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Food safety practice and its associated factors among food handlers working in food and drinking establishments in Hargeisa, Somaliland

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Abstract

Background The World Health Organization reports that 600 million cases of food-borne illnesses occur every year. Additionally, it is estimated that up to 30% of people in developed countries experience food-borne illnesses annually, while developing countries suffer around 2 million deaths from these diseases each year. Inadequate sanitation and challenges in maintaining proper food handling practices are the major contributing factors of food-borne illnesses in developing countries including Somaliland.

Aims The aim of the study was to assess food safety practices and its associated factors among food handlers working in food and drinking establishments in Hargeisa, Somaliland.

Methods A community-based cross-sectional study was conducted from September 20 to October 20, 2024, involving 306 randomly selected food handlers in Hargeisa, Somaliland. Data was collected using a structured questionnaire and analyzed with SPSS version 22. Descriptive analysis summarized respondents' socio-demographic characteristics, while bivariate and multivariable analyses examined relationships in the data. Independent variables with a p -value below 0.25 were included in multivariable logistic regression to identify significant factors, using adjusted odds ratios (AORs) and a 95% confidence interval (CI), with a significance threshold of $p < 0.05$.

Results In this study, a total of 306 food handlers participated. The majority (85.3%) of food handlers was males and 84% had non-formal education. The prevalence of poor food safety practices among food handlers was at 52.3%. Lack of food safety training (AOR = 0.172; 95% CI: 0.070, 0.420), less working experience (AOR = 1.757; 95% CI: 1.026, 3.009), lack of appropriate water storage equipment (AOR = 0.602; 95% CI: 0.364, 0.996), lack of regular sanitary inspection (AOR = 1.691; 95% CI: 1.028, 2.783), and poor knowledge (AOR = 0.589; 95% CI: 0.353, 0.983) were statistically associated with poor food safety practices.

Conclusion The study found low level of poor food safety practices; attributed to factors like food handler training, work experience, water storage equipment, sanitation inspections, and knowledge. However, enhancing food

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handling practices, particularly training is crucial to minimize food-borne diseases and promote optimal food safety practices.

Keywords Food safety practice, Food handler, Hargeisa, Somaliland

Introduction

The basic need for humans is food, and providing access to enough, safe, and nutritious food is crucial for public health and food security [1, 2]. Food safety is defined by the World Health Organization (WHO) as the conditions and precautions required during food production, processing, storage, distribution, and preparation to guarantee that the food is healthy, safe, and suitable for human consumption [3]. Global attention on food safety has increased to protect public health and prevent illnesses from poor-quality food [3, 4].

The World Health Organization reports that inadequate food handling leads to 600 million cases of food-borne diseases each year [5]. Additionally, estimates show that up to 30% of people in developed countries experience food-borne illnesses annually [6]. The WHO revealed that 1 in 10 people globally suffers from food-borne illnesses due to unsafe food practices and contaminated food [7]. Food-borne diseases are particularly serious in developing countries because of challenges in maintaining proper food handling practices and poor sanitation. Poor personal hygiene, inadequate food handling, and contaminated surfaces among food handlers in restaurants can lead to the bacteria and intestinal parasites [1].

Evidence showed in developing countries, around to 70% of diarrheal cases are associated with contaminated food, with particularly poor hygiene practices which contribute to high morbidity and mortality rates [3, 8]. Additionally, lifestyle changes and urbanization are causing people to eat out more frequently, resulting in the unregulated establishment of dining places with insufficient hygiene standards [9]. A systematic review and meta-analysis conducted in low-and middle-income countries revealed that 62% of street food vendors had good knowledge, 66% had a positive attitude, and 51% demonstrated good practice [10]. Another systematic reviews and meta-analyses conducted in Ethiopia showed that the pooled good food hygiene practices among food handlers ranged between 48.36% and 50.5% [11, 12].

In Somaliland, food-borne illness such as diarrhea cases has been reported by Save the Children for the early months of 2023, with an estimated 156 cases and two deaths. This indicates possible potential issues with food safety and hygiene practices [13].

However, to our knowledge, no study has been conducted to investigate factors associated with poor food safety and hygiene practices. Therefore, this study aimed to assess food safety practices and associated

factors among food handlers working in food and drinking establishments in Hargeisa, Somaliland. The findings will offer important insights for public health professionals, policymakers, and those working in food safety.

Materials and methods

Study design, period and area

A community based cross-sectional study was carried out among food handlers working in food and drinking establishments in Hargeisa city, from September 20 to October 20 2024. Hargeisa, the capital city of Somaliland, is divided into eight sub-administrative districts. The city's population is estimated to be approximately 1.5 million people [14]. The number of small and medium-sized food and drinking establishments is growing in the major cities of Somaliland, particularly in Hargeisa, the capital. However, there is no official registration data available for these establishments or the food and drinking handlers.

Population and eligibility criteria

The population source consisted of all food handlers working in food and drinking establishments in Hargeisa. Eligible participants were food handlers employed in selected establishment across three districts, and working in preparation, cleaning and serving areas during the data collection period, regardless of their gender or employment status. However, food handlers who chose not to participant were excluded from the study.

Sample size determination and sampling procedure

The study involved a sample of 306 individuals, determined used a single population proportion formula with a 5% margin of error, a 95% confidence level, and a 27.4% prevalence of food hygiene from a previous study [1]. The study enrolled food handlers working in food and drinking establishments in Hargeisa city, Somaliland. We applied a simple random sampling method to select three districts out of the eight districts (26 June, Ga, anlibah, and Mohamoud Haibe). From the center area of the district, we randomly selected the first restaurant and started recruiting study participants. We then moved to the next restaurant and recruited study participants. This process continued until the required sample size of 102 was achieved in each of the three districts. This process was applied due to lack of a list of restaurants from Hargeisa municipality. Additionally, interviews were conducted with three individuals from each food establishment in these areas. If more than one eligible person, one person was chosen randomly.

Study variables

The dependent variable in this study is food safety practices, specifically practices ensuring that food poses no harm to consumers when prepared and consumed as intended. The independent variables included socio-demographic factors (such as age, education, gender, marital status, work experience, and responsibilities), institutional and health-related factors for food handlers (including food safety training, regular supervision, knowledge of food safety practices, and routine medical checkups), and sanitary facility-related factors for food handlers (like the presence of a refrigerator in the kitchen, suitable water storage equipment, and separate dishwashing systems).

Data collection tools and procedures

Data were collected using a structured questionnaire. The questionnaire was adopted from different relevant published literature [3, 7]. A questionnaire consisting of close-ended questions and was structured into four distinctive parts; socio-demographic characteristics of study participants (six questions), institutional and health related factors (four questions), sanitary facility related factors (three questions), and food safety practices (eight questions).

Food safety practices were assessed through eight closed-ended questions, each with two possible responses: “yes” or “no”. One score was given for every standard practice and zero for every unsafe practice. Food handlers with a total score greater than the mean

were categorized as having “good food safety practices,” and while those scoring below the mean were classified as having “poor food safety practices” [3]. Three public health students and one supervisor with experience in data collection were hired to carry out the data collection process.

Data quality assurance

The quality of the data was ensured throughout the data collection process. Training of data collectors and supervisors was conducted to acquire the necessary skills for effective data collection and supervision. A pre-test was done on 10% of the sample in Hargeisa city and not included in the final sample size. The primary objective of the pre-test was to assess the validity of the questionnaire, and also find out if the questions were clear and not ambiguous to the study participants.

Data processing and analysis

SPSS version 22 was used for analysis. A descriptive analysis was used to describe the percentages and number of distributions of the respondents by socio-demographic characteristics and other relevant variables in the study. Bivariate and multivariable analysis was employed to identify the relationships and associations within the data. In binary logistic regression analysis, the independent variables with a p -value less than 0.25 were entered into the multivariable logistic regression analysis to control for potential confounders and identify significant factors associated with outcome variables. In measuring associations, adjusted odds ratios (AORs) were used, accompanied by a 95% confidence interval (CI). Variables with a p -value equal or less than 0.05 were considered statistically significant.

Results

Socio-demographic characteristics of food handlers

In this study, a total of 306 food handlers participated. Most participants (76.8%) were aged 20 to 29, and overwhelming majorities (85.3%) were male. Over 84.3% had non-formal education, and more than half (52.0%) were married. Additionally, around 211 participants (69.0%) had worked as food handlers for three years or longer (Table 1).

Institutional and health related factors of food handlers

The vast majority of food handlers, (88.2%), had not received any training on food safety practices. In contrast, only 11.8% had acquired basic education in food preparation and safety for six months, which covered topics such as proper hand washing, safe food storage, temperature control, sanitation, food handling, and preventing cross-contamination.

Table 1 Socio-demographic characteristics of the study participants ($n = 306$)

Variables	Frequency	Percent (%)
Age of the respondent		
20–29	235	76.8%
≥ 30	71	23.2%
Educational level		
Non formal education	258	84.3%
Primary school	48	15.7%
Sex		
Male	261	85.3%
Female	45	14.7%
Marital status		
Single	119	38.9%
Married	159	52.0%
Divorced	28	9.1%
Work experience		
≤ 2 years	95	31.0%
≥ 3 years	211	69.0%
Responsibility		
Chef/cook	102	33.3%
Waiter	102	33.3%
Cleaner	102	33.4%

Over half (58.8%) of food handlers did not receive sanitary inspections regarding food safety practices, compared to their counterparts (41.2%). A majority of food handlers (64.7%) showed a lack of knowledge about food safety practices, whereas 35.3% had adequate knowledge. Most food handlers (75.8%) did not receive regular medical checkup, while 24.2% did (Table 2).

Sanitary facility related factors of food handlers

Most food handlers (69.9%), did not use a refrigerator in the kitchen. In terms of suitable water storage equipment, around (63.4%) reported having appropriate equipment, while more than half (57.8%) utilized separate dishwashing systems (see Table 3).

Food safety practice of food handlers

A slightly higher than average number proportion of the respondents had poor food safety practice (52.3%). The vast majority of food handlers, (90.8%) did not wear gloves before touching food or drinking and (89.2%) did not cover the hair. Additionally, (56.2%) of food handlers failed to wash their hands after touching unwrapped food. The majority of food handlers, (52.9%), verified meal expiration dates and used separate utensils for raw and cooked food with (53.3%) did so. Furthermore, most food handlers, (79.4%), cleansed their hands after sneezing (Table 4).

The study found that the prevalence of poor food safety practices among food handlers working in food and drinking establishments in Hargeisa city was 52.3% Fig. 1.

Factors associated with food safety practice among food handlers

In the bivariate logistic regression analysis, factors like food safety training, work experience, lack of suitable water storage equipment, regular supervision, and knowledge of food safety practices were identified as having a significant relationship with food safety practices.

The final multivariable analysis indicated that, Food handlers working in establishments with water storage equipment (AOR=0.602; 95% CI: 0.364, 0.996), who underwent food safety training (AOR=0.172; 95% CI: 0.070, 0.420) and who had good knowledge of food safety practices (AOR=0.589; 95% CI: 0.353, 0.983) had lower odds of involving in poor food safety practices. Moreover, food and drink establishments that did not have regular supervision (AOR= 1.691; 95% CI: 1.028, 2.783) and food handlers with lower work experience (AOR= 1.757; 95% CI: 1.026, 3.009) had higher odds of performing poor food safety practices (Table 5).

Table 2 Institutional and Health related factors of Food safety practice ($n = 306$)

Variables	Frequency	Per-cent (%)
Food safety training course		
No	270	88.2%
Yes	36	11.8%
Regular sanitary inspection		
No	180	58.8%
Yes	126	41.2%
Knowledge related to food safety practice		
No	198	64.7%
Yes	108	35.3%
Regular medical checkup		
No	74	75.8%
Yes	232	24.2%

Table 3 Sanitary facility related factors

Variables	Frequency	Per-cent (%)
Refrigerator in the kitchen		
No	92	30.1%
Yes	214	69.9%
Availability of appropriate water storage equipment		
No	112	36.6%
Yes	194	63.4%
Use separate dishwashing systems		
No	129	42.2%
Yes	177	57.8%

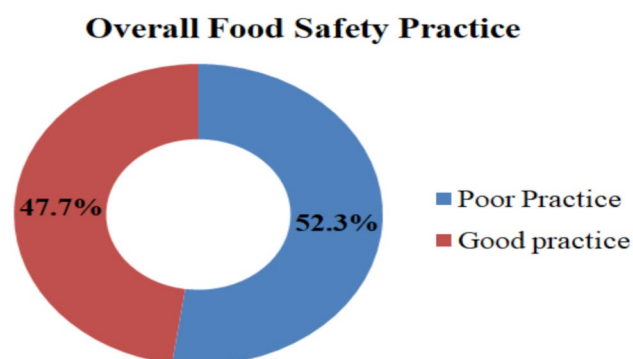
Discussion

To our knowledge this is the first study focusing on food safety practices and associated factors among food handlers to be conducted in Hargeisa, Somaliland. Several factors of importance associated with food safety practices were identified. These included regular supervision, food training, water storage equipment, work experience and knowledge related to food safety practice. It follows that poor hygiene and sanitation practices were widespread among the food handlers in Hargeisa. Poor hygiene and sanitation practices significantly contribute to the transmission of food-borne illnesses. To mitigate the effects of food-borne illness, it is essential for relevant organizations to focus on enhancing food hygiene and sanitation standards [15]. Moreover, in Somaliland, where there is no specific food safety and hygiene policy, the government should take the lead in development of this vital policy to provide standards and direction among food handlers.

Therefore, the findings of this study showed that 52.3% of food handlers had poor food safety practices. Our

Table 4 Food safety practice of the study participants ($n = 306$)

Variables	Frequency	Per-cent (%)
Trim finger nails		
No	268	87.6%
Yes	38	12.4%
Clean fingers		
No	246	80.4%
Yes	60	19.6%
Wash hands after touching unwrapped food		
No	172	56.2%
Yes	134	43.8%
Check and dispose of meal past their expiry date		
No	144	47.1%
Yes	162	52.9%
Use separate utensils for raw and cooked food		
No	143	46.7%
Yes	163	53.3%
Use gloves before touching foods or drinking		
No	278	90.8%
Yes	28	9.2%
Use hair cover/cap		
No	273	89.2%
Yes	33	10.8%
Sanitize/wash hands after sneezing		
No	63	20.6%
Yes	243	79.4%

**Fig. 1** Overall food safety practice among food handlers working in Food and drinking establishment in Hargeisa city, Somaliland, 2024 ($n = 306$)

findings were higher than those reported in Ethiopia (44.9%) [7], and Nigeria (32%) [16]. The discrepancies in food safety practices can be attributed to several factors, including differences in study settings, socio-demographic profiles of food handlers (such as age, education, and cultural background), and variations in study design and data collection methods. Additionally, differing cut-off criteria for defining poor practices and the timing of each study may reflect changes in awareness, training, and regulatory enforcement. These elements collectively help explain the higher percentage of poor food safety

practices observed in this study compared to those in Ethiopia and Nigeria.

In this study, only 11.8% of food handlers were certified in food safety training. This percentage is lower than the 28.4% reported in Ethiopia [17], and 23.02% in Pakistan [18], but slightly higher than the 8.1% found in a study from South Africa [19]. The variation in food safety training certification rates may be due to differing regional emphasis on training. Countries with higher rates often have robust training programs and regulations, enhancing food handler awareness. Conversely, the lower certification rate in this study indicates a lack of sufficient training initiatives or enforcement, which may lead to poorer food safety practices.

This study found that Food handlers with two years or less of work experience had higher chances of poor safety practices, compared to those with three or more years of experience. This find is in line with a study conducted in Ethiopia, which showed that food handlers with less than two years of experience had a higher likelihood of poor food safety practices compared to those with two to four or five to seven years of experience [7]. This suggests that experience plays a crucial role in helping food handlers acquire the skills and knowledge needed for proper food handling.

Moreover, regular sanitary inspection was significantly associated to better food safety practices. Those who did not receive sanitary inspection were more likely to have poor food safety practices compared to those who did receive inspection. This study is consistent with study conducted in Ethiopia, which found that poor food safety practices was higher among those who did not undergo sanitary inspections compared to those who did [7]. One possible explanation of these findings is that regular sanitary inspection provides food handlers with ongoing guidance and accountability, reinforcing safe food handling behaviors. Sanitary inspector can quickly identify and address unsafe practices, whereas the absence of inspection may result in lapses in safety standards, raising the risk of unsafe practices.

Conclusion

Conclusion: In this study, the level of poor food safety practices was relatively low. Factors associated with food handling practices included food handler training on food safety, work experience, availability of proper water storage equipment, regular sanitation inspections, and knowledge of food safety practice. However, it is essential to enhance food handling practices, with a particular focus on food safety training to minimize the risk of food-borne diseases and promote optimal food safety.

The government should consider developing and implementing specific policy focused on food safety and hygiene to ensure public health. This policy should

Table 5 Bivariate and multivariate logistic regression analysis of factors associated with food safety practice among food handlers in food establishments of Hargeisa city, Somaliland, 2024 ($n = 306$)

Variables	Practice		COR(95%CI)	AOR(95%CI)
	Poor practice	Good practice		
Food safety training				
No	153(95.6%)	117(80.1%)	0.185(0.078–0.436)	0.172(0.070–0.420)*
Yes	7(4.4%)	29(19.9%)	1	1
Work experience				
≤ 2 years	36(22.5%)	59(40.4%)	2.336(1.421–3.839)	1.757(1.026–3.009)*
≥ 3 years	124(77.5%)	87(59.6%)	1	1
Water storage equipment				
No	69(43.1%)	43(29.5%)	1	0.602(0.364–0.996)*
Yes	91(56.9%)	103(70.5%)	0.551(0.343–0.884)	1
Sanitary inspection				
No	85(53.1%)	95(65.1%)	1.644(1.037–2.605)	1.691(1.028–2.783)*
Yes	75(46.9%)	51(34.9%)	1	1
Knowledge on food safety practice				
No	113(70.6%)	85(58.2%)	0.580(0.361–0.930)	0.589(0.353–0.983)*
Yes	47(29.4%)	61(41.8%)	1	1

Notes: * significant at p -value < 0.05

emphasize regular training and education for food handlers to enhance their knowledge and compliance with proper food safety practices. Furthermore, relevant organizations, such as the Ministry of Health and the Food and Drug Authority should collaborate to provide resources and support to ensure the maintenance of clean and sanitary conditions in food preparation and handling settings. As the present study revealed significant findings, further research could be conducted to assess the level of bacteria and protozoa in unsanitary food and utensils, with a particular focus on these microorganisms in food and drinking establishments.

Abbreviations

AOR	Adjusted Odds Ratio
COR	Crude Odds Ratio
CI	Confidence Interval
SPSS	Statistical Package for Social Sciences

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Author contributions

MMA was generating the idea, designing the study, analyzing and interpreting data, writing the report. JK, ASI, SHA, FN, ASA and ARK made substantial contributions to data analysis, reviewing the results, and preparing the final manuscript. All authors reviewed and approved the final version of the manuscript.

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Data availability

Availability of data and materials The data set used and/or analyzed during the current study is available from the corresponding author on reasonable request.

Declarations

Limitation of the study

The study has several limitations. First, due to the cross-sectional nature of the study, it cannot establish relationship between the independent variables and the outcome of interest. Additionally, parasitic and microbiological laboratory investigations were not included in this study. The study may also be influenced by social desirability bias, with food handlers potentially providing socially acceptable responses rather than reflecting their true practices. The small sample size limits the generalizability of the findings to the broader population of food handlers. These limitations may affect the interpretation of the results, and caution is needed when applying them to a large context. Despite these limitations, the study is a baseline and provides important insights that can guide future research and public health efforts in the region.

Ethics approval and consent to participate

The ethical clearance was obtained from the Research Ethical Review Committee of the University of Hargeisa (Ref. No: DRCS/005/02/2024), and approval letter was received from the Ministry of Health, Somaliland (Authorization no. MOHD/DG: 2/232/2024). Written informed consent was requested, and the research methodology was clearly explained to participants in their native languages. Participants were assured of their right to decline or withdraw from the study at any time. The study was conducted in accordance with applicable guidelines and regulations, following the Helsinki Declaration.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Clinical trial

Not applicable.

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