

RESEARCH

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**Abstract**  
**Background**

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\*Correspondence:  
Mohamed Mussa Abdilahi  
mohamednsg@gmail.com

Full list of author information is available at the end of the article

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## 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 suffer 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 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 review and meta-analysis 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

### *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-

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

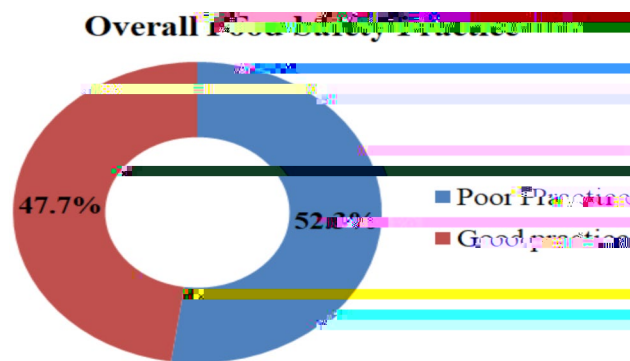
A slightly higher than average number proportion of the respondents had poor food safety practice (52.3%).

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

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

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

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 Odd ration
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.

##### Author details

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