

Research Paper: Environmental Health and Safety Assessment of Schools in Khalkhal City Using Crisis Management Approach



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ABSTRACT

Background: Paying attention to physical, health and safety issues in educational environments is the most effective and fundamental factor for physical, mental and psychological development of students. Therefore, one of the most important and effective health issues of the school is to observe environmental health and safety. This study was conducted with the aim of surveying the environmental health and safety of schools in Khalkhal city with a crisis management approach.

Materials and Methods: This is a descriptive study with cross sectional design. The study population consists of all primary, middle and high schools in Khalkhal city (n=28). For sampling, census method was used. Data collection tool was an 87-item checklist that surveys the health status of schools and its classrooms in terms of health and safety facilities. It was completed by visiting schools and observing, interviews and measurements. Collected data were analyzed in SPSS and Excel software.

Results: 10% of schools had newly constructed buildings and 90% had old buildings. The minimum required area per student was observed in all schools. The green space area required for each student is 0.5 square meters, which was not observed in 73.83% of schools. Only 87.5% of schools had one toilet for every 40 students. Sewage disposal in 98% of schools was hygienic, and 100% of schools had sanitary trash cans. In 60% of the schools, the toilets did not meet the hygiene standards. In 84% of the schools, the number of washbasins was proportional to the number of students (1 per 60). All the classrooms had maximum use of natural light. Moreover, in most schools, health policies, safety policies and emergency and personal hygiene standards were met.

Conclusion: Most schools in Khalkhal city were at moderate level in terms of environmental health and safety and compliance with national school environmental health regulations as well as being prepared to deal with emergencies and crises which indicates a need for more attention and support from the relevant authorities for improving their status.

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1. Introduction

A Child's world is made up of home, school, and the community around him/her. These places should be designed to meet the physical, mental, and social needs of students. In modern education, physical space is considered as a living and dynamic factor in students' educational activities [1]. Paying attention to physical, health and safety issues in educational environments is the most effective and fundamental factor of physical and mental growth and learning in students [2]. Therefore, one of the most important and effective health issues of the school is to observe environmental health and its safety. School environment health refers to the control of factors in students' living environment that affect their physical, mental and social well-being and has a direct effect on preventing the transmission of diseases and improving the health of school environment [3].

Students may develop a variety of parasitic, infectious diseases and diarrheal if the principles of environmental health and school safety are not followed [4]. Studies show that 59% of students are infected with intestinal parasites and 29.5% with monocytes. If school safety is not at an acceptable level, students will be more likely to have accidents, injuries, and deaths [5], and if school ergonomic standards are not met, it will lead to fatigue and skeletal and muscular pains [6]. Therefore, there must be safety-related and emergency-related procurements and precautions in place at schools; children's presence should be controlled as well as their arrival and departure to ensure their maximum safety; nutrition time should be considered as learning time, and personal hygiene should be part of the curriculum [7].

The most important factors that reduce the level of environmental health, safety and ergonomics in schools include: insufficient educational space, proximity of schools to unsanitary and unsafe places, old school building, unhygienic conditions of toilets and drinking fountains, unsanitary and unsafe classrooms and school grounds, risk of electric shock and fire, insufficient first aid facilities, and unsuitable board, desk and bench for students [8, 9]. Therefore, having a comprehensive crisis management program constantly prepares principals to confront the crisis threatening their schools, thereby reducing its impact while preventing it and saving schools from the vortex of various crises in a way that they suffer the least damage [10]. Assessing the current state of schools is the first step in preventing crisis in them, and on the other hand, evaluation and assessment is a part of the effectiveness of systems [11].

In one study, it was found that children's injuries in schools are a major concern and special attention should be paid to specific areas in schools in order to prevent accidents [12]. In a study conducted by Kumar et al. (2008), it was found that there is a direct relationship between physical characteristics of schools and students' behavioral problems [13]. According to statistics released in the United States in 1990, about 43% of children's mental and emotional problems were related to schools, of which 20% were because of schools' buildings [12]. Given the importance of crisis management in schools and the role of assessing the current situation in crisis prevention and control in schools, this study aimed to investigate the environmental health and safety situation of schools in Khalkhal city, Iran with crisis management approach by measuring the conditions of toilets, washbasins and drinking fountains, location of garbage and sewage collection, and health and safety of classrooms.

2. Materials and Methods

This is a descriptive study with cross sectional design conducted in 2015. The study population consists of all primary, middle and high schools in Khalkhal City (n=28). Khalkhal is one of the cities of Ardabil Province with a relatively cold climate. This city is connected from the north to Kowsar County, from the east to Gilan province, from the south to Tarom city in Zanjan province, and from the west to Miyaneh County. For sampling, census method was used. Data collection tool was an 87-item checklist that surveys the health status of schools in terms of health and safety facilities, the health status of school classrooms in terms of health facilities and safety, and the safety status of school laboratories. It was completed by visiting schools and observing, interviews and measurements. Collected data were analyzed in SPSS and Excel. It should be noted that the checklist has acceptable validity designed based on the school environmental health regulations of the Iranian Ministry of Health and other scientific sources and was prepared and finalized by the research team.

3. Results

The results of evaluating the health status of schools based on health facilities (water, drinking fountains, toilets, washbasins, sewage disposal, buffet, health service room, and distance from annoying centers and unsanitary places) are shown in Table 1; based on safety of the classrooms, hallways, stairs, laboratories and school grounds in Table 2; based on health and safety facilities (classrooms' lights, blackboards, wall painting, space, dimension, windows, etc.) in Table 3; and based

Table 1. The health status of schools in Khalkhal based on their health facilities

Facilities	Parameters	No. (%)		Total
		Healthy	Unhealthy	
Water	Piped water supply system	28 (100)	0 (0)	28
	Having quality water approved by health authorities	28 (100)	0 (0)	28
Drinking fountains	Having washable surface with a suitable slope	19 (85.67)	9 (14.32)	28
	Having washable wall	19 (85.67)	9 (14.32)	28
	Proper edge	19 (85.67)	9 (14.32)	28
	Existence of 1 for every 45 students	13 (42.46)	15 (57.53)	28
	Separation from toilets	12 (85.42)	16 (14.57)	28
	Standard wastewater disposal	28 (100)	0 (0)	28
	Height between 75-100 cm above ground level	24 (71.85)	4 (28.14)	28
Washbasins	Existence of 1 for every 60 students	14 (50)	14 (50)	28
	Having hygienic conditions	21 (75)	7 (25)	28
	Having liquid soap	27 (43.96)	1 (57.3)	28
	Height proportional to the age of students	27 (43.96)	1 (57.3)	28
Toilets	Existence of 1 for every 40 students	22 (57.78)	6 (43.21)	28
	Having hygienic conditions	24 (71.85)	4 (19.14)	28
	Standard sewage disposal	28 (100)	0 (0)	28
	Suitable septic tank size	28 (100)	0 (0)	28
Buffet	Observance of Article 13 of the Iranian food, cosmetics and health products law	18 (75)	6 (25)	24
	Floor, wall and ceiling made of durable materials	5 (8.20)	19 (2.79)	24
	Seamless and washable	5 (8.20)	19 (2.79)	24
	Made of stone or tile with an height of 1.30 m and a light color	5 (8.20)	19 (2.79)	24
	Buffet staff have a valid medical examination certificate	14 (3.58)	10 (7.41)	24
Sewage disposal	Sanitary trash cans	28 (100)	0 (0)	28
	Observance of the time interval between disposals	27 (4.96)	1 (6.3)	28
Health service room	Equipped health service room	4 (7.85)	24 (3.14)	28
	Presence of a health coach	11 (3.39)	17 (7.60)	28
	Existence of first aid kit	28 (100)	0 (0)	28
Distance from annoying centers and unsanitary places	Factory, landfill, cemetery, slaughterhouse, livestock, poultry, noisy centers, hospital	28 (100)	0 (0)	28

Table 2. The health status of schools in Khalkhal based on their safety facilities

Facilities	Parameters	No. (%)		Total
		Healthy	Unhealthy	
Classrooms and hallways	Minimum ceiling height (3 meters)	24 (71.85)	4 (29.14)	28
	Upper-floor windows are equipped with a safety fence	4 (05.21)	15 (95.78)	19*
	Lighting (100-150 lux)	28 (100)	0 (0)	28
	Temperature (18-21 °C)	28 (100)	0 (0)	28
	Humidity (50-60%)	25 (28.89)	3 (72.10)	28
	Suitable ventilation system	25 (28.89)	3 (72.10)	28
	Use of artificial light in evening classes (200-500 lux)	6 (100)	0 (0)	6**
	Prohibition of building any terrace and balcony related to the classrooms	24 (71.85)	4 (29.14)	28
	Observing safety rules for cooling and heating devices	28 (100)	0 (0)	28
	Stairs	Non-slip and equipped with handholds	24 (71.85)	4 (29.14)
Maximum height (18 cm), minimum width (30 cm) and minimum length (1.20 cm)		26 (86.92)	2 (14.7)	28
Laboratory	Existence of safety instructions	9 (47)	8 (53)	17***
Fire extinguishing system	Equipped with fire extinguishers	26 (86.92)	2 (14.7)	28
	Existence of at least 2 emergency exits	16 (15.57)	12 (85.42)	28
	Existence of emergency alarm	25 (28.89)	3 (72.10)	28
School grounds	Prohibition of building any pool or pond in the school	27 (42.96)	1 (58.3)	28
	0.5 square meters of green space per student	8 (57.28)	20 (43.71)	28
	Grounds with suitable material (asphalt or concrete)	28 (100)	0 (0)	28
	6-8 square meters of ground per student	25 (29.89)	3 (72.10)	28

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* 19 schools had safety fences classified as healthy and unhealthy; **6 schools had evening classes; ***17 schools had laboratories

on laboratory safety status (floor and surface conditions, washability, non-slip floor with suitable slope, having air conditioner appropriate to its space, having toilet and liquid soap, and existence of safety instructions) in [Table 4](#).

4. Discussion

This study was conducted to investigate the situation of environmental health and safety in schools of Khalkhal City with a crisis management approach. All of the schools were at least 500 meters away from places such as landfills, hospitals, factories, high-voltage power lines, livestock farms, poultry farms, and noisy cen-

ters. In all schools, the method of sewage disposal was hygienic, and the volume and capacity of septic tanks were proportional to the user population. The results of a study by Lee et al. on 9 schools in China showed that increasing school health could lead to improved healthy behaviors and increased self-care among students [14]. According to school environmental standards and regulations, there should be at least one drinking fountain for every 45 students, one toilet for every 40 students, and one washbasin for every 60 students [15].

All schools in Khalkhal had sanitary trash cans and in 96.4% of them, the time interval between emptying and washing the trash cans was observed. 46.42% of schools

Table 3. The health status of schools in Khalkhal based on their health and safety facilities

Health and Safety Facilities	No. (%)		Total
	Healthy	Unhealthy	
Dry, smooth, and seamless walls	18 (28.64)	10 (72.35)	28
Washability of the wall up to a height of 1.2 m	17 (71.60)	11 (29.39)	28
Washable floor with suitable slope	27 (43.96)	1 (57.3)	28
Smooth and seamless ceiling in bright colors	22 (51.78)	6 (43.21)	28
Minimum distance from the blackboard to the first row of student desks (2.2 meters)	25 (29.89)	3 (71.10)	28
Maximum classroom size (7×8 m)	24 (71.85)	4 (29.14)	28
Maximum classroom height (3 m)	24 (71.85)	4 (29.14)	28
Minimum space for each student (3.75-4.5 m)	24 (71.85)	4 (29.14)	28
No disturbance of the assembly hall, laboratory, workshop, sports venue	22 (57.78)	2 (58.28)	28
Use of maximum natural light	26 (87.92)	2 (14.7)	28
Protecting doors and windows with a wire mesh on the outside face	3 (71.10)	25 (28.89)	28
Sanitary trash cans	28 (100)	0 (0)	28

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Table 4. The safety status of laboratories in schools of Khalkhal City

Safety facilities	N (%)		Total
	Compliance	Noncompliance	
Washable floor	17 (100)	0 (0)	17
Non-slip floor with suitable slope	17 (100)	0 (0)	17
Having air conditioner appropriate to its space	14 (3.82)	3 (7.17)	17
Having toilet and liquid soap	6 (3.35)	11 (7.64)	17
Existence of safety instructions	9 (47)	8 (53)	17

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had a drinking fountain for every 45 students, of which 42.85% had drinking fountains separated from the toilet. Considering that the provision of safe drinking water is one of the general principles of public health, the quality of drinking water in all schools was reported at a desirable level due to the use of the urban water distribution network which is consistent with the results of Shokri et al. [6], Sarmadi et al. [16], Shabankhani and Abdollahi [17], and Pirzad et al. [18]. This shows the country's attention to this principle. In Adegbenro's study, only 50% of Nigerian schools had healthy drinking water [19].

Shukri et al. examined 144 schools in Abadan in terms of environmental health and safety. Their results showed

that 100% of the schools had sanitary trash cans and in 76% of the schools there was one toilet for every 40 people [6]. In terms of proper sewage disposal that should meet the standards of school regulations, 100 schools complied with this item, which is consistent with the results of Zazuoli et al. [20]. In the study by Pirzad et al. on comparing the environmental health status of public primary schools in different parts of Isfahan, 77 schools were randomly selected and surveyed. Their results showed that 76.6% of schools had a standard status, 80.5% of their classrooms had a favorable situation, 79% had a favorable situation in terms of collecting and disposing of sewage, and 49% had clean buffets in accordance with the standards. Moreover, the condition

of toilets and washbasins and drinking fountains were good, and there was no significant difference in this regard between different areas [18].

Human safety issues during crisis in schools include: placing the feet on the ground or on a proper support, the suitability of the backrest when sitting on a chair, the acceptable weight of a student's bag, non-slipness of stairs and their fencing, non-slipness of the floors of classrooms and hallways, upper-floor window safety protection, no balcony or terrace, safe and secure heating equipment, keeping oil and gas tanks far enough away, having enough fire extinguishers and in the right place, good conditions and right protection of electrical switchboards, switches and sockets, existence of at least two emergency exits with a special sign and an emergency alarm.

In the present study, of 28 schools, 59% had at least two escape routes for emergencies and 92% had alarms for emergency use. Schools were at relatively good state in terms of safety measures and emergency conditions which is consistent with the results of Malakootian et al. [21]. In studying the environmental health and safety of schools in Kerman, they reported that the safety of schools in some cases (upper-floor windows with protective fences, safety instructions on heating and cooling devices, conditions of heaters/ radiators/firefighting facilities) were relatively favorable. According to the results, 17 schools in Khalkhal had laboratories, all of which had washable and non-slip floors, while only 47% had safety use instructions provided in the laboratory. Although the safety status of the schools was acceptable, maintaining the current status and improving it should be considered in the programs.

5. Conclusion

The safety and health of students is directly related to the crisis issue in schools, so the first step in developing crisis management programs is to evaluate schools comprehensively and accurately. It was concluded that most schools in Khalkhal City were at moderate level in terms of environmental health and safety and compliance with national school environmental health regulations, which indicates a need for more attention and support for improving their status from the relevant authorities. Given the crisis management approach, it is recommended that all school principals and district administrators use such tools periodically to assess the condition of schools and pay attention to missed points so that an acceptable care environment be provided for all students in schools throughout the country, and to prevent any possible harm to students when facing a crisis in schools.

Ethical Considerations

Compliance with ethical guidelines

This research was extracted from an approved research proposal (Code:1.2296).

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Authors' contributions

All authors contributed in preparing this article.

Conflict of interest

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