury Prevention, 13(2): 93-9, 2007.
- 84 Harré N, Coveney A: School-based scalds prevention: reaching children and their families. Health Education Research, 15(2): 191-202, 2000.
- 85 Park KM, Jeon KM, Kim MY, Lee ES et al.: The effects of a safety management program on safety accident-related knowledge, attitude and behavior of elementary school students in Korea. Journal of Korean Academy of Community Health Nursing, 21(2): 220-8, 2010.
- 86 Kim S-J, Kang S-R, Lee S-H, Kang K-A: The effect of coping knowledge on emergency preparedness in elementary school students. The Journal of School Nursing, 30(5): 349-57, 2014.
- 87 Biddinger PD, Savoia E, Massin-Short SB, Preston J, Stoto MA: Public health emergency preparedness exercises: lessons learned. Public Health Reports, 125(5_suppl): 100-6, 2010.
- 88 Satapathy S, Walia A: Intervening with the process of recovery from a traumatic life event: case study of a child victim of a school fire disaster in India. Australian e-Journal for the Advancement of Mental Health, 5(3): 195-201, 2006.
- 89 Irna: The Shinabad incident prompted the Red Crescent's plan [https://www.irna.ir/news/83059852], October 2018.
- 90 Barillo DJ, Wolf S: Planning for burn disasters: lessons learned from one hundred years of history. J Burn Care Res, 27(5): 622-34, 2006.
- 91 Bloghnews.com: Fire at Amol Girls' School [http://www.bloghnews.com/doc/news/9165], September 2012.
- 92 Yjc.ir: Fire at a boarding school in Nobaran Saveh [https://www.yjc.ir/fa/news/6801184], January 2019.