

Investigating Environmental Health Engineering Graduates' Attitudes towards Compliance of the Received Trainings with their Occupational Needs in Mashhad, Iran, 2019

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Abstract

Background: One of the most important goals of any higher education system is to educate specialized manpower with sufficient skills and knowledge. Therefore, this study was conducted to investigate the environmental health engineering graduates' attitudes towards compliance of the received training during their education with their occupational needs.

Methods: In this descriptive study, the viewpoints of 76 environmental health engineering graduates were investigated over the compliance of the contents of the courses passed with their occupational needs. The participants were employed in various organizational positions in Mashhad city in 201

Results: In the case of Water and Wastewater, Municipality, Comprehensive Health Center, Hospital, and Common courses, the lowest compliance rate was related to the environmental health employees working at the comprehensive health centers, hospitals, water and sewerage company, and university, respectively. There was a significant difference between attitudes of males and females towards Water and Wastewater and Comprehensive Health Center courses. Findings based on the graduates' degrees showed that people with bachelor's degrees more disagreed with the set of Water and Wastewater courses than the graduates with Master's and PhD. degrees.

Conclusion: Considering that specialized courses had the highest compliance with the individuals' field of work, the authorities are recommended to revise the curriculum of this field of study. Furthermore, it is suggested that specialized trends in the undergraduate course should be provided to improve the impact of education and graduates' satisfaction rate in this field.

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Introduction

The higher education system in any country is a great source of resources and skills. This system pursues many different goals such as increasing the level of education, improving the cultural level, social and political progress,

and preparing the labor force to develop the economic status of the country.¹⁻³ Failure to achieve the set goals and defeat is a part of the challenges of any educational system.^{2,4} Courses in each educational system act as the heart of that system; in other words, they provide the necessary skills, knowledge, and experience to deliver

services and play an effective role in all professions. A responsible curriculum, in addition to gaining the goals of the higher education system, must meet the personal needs of students, organization, and community.⁵ Following the national macro-policies, a lot of resources and budgets have been allocated to training manpower, especially in postgraduate courses. Instead of preparing individuals to meet the needs of an educated workforce for the community, these resources appear to have been used to expand education quantitatively.⁴ According to recent studies, organizations that have focused more on the training process exhibit higher financial performance. As a result of the training process, human resources show higher occupational performance by acquiring the necessary skills and knowledge. Followed by appropriate education and training, suitable individuals can be placed in job positions.^{6,7} Since the curriculum is a key factor in determining the outcomes of any educational program, higher educational systems, due to their responsibility, evaluate the curricula to facilitate achieving the defined goals.^{4,8,9}

The main goal of medical education is to provide qualified, professional and knowledgeable personnel who are responsible for the patients and improve their skills over the working time. Health literacy, as a capital, is very important for health graduates. The administration of a sensitive and effective program and its evaluation are, therefore, of great significance in the training of dedicated, competent, and trained staff.^{10,11} In a qualitative study, Shahamat et al. (2019) analyzed incentive components of an educational curriculum from the viewpoints of architecture students and noted that four factors of knowledge, insight, readiness, and observation (supervision) played the key role in forming an educational program.¹² Samadi et al. (2010) investigated environmental health students' attitudes toward their field of study and their occupational future. The results showed a lack of a favorable attitude towards the occupational future of these students.¹³ Education has an undeniable effect on career decisions. Mouzakitis evaluated the role of vocational and training curricula in economic development. The appropriate design of relevant curricula based on market needs identification and analysis is a requisite for economic development. Education and training is an initial element in the process of job creation and its development¹⁴. In a similar study, Goldey et al. transformed first-year curriculum in biology with a new course, Biological Inquiry, after an assessment plan. In their study, students developed new information and skills through the investigation of real-world issues that attracted the students' interests.¹⁵ In most studies over the evaluation and effectiveness of curricula in various disciplines, only a part of the training course and its related topics (e.g., Internships) or a special training course (such as marketing and business) was investigated. In the

studies that examined the compliance of educational contents with the occupational needs, only the views and opinions of students were examined.¹⁶⁻¹⁸ Fallahi et al. also studied all units of specialized courses in the field of nutrition sciences from the students' point of view. This study evaluated the quality, quantity, and compliance of the courses considering the number of units and performed needs assessment over the courses. According to the students of this field, some courses were lacking in the training course.¹⁹ However, the fact is that graduate students can be the best experts in determining the compliance of the studied courses with occupational needs after choosing a field of work and being placed in a job position.

The field of environmental health is a branch of health sciences that detects, assesses, controls, and manages environmental pollutants to protect and promote human health. The history of the establishment of this field in Iran dates back to 40 years ago. Nowadays, many students are trained in bachelor's (continuous and discontinuous), master's, and doctorate degrees annually. Due to the complexity of the courses in this field during the education and the low application of these courses in its future jobs, it is recommended that the compliance of the courses with occupational needs should be evaluated.²⁰ This field of study, like other fields, needs evaluation of training courses and modification of the educational contents to achieve the goals of the higher education system. Ghafari et al. investigated environmental health engineering graduates' viewpoints about the conformity of the curriculum with their professional needs.²¹ In pursuing their findings, the present study was conducted to investigate the compliance between the received training during academic education and the occupational needs of graduates among different possible job opportunities for this major. To this end, environmental health graduates working in different occupational positions were asked to provide us with their opinions about the compliance of all specific courses and units in their field of study with their occupational needs.

Methods

This descriptive study was conducted after obtaining the necessary permissions from the Vice-Chancellor of Research, Mashhad University of Medical Sciences. To collect the data, we distributed a questionnaire among the graduates of environmental health who were working in various organizations. The questionnaire consisted of questions about the participants' demographic information and views on the courses offered during the undergraduate period in environmental health major. The design, reliability, and validity of the questionnaire were confirmed in a pilot study by 10 experts in this field. Its formal and content validity were also determined by the panel of experts. Cronbach's alpha coefficient was

calculated as 0.75 that showed the high reliability of the questionnaire. Finally, the questionnaire was approved by professors and experts in environmental health. Due to the great diversity of the working environment for the environmental health graduates, we tried to examine the views of people working in different organizational positions within different organizations and departments such as Comprehensive Health Center, Hospital, Municipality, Water and Sewerage Company, and School of Health in University of Medical Sciences in Mashhad, Iran. Given the expansion of Mashhad city and the dispersion of health centers, organizations, and departments where environmental health experts were working, distributing and collecting the questionnaires was a real challenge. Therefore, the participants were selected using a non-probability sampling method. To collect the study data, we distributed the questionnaires among those who met the inclusion criteria (i.e., having at least 5 years of work experience) in the Annual Meeting on the National Day of the Environmental Health Conference. Consequently, 90 people were included in this study as the research participants; 22% of these participants were university professors who filled out the questionnaires concerning the students' possible future careers.

Questions over the respondents' viewpoints investigated specialized courses in the field of environmental health in accordance with the educational curriculum. In this part, the participants were required to determine the degree of compliance between the presented courses and their occupational needs on a five-point Likert Scale. The options included "I strongly agree" (5 scores), "I agree" (4 scores), "I have no opinion" (3 scores), "I disagree" (2 scores), and "I strongly disagree" (1 score). Considering the dispersion of courses mentioned in the questionnaire, all specialized courses were classified according to the educational curriculum and working areas for the environmental health graduates to facilitate data analysis. Courses related to a specific field of work (specific organization or department) were classified under one category. Courses directly or indirectly related to different fields of work were categorized, as shown in Table 1. In this classification, courses were generally divided

into five categories: Water and Wastewater Courses, Municipality Courses, Comprehensive Health Center Courses, Hospital Courses, and Common Courses. After coding the questionnaires, data were extracted, entered into IBM SPSS21 software, and analyzed using one-way ANOVA and independent t-test. Mann-Whitney test was run to examine the difference of quantitative variables between males and females. Analysis of variance or Kruskal-Wallis test was applied to examine the differences among quantitative variables among the study groups.

Results

The results of one-way analysis of variance, which was performed to determine the participants' viewpoints (frequency of agreement and disagreement with the courses) in terms of their place of employment, are shown in Figure 1. Based on the viewpoints of employees in the Water and Wastewater Co., the set of courses related to Water and Wastewater received the highest scores (mean score=26), while courses related to Hospitals and Municipality received the lowest scores (mean score=7.64). Employees of Municipality believed that the set of courses related to the Municipality (mean score=157.5) had the highest compliance with their current occupational needs. According to these participants, the set of courses related to Hospital (mean score=38.5) had the lowest compliance with their occupational needs among other courses. According to the staff of Comprehensive Health Centers, courses related to the Comprehensive Health Center had the highest compliance scores (mean score=125.48). Based on the viewpoints of the University employees, the set of courses related to the Hospital (mean score=17) and Common courses (mean score=8) had the highest and lowest compliance with their job needs, respectively. Therefore, the highest compliance of occupational requirements was attributed to the courses specific to that field of work. For instance, people working in Water and Wastewater companies believed that the set of courses related to Water and Wastewater had the highest compliance with their occupational requirements.

Table 1: Classification of questionnaire courses for data analysis

1. Water and Wastewater Courses	Hydraulic Laboratory, Fluid Mechanics, Environmental Chemistry and Microbiology, Processes and Operations in Environmental Health Engineering, Water Quality Management, Water Treatment, Designing Transmission and Distribution Facilities, Wastewater and Surface Water Collection Networks, Municipal Wastewater Treatment, Soil Mechanics, Hydrology and Hydrogeology
2. Municipality Courses	Air Pollution, Waste Collection and Disposal, Environmental Chemistry and Microbiology, Soil Mechanics
3. Comprehensive Health Center Courses	Radiation Hygiene and Protection, Engineering Methods in dealing with Vectors, Food Hygiene Inspection and Control, Environmental Chemistry and Microbiology
4. Hospital Courses	Radiation Hygiene and Protection, Disinfectants, Environmental Chemistry and Microbiology, Waste Collection and Disposal
5. Common Courses	Specialized Language, Application of Statistical Methods in Environmental Health, Mathematics, Application of Computer

Classification of courses is based on applicability of the relevant course in a particular field of work.

Optional courses and some other courses that are directly or indirectly used in various fields of work were considered as general specific courses.

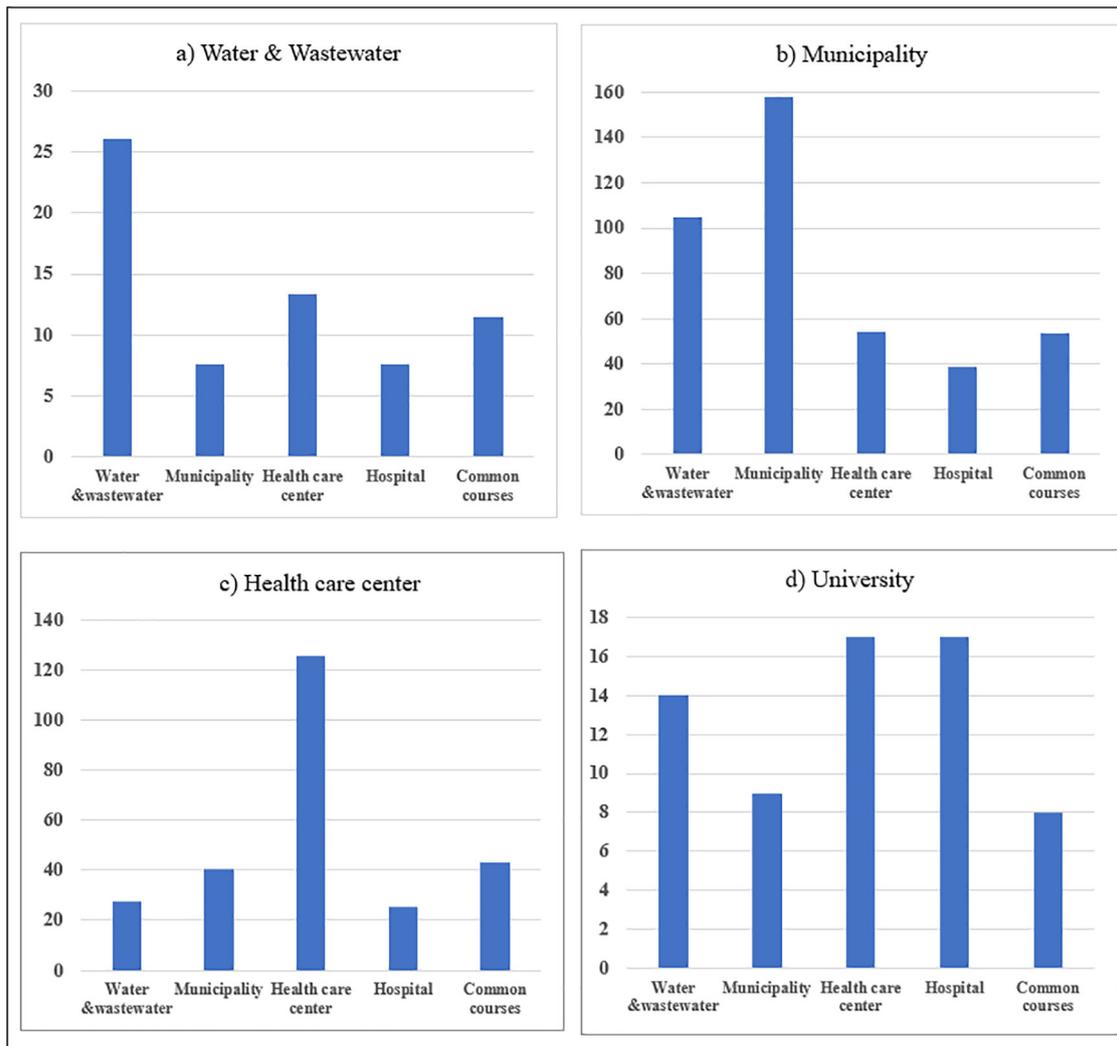


Figure 1: Scores of different courses from the viewpoints of employees working in a) Water and Wastewater Company; b) Municipality; c) Comprehensive Health Center; d) University.

According to Table 2, the results of the Kruskal-Wallis test showed no significant difference among the compliance scores in terms of the participants' employment status.

The mean scores of men and women working in different occupational fields related to environmental health were assessed using Mann-Whitney test (Table 3). The degree of compliance between the courses and occupational requirements was investigated from the viewpoints of men and women. The findings showed a significant difference between male and female participants with regard to the set of municipal courses ($P=0.034$) and common courses ($P=0.013$). In other words, men and women had different opinions about the compliance of common courses and municipal courses with their occupational requirements.

The individuals' usage and perception of the presented concepts and topics are not similar among people with different degrees. One-way analysis of variance was performed to determine the effect of the participants' degree of education on their compliance

scores (Table 4). The findings indicated that the lowest compliance scores (highest disagreement scores) were attributed to the set of Water and Wastewater courses, but the highest compliance mean scores (highest agreement scores) were related to Hospital courses. Graduates of discontinuous and continuous bachelor's degrees had the lowest compliance scores (highest disagreement scores) with the set of Water and Wastewater courses than individuals with master's and PhD. degrees.

The lowest compliance scores (highest disagreement scores) regarding the set of Municipal courses were associated to the graduates with continuous bachelor's degree, whereas the highest compliance scores (highest agreement scores) belonged to the graduates with discontinuous bachelor's degree. A non-significant difference was found between the compliance mean scores of participants in terms of the Comprehensive Health Center courses. The highest compliance mean scores (agreement scores) and the lowest compliance mean scores (disagreement scores) were related to the set of Hospital courses and common courses, respectively, belonging to the PhD degree.

Table 2: Participants' viewpoints towards compliance of the courses with the occupational needs in terms of employment status

Courses categories	Employment Status	Mean Rank	P value
Water & Wastewater	Official	41.07	0.316
	Adaptive	39.28	
	Contractual	50.48	
	Projection	36.91	
Municipality	Official	42.43	0.319
	Adaptive	35.56	
	Contractual	50.50	
	Projection	38.47	
Health care center	Official	38.19	0.135
	Adaptive	36.50	
	Contractual	52.68	
	Projection	44.38	
Hospital	Official	38.96	0.249
	Adaptive	37.33	
	Contractual	51.30	
	Projection	44.06	
Common courses	Official	44.50	0.377
	Adaptive	29.44	
	Contractual	44.20	
	Projection	45.35	
Total	Official	41.00	0.315
	Adaptive	36.22	
	Contractual	50.52	
	projection	38.62	
	Official	41.00	

Table 3: Participants' viewpoints towards compliance of the courses with the occupational needs in terms of gender

Courses categories	Gender	Mean Rank	Quartiles			Sum of Ranks	P value
			25	50	75		
Water & Wastewater	Female	48.26	16.00	24.00	31.00	1689.00	0.262
	Male	42.02	15.00	21.00	27.00	2227.00	
Municipality	Female	51.99	4.00	6.00	8.00	1871.50	0.034
	Male	40.25	4.00	5.00	7.00	2133.50	
Health care center	Female	47.74	5.00	7.00	10.00	1718.50	0.407
	Male	43.14	5.00	6.00	9.00	2286.50	
Hospital	Female	47.96	3.00	4.00	6.00	1726.50	0.366
	Male	42.99	2.00	4.00	5.00	2278.50	
Common courses	Female	53.18	6.00	9.00	11.00	1914.50	0.013
	Male	39.44	6.00	7.00	9.00	2090.50	
Total	Female	49.31	32.00	45.00	53.00	1726.00	0.151
	Male	41.32	29.00	38.00	50.00	2190.00	

The participants' compliance scores were not significantly different in terms of their educational degrees.

The Spearman test was run to study the relationship of the participants' age and work experience with their viewpoints towards compliance of courses with occupational needs. No significant relationship was found between the compliance scores of the people working in different organizations in terms of their age and work experience. However, the results of Spearman test showed that compliance scores had a low correlation with the participants' work experience and age. In this regard, common courses and work experience had a direct correlation with a correlation coefficient of 0.042. Other courses showed a negative

correlation coefficient with work experience. In other words, the individuals' compliance scores decreased by the increase of age and work experience; they showed more disagreement in terms of the compliance between the studied courses and occupational requirements.

Discussion

The degree of compliance between courses in each field of study and its occupational requirements determines the productivity and efficiency of the higher education system. In addition, training capable, skilled, and knowledgeable manpower is one of the most important goals of any higher education system to develop and improve the economic and social conditions.

Table 4: Participants' viewpoints towards compliance of the courses with the occupational needs in terms of educational degree

Courses categories	Grade	Mean±SD	Sig.
Water and wastewater	Discontinuous BS	20.81±6.84	0.080
	BS	16.85±8.83	
	MSc	16.82±6.18	
	PhD	15.33±3.05	
	Total	19.02±6.94	
Municipality	Discontinuous BS	4.71±1.77	0.570
	BS	6.00±3.82	
	MSc	5.14±2.07	
	PhD	5.14±2.07	
	Total	4.95±2.03	
Health center	Discontinuous BS	8.8±3.1	0.995
	BS	8.6±5.5	
	MSc	8.71±3.14	
	PhD	8.33±1.15	
	Total	8.74±3.2	
Hospital	Discontinuous BS	4.13±1.91	0.302
	BS	4.13±1.91	
	MSc	3.6±1.65	
	PhD	3.6±1.65	
	Total	3.86±1.82	
Common	Discontinuous BS	3.86±1.82	0.647
	BS	15.75±7.13	
	MSc	15.27±6.37	
	PhD	19.66±2.88	
	Total	16.42±5.34	

Given the importance of professional background for medical education graduates and their direct relationship with people's health, they should be ready to provide services and occupy organizational positions. Conformity of educational content and its application is an essential principle to improve the graduates' efficiency. In an evaluation of the conformity of assistential practice in the maintenance of dialysis catheter in Brazil, the rate of general conformity of the assistential practice corresponded to 65.8%. They found that suggesting and using educational strategies with the health team were essential in raising the conformity rates and guaranteeing the quality of the services.²² Environmental health engineering is a field of study in medical sciences aiming to promote the level of public health and provide a healthy environment in order to ensure and maintain the community members' health. Since the graduates of this field can play a role in different organizations, they take advantage of the offered courses depending on their duties and responsibilities. In this study, the participants were asked to indicate their level of agreement with each of the specialized courses according to their profession and its requirements. For example, units offered in the set of Water and Wastewater courses, Comprehensive Health Center, and Hospital received the highest agreement scores by the participants working in the Water and Wastewater Company, Comprehensive Health Center, and Hospital, respectively. This level of agreement can be justified by the applicability of these courses in terms of occupational position and its requirements. Differences in participants' viewpoints can indicate

that contents of the curriculum do not fully conform to the occupational requirements in the labor market; of course, this difference is consistent with the application of courses in different organizational positions. Shirjang et al. also confirmed the lack of complete compliance between courses of public health and occupational needs of the graduates of this major.²³ In study of Ghafari et al., findings revealed that inspection and control of food, solid waste, disinfection, and water treatment had the most compliance with professional needs. They concluded that the occupational needs of environmental health graduates were not met by the current curriculum completely.²¹

For example, theoretical and technical-computational courses of Water and Wastewater set, (including basic concepts, design, and operation of water transmission and distribution systems, wastewater collection, as well as water and wastewater treatment plants) are among the most applicable courses for people working in the Water and Wastewater Company. Given that environmental health engineers working in the Comprehensive Health Centers are responsible for inspection of places and guilds of food preparation, distribution, and storage centers, as well as public places, having a background and brief knowledge about water and wastewater issues seems to be enough. Therefore, presenting the set of Water and Wastewater courses and units to applicants of working in Comprehensive Health Centers is neither applicable nor necessary.

Based on the findings, employees of organizations other than the Water and Wastewater Organization strongly disagreed with presentations of Water and Wastewater courses during their academic education as environmental health engineers. Since most courses in Water and Wastewater have a computational and technical nature, students should study harder to pass these courses and find computational courses more difficult than other courses. Since the contents covered in Water and Wastewater courses are not applicable in organizational positions, except for the positions in Water and Wastewater Company, participants disagreed with the presentation of these courses in academic curriculum. Due to the fact that the contents covered in the set of Water and Wastewater courses are overlapped with the courses presented in Civil Engineering, Chemical Engineering, and some other disciplines, many organizational positions related to water and wastewater have been occupied by graduates of other disciplines. Thus, environmental health engineers may be less active in this field. Consequently, fewer applications of these courses reduce the need for presenting them. In a study conducted in Isfahan province, only 4.8% of the environmental health engineering graduates were employed in organizations (12 people were employed in the Water and Sewerage Company and 2 in the Environmental Protection Department) other than the environmental health units in the health centers of cities and provinces, medical centers, and faculty of health in the universities.²⁴

Differences in the level of disagreement between men and women, especially with regard to the set of common courses and municipality courses can be due to the differences in the amount of gained knowledge, changes in attitude, and obtained skills from the training courses. Hosseinzadeh examined the effectiveness of educational courses curricula on improving the level of knowledge, attitude, and skills of the students of the Islamic Azad University of Mazandaran and found a significant difference between men and women regarding the effectiveness of these curricula. He explained that these discrepancies can be due to the fact that men are provided with better conditions and opportunities to learn and apply their knowledge in scientific settings.²⁵ Tessema et al. studied the factors affecting the students' satisfaction with the curriculum, but their findings were contrary to the results of the present research. In their study, women were more satisfied with the educational curriculum than men. The researchers attributed this finding to the fact that women have a different internal evaluation system; in other words, women tend to evaluate and comment on the curriculum with a more positive attitude. The reason for this difference between the results of these two studies can be the participants' cultural differences.²⁶ In a similar

study, Adhami et al. examined the adequacy of the training provided in the Obstetrics and Gynecology Department from the medical students' viewpoints during their internship. Unlike the present study, Adhami et al. found no significant difference between men and women considering the total adequacy scores.²⁷

Despite the fact that having at least five years of relevant work experience as the required inclusion criteria for participants to enter the study, findings of the correlation test showed that individuals with higher work experience reported higher compliance between the presented courses and occupational requirements. This suggests that during years of work, employees need the knowledge gained from different topics covered in university courses.

Given that the new educational curriculum of environmental health engineering was announced to universities in 2018, future researchers are suggested to evaluate the compliance of this new curriculum with occupational needs in the coming years. Furthermore, authorities are suggested to create a suitable environment for the students so that they can take optional courses according to their interests and field of work. As a result, time and money of the students and the educational system will be saved. In the case of offering educational courses only in accordance with educational facilities and human resources of the university, educational efficiency decreases and compliance of training with occupational requirements reduce.

In the present study, the non-probability and available sampling method was used due to some limitations in the research process. Given the fact that people do not welcome completing the electronic questionnaires compared to the physical ones, the paper questionnaires were administered as the data collection tool. To this end, distributing and collecting paper questionnaires required follow-up and referral to individuals at least twice. Due to the diversity of the participants' job positions and their geographical distribution throughout the city, the non-probability sampling method was applied, which could eliminate some problems and traffic restrictions.

Conclusion

Management of a comprehensive curriculum requires assessing the educational plan and designing the educational course. Considering the wide and scattered courses of environmental health engineering, students of this field should pass all units in different fields. In other words, graduates may have different careers in various organizational positions and consequently can benefit from just a part of the courses offered during their studies in terms of their duties and organizational position. In

fact, passing all courses requires spending a lot of time and energy by the students and imposes a large cost on students and the medical education system of the country. In general, authorities of environmental health are recommended to revise the curriculum of this field and increase its specialized trends at the undergraduate level to improve the impact of education in this field of study and reduce the costs.

Conflict of Interest: None declared.

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