RESEARCH ARTICLE

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Effective Factors in Environmental Health Status of Grocery Stores

Mehdi Asadi[a*], Mehdi Norouzi[b], Mehdi Ghafuri[c], Fahimeh Tavakkoli[d], Alireza Omidi Oskouei[b]

[a] Department of Environmental Health Engineering, Qom University of Medical Sciences, Qom, Iran.
[b] Department of Public Health, Qom University of Medical Sciences, Qom University of Medical Sciences, Qom, Iran.
[c] Department of Environmental Health Engineering, Qom Health Center, Qom University of Medical Sciences Qom, Iran.
[d] Department of Environmental Health Engineering, Qom University of Medical Sciences, Qom, Iran.
[*]**Correspondence** should be addressed to Mr. Mehdi Asadi; **Email:** masadi@muq.ac.ir

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Aims of the Study: This study was carried out to determine the effective factors in environmental health status of grocery stores in the city of Qom (located in the center of Iran).

Materials & Methods: In this cross-sectional study, 283 grocery stores from 3 different regions were selected randomly using stratified sampling. Data were gathered through observation, interview, and questionnaire. The questionnaire consisted of two sections: section 1 dealt with some shop managers' features including the age, educational level, job satisfaction, passing "food and occupational hygiene training courses", store ownership, duration of employment, and features of stores including their location (Region) and environmental health condition. And section 2 dealt with the important aspects of regulations of Article 13. The data analyzed using statistical procedures such as Spearman Rank Correlation and Multivariate Regression Analysis. P-values less than 0.05 were considered as statistically significant.

Results: Among the investigated factors, the manager's educational level had a greater impact on the environmental health conditions of grocery stores. The ownership status of grocery stores, Job satisfaction and passing "food and occupational hygiene training courses" were next in the ranking, respectively ($p < 0.001$ for all measures, except for shop ownership, for which p-value was < 0.02).

Conclusions: Planning and implementation of effective operational and strategic programs addressing the above mentioned issues seems to be necessary. Such programs will improve the health status of the stores over time.

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Background

Human health as sustainable development is one of the issues that have attracted the attention of health sector authorities (1). Healthy feeding is the main condition in the human health and food health is of great importance in healthy feeding. Unhealthy food and the lack of observation of personal and environmental hygiene in food distributors are among the most important factors related to human health.

In the process of food health, food distribution health is one of important factors (2, 3). Minimizing the environmental pollutions and keeping food distribution health requires strict rules and regulations, enforcement, and monitoring the implementation of rules and regulations (4). In Iran, Article 13 of "Act of edible, drinkable, cosmetics and hygienic products" has been formulated in this regard. The Article 13 adopted on food hygiene by the Ministry of Health & Medical Education, and includes commands for preparation, production and distribution of food products. Implementation of this Article helps to control the health condition of food distributors (5, 6).

Regarding the determining factors among food handlers there are a considerable number of reports confirming the impact of hygiene training studies on food safety in commercial sectors (7).

According to "The Food Safety Authority of Ireland (year 2001)" in 100 reported studies implemented between years 1998 to 2000, the great majority of food poisoning outbreaks were attributed to inadequately trained staff (cited in: Worsfold & Griffith) (8).

Rennie *et al.* proved that providing health education to the people having role in producing food improved the knowledge and performance of the staff and food health (9).

The city of Qom (located in the center of Iran) has a population of about one million with its special cultural and religious characteristics. Some holy places such as the Holy Shrine of Fatemeh Masumeh and the Holy Mosque of Jamkaran, and some educational centers as Hoze Elmieh (*i.e.*, the scholarly Islamic academia) are located in the city of Qom (10).

About 17 million visitors, including national and international tourists and pilgrims, visit this city annually (10). According to the statistics of Qom Health Center, there were 3851 food distributing centers and grocery stores in the city of Qom in 2010, of which 80% had good health status and 20% did not. It is obvious that failure to comply with the health and safety regulations can cause some health problems for its population and this large number of visitors (10).

Aims of the study: Based on the above mentioned facts, this study was carried out to determine the effective factors in environmental health status of grocery stores in the city of Qom (located in the center of Iran).

Materials & Methods

This descriptive, analytical, and cross-sectional study was conducted in year 2010 on grocery stores of the city of Qom (located in the center of Iran).

The sampling method was stratified sampling and samples were selected randomly. Society stratification was considered based on factors including income of people, land price, local survey, *etc*. Based on these factors, the city was divided into three regions with: good economic condition (Region 1), average income (Region 2) and low income (Region 3). Grocery stores of each region were under supervision of related health center office.

Size of samples was calculated according to the distribution of grocery stores in each Region. To do this, the list of grocery stores was collected in the above mentioned Regions. The map of each region was defined based on the geographical attributes with its address and area. Then, the exact location of the first sample was defined on the map with its address. After that, we moved to the right direction of the map to select other eligible grocery stores. In this way, 283 samples were selected among 3851 grocery stores.

By visiting each selected grocery store, a questionnaire was completed. Then, by visiting the related Health Centers, "Questionnaire and Visit Checklist" of each selected grocery store were obtained from their health records. The contents of these "Questionnaire and Visit Checklist" are based on the regulations of Article 13 (Ministry of Health & Medical Education of the I.R Iran).

Based on the importance and effect of each items on environmental condition of grocery stores, a part of the questionnaire with 30 items from the regulations of Article 13 was selected. These 30 items were as follows:

Certificate of passing food and occupational hygiene training courses, health card, mantle, locker, personal health, first aid box, smoking, selling cigarette in the shop, the condition of the "shop floor, ceiling and wall", observing fly and mosquito in the shop, required measurements to avoid the attack of rodents and insects, wastewater, toilets, shelves and work table, food storage, palettes, spoiled materials in refrigerators, raw and cooked materials together in the refrigerator, ventilation, light, sprinkler system and fire extinguisher, rubbish bin, extra equipments in the shop, dishes, food packing, using newspaper and recycled plastics, unlabeled foods and packages, and finally food transportation. This part of the study was done based on the visits done by experts of environmental health and scoring each of 30 items. Scoring of each item was based on "observed" or "not observed".

The maximum score that a grocery store could get was 72. The classification of scores of environmental health condition was as: Weak: <25; Moderate: 25≤X<50; Good: 50≤X≤72.

Overall, in this study data were gathered through observation, interview, and questionnaire. The questionnaire consisted of two sections: section 1 dealt with some shop managers' features including the age, educational level, job satisfaction, passing "food and occupational hygiene training courses", store ownership, duration of employment, and some features of stores including their location (Region) and environmental health condition. And section 2 dealt with the important aspects of regulations of Article 13.

Data analysis: data were analyzed using SPSS computer software version 17.0. The descriptive and analytical statistics were used.

In descriptive statistics, for quantitative variables we used central indices (mean and median) and distribution indices including Standard Deviation (SD), coefficient of variation, maximum, and minimum.

For qualitative variables, relative frequency tables and percentage of relative frequencies were obtained.

To find the correlation between two quantitative variables, Pearson's correlation coefficient was measured, and in case of qualitative variables, Spearman's Rank Correlation Test was used. P-values less than 0.05 were considered statistically significant.

To investigate the impact of effective factors, Multivariate Regression Analysis was used. In this Test, all effective factors were simultaneously entered in logistic regression model to control for confounding factors and their effects were investigated.

The variables with the highest OR (odds ratio) were recognized as "more effective factors".

Results

Table 1 shows the educational level of grocery store managers in the three Regions.

Among all the investigated shop managers, 204 managers (72.1%) were satisfied with their job and 79 managers (27.9%) were not. In Region 3, 58.2% of the managers were satisfied with their job, this amount in Region 2 reached to 78.2%, and in Region 1 was 95.2%.

Of total grocery store managers in Region 3, 69.7% did not take "food and occupational hygiene training courses". This amount in Region 2 was 61.3% and in Region 1 reached 42.9%.

The mean and SD of the obtained score of health condition of grocery stores were 50.75±12.76.

Spearman's Rank Correlation Test showed that there was significant direct correlation between educational level of shop managers,

location (Region) of grocery stores, passing "food and occupational hygiene training courses", job satisfaction and shop ownership, with environmental health conditions of grocery stores ($p < 0.001$ for all measures, except for shop ownership, for which p-value was <0.02) (Table 2).

There was a reverse and significant correlation between the managers' age (44.2±12) and duration of employment (8±4.9) with environmental health conditions ($r = -0.48$, $r = -0.219$, respectively; $p < 0.001$).

The analyses of all effective factors by multivariate regression coefficient, logistic regression model and their effect were investigated to control confounding factors. Among the factors, the manager's educational level had a greater impact on the environmental health conditions of grocery stores. Afterwards, the ownership status of grocery stores (with almost large difference compared to the impact of educational level), had the greatest impact on the health conditions of the stores. Job satisfaction and passing "food and occupational hygiene training courses" were next in the ranking, respectively (Table 3).

It should be mentioned that by this analysis method and due to high amount of p-value, the location (Region) of the stores, and managers' age were not effective on environmental health status of stores.

Table 1) Educational level of the grocery store managers in the investigated Regions

Region	Educational Level	No.(%)	Total
3	Illiterate	21(17.21)	122
	Elementary School	42(34.43)	
	Junior-High School	21(17.21)	
	Diploma and higher	38(31.15)	
2	Illiterate	7(5.9)	119
	Elementary School	34(28.6)	
	Junior-High School	21(17.6)	
	Diploma and higher	57(47.9)	
1	Illiterate	0(0)	42
	Elementary School	1(2.4)	
	Junior-High School	5(11.9)	
	Diploma and higher	36(85.7)	
		Total	**283**

Table 2) Correlation between descriptive variables with health status of grocery stores using Spearman Test

Variable		Investigated Managers		Correlation Coefficient
		No.	%	
Educational level*	Illiterate	28	9.9	0.755
	Elementary School	77	27.2	
	Junior-High School	47	16.6	
	Diploma and higher	131	46.3	
Region of grocery store*	3	122	43.11	0.352
	2	119	42.05	
	1	42	14.84	
Passing training courses*	Yes	107	37.8	-0.636
	No	176	62.19	
Job satisfaction*	Yes	204	72.1	-0.389
	No	79	27.9	
Grocery store ownership**	Private property	156	55.1	-0.135
	Rented	127	44.9	

*p <0.001
**p <0.02

Table 3) Investigation of effective factors on health status of grocery stores in Qom using multivariate regression analysis

Variable	Level	p-value	OR[a]	95.0% CI[b] for OR	
				High	Low
Educational level*	Illiterate	--	0	--	--
	Elementary School	0.998	0.000	0.000	0.000
	Junior-High School	0.000	0.004	0.003	0.2
	Diploma and higher	0.000	418.3	3715	47.1
Grocery store ownership*	Private property	0.042	43.4	0.401	0.030
	Rented	--	1	--	--
Job satisfaction*	Yes	--	8	--	--
	No	0.000	1	17.56	3.68
Passing training courses*	Yes	--	40	--	--
	No	0.000	1	113.66	14.10
Region of grocery store**	--	0.741	0.881	1.86	0.417
Manager's age**	--	0.409	1.04	1.15	0.944

[a]Odds Ratio, [b]Confidence Interval
*p <0.001
**p >0.05

Discussion

The results showed that grocery stores' managers in Region 1 had participated in training classes of health centers more than managers in the other Regions.

Also we found the reverse effect of managers' age and duration of employment in environmental health status of grocery stores: The younger the age of grocery store managers and less duration of employment, the better the environmental health status of grocery stores.

The Educational level was one of the important factors of environmental health status of stores. The multivariate regression test showed that this factor had a significant effect on health condition of grocery stores and the increase in literacy improved the chance of suitability of environmental health status. This may be due to increase in the knowledge of managers regarding the importance of health on their job and carrier. This finding can help health authorities to provide required facilities for the education of shop managers. In this regard, other studies have shown that there is a significant relationship between job satisfaction, job commitment and literacy, with health status (7, 11).

The effect of stores' ownership on their environmental health status was in second rank next to the educational status so that some grocery stores with private property had better health conditions compared to the rented ones. This result suggests that grocery store managers with private property have more tendency and motivation to improve their grocery store health conditions.

The significant relationship between job satisfaction and environmental health status of grocery stores indicates a direct relationship between job satisfaction and good status of environment health of the shops. The managers' job satisfaction in Region 1 was considerably higher than that in Regions 2 and 3. Also a reported study found a significant relationship regarding the correlation of job satisfaction and managers' knowledge and attitude in improving the workplace conditions (12). These results were in line with the ecological data of the study reported by Ghosh (13). One of the possible reasons is that the managers who were satisfied with their job, attracted more customers and hence more income. The customers, in turn, welcomed more grocery stores with better environmental health status, since the grocery stores whose managers passed the "food and occupational hygiene training courses" had better

environmental health status compared to the other ones.

It seems that passing "food and occupational hygiene training courses" is a good chance for improving environmental health status in the grocery stores by managers. The study of Ehrampoosh and Farsad supports this result. They investigated the effect of the education classes on the knowledge, attitude and practice of food distributors and retailers in the city of Yazd. In this study, the food distributors' knowledge was increased from 12.1 (before the study) to 14.8 (after the study). Scores were calculated from 20 (14).

In the investigation of the impact of sellers educational classes on changing the knowledge and health performance of the managers of distributing centers of food in Lordegan, it was found that the average number of people studied changed from 23.4 (before training) to 50% (after training) (15).

Another study by Rennie *et al*. confirmed that food hygiene training for food industry personnel improves their knowledge and performance and thus improves the food health (9). Some other studies on businesses related to food distribution are consistent with these findings, regarding taking part in food and occupational hygiene training courses (16-20).

Conclusion: Among the investigated factors, the manager's educational level had a greater impact on the environmental health conditions of grocery stores. The ownership status of grocery stores, Job satisfaction and passing "food and occupational hygiene training courses" were next in the ranking, respectively.

Since the mean score achieved in various educational level, age groups location of grocery stores, job satisfaction and taking training courses can vary, the results of this study can be used to detect the people or groups requiring education and based on which some good solutions including taking courses, increasing literacy level via literacy classes, *etc*. can be provided.

Regarding the fact that a high percentage of grocery stores with low environmental health status are in the economically poor regions, it is recommended that by considering good facilities, the environmental status of grocery stores can be improved. Also continuous inspection by health investigators and continuous education of managers can be effective in improving health status of grocery stores.

Finally, Planning and implementation of effective operational and strategic programs addressing the above mentioned issues seems to be necessary. Such programs will improve the health status of the stores over time.

Footnotes

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Conflict of Interest:

The authors declare no conflict of interest.

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