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Health in disasters in Iranian schools: A systematic review

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Mohsen Poursadeqiyani^{2,3}

Abstract:

Iran is disaster-prone country in the world. Lack of awareness and failure to have a proper response to natural disasters cause heavy damages to nations and national assets. Risk management is essential to prevent, intervene, and fight disasters as it can attenuate the destructive effects. The present study reviews studies on health in disasters in Iranian schools with an emphasis on readiness to deal with crises. The study was carried out through a systematic search using keywords in Persian and English in Iranian and international databases such as Google Scholar, SID, Magiran, Web of Sciences, PubMed, and Scopus. The time range of the search included all articles published before September 2020. The reference lists were also checked to find more articles. Totally, 575 articles were found and full-text of 32 articles were examined. After omitting repetitious items, the articles were checked by two independent researchers in terms of inclusion and exclusion criteria so that 15 articles entered the final analysis phases. The target population consisted of students, teachers, managers, and experts of disaster resilience. The articles were mostly focused on earthquake, fire, and structural safety. Implementation of health school models through improving awareness and crisis management knowledge in school officials plays a key role in improving and preserving health in school environment and safety of students. Measures like paying more attention to safety of building and physical space of schools, adding crisis management skills to curriculum as practical educations, informing parents about such risk, and educating students about safety and prevention of risks are recommended.

Keywords:

Crisis, environment, health, safety, school

Introduction

Crisis management is the science of preparing, preventing, and dealing with disasters and crises that await human societies. It has received more attention over the past years.^[1] Crisis management covers five topics of organizing, communication, decision-making, detecting crisis factors, and design. Controlling a crisis is easier when it is possible to organize the forces to deal with it.^[2] Crises attenuate the health and quality of life of man. Thus, the most important step to fight crises and the caused problems is to plan before the occurrence of a crisis and to implement it during and

after it.^[3] Iran is disaster-prone country in the world.^[4] Lack of readiness and failure to demonstrate the proper response to natural crises create heavier damages to nations and assets and some of these damages are irreversible. Natural disaster management can be a way to decrease such costs and keep societies safe against crises.^[5] The safety of educational spaces has become a top concern in the world. Many countries have started to examine and analyze their condition and seek solutions to prevent crises and improve safety in urban spaces.^[6] School is the first society that children experience and with a good educational performance, schools can play a key role in the development of life skills in children. Every child spends 12 years in school where they learn and

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become prepared for life. They have their first experience of social life in school environment. Many mental perceptions, mindsets, beliefs, feedbacks to life in school, and classroom in children are tested and experienced.^[2] Students are one of the main groups exposed to accidents and disasters.^[1] According to the Japan Agency for International Cooperation, disasters have serious effects on educational services. In addition to the lost lives (including teachers and students), the sudden halt of educational activities causes mental disorders in children.^[7] The Earthquake and Tsunami of 2011 in Japan damaged 6000 schools and killed 607 students and teachers.^[8] In 2013 an earthquake in Philippine damaged 604 elementary schools and 92 high schools.^[9] A fire in an elementary school in Zahedan-Iran in 2018 killed four students and set a new record of mortality caused by school fire in Iran.^[10] The experienced crises in the world have shown us that despite the readiness in organizations and relief bodies (state or private) to attend the incident site in time and take required measures, they cannot have expected performance in the face of disasters due to different reasons.^[11] Schools can be completely demolished or become nonfunctional due to earthquake in earthquake-prone regions.^[12] It is possible to improve the safety and structural resistance of schools by implementing structures standard and providing the infrastructures. Through this, schools can be a safe environment and also a shelter for survivors of disasters. A comprehensive crisis management program can prepare managers to face crises that might occur at schools. In addition, they prevent or decrease damages caused by crisis.^[13] Studies have shown that a major part of damages and losses is due to a lack of familiarity with the principles of safety and unsafe environment and failure to use safety equipment. Poor education can be the main reason for this.^[14] The role of proper education in developing knowledge and the right attitude about safety and crisis is unquestionable. Therefore, the best target population to make a change in education style and attitudes about safety issues is children. Doubtlessly, educating, and creating readiness in students have a profound effect on the future safety of any society. The point is that students keep in mind whatever they learn and transfer that to their families.^[15] Given the fact that Iran is located in a disaster-prone region and the importance of students' safety in the education environment, the present systematic review study is health in disasters in Iranian schools with an emphasis on readiness to deal with crises.

Methodology

The study was carried out as a systematic review in all available Iranian and international databases including Web of Science, Magiran, SID, Google Scholar, PubMed, and Scopus. The search included all articles published

at the first publication before September 2020. The keywords were "crisis management, HSE, school, and disaster" and the Farsi equivalents. The references of the found articles were also checked to find articles missed in the search. The articles on schools located in Iran in Persian and English were selected. Articles with incomplete information for data analyses were omitted. After removing duplicate articles, two independent authors checked the articles in terms of inclusion and exclusion criteria.

The flowchart of identifying and selecting articles is illustrated in Figure 1. Out of 575 articles, the full texts of 32 were examined and 14 articles entered the final stage of analysis.

Results

According to the studies that have been searched, the research results of the original articles are given in Table 1 with explanations.

Discussion

The studies on health at schools during crisis in Iran with emphasis on management and readiness to face crises were reviewed. The majority of studies focused on earthquakes, fire, and structural safety. The results showed that junior high schools in Shiraz had the lowest level of readiness.^[28] Schools in Ielam were relatively ready to face earthquake, while they needed improvement in two area of skills and readiness. In addition, the school buildings were in poor condition in terms of structural stability and safety.^[22] Shirzad Kebria showed that the intra-school elements were in a desirable condition in terms of physical aspect, prevention, and intervention. He also reported that the sub-scales of services and health education were at very poor level.^[17] A study by Karande and Rao in India showed that because of absence of instructions

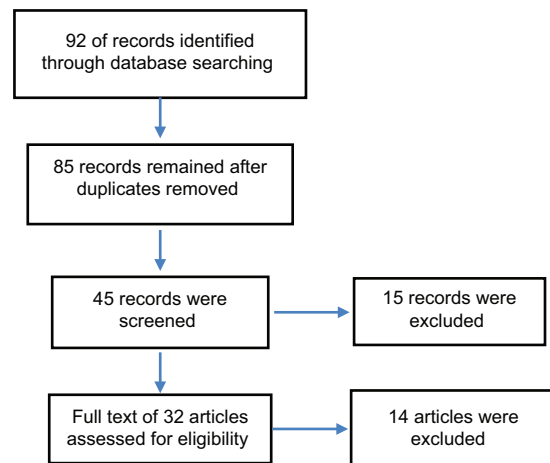


Figure 1: The process of identifying articles

Table 1: Table of list of studies

Row	Study	Years	Population	Region	Sample size	Design	Study method	Outcomes examined Key findings	Outcomes examined
1	Pourahmadi et al. ^[16]	2014	Students	Isfahan	180	Interventional	Questionnaire	Earth quake	If crisis management training programs in schools are accompanied by the necessary continuity and dynamism and the support of families, there will be significant changes in the level of awareness and performance of students during an earthquake
2	Shirzad Kebria ^[17]	2013	School managers	Tehran	170	Descriptive-analytical	Researcher-design questionnaire	School buildings safety and vulnerability	The components within the school in the physical dimension, prevention and intervention are at a desirable level And the sub-component of health services and education has been very weak
3	Nejadshokohi et al. ^[18]	2016	Principles and teachers in schools	Mashhad	Not reported	Analytical survey	Delphi, FAHP pairwise comparison, TOPSIS, and library resources	Crisis in schools	The results show that the most important factors to prepare for coping with crisis in schools are safety, observance of the primary standards and committees
4	Hadavandi and Hadavandi ^[13]	2014-2015	Principles and crisis experts	Shiraz	Principles: 110 Experts: 20	Descriptive-survey	Hierarchical analysis process questions and school readiness	Earthquake	Emergency planning and emergency action plans have the highest importance among preparedness programs. The level of readiness of high schools in Shiraz is below the optimal level
5	Mirzaei et al. ^[19]	2018	teachers managers assistants	Yazd	238 teachers 94 principles 35 assistants	descriptiveanalytic	questionnaire	Resilience of schools against natural disasters	The highest score was related to the performance dimension and the lowest score was related to school safety. Optimization of school architecture, building, enhancing organizational interaction, improving education in schools is effective in the resiliency of schools against disasters
6	Vosoughi ^[11]	2015	School space	Khalkhal	28 schools	Descriptive	Checklist	Environmental health and safety assessment of schools in using the crisis management approach	Most of the schools were in a medium level in terms of environmental health and safety and compliance with the national regulations of public health
7	Heidari et al. ^[10]	2019	Students	Zahedan	1 school	descriptive	Library review	Fire outbreaks in school	In the fire, the highest mortality rate has occurred. Increasing awareness of the risk of fire in schools is essential to promoting the culture of fire prevention in society
8	Abdoli et al. ^[21]	2013	Staff and health trainer	Rafsanjan	153 schools	Descriptive	questionnaire	Accidents and disasters	These schools have been the primary equipment for dealing with accidents, but there are no advanced equipment in any of the schools

Contd...

Table 1: Contd...

Row	Study	Years	Population	Region	Sample size	Design	Study method	Outcomes examined Key findings	Outcomes examined
9	Shahi and Esmaily ^[22]	2015-2016	Principals, teachers, students	Ielam	8 principles, 120 teachers 291 students	Descriptive	Questionnaire, interview, check list	Earthquake	Students, managers and teachers were fairly ready to deal with the earthquake, but that wasn't enough preparation. In terms of physical dimension (resistance and building safety), schools have undesirable conditions
10	Taghvae M, Rahmani N ^[5]	2018	School space	Esfahan	142 schools	Applied survey-analytical	Field study	Earthquake	The resilience rate of the region's schools has been poor with respect to the underlying indicators and management. And these schools are vulnerable to potential crises
11	Maleki ^[4]	2018	School structure	Brojerd	32 schools	Descriptiveanalytic and survey	Library studies interview	Vulnerability of school structure	About 43.75% of buildings had high vulnerability. The most weakness in these centers is the safety and structure of these buildings
12	Vahdat and Smith ^[25]	2014	School structure	Iran earthquake prone regions	21 schools	analytical	Sources of data and interview with experts	Earthquake	Most of the buildings need to be resistant or reconstructed
13	Moradian and Nazoik ^[26]	2016-2017	students	Shiraz	332 students	Randomized field trial	Pretest and posttest with questionnaire	Disaster risk education	Educational method using role-playing was more effective than traditional lecture method for students, and it can be considered as a new approach to promote behaviors in disaster risk management
14	Gholami ^[27]	2020	Teachers	Sarchehan	110 teachers	Descriptive	Teacher made questionnaire	Designing and validating a curriculum framework of natural disaster risk reduction education in primary school	The results of factor analysis showed that teaching methods, content and purpose, evaluation methods, materials and resources and logic are the guidelines for reducing risk of natural disasters in primary period

1 for emergency situation management and lack of
 2 adequate physical equipment, trained and skilled staff,
 3 and funding, Indian schools were in poor condition.^[29,30]
 4 According to Mehraein, safety of schools has a vital role
 5 in readiness to face disasters. Based on FAHP results,
 6 the main subscales to improve safety in school were
 7 improving structural safety and resistance against
 8 earthquake.^[3] Taghvae M, Rahmani N. showed that the
 9 number of buildings, floors, classes, fire safety system,
 10 heating system, structure age, type of structure, and
 11 ownership were the fundamental indices of resilience
 12 during disasters. Managerial indices, physical space,
 13 human forces, emergency evacuation, relief services, and
 14 so on were also examined. The results showed that the
 15 schools were in poor condition in terms of these factors.^[5]
 16 Maleki reported that the main problem in schools was
 17 safety and building structure.^[4] One of the most efficient
 18 factors in school resilience is the geographical position.
 19 Easy access to a main street and relief services and safe
 20 distance from risks are recommended. Moreover, position
 21 of school building is important for safe evacuation and
 22 easy access to roads in the case of a disaster.^[19] Grimaz
 23 and Malisan showed that proper positioning, structural
 24 codes, and construction quality control were the key
 25 factors.^[31] some Iranian study based literature review^[32]
 26 such as Mirzaei and Mohammadinia reported that
 27 resilience of elementary schools was higher than high
 28 schools.^[19] A study in Turkey showed that readiness of
 29 high schools in the face of earthquake was higher than
 30 that of elementary schools. This can be explained by the
 31 better positioning of the schools.^[33] The results showed
 32 that the classroom of younger students in educational
 33 centers should be in lower floors. Elementary school
 34 buildings should not exceed two levels and if there are
 35 extra levels, they should be used for administrative and
 36 noneducational purposes.^[23] One of the main measures
 37 in crisis management and emergency evacuation is to
 38 take the students' gender into account. There are mental,
 39 physiological, and physical differences between girls and
 40 boys and such differences should be taken into account
 41 in management plans.^[5] One of the serious crises that
 42 may happen in schools is fire and as shown by statistics,
 43 there have been 56 fires in schools and dormitories
 44 between 1995 and 2019 and 50 of these cases have been
 45 with students inside the facilities. In addition, there
 46 have been physical injuries in 14 cases.^[35] According to
 47 Mirzaei and Mohammadinia, one of the main reasons of
 48 fires in schools is the heating system, which makes fire
 49 alarm and safety systems with high resilience a necessity
 50 in schools.^[19] To control the costs, some private schools
 51 might use nonstandard designs that cannot fulfill the
 52 functions of an educational facility and increase the
 53 risk of incidents at schools such as fire.^[36] Studies have
 54 shown that nonstructural requirements have been
 55 neglected in renewal projects in some schools.^[10] There
 56 is a need for instructions that require regular checks on

safety equipment in educational centers in terms fire
 safety and other hazards.^[18] In addition to supplying
 necessary fire distinguishers in schools, the students
 should be educated about keeping their calm during
 incidents and how to safely evacuate the facility when
 a fire extinguishing system is not available.^[37] Schools
 fire statistics show that in 8% of the cases, the students
 were not able to leave the school because of blockage of
 fire escapes.^[35] The number, dimension, and mechanical
 specifications of fire escapes are important factors in
 survival or users. Safe fire escapes should guarantee a
 safe exit in the worst fire scenarios in <2.5 min.^[23] Aghili
et al. studied schools in five provinces (Khorasan Razavi,
 Bushehr, Tehran, Gulestan, and Ardabil) and found that
 69.6% of the schools in these cities did not have a proper
 fire escape for emergency situations.^[34]

The results of studies on fire incidents have shown that
 the teacher's failure to detect the risk of fire in Shinabad
 School was the reason for negligence of the risk and not
 asking the students to leave the classroom.^[36] In the case
 of a fire incident in an elementary school in Zahedan, the
 students used their benches as a protection instead of
 evacuating the school.^[35] In Shinabad School, the school
 personnel did not know how to use fire extinguisher
 equipment or the equipment were expired.^[38] These
 results indicate that education and having a safety
 plan affect accident prevention behaviors in students
 and personnel.^[14,21] Elementary students are the best
 target group to implement changes in education style
 and attitudes about safety issues.^[39] Curriculum design
 should use the results of research works on vulnerability
 to natural disasters.^[27] Moradian and Nazdik showed
 that playing game was more efficient than traditional
 lecturing methods in improving knowledge and risk
 management behavior in children. They recommended
 playing the game as a new educational approach.^[26]
 According to Shiwaku *et al.* the key factors in resilience
 at schools were educational programs for teachers,
 personnel, students, parents, and individuals at
 risk, participation in preparation programs, sharing
 essential information, and participation of parents in
 school activities.^[40] Tong *et al.* reported that combining
 curriculum, school regulation, emergency situation
 management, crisis management plans, and educations
 for disaster readiness programs were the key factors
 in improving resilience in schools against disaster.^[41]
 Continuity and dynamism of educational programs
 are needed to make a change in awareness level and
 attitudes.^[16,42]

Some of unpleasant incidents happen outside school
 perimeter and during field trips that may even cause
 death of students or teachers. Lack of education for
 school personnel and visiting nonstandard camps for
 camping are the causes of such accidents.^[20] One of the

key educations needed is psychological education after an incident or crisis.^[19] Some students that witness bitter incidents might develop acute or posttrauma stress disorders.^[20] Akariaee studied Tehran-based schools and showed that public schools, elementary and junior high schools held more earthquake and safety maneuvers than private schools and high schools.^[43] Bajasteh Askari showed that privatizing does not necessary improve safety and health indices in elementary schools.^[44] Abdoli *et al.* argued that there was a significant difference between schools in terms of equipment and presence of a health trainer. They reported that elementary schools were more equipped, and they had a health trainer.^[21] There is a need for periodic assessment of safety condition of schools and their readiness to face disasters. Some measures need to be taken to make sure of adherence to legal requirements.^[24] In this regard, experts' opinions, placing safety checklists in public spaces, and preparation of the infrastructures are recommended.^[28] Adherence to HSE principles in schools as well as full ergonomics of the school environment can be an important principle in the resilience of schools in the face of disaster.^[45-47]

Limitation

Due to the lack of studies in this field, no limit was set for the start time. Furthermore, some articles were not available in full text because they were presented abstract at the conference. In general, less homogeneous and comprehensive research was founded on this subject.

Conclusion

The results showed that implementation of health school models through improving awareness and crisis management knowledge in school officials plays a key role in improving and preserving health in school environment and safety of students. By educating the next generation in this field, resilience and safety in society can be improved as well. Measures like eliminating or controlling environmental risks at schools, holding school evacuation maneuvers, equipping schools with first aid equipment and educating teachers, personnel, and health staff, paying more attention to safety of building and physical space of schools, establishing health safety and environment management system, providing easy access to first aid equipment, adding crisis management skills to curriculum as practical educations, informing parents about such risk, and educating students about safety and prevention of risks are highly recommended. In addition, supervising organizations should assess environment and safety equipment of schools based on safety standards.

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Conflicts of interest

There are no conflicts of interest.

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