

Food safety knowledge, attitude and self-reported practices among food handlers in Sohag Governorate, Egypt

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Abstract

Background: Foodborne diseases are of public health importance worldwide and most of the factors related to their occurrence are under the responsibility of food handlers.

Aims: This study aimed to determine food safety knowledge, attitude and self-reported practices of food handlers in Sohag Governorate, Egypt, and factors affecting their knowledge, attitude and practices.

Methods: A cross-sectional study was done from May 2016 to March 2017 on 994 participants working in four randomly selected districts in Sohag Governorate. A questionnaire was designed to obtain data about socio-demographic variables, food safety knowledge, attitude, and practices of the participants.

Results: More than 39% of the participants had good knowledge, 61.2% had positive attitudes and 56.3% reported good food safety practices. On univariate logistic regression, most of the variables significantly influenced participants' knowledge. Only residence and education were significantly associated with positive attitudes. However, none of the studied variables impacted participants' practices. A stepwise logistic regression identified that age, sex, residence, education, and occupation are strong predictor variables of good knowledge. Residence and education significantly influenced positive attitudes.

Conclusion: The study highlighted poor knowledge and noncompliance with food safety practices among the participants. Educational and training programmes should be implemented to affect their attitude positively and improve their knowledge and practices.

Keywords: Food safety, food handlers, hygiene, foodborne diseases

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Introduction

Safe food is defined as not causing harm or illness to the consumer (1). Changing lifestyles and living and working conditions have given rise to a greater number of working women relying on convenience foods (fast foods) and greater negligence of food safety and hygiene, which cause an increase in foodborne diseases (2,3), and are among the important public health issues worldwide (4). These illnesses are primarily transmitted by ingestion of viable pathogens or their toxins in amounts sufficient to produce illness (5). Low and middle-income countries are much more affected by foodborne diseases due to negligence of food safety training, noncompliance with hygiene practices, inadequate potable water and unhygienic storage (6).

The World Health Organization (WHO) also determined five factors connected to the occurrence of these illnesses including unhygienic practices and insufficient sanitation by food handlers, inadequate cooking procedures, improper storage without considering temperature requirements, cross-contamination, and sourcing food from unsafe places (3). Most of these factors are under the responsibility of food handlers who are involved in food production and preparation. Food handling includes all steps of storing, preparing and preserving food until reaching final consumption (7). Furthermore, studies have confirmed the existence of pathogenic microbes on food handlers' hands, and therefore they are considered an inevitable source of foodborne diseases (8,9). Furthermore, previous studies have demonstrated the essential role of inadequate food handlers' knowledge, attitude, and practice in the occurrence of food poisoning (10–12). In addition, food handlers' attitudes have a crucial impact on their practices (13).

This study focused on determining food safety knowledge, attitude and self-reported practices of food handlers in Sohag Governorate, Egypt, and the effect of certain sociodemographic and work-related factors on their knowledge, attitude and practices.

Methods

Study design

A cross-sectional study was accomplished from May 2016 to March 2017 in Sohag Governorate. The target population included food handlers in cafeterias, restaurants, food establishments and roadside food sellers in selected districts.

Study settings

Sohag Governorate is located in the south of Egypt with a total area of 11 022 km² and an inhabited area of 1547 km², with an estimated 4.9 million inhabitants. The governorate consists of 12 districts. Multi-stage sampling technique was used based on the districts of the Governorate. The study was performed in four districts: Sohag, Akhmim, Girga, and Tama, which were selected by simple random sampling out of the 12 districts of Sohag governorate. From each district, four regions were chosen randomly representing both urban and rural zones (1 urban and 3 rural regions due to the decreased number of food establishments in rural compared to urban regions) in the selected districts.

Study population

All food handlers in the selected areas that gave consent after receiving explanation about the aim of the research, and accepted to take part in the study, were included. Food handlers who refused to interact and participate in the study were excluded.

Data collection

A questionnaire was prepared based on validated questionnaires of previous studies (14,15) to gather data about socio-demographic variables, food safety knowledge (15 items), attitude (15 items), and self-reported practices (19 items) of the participants.

Data analysis and presentation

IBM SPSS Statistics for Windows version 22 (16) was utilized for data entry and analysis. Categorical data were presented as numbers and percentages. The associations between good knowledge, attitudes and practices and the studied determinants were examined using binary logistic regression. The scores were tested for normality using Shapiro-Wilk test. The nonparametric Mann–Whitney test, Kruskal–Wallis test and Spearman's correlation were used as data was not normally distributed. $P < 0.05$ was considered statistically significant.

Regarding scoring of answers to knowledge questions, the correct response was scored as 2 while the false score was marked as 0. The score range was between 0–30. Food safety attitudes and self-reported practices were evaluated by a 5-level Likert scale. For items under the attitudes section, positively worded questions were scored as follows: strongly agree (4), agree (3), neutral (2), disagree (1) and strongly disagree (0). In contrast, for negatively worded items, the lowest point (0) was given to “strongly agree” and the highest (4) for “strongly disagree”. The scores given ranged 0–60. For positively worded self-reported practices, “always” was scored (4) and the lowest point (0) was given to “never”; this was reversed for the negatively worded questions and the score range was 0–76. Total scores equal to or greater

than 50% of the maximum scores of knowledge, attitude or practices were categorized as “good” while lower scores were considered “poor” or unsatisfactory.

Ethical considerations

Approval of the Research Ethics Committee of Faculty of Medicine, Sohag University, Egypt, was secured, and informed consent was obtained from all respondents. The questionnaires used in information gathering were anonymous and confidentiality of data was guaranteed.

Results

The present study included 994 food handlers. The mean age \pm SD was 31.7 \pm 9.9 years (range 16–55 years); the majority were males (805, 81%), and 531 (53.4%) were rural residents. Nearly one-fifth of the participants (189, 19%) were illiterate, 318 (32%) had preparatory education, 227 (22.9%) had secondary education and only 76 (7.6%) had university education. More than one third (346, 34.8%) of the respondents were cooks and 648 (65.2%) were assistants. The mean of experience years was 9.6 \pm 6.3 years.

More than one-third of the participants correctly answered most of knowledge section questions about the role of eating raw or semi-cooked meat (325, 32.7%), raw unwashed vegetables (357, 35.9%), and covered leftover food kept for > 6 hours at room temperature (398, 40%) as an increasing risk of food poisoning. More than 50% of food handlers did not know that insects can transmit food poisoning pathogens (564, 56.7%) and harmful bacteria multiply rapidly at room temperature (588, 59.2%) (Table 1).

Regarding participants’ food safety attitude, 435 (43.8%) considered that safe food handling is an essential part of their job tasks; an approximate proportion (426, 42.9%) thought that food safety training courses are necessary; 44% (433) agreed that raw and cooked foods should be separated; and 334 (33.6%) did not agree that wiping vegetables or fruit makes them safe to eat. Nearly one-third of participants did not think that food handlers could be a source of food poisoning outbreaks (311, 31.3%) and did not agree that thorough washing of vegetables and fruits is mandatory to prevent food poisoning (325, 32.7%). Forty-five percent agreed that vegetables and raw meat should not be cut on the same cutting board, 448 (45.1%); considered that long nails could be a source of pathogens; and (466, 47.2%) agreed that food handlers should be subjected to a medical examination biannually.

Table 2 revealed that 185 (18.6%) always wear gloves when touching cooked food and 177 (17.8%) always washed their hands before food processing. Only 101 (10.2%) reported that they never work when they had diarrhoea and similar proportions reported refraining from work when they had hand lesions (120, 12.1%)

or a common cold (145, 14.6%); 217 (21.8%) stated that they always separate raw meat from cooked food and a similar proportion; and 210 (21.1%) stated that they check the refrigerator temperature regularly. Figure 1 shows that 390 (39.2%) of participants had a good knowledge of food safety and 608 (61.2%) had positive attitudes towards food safety. More than half of the participants (560, 56.3%) reported good food safety practices.

Males had a higher knowledge and attitude scores compared to females ($P < 0.001$, $P < 0.004$ respectively) while practice scores of both sexes were not significantly different. Knowledge scores significantly associated with participants' education ($P < 0.001$), while, attitude and practice scores were not. Residence significantly affected participants' knowledge and attitude scores ($P = 0.005$, $P = 0.002$ respectively). Furthermore, work activity significantly affected knowledge scores ($P < 0.001$). A significant positive correlation was found between knowledge scores and participants' age (Spearman's correlation coefficient $r = 0.171$, $P < 0.001$) and years of experience (Spearman's correlation coefficient $r = 0.123$, $P < 0.001$).

Univariate logistic regression analysis indicated that most of the studied variables were significantly linked to good food safety knowledge, while education, work activity, sex, residence, and age were strongly linked to good knowledge scores (OR = 6.9, OR = 4.4, OR = 2.3, OR = 1.3 and OR = 1.01, respectively). With regard to attitudes, only residence (OR = 1.5, $P = 0.002$) and education (OR = 1.1, $P = 0.013$) influenced participants' positive attitude significantly. On the contrary, none of the studied factors significantly influenced food safety practices (Table 3).

A stepwise logistic regression analysis was performed for significant variables in univariate analysis and identified that age, male sex, urban residence, higher education and cook occupation are strong indicators of good food safety knowledge, and residence and education were significantly linked to positive food safety attitude (Table 4).

Discussion

Foodborne diseases account for a great proportion of morbidities and deaths worldwide (17). Food mishandling and inadequate hygiene throughout all stages of food processing, preparation and serving enhance foodborne illnesses transmission (18,19).

The present study indicated that only 36% of participants correctly identified that healthy food handlers might carry foodborne pathogens, which is lower than the results of Akabanda et al. (20) where 71.5% answered correctly, and 56.7% did not know that insects could transmit food poisoning pathogens, which contrasts with Afifi and Abushelaibi (21) who indicated that 97% identified the relation between insects and foodborne illnesses.

Approximately 60% knew that harmful bacteria multiply rapidly at room temperature, which is lower than findings by Sani and Siow (22), where 77.7% knew that keeping food at room temperature for a prolonged time enhance bacterial growth, as well as 98.2% considered safe food handling is a vital part of their work tasks compared to 43.8% in the present research. Furthermore, 42.9% of participants in the present study thought that food safety training is essential, which is lower than the findings by Afifi and Abushelaibi (21), and Zhang et al. (23), who observed that 96% and 93.6% believed in the importance of food safety training, respectively.

Forty-four percent of food handlers agreed that raw and cooked foods should be separated compared to 79.9% of participants in a study by Son et al. (15), and 45% thought that beards could contaminate food, yet in the study by Akabanda et al. (20), only 13.6% agreed on this statement. Additionally, 45% agreed that vegetables and raw meat should not be prepared on the same cutting board compared to 27.6% in a study by Al-Shabib et al. (24), and 45.1% considered long nails could be a source of food poisoning pathogens compared to 88.1% in the study by Akabanda et al. (20). Almost half of participants (47.2%) agreed that food handlers should be medically examined regularly compared to 68.5% in the study by Iwu et al. (25) and 71.1% in the study by Bamidele et al. (26).

In the present study, 18.6% declared that they always wear gloves when touching cooked food and 17.8% always wash their hands before food processing, which is far lower than findings by Al Suwaidi et al. (3), where 92.2% of food handlers confirmed that they used gloves and 90.1% always washed their hands before and during food preparation. Results from Woh et al. (17) confirmed that 44.4% of participants wear gloves and 86.4% wash their hands before food preparation.

Only 10.2% of participants stated that they never work when they have diarrhoea and a similar proportion (11.9%) was observed by Sumner et al. (27). Food handlers who reported that they refrain from work when they have hand lesions or common colds constituted 12.1% and 14.6% respectively and these findings are lower than findings by Al-Shabib et al. (24), where 64.4% said that they do not handle foodstuffs when they have cuts or wounds and 65.5% stop handling food during illness.

More than one fifth (20.1%) of the respondents clarified that they always wash their hands with soap and water after using the toilet, which is much lower than the findings of Bamidele et al. (26), and Galgamuwa et al. (28) where 71.7% and 88.5% of food handlers respectively confirmed that they are compliant with this practice. Moreover, those who said that they always separate raw meat from cooked food

represented 21.8% in the current study compared to 84.7% in the study by Al Suwaidi et al. (3).

A discrepancy between similar research was observed concerning proportions of participants having good knowledge, attitudes, and behaviours. In the present study, 39.2% had food safety good knowledge, those who had positive attitudes constituted 61.2%, and 56.3% reported good practices. In a study by Rahman et al. (29), lower proportions of participants having good knowledge (36.8%), attitude (19.1%) and practice (10.8%) were observed. Another study by Iwu et al. (25) observed that 81% had good knowledge, 71% had positive attitudes, and 37% had good practices.

Age, male sex, urban residence, higher education, and cook occupation are indicators of good food safety knowledge in the present research, which is consistent with Woh et al. (17) who observed that age, sex and education significantly influenced food safety knowledge; however, Abdul-Mutalib et al. (14) showed that none of these factors significantly influenced food handlers' knowledge. Furthermore, residence and education were significantly linked to positive attitude in the present study, which contrasts with Anuradha et al. (30) who detected that age and sex significantly influenced participants' attitude. In contrast, findings by Abdul-Mutalib et al. (14) indicate that education significantly impacted participants' attitude.

None of the studied variables affected participants' practices, which concurs with findings of other studies (17,30–32) that indicate age, sex and education had no effect on practices. On the contrary, a study by Afolaranmi et al. (33) highlighted the significant impact of age and education on participants' practices. Confirming the current study findings, Pokhrel et al. (34) indicated that participants' education significantly affected their knowledge and attitudes and had no impact on their practices.

Conclusion

The study highlighted the poor knowledge and high level of noncompliance with food safety practices among participants, which could result in outbreaks of foodborne illnesses. Therefore, there is an urgent need to raise interest in food safety. Education and training programmes should be implemented to improve food handlers' attitude, knowledge and practices. Additionally, licensing and maintaining supervision should be mandated.

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Table 1: Distribution of participants according to food safety knowledge.

Question	Yes No.(%)	No No.(%)
Food poisoning is caused by pathogenic microbes	360(36.2)	634(63.8)
Eating raw or semi-cooked meat may increase food poisoning risk	325(32.7)	669(67.3)
Eating raw, unwashed vegetables may increase food poisoning risk	357(35.9)	637(64.1)
Food handlers uncompliant to hygienic practices can be a source of food poisoning microbes	369(37.1)	625(62.9)
Consuming covered leftover food, kept for >6 hours at room temperature may increase food poisoning risk	398(40)	596(60)
Keeping food in the fridge helps to prevent food poisoning	407(40.9)	587(59.1)
Hand contact with ready to eat food may cause contamination with food poisoning microbes	463(46.6)	531(53.4)
The safest way to defrost frozen meat is to keep it at room temperature during the night	331(33.3)	663(66.7)
Food poisoning can lead to hospitalization and sometimes death	442(44.5)	552(55.5)
Apparently healthy food handlers might carry foodborne pathogens	358(36)	636(64)
Insects can transmit food poisoning pathogens	430(43.3)	564(56.7)
Harmful bacteria multiply rapidly at room temperature	406(40.8)	588(59.2)
Food poisoning microbes could be seen by the eye	397(39.9)	597(60.1)
Vegetables must be placed on a higher rack inside the refrigerator than meat	341(34.3)	653(65.7)
Cooked food should be adequately reheated	332(33.4)	662(66.6)

Table 2: Distribution of the participants according to compliance with food safety practices.

Question	Always No.(%)	Usually No.(%)	Sometimes No.(%)	Rarely No.(%)	Never No.(%)
Wearing gloves when touching ready to eat food	185(18.6)	242(24.4)	237(23.8)	232(23.3)	98(9.9)
Washing hands with water and soap before food preparation	177(17.8)	238(23.9)	249(25.1)	233(23.4)	97(9.8)
Working in case of having diarrhea	177(17.8)	268(27)	248(24.9)	200(20.1)	101(10.2)
Working in case of having hand lesions	160(16.1)	274(27.6)	226(22.7)	214(21.5)	120(12.1)
leaving nails long	162(16.3)	280(28.2)	222(22.3)	214(21.5)	116(11.7)
Washing vegetables and fruits before peeling	149(15)	300(30.2)	211(21.2)	223(22.4)	111(11.2)
keeping cooked meat or chicken for > 4 hours at room temperature	159(16)	289(29.1)	214(21.5)	216(21.7)	116(11.7)
Cleaning food contacting surfaces before and after processing	169(17)	262(26.4)	212(21.3)	220(22.1)	131(13.2)
Working in case of having a common cold	177(17.8)	246(24.8)	208(20.9)	218(21.9)	145(14.6)
Washing vegetables and fresh fruit before eating	171(17.2)	255(25.7)	217(21.8)	231(23.2)	120(12.1)
Washing hands with soap and water before eating	170(17.1)	277(27.9)	205(20.6)	222(22.3)	120(12.1)
Washing hands with soap and water after handling raw meat	176(17.7)	269(27.1)	207(20.8)	236(23.7)	106(10.7)
Washing hands with soap and water after using the toilet	200(20.1)	266(26.8)	184(18.5)	243(24.4)	101(10.2)
Drying hands after washing them	220(22.1)	259(26.1)	207(20.8)	228(22.9)	80(8.1)
Eating half cooked eggs	208(20.9)	275(27.7)	249(25.1)	190(19.1)	72(7.2)
Separating raw meat from ready-to-eat food	217(21.8)	262(26.4)	258(26)	172(17.2)	85(8.6)
Checking the refrigerator temperature regularly	210(21.1)	251(25.3)	254(25.6)	182(18.2)	97(9.8)

Drinking unpasteurized milk	209(21)	264(26.6)	237(23.8)	197(19.8)	87(8.8)
Eating half cooked meat	202(20.3)	262(26.4)	231(23.2)	205(20.6)	94(9.5)

Figure 1: Distribution of the participants according to their knowledge, attitudes and practices.

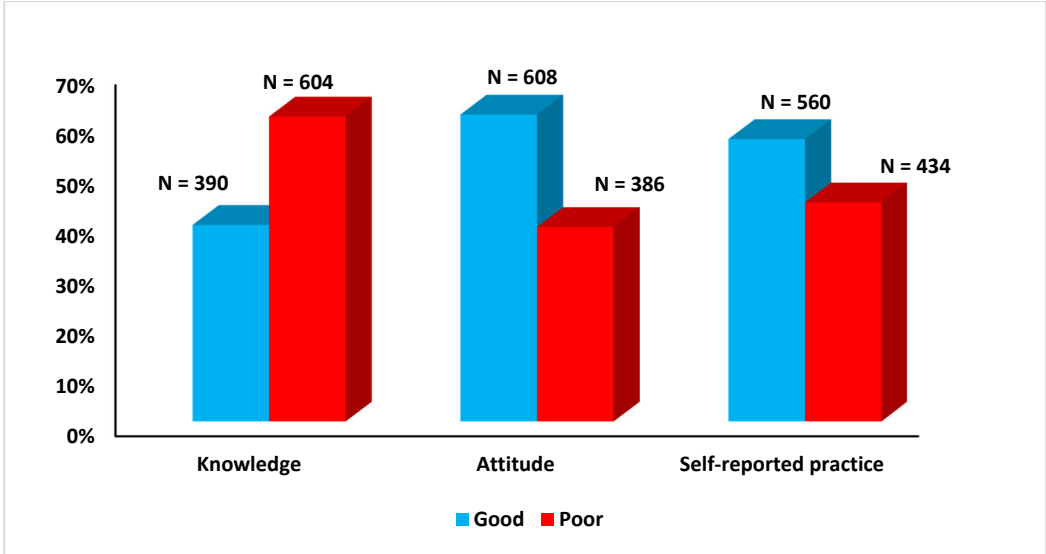


Table 3: Univariate logistic regression analysis of factors affecting (good) knowledge, attitude, practices of the participants.

Variables	OR (CI 95%)	P value
<i>Knowledge</i>		
Age	1.01 (1.001 – 1.03)	0.034*
Gender	2.3 (1.6 – 3.3)	<0.001*
Residence	1.3 (1.04 – 1.7)	0.024*
Education	6.9 (5.4 – 8.8)	<0.001*
Work activity	4.4 (3.4 – 5.9)	<0.001*
Years of experience	1.003 (0.98 – 1.02)	0.783
<i>Attitude</i>		
Age	1.004 (0.9 – 1.02)	0.512
Sex	1.4 (0.9 – 1.9)	0.055
Residence	1.5 (1.2 – 1.9)	0.002*
Education	1.1 (1.03 – 1.3)	0.013*
Work activity	0.9 (0.7 – 1.2)	0.719
Years of experience	1.01 (0.9 – 1.03)	0.512
<i>Self-reported practice</i>		
Age	1.002 (0.9 – 1.02)	0.776
Sex	1.1 (0.8 – 1.5)	0.466
Residence	0.9 (0.7 – 1.1)	0.38
Education	1.01 (0.9 -1.12)	0.869
Work activity	1.12 (0.9 – 1.4)	0.415
Years of experience	1 (0.9 –1.02)	0.988

*Statistically significant

Table 4: Multiple stepwise regression for significant factors in univariate analysis

Variables	Adjusted OR (CI 95%)	P value
<i>Knowledge</i>		
Education	12.2 (8.8 – 16.9)	<0.001*
Work activity	20.2 (11.2 – 36.4)	<0.001*
Age	1.04 (1.01 – 1.06)	0.004*
Sex	1.9 (1.09 – 3.4)	0.024*
<i>Attitude</i>		
Residence	1.5 (1.1 – 1.9)	0.005*
Education	1.1 (1.005 – 1.3)	0.033*

***Statistically significant**