

# An Assessment on Knowledge, Attitudes, and Practices on Food Hygiene and Safety Among Food Handlers in Restaurants and Tuckshops in Sub-Saharan Africa: A Scoping Review

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## ABSTRACT

**Objectives:** The objective of this scoping review was: To assess food handler's knowledge, Attitudes and Practice on food safety and hygiene in restaurants and tuck shops in Sub-Saharan Africa.

**Background:** Food safety is an important issue worldwide, as contaminated food can lead to illness or even death. According to the World Health Organization (WHO), foodborne diseases contribute to 420,000 deaths and 600 million cases globally each year, while in low and middle-income countries being hit particularly hard with the highest rates of foodborne illnesses in the region, with an estimated 137 cases per 100,000 people annually.

**Inclusion Criteria:** The study reviewed qualitative and quantitative studies published between 2013 and 2022. Articles in English that address knowledge, attitudes, and practices of food hygiene and safety among food handlers in sub-Saharan African countries. Exclusion criteria include studies not matching the search terms and not in English.

**Method:** This study used a scoping review approach to gather data from included articles and documents using a data extraction tool. It followed the six-stage framework for scoping reviews, including identifying relevant studies using databases, study selection using a 3-phase approach, charting data with a flowchart, collating and summarizing data using descriptive statistics, moreover data extraction tool was developed.

**Results:** 60% of the studies revealed that about food handlers were not trained in any food hygiene, and has therefore revealed that there was an association between level of knowledge and practices among food handlers. Studies also found that, food safety training, hand washing, knowledge on causes of cross contamination, proper handling of food materials and prevention of food related illness were the influenced by the knowledge of food safety to food handlers.

**Conclusion:** This scoping review was crucial in addressing the issue of foodborne illnesses in sub-Saharan African countries and improving the knowledge, attitudes, and practices of food handlers in ensuring food hygiene and safety. This review provided valuable insights into the current state and inform policies and strategies aimed at improving food safety and preventing the spread of foodborne illnesses.

**Recommendation:** To exhibit better knowledge and safer practices in food industries., it is imperative to make food safety training mandatory, easily accessible, and periodically updated to reflect the latest scientific insights and regulatory changes.

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## Keywords

Food safety, Food handlers, Knowledge, Attitude, and Practice.

## List of Abbreviations

CDC: Centers for Disease Control and Prevention, FAO: Food and Agriculture Organization of the United Nation, FICCI: Federation of Indian Chambers of Commerce and Industry, HACCP: Hazard Analysis and Critical Control Points, PPEs: Personal protective equipment, KAP: Knowledge, Attitude, and Practices, UNAM: University of Namibia, WHO: World Health Organization.

## Introduction

According to Joint FAO/WHO Codex Alimentarius Commission [1], Food safety is defined as, an assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use. Food safety can also be defined as the protection of human health by preventing edible substances, defined by law, from becoming hazardous and minimizing the risk from those hazards, or the absence of harm to people from food [2]. All practical measures involved in keeping safe food and wholesome through all the stages of production to point of sale or consumption is referred to as food hygiene. Food can be defined as substance that can be ingested (eaten or drunk) to maintain human life and growth. It is a composite of natural ingredients normally referred to as nutrients that are needed by human for the maintenance of the body. Food is necessary for human survival, growth, physical abilities and good health [3]. Our bodies need food for energy production, to survive and to remain strong. Food can be of animal origin, animal product, plant origin, and plant product or reproduction material [4].

The need for food is ongoing as one is continuously reminded to eat by hunger sensation. However, the availability of food does not necessarily guarantee survival unless food is nutritionally complete and contain no hazardous substances. Food should be attractive; it should be visibly clean and free from noxious materials [5]. Food hygiene and safety are important measures to protect food from different types of hazards. Biological hazards can enter the food premises through food handlers, raw foods, insects, rodents, animals, and environmental pollution such as soil and dust. People can carry food poisoning organisms in their nose, mouth, intestine, and on their skin. Physical hazards are objects that are not supposed to be part of food, such as glass, metal, toothpicks, cigarette butts, hair, staples, and jewellery, and can enter food at any stage of production. Chemical hazards refer to the contamination of food by chemicals such as cleaning agents, fertilizers, pesticides, and environmental contaminants like lead and dioxins during growth and processing [6]. Unhygienic practices during food preparation, handling and storage creates the conditions that allows the multiplication and transmission of disease-causing organisms such as bacteria, viruses and other food-borne pathogens [7].

## Background of the Study

Food is an integral and indispensable part of all cultures. However, illness or even death may result if contaminated food is consumed. Measures that prevent contamination of food during processing,

preparation, and food handling thereby ensuring that the food is safe to consume are termed food safety. “Any disease of an infectious or toxic nature caused by, or thought to be caused by, the consumption of food or water” is how the World Health Organization (WHO) defines foodborne diseases [8,9]. Foodborne diseases continue to be the foremost public health challenge contributing to 420,000 mortalities and 600 million cases in 2018. Instances of foodborne diseases have been reported in many countries around the world. Low and middle-income countries have been hit particularly hard by instances of foodborne diseases 3,4 as access to clean water is scarce and the food service sector in these countries is mostly unorganized and informal.

Globally, the high incidence of food-borne illnesses especially in developed countries where statistics are compiled has led to an increase in global concern about food safety and has been associated with the poor personal hygiene of food handlers. The Centers for Disease Control and Prevention (CDC) estimated that about (48 million people) are affected by foodborne illnesses annually. The estimates suggest 128,000 people are hospitalized and 3,000 die. The 31 known pathogens account for an estimated 9.4 million annual cases, 55,961 hospitalizations, and 1,351 deaths. Unspecified agents account for 38.4 million cases, 71,878 hospitalizations, and 1,686 deaths.

In other county’s such as India, the Federation of Indian Chambers of Commerce and Industry (FICCI) in its report of 20176 has indicated that about 66% of the food service establishments in India are in the unorganized sector. On the other hand, the possibility of widespread outbreaks of foodborne diseases in high-income nations cannot be dismissed [10]. In such countries, the highly consolidated structure of the food service industry with extensive and long supply chains has the potential to affect the widespread occurrence of foodborne illness as the number of patrons frequenting such establishments is considerable [11]. The rise in eating-out venues and accessibility to different cuisines are helping the food industry to post strong and sustained except for a few periods of exceptional growth over the last two decades [12]. Overall impression of the establishment, inspection ratings, grooming and attire of staff members, and observed cleanliness are the elements identified by Henson et al. that influence customers’ perception of an establishment’s food safety. In their study, attributes the increase in the number of restaurants and other foodservice operations that have an “open” kitchen design where patrons can observe the kitchen operations to patrons’ perception of offering better food quality and cleanliness [13]. Consequently, such establishments are becoming popular amongst patrons who value food safety and cleanliness [14]. Many studies [15] identify insufficient food handlers on Knowledge, Attitude, and Practices (KAP) as the reason behind instances of foodborne diseases. This perception of poor food safety at food service establishments in general and restaurants, in particular, has assumed significance as an instance of foodborne diseases at a food services business operations can have serious financial, societal, and economical implications.

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Namibia is a developing country located in southern Africa, with a population of approximately 2.5 million people. Foodborne illnesses are a significant problem in the developing region, of Namibia, with outbreaks reported regularly. According to the World Health Organization (WHO), Namibia has one of the highest rates of foodborne illnesses in the region, with an estimated 137 cases per 100,000 people annually. This is a major concern, as foodborne illnesses can have serious health consequences, including diarrhea, vomiting, and in severe cases, death. A study conducted by Nghipondoka et al. in Oshakati, Namibia, found that food handlers had inadequate knowledge of food safety practices, particularly in the areas of personal hygiene and cross-contamination. The study also found that food handlers had a positive attitude towards food safety and were willing to implement food safety practices if provided with adequate training. In addition, Namibia has a limit to access to clean water in informal settlements this is scarce and the food service sector in the country is mostly unorganized and informal and which may be the reason for the high number of foodborne illnesses reported annually.

Few systematic reviews of consumer Knowledge, Attitude, and Practices (KAP) have been done previously. However, there is a scant and insufficient synthesis of various studies on the KAP of food handlers. Thus, there is a necessity of synthesizing evidence on the KAP of food handlers with regard to food safety and hygiene. Against this background of contamination and unsatisfactory hygiene practices that are likely to occur in these places, the researcher found the need to conduct a study to assess knowledge, attitudes, and practices on food safety among food handlers in sub-Saharan Africa.

### Objectives

The objective of this scoping review was:

- To assess food handler's knowledge on food safety and hygiene in restaurants and tuck shops in Sub-Saharan Africa.
- To assess food handlers' attitudes on food safety and hygiene in restaurants and tuck shops in Sub-Saharan Africa.
- To assess food handlers' practices on food safety and hygiene in restaurants and tuck shops in Sub-Saharan Africa.

### Review Questions

The following review questions aim at answering the objectives of the proposed study.

1. What is the level of knowledge of food handlers towards food hygiene and safety in restaurants and tuckshops in sub-Saharan Africa?
2. What are the attitudes of food handlers towards food hygiene and safety in restaurants and tuckshops in sub-Saharan Africa?
3. What are the common practices of food handlers in ensuring food hygiene and safety in restaurants and tuckshops in sub-Saharan Africa?

### Methods

A scoping review approach was utilized in this study due to the broad nature of the research question of the study. The study used a scoping review approach using data extraction tool to collect data from included articles and documents. Furthermore, this scoping

review describes the stages scoping review framework described by [16] such as: Identifying the research question, Identifying the relevant studies, Study selection, Data (extracting) and charting, Collating summarizing, and discussing data, and optionally, discussing with experts (research supervisor).

### Eligibility Criteria

#### Type of Participants

This scoping review included studies that address food handlers working in restaurants and tuckshops across Sub-Saharan Africa, irrespective of their age, ethnicity, or gender, as food hygiene and safety are universally pertinent concerns.

#### Concept

The scoping review aimed to investigate research studies focusing on various aspects of knowledge, attitudes, and practices related to food hygiene and safety among food handlers in Sub-Saharan Africa. This includes interventions, training programs, and best practices in this context. Given the nature of the topic, it is essential to emphasize that improving knowledge, attitudes, and practices among food handlers is crucial for ensuring food safety in these establishments.

#### Context

Considering the widespread importance of food safety in the region, particularly in Sub-Saharan Africa where foodborne illnesses are a significant concern this scoping review adopts a comprehensive approach. It includes studies conducted in various settings, such as urban and rural areas, formal and informal food service establishments, and both small-scale and large-scale enterprises. By doing so, this review aims to offer an overview of the state of food hygiene and safety knowledge, attitudes, and practices among food handlers in Sub-Saharan Africa.

#### Type of sources

The review included studies from existing literature which may have included primary research studies, reviews (systematic reviews, meta-analyses, scoping reviews), grey literature (guidelines, policies, and thesis). All study designs will be included (qualitative and quantitative studies).

#### Time frame

All studies conducted between 2013 and 2023 of the time of publication were included. This was to incorporate the previously found evidence with the latest evidence on food hygiene and safety knowledge, attitudes, and practices among food handlers in Sub-Saharan Africa.

#### Language

Further, all literature written in English including those that had titles written in English were included.

#### Exclusion Criteria

Research titles that don't match the search words (Food safety and hygiene, food handlers, Knowledge, Attitude, and Practice) within the research's search terms were not reviewed and was removed. In addition, studies that are not in English was also not

the included. The literature articles that the researcher used were in accordance with the inclusion and exclusion criteria of the proposed study.

### Information sources

The researcher used of the databases that are on the UNAM website. Whereby, Science direct and google scholar was used. The databases are suitable for the study as google scholar has a vast database coverage that provided the research with a variety of articles published globally. The UNAM website database (UNAM REPOSITORY) was used to gather articles on Namibia and about Namibia's grey literature. Duplicated materials were removed.

### Search strategy

The search strategy aimed to find both published and unpublished studies. The first step was an initial limited search of two appropriate online database relevant to the topic. For this step the Science direct and PubMed central were the databases.

The initial keywords were: Food handlers, Knowledge, Practices, Attitude, Restaurant, Food service establishment. Food safety and hygiene.

This initial search was then followed by an analysis of the text words contained in the title and abstract of retrieved papers and of the index terms used to describe the articles. The second search used all identified keywords and index terms across all included databases. The input of the librarian was used in approving and refining the search strategy.

### Selection of sources of evidence

The study selection was based on title, abstract and full text examination. Titles and abstracts were screened against the inclusion criteria pre-specified in the review protocol. Studies that met the criteria were retrieved in full-text. The full text of selected studies was retrieved and screened against the inclusion criteria. Full text studies that did not meet the criteria were excluded. The reference list of final included articles was screened for any further articles.

### Data Charting process

A data extraction tool was developed at the protocol stage, adapted from the JBI data extraction tool by Joanna Briggs Institute, 2015 to record the key data relevant to the review question. See (Annexure 1).

The charting flowchart include general information about the study and its design and more specific information about the methods of engagement. The charting flowchart presented showcase the literature selection methods used based on the following criteria and categories; identification, screening, eligibility, and included. All final included articles were charted using a data extraction form See (Annexure 2).

### Data Items

The following are explanation of the data items that were utilised:

- Author and year of publication: the citation details of included sources were provided.

- Objectives: a clear description of what the included studies aimed at were stated.
- Participants: the defining characteristics of the participants in included sources was provided, this included demographic details, age of participants and total numbers.
- Concept: data from included sources of evidence to studies focusing on various aspects of knowledge, attitudes, and practices related to food hygiene and safety among food handlers in Sub-Saharan Africa including those on dialysis was extracted and mapped.
- The outcomes and results of the included studies were extracted and mapped.
- Context: details of the context, such as location of care (acute, primary health care, community) or a particular geographical location, was described.
- Outcomes: studies describing the various aspects of knowledge, attitudes, and practices related to food hygiene and safety among food handlers in Sub-Saharan Africa were extracted and mapped.
- Recommendations for practice and future research from the included sources were provided.

### Synthesis of Results

The results of a scoping review were presented as a map of the data extracted from the included papers in a tabular form that aligns with the objective and scope of the review. The tables and figures showed results as distribution of studies by year or period of publication, countries of origin, area of intervention and research methods.

## Results

### Selection of Sources of Evidence

The initial search yielded from those databases was 36424 related articles of which 35774 did not meet the inclusion criteria and 650 were retained for reviewing. After the screening on abstracts 130 articles remained and 520 were excluded for duplication. A final of 50 articles were included in full-text screening and 40 articles were excluded for not meeting the inclusion criteria, type of article or insufficient data. In the end, 10 articles were selected for this review. The review utilised an adapted Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) flow diagram for the selection of articles as shown in, Figure 1.

### Characteristics of Sources of Evidence

A summary of the characteristics of the individual sources of evidence of the final included articles are shown in Annexure 3.

### Results of individual sources of evidence

Between 2013 and 2023, a total of two studies were conducted in 2013, with a notable gap of three years (from 2014 to 2016) during which no studies were undertaken. However, from the available results, it is evident that there was an increasing interest in evaluating the knowledge, attitudes, and practices of food handlers concerning food safety and hygiene in restaurants and tuck shops situated in Sub-Saharan Africa. By the year 2022, two additional studies had been conducted, as indicated in: Figure 2.

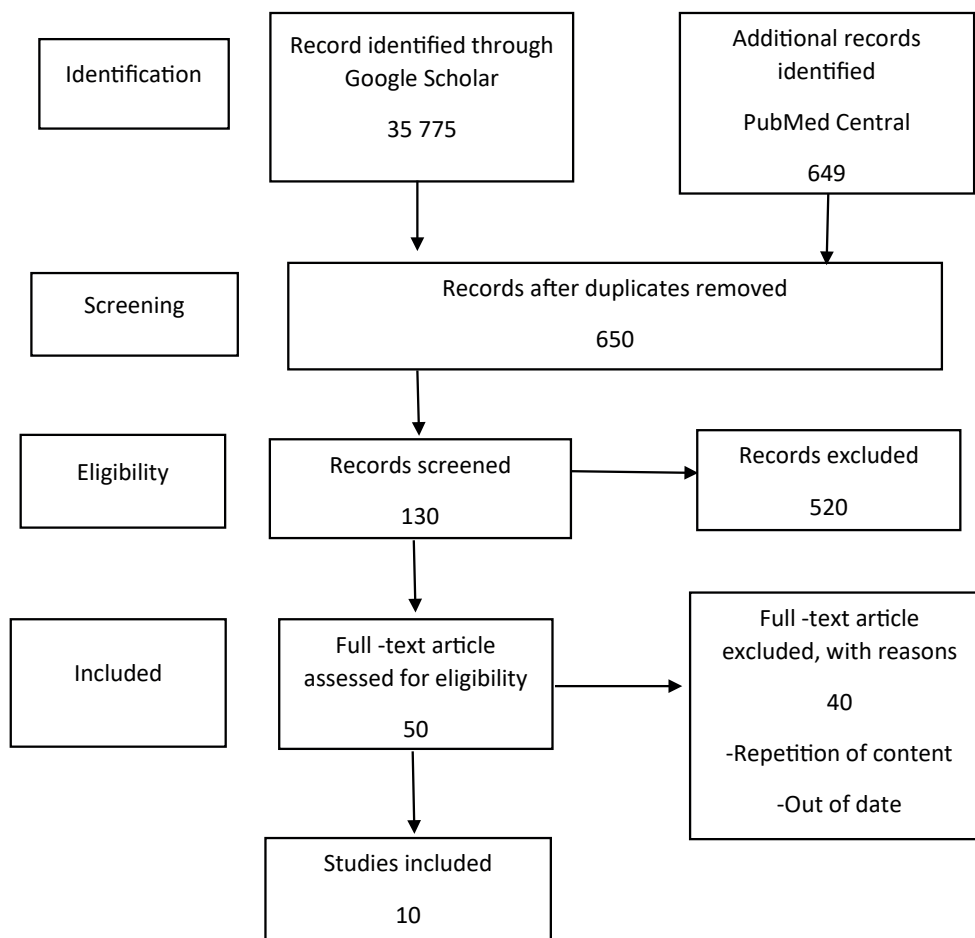


Figure 1: PRISMA flow diagram design by Peters et al., 2015.

### Year of Publication

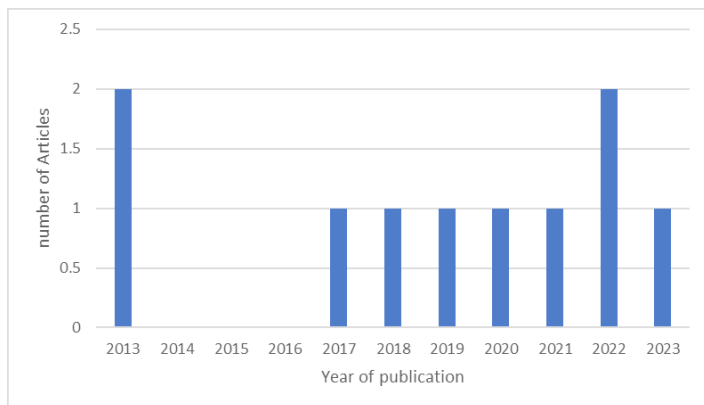


Figure 2: Year of publication.

### Sample Sizes

The sample sizes of participants in these studies exhibited a range from 75 to 422 individuals. Notably, the study involving a smaller participant pool was conducted among Food Handlers in Restaurants within Ilala Municipality, Tanzania. Conversely, the study with a larger cohort was conducted in Gambelia Town, Southwest Ethiopia, specifically focusing on Butcher Houses and Restaurants.

### Instruments Used in Studies

In the selected studies, various instruments were employed to collect information. The predominant methods included face-to-face interviews and questionnaires. Below is a summary of the instruments used in each of the ten articles. Table 1.

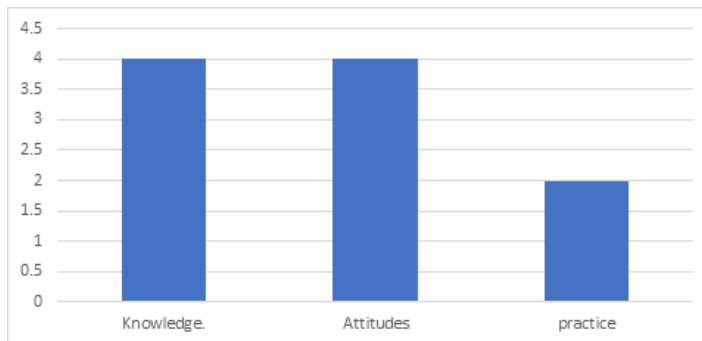
Table 1: Summary of the instruments used.

Articles	Instrument used
1	Face-to-face interviews
2	Semi Structured Questionnaire
3	Face to Face interview and Questionnaire
4	Face to Face interview and Questionnaire
5	Questionnaire
6	Interview and Observations
7	Questionnaire, Interview and documental Literature
8	Questionnaire and Observations
9	Questionnaire
10	Face to Face Interview

### Analysis of Discussions on Knowledge, Attitudes, and Practices in Selected Articles

Across the provided articles, the discussions pertaining to knowledge, attitudes, and practices (KAP) were examined. It is noteworthy that in 8 out of the 10 articles, a significant emphasis was placed on exploring the knowledge and attitudes of food

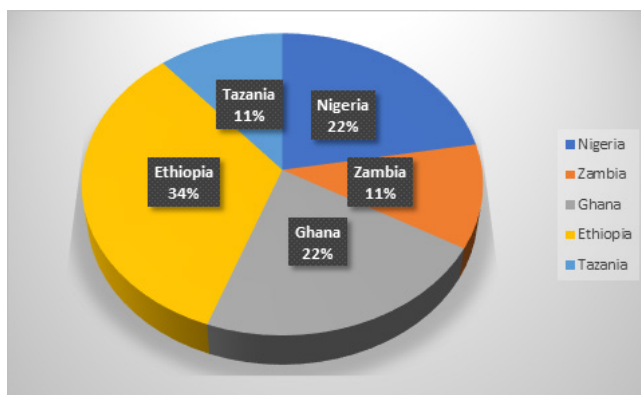
handlers concerning food safety and hygiene. In contrast, a narrower focus on the practical aspects of food safety and hygiene was observed in only 2 out of the 10 articles. See Figure 3.



**Figure 3:** Total count of discussions related to knowledge, attitudes, and practices (KAP) across the provided articles.

### Demographic Location/Countries with selected articles.

All articles were from countries in Sub-Saharan Africa, whereby more studies were done in Ethiopia with 3 (33%) articles. Nigeria and Ghana had 2 (22%) of selected articles. See Figure 4



**Figure 4:** Countries with studies used.

### Purpose addressed by Studies

Majority of the studies (8) aimed at Assessing Knowledge, Attitudes, and Practices of Food Handlers in restaurants or neither in food establishments while (2) of them focuses on Comprehensive Assessment and Determinants of Safe Food Handling. Table 2

**Table 2:** Purpose addressed by studies.

No of articles	Purpose addressed by Studies	Author
1	To establish their knowledge of food safety hazards and control measures.	Sylvester N. Onyinyechi and Craig W. Hedberg
2	To determine beliefs and practices in food safety among food handlers in Chika kata district.	Danny Malambo
3	To evaluate the level of food safety knowledge, attitudes and practices among 402 food handlers in Kuwait restaurants.	Dina Al-Kandari, Jumanah Al-abdeen, Jiwan Sidhu

4	To assess the magnitude of food safety practice and associated factors among food handlers in public food establishments in Batu town, Central Oromia.	Fortune Akabanda, Eli Hope Hlortsi and James Owusu-Kwarteng
5	To assess the magnitude of food safety practice and associated factors among food handlers in public food establishments in Batu town, Central Oromia	Shumi Abe1 and Godana Arero
6	The aim of this study was to assess the magnitude of meat hygiene practices and factors associated with poor practices among food handlers in Gambela, Ethiopia.	Ruot Gatwech Gil
7	The aim of this study was to assess food safety knowledge and hygiene practice among food handlers in restaurant at Ilala Municipality in Dar es Salaam Region.	Mariam Omar Mambosasa
8	To assess the food safety knowledge and practices of food handlers in restaurants in the Tamale Metropolis.	Udith Amma Seidu
9	The aim of this study was to determine the attitude and practice of food hygiene among food handlers in Ebonyi State Nigeria.	Ituma1, Onwasigwe U. Nwonwu1, B. N. Azuogu1 and N. C. Eze1
10	<b>To assess food safety knowledge, attitude and practice of food handlers, establishments' status and determinants of safe food handling practice.</b>	Mariam Omar Mambosasa

### Discussion

The study aimed to assess food handler's knowledge, Attitudes and Practice on food safety and hygiene in restaurants and tuck shops in Sub-Saharan Africa. The included studies were done in countries such as Ethiopia, Nigeria, Ghana, Zambia. All the included studies came from different departments like epidemiology, public health, health sciences, human performance, biology and management information system. The study design of all studies to be used were conducted through cross sectional study. Instruments such as structured questionnaire, Face to face interviews the most tools were used to determine the socio-demographic profile of food handlers.

The findings from multiple cross-sectional studies provided valuable insights into the state of food safety awareness and implementation among food handlers and therefore helped to answer the review questions which were: 1. What is the level of knowledge of food handlers towards food hygiene and safety in restaurants and tuckshops in sub-Saharan Africa? 2. What are the attitudes of food handlers towards food hygiene and safety in restaurants and tuckshops in sub-Saharan Africa? And What are the common practices of food handlers in ensuring food hygiene and safety in restaurants and tuckshops in sub-Saharan Africa?

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### Knowledge of Food Handlers on Food Safety

The studies collectively reveal that food handlers generally possess a reasonable level of knowledge in certain aspects of food safety. In a study by Onyeneho [17], it was found that only 40% of respondents had knowledge of Salmonella, 28% of *E. coli*, and 21% of Hepatitis A as pathogens. This indicates a significant gap in understanding the potential risks associated with foodborne illnesses. Similar findings were observed in study done by Akabanda [18], where a considerable number of food handlers did not correctly identify common foodborne pathogens. This lack of knowledge about specific pathogens could lead to inadequate food safety practices and an increased risk of foodborne illnesses. Furthermore, in a study done in Ghana by Abe [19] highlighted that the association between education level and knowledge among food handlers. Those with a secondary level of education tended to have better knowledge of food safety practices. This suggests that educational interventions and training programs could play a crucial role in improving the knowledge of food handlers, ultimately enhancing food safety. Studies have emphasized the importance of training in food safety practices this is supported by a study by Malambo [20] Food handlers who received training were more likely to have good knowledge and practice food safety measures. This underscores the need for comprehensive training programs for food handlers to ensure they are well-informed about food safety protocols.

However, despite variations in knowledge levels, there is a recurring theme in these articles - a gap between knowledge and practice. specifically points out that even though 77% of food handlers were knowledgeable about food safety issues, this knowledge did not consistently translate into safe food handling practices. This gap is a critical concern as it can result in foodborne illnesses and outbreaks, which can have severe consequences for public health. To bridge this gap between knowledge and practice, it is essential to address the barriers identified in the studies. Study done in the Tamale Metropolis, Ghana identifies by Seidu [21] several barriers, including time constraints, lack of enforcement of food safety rules and regulations, and forgetfulness. These barriers need to be tackled through targeted interventions and regular monitoring.

These knowledge deficiencies are a cause for concern as they directly impact the safety of the food supply. The studies consistently highlight the importance of targeted training and education to address these gaps, with trained food handlers consistently exhibiting higher knowledge scores.

### Attitude of food handlers on food safety

According to Onyeneho [17] highlight several concerning attitudes among food handlers. that about, 49% of respondents reported that they would allow a sick person to handle food, indicating a lack of awareness regarding the risks of foodborne illness transmission. Additionally, 37% engaged in cross-contamination practices, which is a significant concern for food safety. These findings suggest a need for improved education and training on food safety practices to change these attitudes and behaviours.

The association between level of knowledge and practices among food handlers is significant in many articles. This implies that those with higher levels of knowledge tend to exhibit better food safety practices. This finding underscores the importance of educational programs aimed at improving food safety knowledge among food handlers, which can subsequently influence their attitudes and practices positively.

Study done in Zambia and Tanzania identified that significant associations between education and infrastructure/environment of food premises with attitudes and practices of food hygiene. This suggests that both individual factors (education) and environmental factors (infrastructure) influence food safety attitudes and practices.

### Practice of Food Handlers on Food Safety

Food handlers generally display positive practice towards food safety, as indicated in six of the ten articles. The findings from article complied by Akabanda [18] reveal both positive and concerning aspects of food safety practices among food handlers. While an encouraging 92% reported cleaning and sanitizing food equipment and contact surfaces, there is cause for alarm with 37% engaging in cross-contamination practices. Additionally, allowing sick individuals to handle food (reported by 49%) is a worrisome practice that can lead to foodborne illnesses. The 70% who reported always washing their hands is commendable, but the 6% who continue cooking after handling raw eggs pose a risk. The lack of knowledge about ideal refrigeration temperatures (35%) is another area that needs attention [22].

About 70% of the studies highlighted on the importance of education and its association with food safety practices. It is encouraging to note that 87.5% of food handlers washed their hands after every procedure, but the 5% who only washed hands twice in a shift is a concern. The association between knowledge and practices is significant, emphasizing the need for training and education programs in the food industry. Food handlers with secondary education were more likely to exhibit better practices, suggesting that educational initiatives can yield positive results in enhancing food safety. This study in Ethiopia highlights the importance of education and training in improving hygiene practices among meat handlers. A low prevalence of good hygiene practices underscores the need for targeted interventions, particularly among those with lower levels of education. Food hygiene training emerges as a significant factor in promoting safer practices [23].

### Limitations

According to Simon [24] limitations are conditions beyond the researcher's control and that may negatively influence the research findings. This study had several limitations that may have affected the results. First, only literature written in English including those that had titles written in English were included. Secondly, the electronic databases searched were only those hosted by the University of Namibia and may have limited the coverage of literature. Lastly, only articles from countries that apart of Sub-Saharan African were included which made it so hard for the researcher to find them, because only few articles found that met

the condition set in inclusion and exclusion criteria of this review.

## Conclusion

The comprehensive assessment of food safety knowledge, attitudes, and practices (KAP) among food handlers across various settings presented in this scoping review underscores the multifaceted nature of the food safety challenge. While the studies collectively highlight both strengths and areas for improvement, they offer valuable insights that can guide actions to enhance food safety and protect public health. The studies, have demonstrated that many food handlers possess a solid understanding of personal hygiene principles. This is indeed a promising foundation upon which to build further knowledge. However, there remain gaps in understanding crucial aspects of food safety, notably cross-contamination, temperature control, and foodborne pathogens.

These knowledge deficiencies are concerning because they directly impact the safety of the food supply. Attitudes among food handlers were generally positive, indicating a willingness to prioritize food safety. Positive attitudes are a valuable asset, as they can serve as a driving force for adopting safer practices. However, it's important to note that attitudes alone are not sufficient to ensure food safety. They must be complemented by comprehensive training and resources. The observed practices of food handlers reflected a mixed picture. While personal hygiene practices generally met acceptable standards, concerning issues emerged, such as cross-contamination and temperature control failures. The prevalence of poor practices, such as multiple freeze-thaw cycles and infrequent handwashing during food preparation, underscores the need for targeted interventions.

The correlations identified among knowledge, attitudes, practices, and training emphasize the interconnectedness of these elements. They underscore the importance of holistic approaches to food safety improvement. Knowledge and attitudes alone cannot guarantee safe practices; instead, they must be reinforced by effective training programs and supported by a conducive working environment. One consistent theme across these studies is the vital role of training and education in enhancing food safety. It is evident that food handlers who have undergone training tend to exhibit better knowledge and safer practices. Therefore, it is imperative to make food safety training mandatory, easily accessible, and periodically updated to reflect the latest scientific insights and regulatory changes.

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## ANNEXURES

### Annexure 1: Data Extraction tool.

Evidence of source details and characteristics	
No	
Author	
Title	
Country/ region	
Instruments used	
Study Design	
Study duration	
Publication year	
Details /results extracted from source of evidence	
Study aims/objectives	
Participants	
Context	
Study outcomes	
Recommendations	
Future research	

Source adopted from (Joanna Briggs institute, 2015).

### Annexure 2: Data Extraction form.

Evidence of source details and characteristics	
No	
Author	
Title	
Country/ region	
Department	
Study Design	
Instruments used	
Sample size	
Publication year	
Details /results extracted from source of evidence	
Study aims/objectives	
Participants	
Study outcomes	
Recommendations	

### Annexure 3: Summary of individual evidence of selected studies.

Evidence of source details and characteristics	
No 1	
Author	Sylvester N. Onyinyechi and Craig W. Hedberg
Title	An Assessment of Food Safety Needs of Restaurants.
Country/ region	Owerri, Imo State, Nigeria
Department	Division of Environmental Health Sciences, University of Minnesota, 420 Delaware Street SE,
Study Design	Cross sectional

Instruments used	Face-to-face interviews
Sample size	One hundred and forty-five
Study duration	N/A
Publication year	2 August 2013
Details /results extracted from source of evidence	
Study aims/objectives	To establish their knowledge of food safety hazards and control measures.
Participants	Head chefs and catering managers
Study outcomes	Ninety-two percent reported that they cleaned and sanitized food equipment and contact surfaces while 37% engaged in cross-contamination practices. Forty-nine percent reported that they would allow a sick person to handle food. Only 70% reported that they always washed their hands while 6% said that they continued cooking after cracking raw eggs. All respondents said that they washed their hands after handling raw meat, chicken or fish. About 35% lacked knowledge of ideal refrigeration temperature while 6% could not adjust refrigerator temperature. Only 40%, 28%, and 21% had knowledge of Salmonella, E. coli, and Hepatitis A, respectively while 8% and 3% had knowledge of Listeria and Vibrio respectively, as pathogens.
Recommendations	Results of this survey highlighted key prevention and safety issues that increased the likelihood of outbreaks of food-borne diseases originating from many of these restaurants. To help mitigate these risks, restaurants should be targeted for intensive inspection and improvement of the sanitary conditions of their facilities. Furthermore, the survey highlighted the potential risks of the sources of food and water supply. The lack of current knowledge of food safety among the restaurant staff in Owerri called for the development of an appropriate training program for food service personnel in order to avert the potential danger of food-borne illness outbreaks. Government involvement might include public service announcements promoting food safety and offers of some types of incentives to encourage restaurants to participate in trainings, especially fast-food restaurants and itinerant food hawking operators.

Evidence of source details and characteristics	
No.2	
Author	Danny Malambo
Title	Beliefs And Practices In Food Safety Among Food Handlers In Restaurants Of Chikankata District.
Country/ region	Zambia
Department	Department of Health Promotion and Education, School of Public Health
Study Design	Cross sectional
Instruments used	The semi structured questionnaires
Sample size	120
Publication year	2013
Details /results extracted from source of evidence	
Study aims/objectives	To determine beliefs and practices in food safety among food handlers in Chika kata district.
Participants	food handlers in Chika kata district
Study outcomes	The education level, there were more female food handlers (87.5%) working in restaurants than male in all age groups. The study revealed that 60% were not trained in any food hygiene and 87.5% of food handlers washed hands after every procedure in the restaurant while 5% washed hands twice in a shift. The study revealed that food handlers that were knowledgeable were among those with secondary level of education. The association between level of knowledge and practices was significant at 95% level of confidence with P-value=0.001. This significance was well supported by what food handlers believe about food safety. This study has therefore revealed that there was an association between level of knowledge and practices among food handlers.
Recommendations	In order to maintain the hygiene practices among the food handlers in restaurants of Chikankata District, the following are recommendations; 1. Chikankata District Council ♣ A bacteriological food quality assessment should be conducted to ascertain the relevance of this study results ♣ Design short courses for food handlers in order to transform the high knowledge levels into practice ♣ Restaurants owners to provide protective clothing (PPE) to food handlers ♣ Encourage Restaurants owners to employ food handlers who are trained in food hygiene 2. Chikankata District Health Office ♣ Employ more Health Inspectors to carry out inspections of restaurants and other premises in order to maintain and improve the current status quo. To continue with sensitization programmes on food hygiene and safety in the restaurant

Evidence of source details and characteristics	
No.3	
Author	Dina Al-Kandari, Jumanah Al-abdeen, Jiwan Sidhu
Title	Food safety knowledge, attitudes and practices of food handlers in restaurants in Kuwait
Country/ region location	Kuwait
Department	Department of Food Science and Nutrition, Faculty of Life Sciences, Kuwait University, Kuwait
Study Design	Cross sectional

Instruments used	face to face interviews and questionnaire
Sample size	402
Publication year	September 2018
Details /results extracted from source of evidence	
Study aims/objectives	To evaluate the level of food safety knowledge, attitudes and practices among 402 food handlers in Kuwait restaurants.
Participants	402 food handlers
Study outcomes	The results show that the majority of food handlers had sufficient knowledge $53.59 \pm 16.68$ (70%) showing very good knowledge particularly about personal hygiene (93%). Areas of concern were lack of knowledge about crosscontamination and sanitation (68%), time and temperature control for food (63%), and food pathogens (51%). For attitudes, results show that respondents had excellent positive attitudes with a mean score of $69.12 \pm 9.97$ (94%). Food handlers generally show very good practices $27.6 \pm 7.03$ (82%) particularly in personal hygiene. However, a few areas of poor practice include cross-contamination as well as time and temperature control. A significant positive correlation was observed between knowledge with practices ( $r_s = 0.536$ , $P < 0.05$ ), knowledge with attitudes ( $r_s = 0.407$ , $P < 0.05$ ), practices with attitudes ( $r_s = 0.317$ , $P < 0.05$ ) and knowledge with training ( $r_s = 0.59$ , $P < 0.05$ ), attitudes with training ( $r_s = 0.314$ , $P < 0.05$ ) and practices with training ( $r_s = 0.30$ , $P < 0.05$ ).
Recommendations	The current study concludes that the level of knowledge, attitudes and practices of food handlers in Kuwait restaurants was satisfactory. However, there are some limited knowledge aspects that need to be improved. These are particularly associated with time and temperature control as well as cross-contamination. The consequences of lacking knowledge in such areas may increase the risk of food-borne diseases. The need for mandatory training is necessary considering the rapid growth of small and medium-sized restaurants in Kuwait and the increasing need for food handlers to accommodate these establishments. The training should not only focus on theoretical aspects, but should also be practical and foster positive attitudes towards food-safety practices, and be part of an established food-safety culture. The support and positive reinforcement and motivation given to food handlers by supervisors, managers, and trainers are extremely important to the success of food safety training. This research is the first in Kuwait that presents baseline data for further research on food handler's knowledge, attitudes and practices. For future research, it is recommended that studies on food handlers also include physical assessments and tests, such as microbiological assessment of their hands, internal health, and food-working areas.

Evidence of source details and characteristics	
No.4	
Author	Fortune Akabanda, Eli Hope Hlorts and James Owusu-Kwarteng
Title	Food safety knowledge, attitudes and practices of institutional food-handlers in Ghana
Country/ region	Ghana
Department	Department of Applied Biology, Faculty of Applied Sciences, University for Development Studies, P. O. Box 24, Navrongo Campus, Ghana
Study Design	Cross sectional
Instruments used	face to face interview and administration of questionnaire
Sample size	235
Publication year	2017
Details /results extracted from source of evidence	
Study aims/objectives	The purpose of this study was to evaluate the food safety knowledge, attitudes, and practices among institutional food-handlers in Ghana.
Participants	Institutional food- handlers
Study outcomes	Majority of the food-handlers were between 41–50 years (39.1%). Female respondents were (76.6%). In our study, the food-handlers were knowledgeable about hygienic practices, cleaning and sanitation procedures. Almost all of the food-handlers were aware of the critical role of general sanitary practices in the work place, such as hand washing (98.7% correct answers), using gloves (77.9%), proper cleaning of the instruments/utensils (86.4%) and detergent use (72.8%). On disease transmission, the results indicates that 76.2% of the food- handlers did not know that Salmonella is a food borne pathogens and 70.6% did not know that hepatitis A is a food borne pathogen. However, 81.7% handlers agreed that typhoid fever is transmitted by food and 87.7% agreed that bloody diarrhea is transmitted by food. Logistic regression analysis testing four models showed statistically significant differences ( $p < 0.05$ ), for models in which the explanatory variable was the level of education.
Recommendations	Ccontinuous food safety education and motivation for foodhandlers of various demographic backgrounds with special attention paid to those with lower levels of education would complement other interventions that pursue the enhancement of food safety systems in Ghana

Evidence of source details and characteristics	
No.5	
Author	Shumi Abe1 and Godana Arero

Title	Food handlers safety practices and related factors in the public food establishments in Batu Town, Central Oromia, Ethiopia.
Country/ region	Batu Town, Central Oromia, Ethiopia
Department	Public Food Establishments in Batu Town, Central Oromia, Ethiopia. Special Journal of Public Health, Nutrition, and Dietetics. 2021, 2(1): 1-18.
Study Design	Cross-sectional study design
Instruments used	A structured questionnaire
Sample size	302
Publication year	2021
Details /results extracted from source of evidence	
Study aims/objectives	To assess the magnitude of food safety practice and associated factors among food handlers in public food establishments in Batu town, Central Oromia.
Participants	Food handles
Study outcomes	The proportion of food safety practice was 176(58%) of which 52% had good knowledge and 126(47%) of the study participants had poor food safety practice. Those who had training on food safety practice were 3.1 more likely to keep food hygiene than those who didn't get training with (AOR 3.10, 95%CI (1.30, 7.38), Those who had good knowledge on food safety practice were 3.90 times at higher odds of observing food safety practice as compared to their counterparts with poor knowledge (AOR =3.897, 95%CI (2.28, 6.70). Those who had training on food safety practice were 3.1 more likely to keep food hygiene than those who didn't get training on food safety practice with AOR 3.10, 95%CI (1.30,7.38), Value 0.01. Regarding food handlers, those who had good knowledge of food safety were 3.90 times at higher odds of food safety practice compared to those who had poor knowledge of food safety practice [AOR =3.897, 95%CI (2.28, 6.70)]
Recommendations	Not stated

Evidence of source details and characteristics		
No.6		
Author	Ruot Gatwech Gil	
Title	Hygiene Practices and Associated Factors Among Meat Handlers at Butcher Houses and Restaurants in Gambela Town, Southwest Ethiopia	
Country/ region	Gambela Town, Southwest Ethiopia	
Department	N/A	
Study Design	Cross-sectional study	
Instruments used	Structured questions through interviews and observations	
Sample size	422	
Publication year	February 13th, 2023	
Details /results extracted from source of evidence		
Study aims/objectives	The aim of this study was to assess the magnitude of meat hygiene practices and factors associated with poor practices among food handlers in Gambela, Ethiopia.	
Participants	Food handles	
Study outcomes	This study showed a low prevalence of good hygiene practices of 40.6% (36.0–45.6) among meat handlers at butcher houses and restaurants in Gambela, southwest Ethiopia. Low levels of good hygiene practices were significantly related to education (i.e., having a secondary education) (AOR: 95% C.I., 2.51: 1.17–5.41) and food hygiene training (i.e., receiving training on general safe food hygiene) (AOR: 95% C.I., 5.11: 2.55–10.23).	
Recommendations	Intensive food safety training and providing a comfortable work environment will help them attract educated workers.	

Evidence of source details and characteristics		
No.7		
Author	Mariam Omar Mambosasa	
Title	Assessment Of Food Safety Knowledge And Hygiene Practice Among Food Handlers In Restaurants At Ilala Municipality, Tanzania	
Country/ region	Tanzania	
Department	Department Of Geography, Tourism And Hospitality Services Of The Open University Of Tanzania	
Study Design	A cross-sectional research design	
Instruments used	Questionnaires, interviews, direct observation and documentary literature review	

Sample size	75
Publication year	2022
Details /results extracted from source of evidence	
Study aims/objectives	The aim of this study was to assess food safety knowledge and hygiene practice among food handlers in restaurant at Ilala Municipality in Dar es Salaam Region.
Participants	restaurant food handlers and customers
Study outcomes	The study revealed that, restaurant hygiene, quality of food received, preservation of food materials, food storage and preservative measures, method used to hold cooked food and availability of designated sinks for hand washing in their work place were hygiene practice among food handlers in restaurant of Ilala Municipality. Furthermore, customer chooses to eat at safer restaurant with well-groomed staff, proper temperature of the food and proper food handling and preparation.
Recommendations	The government through Ilala Municipality, health department should strengthen supervision and regular monitoring of food premises to ensure adequate food safety and hygiene practices among food handlers.
Evidence of source details and characteristics	
No:8	
Author	Udith Amma Seidu
Title	Food Safety Knowledge And Practices Of Food Handlers In Restaurants In The Tamale Metropolis, Ghana
Country/ region	Ghana
Department	Department of Hospitality and Tourism Management, Faculty of Social Sciences, College of Humanities and Legal Studies, University of Cape Coast, in partial fulfilment of the requirements for the award of Doctor of Philosophy in Hospitality Management.
Study Design	Cross sectional
Instruments used	Questionnaires and an observation checklist
Sample size	214
Publication year	2020
Details /results extracted from source of evidence	
Study aims/objectives	To assess the food safety knowledge and practices of food handlers in restaurants in the Tamale Metropolis.
Participants	Restaurant food handlers
Study outcomes	The results showed that 77% of the food handlers in the restaurants were knowledgeable in food safety issues but this did not translate into food safety practices. Thus, there exist a gap between knowledge and practice. They were found to be more knowledgeable in environmental hygiene issues but fell short in some food hygiene issues such as knowledge on thawing frozen foods and storage of food items under appropriate refrigeration temperatures. The study also identified five major barriers to food safety practices such as time constraint and busy work schedule, lack or inadequate knowledge, lack of enforcement of food safety rules and regulations, inadequate resources or supplies and forgetfulness or lack of reminders. Based on these findings, it was concluded that, food handlers were knowledgeable about food safety issues, but did not put the knowledge into practice.
Recommendations	It was therefore recommended that, facility managers in collaboration with the environmental health officers, and Food and Drugs Authority (FDA) put in place more stringent monitoring and supervision measures to improve on the food safety practices of food handlers in restaurants. More practical work be included in the curriculum for training manpower for the hospitality industry. © University of Cape Coast <a href="https://erl.ucc.edu.gh/jspui">https://erl.ucc.edu.gh/jspui</a>

Evidence of source details and characteristics	
No: 9	
Author	B. I. Ituma1, C. Onwasigwe2 , E. U. Nwonwu1 , B. N. Azuogu1 and N. C. Eze1
Title	Assessment of Attitude and Practice of Food Hygiene among Food Handlers in Ebonyi State, Nigeria
Country/ region	Nigeria

Department	Department of Community Medicine, Federal Teaching Hospital Abakaliki, Nigeria and Department of Community Medicine, University of Nigeria Teaching Hospital, Enugu, Nigeria
Study Design	cross-sectional study in design
Instruments used	Pre-tested interviewer-administered questionnaire and observational checklist.
Sample size	170
Publication year	2019
Details /results extracted from source of evidence	
Study aims/objectives	The aim of this study was to determine the attitude and practice of food hygiene among food handlers in Ebonyi State Nigeria.
Participants	Food handlers
Study outcomes	Majority (75.9%) of the study participants were females, 84.1% were in the age range of 20-49 years. Most of the respondents (98.2%) had one form of education or the other. Only 4 (2.4%) of the restaurants had adequate physical infrastructure, availability of water supply, toilet facility, refuse and dish/hand washing facilities. Slightly above half (52.9%) of the study subjects had positive attitude toward food hygiene while only 27.6% had good practice. Only 33.5% of them wore apron, 27.1% covered their head, 18.2% did not handle money while serving food to consumers. There were however significant associations between level of education and infrastructure/environment of food premises with attitude and practice of food hygiene:
Recommendations	Health education intervention programs for food handlers will help to prevent food-borne diseases/illnesses. Also, regulatory agencies and government should ensure that all food premises used for preparation and sale of food to the public meet the minimum standard for operation
Evidence of source details and characteristics	
No 10	
Author	Fresenbet Fanta a,b , Meseret Azene b,* , Kifle Habte c , Hanna Samson d , Aweke Kebede c
Title	Determinants of safe food handling practice among food handlers in food establishments, Yeka sub city, Addis Ababa, Ethiopia
Country/ region	Ethiopia
Department	National Disaster Risk Management Commission (NDRMC), Addis Ababa, Ethiopia b Center for Food Science and Nutrition, Addis Ababa University, PO Box: 1176, Addis Ababa, Ethiopia
Study Design	Cross-sectional study
Instruments used	Observational checklist and through structured-questionnaire via face-to-face interview.
Sample size	284
Publication year	2022
Details /results extracted from source of evidence	
Study aims/objectives	To assess food safety knowledge, attitude and practice of food handlers, establishments' status and determinants of safe food handling practice.
Participants	Food handlers
Study outcomes	The present study has indicated 42.6% of food handlers had good food handling practice. Food handling practice in the establishments were significantly associated with sex, monthly income, availability of functional pipe water supply, availability of soap and/or detergents and presence of insects or rodents.
Recommendations	enhancing pipe water availability in the food premises and dispatching sufficient soaps and detergents coupled with eradicating ubiquitous insects and rodents are key.