

# Assessment of Environmental Health and Safety Status of Public and Private Schools in Shiraz City in Educational Year of 2014

Rabieh Hoseini,<sup>1</sup> and Aboolfazl Azhdarpoor<sup>1,\*</sup>

<sup>1</sup>Department of Environmental Health Engineering, Shiraz University of Medical Sciences, Shiraz, IR Iran

\*Corresponding author: Aboolfazl Azhdarpoor, Department of Environmental Health Engineering, Shiraz University of Medical Sciences, Shiraz, IR Iran, E-mail: azhdarpoor@sums.ac.ir

Received 2015 February 27; Revised 2015 August 24; Accepted 2015 September 02.

## Abstract

**Background:** The environmental health of schools is included all activities that have a direct effect on preservation of student's health and the prevention of the diseases' transmission and promotion of the level of the environmental health of schools.

**Objectives:** This cross-sectional study was conducted to evaluate the environmental health and safety status of public and private schools of Shiraz city, Iran, in 2014.

**Materials and Methods:** The total number of schools was included 1055 public schools and 490 private schools. The multistage random stratification sampling was performed and samples of 752 schools were met. In order to collect data, a list based on form of regulation of school environmental health was used and 74 questions were selected and the data were analyzed using the SPSS software version 19.

**Results:** The results showed that there was no proper health buffet in 43% of the public schools and 65% of the private schools. Also, only 17% of total schools had a hygiene educator. In terms of availability to equipment and tools, 90% of the public schools and 96% of the private schools had proper conditions. In terms of security and safety, 71% of the public schools and 73% of the private schools had proper conditions.

**Conclusions:** With regard to these findings, it can be concluded that the separately investigation of environmental health status and security of schools at all four areas is necessary.

**Keywords:** Environment Health, Safety, Public and Private Schools, Shiraz

## 1. Background

School environment is an environment in which the students spend one third of their daily life with their teachers and students (1). The environment health of schools includes all activities that have direct effect on preservation of health of students and prevention of diseases transmission and promotion level of environmental health of schools (2). The effect of various elements of environmental health of schools on students' health including quantity and quality of hygiene facilities such as water fountains, washbasins, condition of drinking water, sewage disposal and waste management is very important. The lack of exact knowledge about environmental health status of schools may have malicious and irreversible effects (3). Insufficient drinking water, sanitation, and hygiene in non-household settings, such as schools can affect the health, education, welfare, and productivity of populations, particularly in low- and middle-income countries (4). Many children in both developing and developed nations spend time absent from schools due to diseases contracted within the school environment (5).

When the hygiene and safety situation of schools is not in an acceptable level, there is the probability of occurrence and prevalence of diseases and accidents such as electric shock and fire, injury and death of students. The most important factors reducing the level of environmental hygiene and safety at schools are included insufficient share of educational space, vicinity of schools with nonhygiene places, unsecure classroom environment and compass of school, probability of electric shock and fire, lack of facility and equipment for first aids, improper blackboard, desk and chair of students (6).

The results from studies conducted by Moodi et al. in Birjand showed that 74.5% of the city's schools have undesired situation of water (7). In another study conducted by Fadaei et al. the results showed that the hygienic statues of schools were suitable in water supply 100%, drinking-cup 67.74% and health condition 70.96%, wash-basin health condition 77.41%, toilet health condition 70.96%, buffet 51.61%, and solid waste disposal 74.19% (8). Also, the results from studies conducted by Ekpo et al. showed that the prevalence of helminth infection was 54.9% of schoolchildren in the urban government school, 63.5% in the rural

government school, and 28.4% in the urban private school. A survey of hygiene conditions in the three schools indicated that in the two government schools tap water was unavailable, sanitation of latrines was poor, hand washing soap was unavailable, and garbage was present around school compounds. In the private school, in contrast, all hygiene indices were satisfactory (9). Results of a study in Poland showed that there are unfavorable health conditions, especially in village schools that this condition is often related to poor lighting of schools, poor equipment with furniture, toilet facilities, conditions of feeding, and recreational facilities (10). Schools can play a key role in improving the life of children or in hindering their social advancement (11). Shiraz is one of the metropolises of Iran that has 1.5 million population and 4 educational district which the district 1 has 273 public schools and 193 private schools, the district 2 has 228 public schools and 186 private schools, the district 3 has 274 public schools and 40 private schools, the district 4 has 280 public schools and 71 private schools.

## 2. Objectives

Since Shiraz is one of the cities with large population and many students, who they make the future of this country, are studying at schools of this city. Therefore, this study was conducted to assess the conditions of environmental hygiene and safety status of Shiraz's schools and to compare the hygiene conditions and safety status between the public schools and private schools in this city in educational year of 2014.

## 3. Materials and Methods

This cross-sectional study was conducted in order to evaluate the conditions of environmental health of public and private schools in Shiraz city, Iran, during the first 6 months of 2014. The total number of schools included 1055 public schools and 490 private schools. The multi-stage random stratification sampling was performed as follows: Shiraz has been divided into 4 educational restrict (first classification) and each restrict includes both public and private schools (second classification) and then each group of schools have been divided into boys' and girls' schools (third classification). Finally, the sample number was estimated 207 based on sum of schools at each class and the share of each class. Sampling method was proportional to size and the ratio of public and private schools. From a total of 207 schools (141 public schools and 66 private schools), 37 were mixed schools, and 83 boys' and 87 girls' schools. The following formula was used to estimate the sample number:

$$N = \frac{Z^2(1 - \frac{\alpha}{2})(p(1 - p))}{d^2} \quad (1)$$

Where "N" is sample number, "Z" is the level of confidence; " $\alpha$ " is the error rate of first type (0.05), "d" is accuracy (0.065) and "p" is the prevalence rate that was obtained from previous studies (0.65).

In order to collect information, a check list based on form of the schools' environmental health regulations was used and 74 questions of it were selected. According to school health status, score of 0 or 1 was given to questions. Then, the checklist was completed via the investigation of the recorded data in health care centers which obtained from schools and face to face interviews with schools' directors. The data were analyzed using SPSS software version 19.

In the current study, 4 domains (building characteristics, tools and equipment, hygienic facilities and safety conditions) were considered. At the domain of building characteristics of schools, 14 questions about the place of establishment of schools, classroom environment, conditions of floor of buildings, walls and roof of schools, green space, type of school's compass, compass for playing etc. were considered. This section was classified into two groups as proper (7 - 14) and improper (0 - 6) based on the obtained scores. At domains of facilities and equipment of schools, all questions about blackboard, ventilation and thermal equipment, existence of cable trimming over doors and windows of classroom, existence of hygiene and healthy clean source, existence of hygiene bins etc. were responded. The domain of facilities and equipment of schools included 9 questions that were classified and divided into two groups with regarding to the obtained scores: proper (5 - 9) and improper (0 - 4). Also, many questions on the accessibility to hygiene buffet, accessibility to hygiene and clean drinking water, enough number of toilets, washbasin, existence of liquid soap on washbasin, sanitary sewage disposal and etc. were answered. At the domain of hygiene facilities, the questions about hygiene facilities of schools was included 26 questions that according to the obtained scores were divided into two groups: proper (14 - 26) and improper (0 - 13). Various questions such as emergency entrance and exit, existence of firefighting equipment, existence of alarm bell at emergency conditions, safety of plugs and existence of a health care service room were answered in the domain of safety conditions. The safety conditions included 15 questions which have been divided into two groups including proper (8 - 15) and improper (0 - 7) based on obtained scores. The response to each question is "Yes" or "No". The scores of 1 and 0 were awarded for each answer of "Yes" or "No", respectively. The obtained scores by each school in all areas were separately calculated.

## 4. Results

The results of the current study showed that the hygiene conditions of schools' buildings at all schools was proper. Also, from the viewpoint of access to hygiene facilities, 88% of the public schools and 80% of the private schools had proper conditions. From the viewpoint of access to facilities and equipment, 90% of the public schools and 96% of the private schools had proper condition. From the viewpoint of safety conditions, 71% of public schools and 73% of private schools had proper conditions (Table 1). Also, the results of Table 2 showed that from the view point of hygiene conditions of schools' buildings, there was no significant difference between the public and private schools ( $P = 0.795$ ). At this area, the most problem was related to this question that if dimensions of classrooms are proper (8 meter length  $\times$  8 meter width  $\times$  3 meter height from floor to roof).

**Table 1.** Frequency Distribution of Obtained Scores Based on Environmental Health and Safety Situation of Schools<sup>a</sup>

Domains of Environmental Hygiene of Schools; Type of Schools Scale	Public	Private
<b>Hygiene conditions of schools' buildings</b>		
Proper (7 - 14)	100	100
Improper (0 - 6)	0	0
<b>Condition of facilities and equipment of schools</b>		
Proper (5 - 9)	90	96
Improper (0 - 4)	10	4
<b>Condition of hygiene facilities of schools</b>		
Proper (14 - 26)	88	80
Improper (0 - 13)	12	20
<b>Safety conditions of schools</b>		
Proper (8 - 15)	71	73
Improper (0 - 7)	29	27

<sup>a</sup>Values' unit is %.

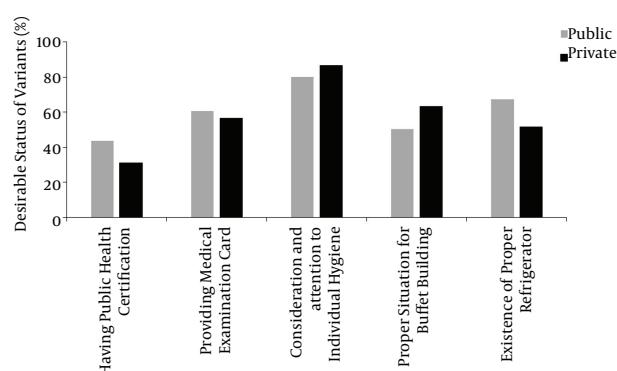
Also, at this domain and from the viewpoint of the type of schools' buildings (old and new), there was a significant difference between the two types of the schools ( $P = 0.019$ ) and it was observed that the hygiene conditions of public and private schools with new buildings were more favorable than those with old buildings ( $P = 0.02$ ). At this domain, most problems were related to the existence of proper cable trimming for doors and windows, which it was not existed in 80% of the schools. From the view point of the conditions of hygiene facilities of schools, the public schools had more desirable conditions compared to the private schools ( $P=0.011$ ). At this domain, most of the prob-

**Table 2.** Statistical Indices for Determining Environmental Hygiene and Safety Conditions of Schools<sup>a</sup>

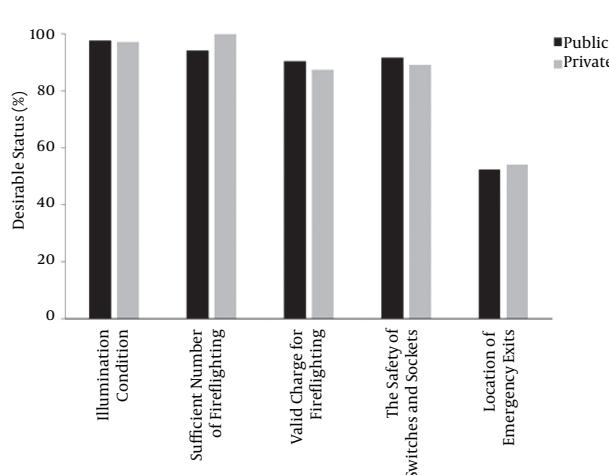
Domains of Physical Environmental Hygiene of Schools; Type of Schools	Mean $\pm$ SD	P Value
<b>Hygiene conditions of schools' buildings</b>		0.655
Public	13.42 $\pm$ 3.1	
Private	13.72 $\pm$ 2.7	
<b>Conditions of facilities and equipment of schools</b>		0.02
Public	5.6 $\pm$ 1	
Private	6.3 $\pm$ 0.9	
<b>Conditions of hygiene facilities of schools</b>		0.011
Public	17.1 $\pm$ 2	
Private	15.88 $\pm$ 2.45	
<b>Safety conditions of schools</b>		0.557
Public	13.1 $\pm$ 4.1	
Private	13.5 $\pm$ 3.7	

<sup>a</sup>P value is worked out by t-test.

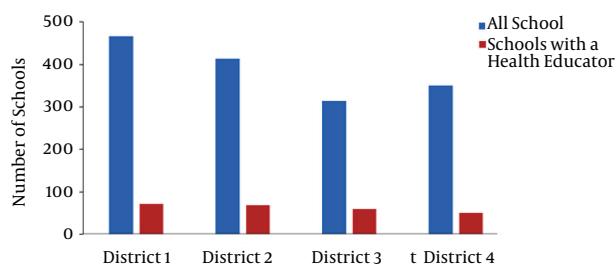
lems were related to buffet (Figure 1) (lack of health cards and health certificates for officers' buffet) and the absence of a health educator in schools and also, if the water fountains is located out of toilets and with proper distance at least 15 meters. The results showed that only 17% of the total schools had a health educator (Figure 2). Also, form the viewpoint of safety conditions of schools, there was no significant difference between the public and private schools ( $P = 0.557$ ). In this domain, most problems were related to that if emergency escape has been identified for students with special symptoms. The safety conditions of public and private schools have been shown in Figure 3.



**Figure 1.** Comparison of the Conditions of Buffet in Public and Private Schools



**Figure 2.** Comparison of the Schools of Districts (1-4) in Terms of Having a Hygiene Educator



**Figure 3.** Comparison of Safety Conditions of Public and Private Schools

## 5. Discussion

School buildings should be appropriate for heating, lighting, ventilation, humidity, noise pollution, and air pollution (1). The results of the present study showed that from the view point of the hygiene conditions of schools' buildings, all schools (public and private) obtained at least 50% of average scores. However, most of the schools are faced with inadequacy from the view point of hygiene conditions of schools' buildings and were not agree with the regulation of environmental hygiene of schools.

For example, at 90.6% of the public schools and 91.6% of the private schools was considered classroom's space for each student at least as equal as  $1.25 \text{ mm}^2$ , only at 80.7% of the public schools and 68.8% of the private schools had considered the proper dimension of classrooms. Moreover, the results showed that in terms of access to hygiene drinking water, toilets, washbasins, proper water fountains, 88% of public schools and 86% of private schools had proper conditions. The problems that exist at this part were due to disagreement of the numbers of water foun-

tains, toilets, washbasins with the number of students; the conditions of the toilets make them unusable by students as was reported by Maria that students could not use toilets since they were in a bad state and in most schools, latrine to student ratio is a main concern (12).

Also, at this area, the water fountains of 20% of the public schools and 33.3% of the private schools were in distance less than 15 meters from the toilets. Lopez-Quintero et al. reported that proper hand washing (before meals, after toilet use) were statistically significantly less likely to report illness such as gastrointestinal and respiratory symptoms, and 20% less likely to be absent (13). Studies by Hughes et al. showed that decrease in the risk for helminthic infections when children have increased access to water for hand washing and relieving wastes (14). One survey on the status of school sanitation and hygiene by Samwel and Gabizon showed that 21% of the schools are served on planned intermittent water supply, and do not have water supply for 2 - 3 hours or even during all the time the children spend in school (15).

This could be due to the cost and required changes in buildings associated with the improvement of the hygiene facilities including Toilets, washbasins, water fountains, etc. Also, the lack of authorities' attention to health care facilities is considered as another reason in some cases. At the domain of accessibility to hygiene buffet, since the buffet of schools is a place to provide and sell food stuff, these places should be completely hygienic and the certification of health education and health card is necessary for the people who are working in schools buffet. High quality meals for children, and special attention should be paid to food services that are provided for susceptible population groups, such as school canteens (16). Fifty percent of the food poisoning cases occurred in schools (17). Studies by Campos et al. showed that 74.1% of the schools do not have a sink exclusively for hand washing and 100% of the handlers do not practice correct hand hygiene, mainly because most of the sinks (81.5%) do not have antiseptic liquid soap or paper towels. Most have bar soap and cloth towels, both important vehicles for food contamination (18). The present study shows that 43% of the public schools and 55% of the private schools did not have hygienic buffets. Regarding the safety situation of schools, the location of emergency exit for students was not specified by special symptom at most schools. Also, 31% of public schools and 50% of private schools were not equipped with the health service room. The studies conducted by Fadaei et al. showed that at only 51.61% of schools had health services room (8). According to these findings, it can be concluded that the separately assessment of the environmental health and safety statues of schools at all four areas is necessary to identify and find the strengths and weak-

nesses of each of these areas without wasting time and cost, with management and taking the necessary measures in each area for decreasing the threaten agents of health at educational environments and also, to prevent the occurrence of some diseases and injuries in students.

### Acknowledgments

We are grateful for teachers of health faculty, managers and the environmental health experts of health care centers of Enghlab and Valfajr and also director of education and researchers improvement center, Shiraz University of Medical Sciences, which they have supported me to perform this study.

### Footnotes

**Authors' Contribution:** Aboofazl Azhdarpoor developed the original idea and the protocol, abstracted and analyzed the data, and wrote the manuscript. Rabieh Hoseini contributed to the development of the protocol, abstracted data, and prepared the manuscript.

**Funding/Support:** This study was supported by Shiraz University of Medical Sciences.

### References

1. Tabancalı E, Bektaş T. Student safety in primary schools: A sample of Büyücekmece county. *Procedia - Soc Behav Sci.* 2009;1(1):281-4. doi: [10.1016/j.sbspro.2009.01.051](https://doi.org/10.1016/j.sbspro.2009.01.051).
2. Neshat AA, Dastorani MJ, Ramazani AA, Changizi H, Hamedi S. Study of Environmental health and safety situation of Elementary and High Schools of Zabol on 2011 [Persian]. *Res Sci J Rostamineh.* 2011;4(53):52-61.
3. Reshadmanesh N. Environment Health and safety situation of schools and effective factors on consider Individual Hygiene of students at Sanandaj on 1995 [Persian]. *J Kurdistan U Med Sci.* 1995;1(1):4-20.
4. Cronk R, Slaymaker T, Bartram J. Monitoring drinking water, sanitation, and hygiene in non-household settings: Priorities for policy and practice. *Int J Hyg Environ Health.* 2015;218(8):694-703. doi: [10.1016/j.ijheh.2015.03.003](https://doi.org/10.1016/j.ijheh.2015.03.003).
5. Koopman JS. Diarrhea and school toilet hygiene in Cali, Colombia. *Am J Epidemiol.* 1978;107(5):412-20. [PubMed: [665657](https://pubmed.ncbi.nlm.nih.gov/665657/)].
6. Ekici M, Ekici A, Akin A, Altinkaya V, Bulcun E. Chronic airway diseases in adult life and childhood infections. *Respiration.* 2008;75(1):55-9. doi: [10.1159/000102952](https://doi.org/10.1159/000102952). [PubMed: [17505127](https://pubmed.ncbi.nlm.nih.gov/17505127/)].
7. Moodi M, Shahriari T, Hajiani M, Shahriari Z. Study of hygienic status of schools in Birjand during year 2007-2008 [Persian]. *J Birjand U Med Sc.* 2009;16(2):68-75.
8. Fadaei A, Jamshedi Z. Evaluation of Environmental Health Condition and Safety of Primary Girls School in Shahre-Kord, Iran. *Middle-East J Sci Res.* 2014;21(10):1729-33.
9. Ekpo UF, Odoemene SN, Mafiana CF, Sam-Wobo SO. Helminthiasis and hygiene conditions of schools in Ikenne, Ogun State, Nigeria. *PLoS Negl Trop Dis.* 2008;2(1):e000146. doi: [10.1371/journal.pntd.0000146](https://doi.org/10.1371/journal.pntd.0000146). [PubMed: [18357338](https://pubmed.ncbi.nlm.nih.gov/18357338/)].
10. Zdunkiewicz L. [Changes in sanitary conditions at elementary schools in Poland 1985-1988]. *Rocz Panstw Zakl Hig.* 1989;40(3):240-5. [PubMed: [2634305](https://pubmed.ncbi.nlm.nih.gov/2634305/)].
11. Duran-Narucki V. School building condition, school attendance, and academic achievement in New York City public schools: A mediation model. *J Environ Psychol.* 2008;28(3):278-86.
12. Mbula SE, Mulwa AS, Kyalo DN. Access to improved sanitation: Implication for sustainable implementation of hygiene practices secondary schools in machakos county, Kenya. *Eur Sci.* 2014;10(1).
13. Lopez-Quintero C, Freeman P, Neumark Y. Hand washing among school children in Bogota, Colombia. *Am J publ health.* 2009;99(1):94-101.
14. Hughes RG, Sharp DS, Hughes MC, Akau'ola S, Heinsbroek P, Velayudhan R, et al. Environmental influences on helminthiasis and nutritional status among Pacific schoolchildren. *Int J Environ Health Res.* 2004;14(3):163-77. doi: [10.1080/0960312042000218589](https://doi.org/10.1080/0960312042000218589). [PubMed: [15203448](https://pubmed.ncbi.nlm.nih.gov/15203448/)].
15. Samwel M, Gabizon S. Improving school sanitation in a sustainable way for a better health of school children in the EECCA and in the new EU member states. *Desalin.* 2009;248(1):384-91.
16. Marzano MA, Balzaretti CM. Protecting child health by preventing school-related foodborne illnesses: Microbiological risk assessment of hygiene practices, drinking water and ready-to-eat foods in Italian kindergartens and schools. *Food Control.* 2013;34(2):560-7. doi: [10.1016/j.foodcont.2013.05.031](https://doi.org/10.1016/j.foodcont.2013.05.031).
17. Tan SL, Bakar FA, Karim MSA, Lee HY, Mahyudin NA. Hand hygiene knowledge, attitudes and practices among food handlers at primary schools in Hulu Langat district, Selangor (Malaysia). *Food control.* 2013;34(2):428-35.
18. Campos AKC, Cardona AM, Pinheiro LBG, Ferreira NR, De-Azevedo PRM, Stamford TLM. Assessment of personal hygiene and practices of food handlers in municipal public schools of Natal, Brazil. *Food Control.* 2009;20(9):807-10. doi: [10.1016/j.foodcont.2008.10.010](https://doi.org/10.1016/j.foodcont.2008.10.010).