

## A survey on the knowledge and attitudes of Dehloran health network personnel about food safety and health

Rouhollah Shokri<sup>1</sup>, Majid Hashemi<sup>2</sup>, Reza Jorvand<sup>3</sup>, Hashem Hajiveisi<sup>4</sup>, Atefeh Shamsi<sup>5</sup>, Hafez Golestani Far<sup>6</sup>, Shima Rezaei<sup>✉, 7</sup>

1. Department of Environmental Health Engineering, Abadan School of Medical Sciences, Abadan, Iran
2. Environmental Health Engineering, School of Health, Isfahan University of Medical Sciences, Isfahan, Iran
3. Ph.D. student of health education, Tarbiat Modares University, Tehran, Iran
4. Health Network of Sanandaj, Kurdistan University of Medical Sciences, Sanandaj, Iran
5. MSc. Student of Statistics, Islamic Azad University of Arak, Iran
6. MSc. of Environmental Health Engineering, Tehran University of Medical Sciences, Iran
7. Department of Environmental Health Engineering, Environmental Health Research Center, Research Institute for Health Development, Kurdistan University of Medical Sciences, Sanandaj, Iran

**Date of submission:** 25 Nov 2017, **Date of acceptance:** 15 Jan 2018

### ABSTRACT

Controlling and ensuring the safety of food plays an important role in preventing foodborne illness. The major objective of this descriptive cross-sectional study was determined the food safety knowledge and attitudes of Dehloran Health Network personnel using a self-completed questionnaire. This structured questionnaire contains personal information, knowledge, and attitude questions. A total of 100 personnel were selected using a census method. All data were analyzed by SPSS 17 software. The results of the study showed that 29% of the personnel had good knowledge, 47% had moderate knowledge, and 24% had poor knowledge about food safety. Personnel had a good attitude about food safety and health. There was no statistically significant difference across different staff in terms of knowledge ( $p$ -value = 0.166). Also, there was no statistically significant difference in knowledge and attitude level among different age groups ( $p$ -value = 0.51 and 0.21, respectively). The  $p$ -value for mean scores of knowledge and attitude in men and women were 0.038 and 0.84. According to the moderate level of participants' knowledge, we encouraged personnel to create plans and procedures to enhance the level of their consciousness, offered a training workshop in this field, and personnel must be more educated, along with development of appropriate information and communication material.

**Keywords:** Attitude, Dehloran, Food safety, Knowledge

### Introduction

According to the World Health Organization, foodborne diseases are considered to be one of the most important health problems and have become one of the most widespread health problems in developing countries.<sup>1, 2</sup> The Centers for Disease Control (CDC) has reported that foodborne diseases annually cause gastroenteritis, hospital admissions and the death of a large number of people.<sup>3</sup> Also, the relationship between

nutrition and chronic non-contagious diseases such as cancer, cardiovascular disease, and diabetes are well-known.<sup>4</sup> The social and economic consequences of these problems also highlight the importance of food safety.<sup>5, 6</sup> Food safety refers to the conditions and practices that take place during the production, processing, storage and distribution of food to ensure food is safe and appropriate for consumption. The use of inappropriate temperature/time for food storage and cooking, the use of contaminated tools and quality of raw materials, poor personal hygiene, storage conditions, and the lack of knowledge and awareness of food safety can cause foodborne diseases.<sup>7-9</sup> Consumption of contaminated food has the potential to produce bloody diarrhea and vomiting, fever, headache,

✉ Shima Rezaei  
sh\_rezaey@yahoo.com

**Citation:** Shokri R, Hashemi M, Jorvand R, Hajiveisi H, Shamsi A, Golestani Far H, et al. A survey on the knowledge and attitudes of Dehloran health network personnel about food safety and health. J Adv Environ Health Res 2018; 6(1): 27-33

abdominal cramping and severe fatigue, and millions of people have died as a result of diarrhea.<sup>6</sup> A survey of the scientific literature provides evidence that increasing knowledge scores in populations plays a very effective role in improving the nutritional status of the community and reducing the incidence of foodborne diseases.<sup>6</sup>

Previous studies carried out among the students of three medical universities of Iran (Tehran, Kermanshah and Shahid Sadoughi) have revealed that although the knowledge scores of the students are relatively high, there is an obvious need to improve the level of their knowledge via training.<sup>10-12</sup> In addition, many studies have examined the knowledge and attitudes of different people.<sup>13-15</sup> Because food safety education improves the health performance of the community and most health education is transferred from the health centers to the people, it is very important to investigate the level of knowledge of health workers.<sup>16</sup> Regarding the previously mentioned issues and the importance of healthy food consumption as well as the effect of the food safety knowledge of individuals on preventing foodborne diseases, according to the best of our knowledge no prior research has been conducted in Dehloran to evaluate food safety knowledge and the attitudes of personnel in a health center. Therefore, the present study was performed to examine the distribution and relationship of food safety knowledge and education level (i.e., Associate Degree, Bachelor, Msc and Doctoral), age, and sex of the employees of the Dehloran Health Center.

## Materials and Methods

This cross-sectional descriptive survey was conducted on Dehloran Health Network personnel. The population of this study were personnel in some post that has relevance to food and nutrition include nursing, environmental health, public health, physician and midwifery posts. By complete enumeration of the population of interest, the number of samples by a census sampling method (total count) was determined to be about 100 staff. All

participants were full-time employees. The demographic characteristics of the Dehloran Health Center staff in the mentioned posts were prepared based on their major, educational level, age, and sex.

To determine the food safety knowledge and attitude of the staff, data were collected using a self-completed questionnaire, which was prepared from previously performed studies.<sup>6, 12</sup> The validity and reliability of the questionnaire has been investigated formerly. A total of 100 questionnaires with 22 questions each were distributed to obtain information about time-temperature control, hygiene, contamination, cooling, cooking, cleaning and food poisoning. The questionnaires which consisted of 3 parts were developed, with the first part included demographic information, the second part consisting of 12 knowledge questions, and the third part included 10 questions about attitude. Each knowledge question was scored as 1 for a correct answer, 0 for the incorrect answers and the option of "I do not know." For attitude questions, scoring was carried out using a Likert scale and a grading scale of zero to four: completely agree, agree, no idea, disagree, disagree and completely disagree.<sup>17</sup> SPSS17 software was used to analyze the data. One-way analysis of variance (ANOVA) and a t-test were used to compare mean scores in different groups. The level of significance was set at <0.05.

## Results and Discussion

### *Socio-demographic data*

The socio-demographic characteristics of 100 personnel employed by Dehloran Health Network are summarized in Table 1.

A total of 100 personnel were involved in this study. The number of male and female participants were 48 and 52%, respectively. All participants in the study had an academic education and the greatest number of participants (57%) were in the age group between 20 and 30 years old. Approximately 30% of the participants were in the age range of 30 to 40 years and 13% in the age range of 40 to 50 years.

Table 1. Participant demographic characteristics

Category	Frequency	Percentage
Gender	Male	48
	Female	52
Age	20-30 years	57
	30-40 years	30
	40-50 years	13
Education level	Associate Degree	28
	Bachelor	55
	Msc	1
	Doctoral	16
Post	Nursing	47
	Environmental Health	14
	Public health	13
	Physician	16
	Midwifery	1

The personnel in this office were employed in different posts include nursing, environmental health, public health, physician, and midwifery.

### Food safety knowledge

The percentage of participants correctly answering the questions about knowledge are summarized in Table 2.

According to our findings, 89% of the personnel pay attention to the date of production and expiration when purchasing a food. In a study conducted at the University of Missouri, more than 90% of students look for the date of production and expiration when buying a food.<sup>18</sup>

Table 2. Percentage of participants with correct and incorrect answers for food safety knowledge questions

Question "knowledge"	Correct (%)	Incorrect (%)
1. When buying a foodstuff, I will look at its production and expiration date.	89	11
2. Symptoms of foodborne diseases are fever, vomiting.	98	2
3. The suitable temperature for storing food in the refrigerator is 1–5 °C.	62	38
4. Botulism is transmitted through canned food.	99	1
5. There is no need to use a refrigerator to store sterilized milk.	34	66
6. Milk and meat are soon corrupted.	24	76
7. Minced meat is corrupted faster.	86	14
8. A fridge with a temperature below zero is best for keeping cans.	7	93
9. When the meat surface is slimy, it is not a symptom of meat corruption.	80	20
10. In terms of sanitation, plastic containers are more suitable for food.	80	20
11. The safe temperature for pasteurizing milk is 72 °C for 15 seconds.	25	75
12. Golden staphylococcus germs enter food through the hands, face, acne, and nasal secretions.	75	25

Also, another study on household food safety showed that most consumers (61.9%) consider the date of production and expiration when they purchase food materials.<sup>19</sup> A number of participants were not aware of the basic temperature control requirements for the control of microbial hazards. Only 62% of the personnel knew the ideal storage temperature for keeping food safe was 1–5 °C. Similarly, Pritchard et al. reported that 63% of participants believed that the refrigerator temperature should be at or below 8 °C.<sup>20</sup> A low percentage of participants (34%) identified the need to use a refrigerator to store sterilized milk, and the majority of the personnel (86%) believed that the minced meat was more likely to get rotten compared to cooked meat. In the Marzban et al. study it was found that 43.4% answered correctly to this

question.<sup>11</sup> Our results indicated that only 80% were able to identify that plastic food containers are more suitable. Participants scored poorly for the question No. 7, where 99% of the personnel believed foodborne disease from canned food was botulism. Bolton et al. reported that only 14% of respondents associated *C. botulinum* with canned foods.<sup>21</sup> In evaluating the risk factors contributing to foodborne disease outbreaks in one of the provinces in China, it was found that most people were not familiar with the most common causes of foodborne illness or the maximum storage time at room temperature.<sup>22</sup> In a study that was conducted among high school students in the United States as well as students from the University of Missouri, they found that participants had an acceptable level of knowledge about foodborne

diseases.<sup>23</sup> Table 3 shows the mean and standard deviation of the health and safety knowledge scores of the personnel.

Table 3. Mean participant food safety knowledge scores

	Item	Mean	Std. Deviation
Education	Associate degree	8.1071	1.39680
	Bachelor	7.1818	1.59966
	Msc	9.0000	0.00000
	Doctoral	7.9333	1.79151
Post	Nursing	7.1702	1.71082
	Environmental Health	7.7143	1.13873
	Public health	8.0769	1.38212
	Physician	8.0000	1.75119
	Midwifery	8.1000	1.52388

If the levels of knowledge were classified into three categories of weak, moderate and good, the percentage of participants in these three levels were 24, 47 and 29%, respectively. According to this result, the need for educating people is more prominent.<sup>24</sup> The results revealed that there was no statistically significant difference in the level of knowledge in different age groups. Also, it was found that men had more knowledge about the health and safety of food products than women.

Mean scores of knowledge between the personnel with different posts were not significantly different ( $p$ -value = 0.166). This item in people with different educational backgrounds was significantly different ( $p$ -

value = 0.033). Therefore, there was a significant difference across the level of knowledge among those with an associate degree and the level of knowledge among those with a master's degree compared with the rest of the groups. Samapundo et al. reported that the sex, level of education and position had no significant effect on the level of knowledge of consumers.<sup>25</sup> In another study in Saudi Arabia, it was found there was a significant difference between age and the level of education.<sup>1</sup> They found that workers of different nationalities had more knowledge about personal hygiene, diseases, and the transmission of food contamination. Nutrition inspectors have excellent performance and a good attitude toward personal hygiene and food safety. The results showed that there was a significant positive relationship between knowledge and attitude, knowledge and education, knowledge and personal hygiene, education and personal hygiene, as well as attitude and personal hygiene.

#### *Food safety attitudes*

Attitude as a crucial factor affects food safety behavior and practice, and thus reduces the occurrence of foodborne illness and other health hazards. Table 4 shows the attitudes of Dehloran Health Center personnel about food safety.

Table 4. Respondents' food sanitation and safety attitude

Question "Attitude"	Absolutely agreed (%)	Agree (%)	No idea (%)	Disagree (%)	Absolutely disagree (%)
1. It is important to know the health and safety of food.	94	6	0	0	0
2. Washing hands with soap and water are necessary before cooking.	84	15	1	0	0
3. Reheating the food is to ensure its safety.	35	35	8	9	13
4. I throw away canned foods that were previously opened.	80	14	1	3	2
5. Food additives are not very important to food safety.	14	16	7	33	30
6. Raw food can be placed alongside cooked foods.	5	10	7	28	50
7. Pasteurized milk can be kept at room temperature for 24 hr.	20	16	11	38	15
8. Putting bread in recycled bags is not a problem.	4	5	4	29	58
9. Drinking raw milk has a high risk of food poisoning.	58	29	4	3	6
10. Washing the vegetables with water is sufficient.	6	3	0	20	71

It is notable that 94% of the respondents absolutely agreed that having information on food safety was important, as well as 84% believing that hand washing using soap was necessary before cooking. A study in Haiti found that the level of knowledge and attitudes among street consumers and food retailers was modest in terms of food safety. The results of this study showed that most consumers and retailers were aware of the importance of hand washing with regard to foodborne diseases. Also, the majority of participants did not have any awareness of the disease factors or the importance of re-heating the food.<sup>25</sup> A study in Taiwan examined the relationship between food safety knowledge, attitude and practices among 542 restaurant workers. They found that the highest attitude score was “concern for food safety” following “self-improvement.”<sup>26</sup> Among the total respondents, 11% had no idea about the safety of leaving milk at room temperature. The majority (58%) of respondents disapproving of using recycled bags for keeping bread. Mohammadzadeh et al. reported that a small percentage of participants were aware that pasteurized milk can be stored for 24 hours at room temperature.<sup>27</sup> According to Tukey's test, the levels of attitude were significantly different between the environmental health personnel and the

physicians and between the physicians and the midwives. The highest levels of attitude were observed in the environmental health agents and the midwives and the lowest level was found for the physicians. Table 5 shows the mean and standard deviation of attitude scores in personnel with different levels of education and positions. Mean scores of attitudes were significantly different among those with different education levels ( $p$ -value = 0.001).

In Al-Shabib et al. it was found that about one-fifth of people combine raw and cooked food materials together.<sup>1</sup> In the present study, 50% of the staff were completely opposed to placing raw foods next to cooked dishes. Only 58% of the participant believed that drinking raw milk may cause food poisoning. Uncooked and contaminated raw foods, by transferring harmful microorganisms to healthy foods, can be a cause of foodborne diseases.<sup>28</sup> In the present study, more than 71% of the personnel believe that washing vegetables and fruits with water only is not sufficient and more than 94% of health personnel believed that knowing about food safety and health was considered an important issue. A study conducted at Taif University showed that more than 50% of students did not have enough knowledge about the risk of food poisoning due to raw foods.<sup>29</sup>

Table 5. Mean food safety attitude scores of participants

	Item	Mean	Std. Deviation	Subset for alpha = 0.05	
				1	2
Education	Associate Degree	31.6296	3.67055		31.6296
	Bachelor	31.3636	3.43923		31.3636
	Msc	22.0000	1.41421	22.0000	
	Doctoral	29.2000	3.70714		29.2000
Post	Nursing	30.7021	3.50723	30.7021	30.7021
	Environmental Health	32.8571	2.74162		32.8571
	public health	30.8333	3.78594	30.8333	30.8333
	physician	28.6875	4.12664	28.6875	
	Midwifery	32.9000	4.22821		32.9000

There was a significant difference between the attitude scores in the Master's group and the rest of the groups. There was no significant difference between the mean scores of attitude in different age groups ( $p$ -value = 0.21) or between men and women ( $p$ -value = 0.84). According to the results of knowledge and

attitude scores in different ages (Table 6) it was found that the mean scores of knowledge in different age groups ( $p$ -value = 0.51) were not significantly different.

Many studies have examined the knowledge, attitude and practice of various groups in the context of food safety.



Table 6. Mean SD of knowledge and attitude scores among men and women

	Gender	Mean	Std. Deviation	Std. Error Mean
Knowledge	Female	7.2692	1.63438	0.22665
	Male	7.9375	1.53548	0.22163
Attitude	Female	31.0000	3.75212	0.52033
	Male	30.8542	3.84259	0.55463

For example, in a study in Turkey, the results showed that knowledge has no significant effect on behavior, and there is a high correlation between attitude and behavior as well as a moderate correlation between knowledge and attitude.<sup>30</sup> In South Vietnam, a study was carried out using a standard questionnaire for educational needs assessment among 909 food production staff at large dining halls in schools and factories. KAP (knowledge, attitude, and practice) among all participants was 26, 36 and 26%, respectively. The researchers reported that the KAP was weak in food handlers. About 6% did not separate raw food from cooked food.<sup>31</sup> In a cross-sectional study to determine the KAP among nutrition inspectors catering to facilities such as prisons, student boarding houses and hospitals in Ghana, the participants held an inadequate knowledge and practice of food safety along with negative attitudes.<sup>32</sup>

### Conclusion

The purpose of this study was to investigate the knowledge and attitude of Dehloran Health Center personnel with respect to food safety, considering their importance in educating people at the community level. The study was the first of its nature that has been conducted in Dehloran. The results showed that the personnel in some of the fields have low knowledge about the safety of food products. The highest and lowest attitude scores were attributed to the personnel of environmental health and physicians, respectively. Therefore, educational programs need to be conducted in the form of workshops for personnel that do not pass these tests. We recommend that in order to improve food safety knowledge, attention should be given to the planning, implementation,

monitoring, and evaluation of food safety education programs.

### Acknowledgment

The authors wish to thank of Manager and personnel of healthcare network of Dehloran for the cooperation in this research.

### References

1. Al-Shabib NA, Mosilhey SH, Husain FM. Cross-sectional study on food safety knowledge, attitude and practices of male food handlers employed in restaurants of King Saud University, Saudi Arabia. *Food Control* 2016;59:212-7.
2. World Health Organization (WHO). Food safety and food-borne illness 2007.
3. Das Q, Islam MR, Marcone MF, Warriner K, Diarra MS. Potential of berry extracts to control foodborne pathogens. *Food Control* 2017;73, Part B:650-62.
4. Tavakoli H R, Sanaei Nasab H, Karimi A A, Tavakoli R. Study of knowledge, attitude, and practice towards proper model of foods and nutrition by Military formal personnel. *J Mil Med* 2008;10(2):129-36. [In Persian]
5. Jevšnik M, Hlebec V, Raspor P. Food safety knowledge and practices among food handlers in Slovenia. *Food Control* 2008;19(12):1107-18.
6. Noorimotlagh Z, Mansourian M, Nourmoradi H, Shafieyan Z, Batavia P. Study of Knowledge and Attitude of among Ilam University of Medical Sciences Students Regarding to Food Sanitation and Safety. *J Ilam Uni Med Sci* 2015;23(3):8-15. [In Persian]
7. Olsen SJ, MacKinnon LC, Goulding JS, Bean NH, Slutsker L. Surveillance for foodborne-disease outbreaks—United States, 1993–1997. *MMwR CDC Surveill Summ.* 2000;49(1):1-62.
8. Osaili TM, Obeidat BA, Jamous DOA, Bawadi HA. Food safety knowledge and practices among college female students in north of Jordan. *Food Control* 2011;22(2):269-76.
9. Asiegbu CV, Lebelo SL, Tabit FT. The food safety knowledge and microbial hazards awareness of consumers of ready-to-eat street-vended food. *Food Control* 2016;60:422-9.
10. Dargahi A, Asadi F, Hashemian A, Sharafi K, Amirian T, Mohamdi M. Knowledge and Attitudes of Kermanshah University of Medical Sciences in the Field of Health and Food Hygiene and Safety. *Quarterly Journal of Health Breeze* 2013;2(3):1-8.

11. Eslami H, Marzban A, Akrami Mohajeri F, Rezaei Z, Rafati Fard M. Students' Knowledge and Attitude of Hygiene and Food Safety at Shahid Sadoughi University of Medical Sciences in Yazd, Iran. *Journal of Community Health Research* 2015;4(3):159-67.
12. Jahed G, Golestani Far H, Ghodsi R, Mohammadi MT. The knowledge and attitude of students in relation with health and food safety at Tehran university of medical sciences. *J Res Health* 2012;2(1):154-61.
13. Muyanja C, Nayiga L, Brenda N, Nasinyama G. Practices, knowledge and risk factors of street food vendors in Uganda. *Food Control* 2011;22(10):1551-8.
14. Ovca A, Jevšnik M, Kavčič M, Raspor P. Food safety knowledge and attitudes among future professional food handlers. *Food Control* 2018;84:345-53.
15. Samapundo S, Thanh TC, Xhaferi R, Devlieghere F. Food safety knowledge, attitudes and practices of street food vendors and consumers in Ho Chi Minh city, Vietnam. *Food Control* 2016;70:79-89.
16. Ahmadabadi Arani M, Sabahi M, Jedi Arani Ts, Gilasi H, Jahed Khaniki G. Knowledge and Attitudes of Health Workers in Health Centers of Kashan About Health and Food Safety in 2014 year. *Quarterly Journal of Health Breeze* 2015;3(3):1-7.
17. Mataji Amirrood M, Taghdisi MH, Gohari MR, Shidfar F. The Role Of Eating Attitude On Obesity-Related Eating Behavior In Overweight And Obese Women Of Urmia In 2012. *J Payavard Salamat* 2015;8(6):464-77.
18. Marietta AB, Welshimer KJ, Long Andersons S. Knowledge, Attitudes, and Behaviors of College Students Regarding the 1990 Nutrition Labeling Education Act food Labels. *J Am Diet Assoc* 1999;99(4):445-9.
19. Surujlal M, Badrie N. Household consumer food safety study in Trinidad, West Indies. *Internet j food saf* 2004;3:8-14.
20. Walker E, Pritchard C, Forsythe S. Food handlers' hygiene knowledge in small food businesses. *Food Control* 2003;14(5):339-43.
21. Kennedy J, Jackson V, Blair I, McDowell D, Cowan C, Bolton D. Food safety knowledge of consumers and the microbiological and temperature status of their refrigerators. *J food prot* 2005;68(7):1421-30.
22. Zhang H, Lu L, Liang J, Huang Q. Knowledge, attitude and practices of food safety amongst food handlers in the coastal resort of Guangdong, China. *Food Control* 2015;47:457-61.
23. Unklesbay N, Sneed J, Toma R. College students' attitudes, practices, and knowledge of food safety. *J food prot* 1998;61(9):1175-80.
24. Majowicz SE, Hammond D, Dubin JA, Diplock KJ, Jones-Bitton A, Rebellato S, et al. A longitudinal evaluation of food safety knowledge and attitudes among Ontario high school students following a food handler training program. *Food Control* 2017;76:108-16.
25. Samapundo S, Climat R, Xhaferi R, Devlieghere F. Food safety knowledge, attitudes and practices of street food vendors and consumers in Port-au-Prince, Haiti. *Food control* 2015;50:457-66.
26. Ko W-H. The relationship among food safety knowledge, attitudes and self-reported HACCP practices in restaurant employees. *Food control* 2013;29(1):192-7.
27. Dehghan P, Pournaghi-Azar F, Azami-Aghdash S, Sohraby-Silabi Y, Dadkhah H, Mohammadzadeh-Aghdash H. Knowledge and attitude towards health and food safety among students of Tabriz University of Medical Sciences, Tabriz, Iran. *J Anal Res Clin Med* 2017;5(2):62-8.
28. Institute NA. Handbook for safe food service management. New Jersey. USA, 2 editon,1998.
29. Young I, Hendrick S, Parker S, Rajić A, McClure J, Sanchez J, et al. Knowledge and attitudes towards food safety among Canadian dairy producers. *Prev vet med* 2010;94(1):65-76.
30. Baser F, Ture H, Abubakirova A, Sanlier N, Cil B. Structural modeling of the relationship among food safety knowledge, attitude and behavior of hotel staff in Turkey. *Food Control* 2017;73:438-44.
31. Vo TH, Le NH, Le ATN, Minh NNT, Nuorti JP. Knowledge, attitudes, practices and training needs of food-handlers in large canteens in Southern Vietnam. *Food Control* 2015;57:190-4.
32. Kunadu AP-H, Ofosu DB, Aboagye E, Tano-Debrah K. Food safety knowledge, attitudes and self-reported practices of food handlers in institutional foodservice in Accra, Ghana. *Food Control* 2016;69:324-30.