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# Food Safety Handling Knowledge, Attitude, Practice and Associated Factors Among the Food Handlers in Restaurants: The Case of Gode Town, Somali Region, Ethiopia

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## Abstract

Foodborne illnesses pose significant risks to public health, leading to substantial morbidity and mortality worldwide. This study aimed to evaluate safe food handling practices among food handlers in Gode town, aiming to identify associated factors. Data from 400 restaurant workers were collected through a structured questionnaire and analyzed using Statistical Package for Social Sciences (SPSS). Bivariate and multivariable logistic regression analyses were conducted to identify predictor variables related to safe food handling practices. Results revealed that a substantial proportion of participants demonstrated varying levels of adherence to safe food handling practices. Though a majority exhibited good knowledge (67.50%) and a positive attitude (60.00%) towards safe food handling, a significant portion also displayed poor knowledge (32.50%) and a negative attitude (40.00%). Despite generally positive findings, further observational studies and interventions are imperative to augment safe food handling practices. This study emphasizes the necessity of addressing knowledge and attitude gaps among food handlers to mitigate the risk of foodborne illnesses in Gode town.

## Keywords

Food safety, Food handlers, Restaurant workers, Adherence, Risk factors

## Introduction

Food safety is a paramount public health concern globally, with the supply of secure, wholesome, and nutritious food essential for human health and well-being. However, the consumption of contaminated food can lead to foodborne diseases, affecting millions of people worldwide [1]. Throughout history, societies have faced the challenge of ensuring safe food, with today's food safety challenges echoing those of the past. Governments worldwide are actively working to enhance food safety standards to address these ongoing challenges. Diarrheal diseases alone claim two million lives annually, with contaminated food contributing to 1.5 billion cases in children yearly, leading to over three million premature deaths [2].

In developing nations, up to 70% of diarrheal cases are linked to consuming unsafe food. The economic burden of foodborne illnesses is staggering, with costs amounting to $152 billion annually in the USA alone, resulting in 5,000 deaths and hospitalization of 325,000 individuals [3].

Globally, nearly 600 million people suffer from illnesses due to consuming contaminated food, resulting in 420,000 deaths, including 125,000 children under 5 [4].

Food handlers play a critical role in food safety, contributing to 10 - 20% of foodborne disease outbreaks. Microorganisms are the primary culprits behind

quality and safety concerns in food, with over 200 foodborne diseases transmissible through foods [5]. Large-scale cooking operations involve numerous individuals handling food, elevating the risk of contamination in the final product [6]. Unintentional contamination during such processes can result in foodborne disease outbreaks, endangering consumer health and triggering economic repercussions for nations.

The prevalence of foodborne illnesses has risen over time, impacting the health and economic stability of numerous developing nations [7]. In Ethiopia, the Ministry of Health (MoH) addresses food safety issues through various measures, including the implementation of standard operating procedures. However, there is a pressing need for further research to evaluate the status of food safety and hygiene practices, particularly among food handlers in restaurants. Understanding how food handlers' beliefs, knowledge, and practices interact is crucial for reducing foodborne outbreaks. This study aims to examine safe food handling practices and related factors among food handlers in restaurants in Gode town, addressing a notable gap in comprehensive and organized data regarding food handling behaviors, attitudes, and practices in the region.

# Materials and Method

## Study area

The study was conducted in Gode town, one of the major pre-urban towns of the Somali regional state, Ethiopia. Gode is among the selected major towns of the Somali region for this study. In Gode, different people with different diversity live together. Urbanization, globalization, demographics, and other contributing factors come with significant and rapid change in Gode towns, which is believed to have changes into the food safety handling knowledge, attitude, and practice (KAP), and associated factors among the food handlers in restaurants: the case of Gode town, Somali region, Ethiopia (Figure 1).

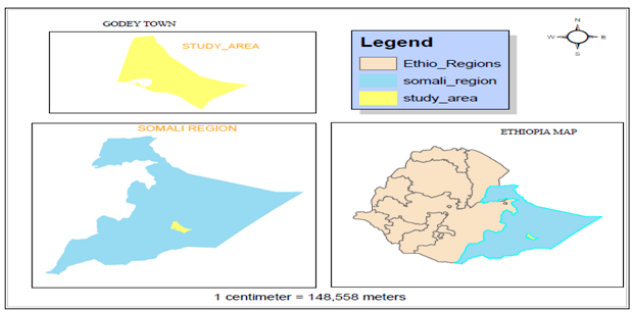


**Figure 1:** Map of the study area in Gode city, Somali region, Ethiopia 2022, taken from central statistics agency, 2008 with slight modification.

## Study population

The study population consisted of food handlers working in restaurants within Gode town, specifically in the two selected kebeles out of the ten existing ones.

## Study design

This study employed a cross-sectional design, utilizing a structured questionnaire to collect data from food handlers in selected restaurants within Gode town.

## Study duration

The study was conducted between December 2021 and June 2022.

## Inclusion criteria

- Individuals employed in restaurants within Gode town.
- Residents of Gode town for a minimum duration of three months.
- Willingness to participate in the study.
- Ability to comprehend and respond to the questionnaire.
- Both full-time and part-time restaurant workers.

## Exclusion criteria

- Individuals employed in restaurants for less than three months in Gode town.
- Those who refuse to participate in the study.
- Individuals with severe communication impairments that hinder interview participation.
- Persons with mental health conditions that may affect their ability to provide accurate responses.
- Employees on temporary contracts or seasonal workers.
- Individuals working in managerial positions without direct involvement in food handling activities.
- Participants unwilling or unable to provide informed consent.

## Sample size determination

The study's sample size was determined using a single population proportion [8] assuming that the rate of medical checkups among food handlers in restaurants would be 50%. With a 95% confidence level, a 5% margin of error, and a 5% nonresponse rate, the formula used for calculation was:

$$n = \frac{(Z_{1-\frac{\alpha}{2}})^2 \times p \times (1-p)}{d^2}$$

where: n is total sample size that will be included in this study; d is marginal error which is 0.05; P is prevalence rate which is 0.5; and $Z_{1-\frac{\alpha}{2}}$ is confidence interval (95%) which is 1.96.

As there was no previous information available for such a study in the area, a p value of 0.5 was utilized. Therefore, the final sample size for this study was calculated accordingly.

$$\left[ n = \frac{1.96^2 \times 0.5 \times (1-0.5)}{0.05^2} \right] = 384.16$$

$$385 + 385 \times 5\% \; nonresponse\; rate = 405$$

## Sampling technique

All restaurants in Gode town were included in the study to ensure representativeness of the food handling practices within the area. Additionally, two kebeles out of the ten existing ones in Gode town were purposively selected based on the concentration of restaurants in those areas, ensuring adequate

coverage of the study population.

### Data collection and instrument

Data were collected from restaurant premises using structured questionnaires administered by trained research assistants. The questionnaires covered various aspects of food safety handling KAP of food handlers. To mitigate differences among data collectors and enhance their efficacy in field tasks and was provided a two-day training session covering the research objectives, and questionnaire content. The principal investigator and co-investigators monitored the collected information daily to ensure its quality and proper coding. The data collection phase covered four weeks and was successfully concluded.

### Study variables

The study focused on assessing food safety handling KAP among restaurant food handlers. The justification behind the study was to identify areas for improvement in food safety practices and to develop targeted interventions to enhance the overall safety of food handling in restaurants.

#### Independent variable

Sociodemographic variables such as:

- Age.
- Occupation.
- Marital status.
- Religion.
- Ethnicity.
- Educational level.
- Income.
- Household size.

#### Dependent variable

- Food safety handling knowledge.
- Food safety handling attitudes.
- Food safety handling practices.

#### Data processing and analysis

Data and information were employed both qualitative and quantitative methodologies. Quantitative data underwent analysis via a descriptive approach, following these steps: 1) data verification; 2) coding and data cleansing; and 3) data entry into a computer system. Subsequently, SPSS for windows (version 20) was utilized for data analysis. Statistical significance was determined at $p < 0.05$ for differences in means. Mean response scores were converted into percentages to facilitate result interpretation. Regression analysis (with significance levels set at $p < 0.05$ and $p < 0.25$) was conducted to explore the relationship between the KAP of food handlers.

### Data quality control measures

To certify the quality of the data, enumerators were trained, and the questionnaire was translated into the Somali language and then back to English for consistency. Data was collected by Jigjiga University (JJU) weekend students at Gode center, and research teams supervised each kebele to ensure the quality of the data.

### Operational definition

The prevalence rate about the food safety knowledge, attitude, categorized the level of KAP using a modified loom's cut-off point. For each category:

- Level of knowledge was categorized, using modified bloom's cut-off point, as good if the score was ≥ 60%, and poor if the score was < 60%.
- Level of attitude was categorized, using modified bloom's cut-off point, as good if the score was ≥ 60%, and poor if the score was < 60%.
- Level of practice was categorized, using modified bloom's cut-off point, as good if the score was ≥ 60%, and poor if the score was < 60%.

### Ethical consideration

The JJU research and ethical committee granted ethical clearance for this project, with the help of the relevant kebeles and the Gode town. Before the participation, informed voluntary consent was obtained, and each participant provided an in-depth overview of the study's objectives. Throughout the study procedure, rigorous confidentiality protocols were in place to ensure that participant data remained confidential and unchanged by unauthorized access. Participants' willingness and sense of confidence were encouraged by this dedication to secrecy and ethical norms, which preserved the validity of the study's conclusions.

## Results

### Sociodemographic characteristics

A total of 400 workers participated in the study, with a response rate of 98.76% and a total of 262 (65.50%) were 10 - 22 years of age, 77 (19.25%) were between 23 - 35 years of age, and only 24 (6%) were 49 - 70 years of age. Most of the participants were male (360, 90%), and only 40 (10%) were male. As seen in table 1, the results indicated that 274 (68.50%) were single and 120 (30%) were married. Most of the families of the subjects were 297 (74.25%) with 3 - 4 children. As indicated, most of the food handlers did not receive any training in safe food handling. Additionally, most of the food handlers were from middle-income families (343, 85.75%), and most of them (295, 73.75%) had worked less than six months.

#### Safe food handling knowledge

As seen in table 2, most of the participants had good knowledge about food contamination, and approximately 360 (90%) of them were aware. On the other hand, approximately 392 (98%) of the food handlers believed that cooked foods have no microbes. Approximately 241 (60.25%) said that healthy people cannot cause that food-borne illness. Approximately 394 (98.50%) food handlers believed that contact between raw and cooked foods can cause food contamination. Additionally, almost all the study participants responded that hand hygiene can prevent food contamination. On the other hand, most of the participants responded that proper cleaning of the utensils can prevent microbial contamination. Approximately 358 (89.50%) participants believed that proper cleaning and sanitation of the utensils are very important to prevent

**Table 1:** Sociodemographic characteristics.

| Variables | Category | Response | |
|---|---|---|---|
| | | N | % |
| Ages (Years) | 10 - 22 | 262 | 65.50 |
| | 23 - 35 | 77 | 19.25 |
| | 36 - 48 | 24 | 6.00 |
| | 49 - 70 | 37 | 9.25 |
| Sex | Female | 40 | 10.00 |
| | Male | 360 | 90.00 |
| Marital status | Divorced | 2 | 0.50 |
| | Married | 120 | 30.00 |
| | Separated | 1 | 0.25 |
| | Single | 274 | 68.50 |
| | Widow | 3 | 0.75 |
| Family size | ≤ 2 children | 10 | 2.50 |
| | 3 - 4 children | 297 | 74.25 |
| | > 4 children | 93 | 23.25 |
| Educational level | Illiterate | 100 | 25.00 |
| | Can read and write | 162 | 40.50 |
| | Elementary school | 88 | 22.00 |
| | High school | 42 | 10.50 |
| | College/University degree | 8 | 2.00 |
| Training on food safety | No | 299 | 74.75 |
| | Yes | 101 | 25.25 |
| Family income | Low income | 21 | 5.25 |
| | Middle income | 343 | 85.75 |
| | High income | 36 | 9.00 |
| Years of work | ≤ 6 months | 295 | 73.75 |
| | > 6 months | 105 | 26.25 |

**Table 2:** Safe food handling knowledge.

| Variables | Category | Response | |
|---|---|---|---|
| | | N | % |
| Contaminated foods always have some change in color, odor, or taste | No | 40 | 10.00 |
| | Yes | 360 | 90.00 |
| Cooked foods don't have microbes | No | 8 | 2.00 |
| | Yes | 392 | 98.00 |
| Healthy people can cause illness by carrying germs into foods | No | 241 | 60.25 |
| | Yes | 159 | 39.75 |
| Contact between raw and cooked foods contributes to food contamination | No | 6 | 1.50 |
| | Yes | 394 | 98.50 |
| Hand hygiene can prevent food contamination | No | 5 | 1.25 |
| | Yes | 395 | 98.75 |
| Food handlers with a disease such as diarrhea, flu, and sore throat pass a risk of food contamination | No | 30 | 7.50 |
| | Yes | 370 | 92.50 |
| Proper cleaning and sanitation of the utensils are very important to prevent microbial contamination | No | 42 | 10.50 |
| | Yes | 358 | 89.50 |
| Use of jewels such as rings, and watches, and wearing in food handling cause food contamination | No | 326 | 81.50 |
| | Yes | 74 | 18.50 |
| Foods that are unfit for consumption always do not have a bad smell and taste of spoil | No | 19 | 4.75 |
| | Yes | 381 | 95.25 |

microbial contamination. Generally, most of the participants in this study had good knowledge about safe food handling.

## Safe food handling attitude

As indicated in table 3, approximately 191 (47.75%) of the food handlers agreed that washing hands before food handling was good, and 94 (23.50%) of percipients disagreed, whereas 115 (28.75%) had no ideas about hand washing. Additionally, as seen in table 3, approximately 324 (81%) of the participants agreed that eating contaminated food can cause illness, and only 8 (2%) disagreed. The results of this study indicated that most food handlers 356 (89%) agreed that perishable foods should be stored, and 17 (4.25%) disagreed, which means that the study participants had a good attitude about food preservation techniques. In regard to the leftover foods, the majority of the precipitins had less attitude toward food-borne disease, which indicated that food handlers did not receive any triaging about food storage and preservation techniques and that most of them practiced what they believed to be cultural. On the other hand, in regard to fruit and vegetable preparation, most participants agreed that fruit and vegetables should be washed to serve customers. As indicated in table 3, approximately 382 (95.50%) of the food handlers believed that wearing gloves and covering hair during food handling was not important, which indicated that the majority of the participants had a poor attitude about food safety and methods of cooking. Additionally, 315 (78.75%) of the food handlers responded that they used a clean towel to wipe their hands after eating food.

## Safe food handling practice

The safe food handling practices of the study participants are presented in table 4. According to the results, 367 (91.75%) food handlers always followed the right hand-washing procedures, whereas only 18 (4.50%) of the participants rarely followed the right hand-washing procedures. On the other hand, 362 (90.50%) of the food handlers washed their hands after the washroom. As seen from the results of the study, 353 (88.25%) of the participants did not wear their hands after touching their nose or scratching their body, and only 37 (9.25%) washed their hands, which indicates that most of the

**Table 3:** Safe food handling attitude.

| Variables | Category | Response | |
|---|---|---|---|
| | | N | % |
| Do you agree it good food handlers should wash their hands before food handling? | Agree | 191 | 47.75 |
| | Disagree | 94 | 23.50 |
| | Uncertain | 115 | 28.75 |
| Do you agree to eat contaminated foods can cause illness? | Agree | 324 | 81.00 |
| | Disagree | 8 | 2.00 |
| | Uncertain | 68 | 17.00 |
| Do you think it is good perishable foods should be stored in the refrigerator? | Good | 356 | 89.00 |
| | Not good | 17 | 4.25 |
| | Not sure | 27 | 6.75 |
| Do you believe that leftover foods can be reheated before eating or serving? | Good | 52 | 13.00 |
| | Not good | 239 | 59.75 |
| | Not sure | 109 | 27.25 |
| Do you think it is good to wash fruits and vegetables with clean water? | Good | 373 | 93.25 |
| | Not good | 8 | 2.00 |
| | Not sure | 19 | 4.75 |
| Do you agree that it is important during food handling to wear gloves and cover hair? | Agree | 12 | 3.00 |
| | Disagree | 382 | 95.50 |
| | Uncertain | 6 | 1.50 |
| Do you think it's good to use a clean hand towel to wipe their hands after handling foods? | Good | 315 | 78.75 |
| | Not good | 71 | 17.75 |
| | Not sure | 14 | 3.50 |

**Table 4:** Safe food handling practice.

| Variables | Category | Response | |
|---|---|---|---|
| | | N | % |
| Do you follow the right hand-washing procedures before working (using soap, detergent, etc.)? | Always | 367 | 91.75 |
| | Sometimes | 12 | 3.00 |
| | Rarely | 18 | 4.50 |
| | Never | 3 | 0.75 |
| Do you wash your hands after returning from the washroom? | Always | 362 | 90.50 |
| | Sometimes | 15 | 3.75 |
| | Rarely | 21 | 5.25 |
| | Never | 2 | 0.50 |
| Do you wash your hands after rubbing your nose or scratching your body? | Always | 37 | 9.25 |
| | Sometimes | 8 | 2.00 |
| | Rarely | 2 | 0.5 |
| | Never | 353 | 88.25 |
| Do you wash your hands after handling food waste or dealing with rubbish? | Always | 289 | 72.25 |
| | Sometimes | 5 | 1.25 |
| | Rarely | 5 | 1.25 |
| | Never | 101 | 25.25 |
| Do you wear any items of jewelry when you are handling food? | Always | 65 | 16.25 |
| | Sometimes | 43 | 10.75 |
| | Rarely | 41 | 10.25 |
| | Never | 251 | 62.75 |
| Do you smoke while you are preparing food handling? | Always | 254 | 63.50 |
| | Sometimes | 114 | 28.50 |
| | Rarely | 23 | 5.75 |
| | Never | 9 | 2.25 |
| Do you wear a clean and suitable uniform before working? | Always | 25 | 6.25 |
| | Sometimes | 15 | 3.75 |
| | Rarely | 270 | 67.50 |
| | Never | 90 | 22.50 |
| Do you wear an apron when you are food handling? | Always | 52 | 13.00 |
| | Sometimes | 35 | 8.75 |
| | Rarely | 17 | 4.25 |
| | Never | 296 | 74.00 |
| Do you wear a mask when handling food? | Always | 54 | 13.5 |
| | Sometimes | 37 | 9.25 |
| | Rarely | 8 | 2.00 |
| | Never | 301 | 75.25 |

food handlers did not know the source of food contamination. In regard to food waste, the results of the study showed that 289 (72.25%) subjects washed their hands, whereas 101 (25.25%) did not wash their hands after cleaning food waste or rubbish things. Additionally, as seen in table 4, more than half of 251 (62.75) of the study participants removed the jewelers, whereas only 65 (16.25%) of them used the jewelers. The findings of the study indicated that more than half of 254 (63.50%) of the participants always smoked a cigarette while they were in the kitchen. More than half of the study participants rarely used suitable uniforms during food handling, and 90 (22.50%) of them never used any uniform during food handling. Furthermore, 25 (6.25%) of the study participants always used their uniforms during food preparation. Almost one-third of 296 (74.00%) of the study participants never used any aprons during food handling.

## Prevalence of safe food handling KAP

### Prevalence of safe food handling knowledge

As indicated in figure 2, the overall knowledge of the participants regarding food handling indicated that 270 (67.50%) had good knowledge, while 130 (32.50%) had poor knowledge.

### Prevalence of safe food handling attitudes

As seen in figure 3, the prevalence of poor attitudes among food handlers was 160 (40.00%), and 240 (60.00%) of them had a good attitude about food handling.

### Prevalence of safe food handling practices

As indicated in figure 4, the results of the study showed that the prevalence of poor practices among food handlers was 154 (38.50%), and 246 (61.50%) of them had good food handling practices.

## Factors associated with KAP

### Binary logistic regression of safe food handling knowledge

To identify the correlations among food handlers, a bivariate logistic regression was employed, considering covariates with a p value less than 0.25. Factors such as age, gender, marital status, family size, educational attainment, food safety training, family income, and years of employment were included in the analysis. As indicated in table 5, the bivariate logistic regression revealed significant associations between marital status, family size, educational level regarding food handling knowledge, as well as between training in food safety and food handling knowledge.

### Multivariate logistic regression of safe food handling knowledge

From table 5, variables that had a p value less than 0.25

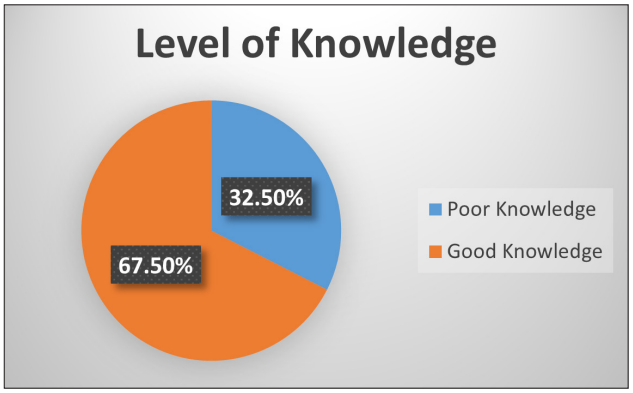


**Figure 2:** Level of overall knowledge among the food handlers.

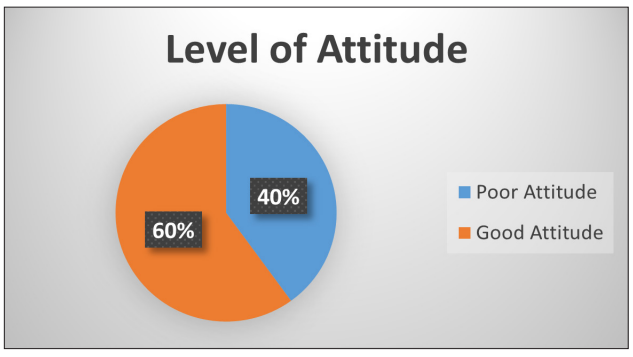


**Figure 3:** Level of overall attitude among the food handlers.

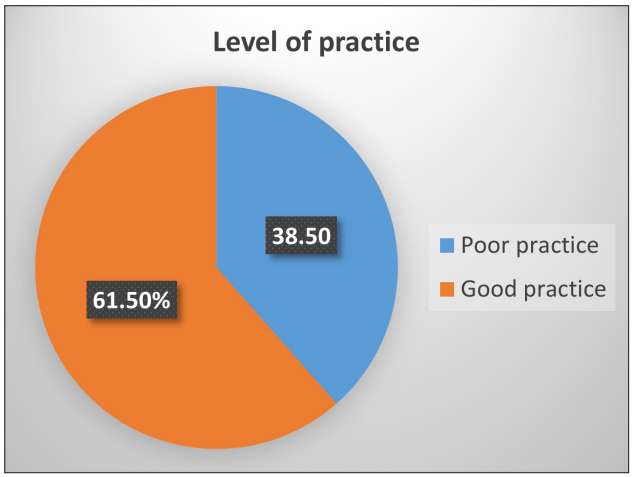


**Figure 4:** Level of overall practice among the food handlers.

were included in the multivariate analysis. As indicated in table 6, in the multivariate analysis, there is no significant association between the variables with specified variables that were significant from the bivariate analysis.

## Binary logistic regression about the safe food handling attitude

In the bivariate analysis, a total of 7 variables (sex, age, marital status, family size, educational level, training on food safety, and years of working) with covariates having p values ≤ 0.25 were analyzed, and the results indicated that age, family size, educational level and training on food safety had a significant association with food handling attitudes table 7.

## Multivariate logistic regression of attitudes toward safe food handling

As seen in table 8, variables that were significant during bivariate logistic regression were reinterpreted for multivariate analysis, and the results indicated that family size was significantly associated with food handling attitude.

## Binary logistic regression of safe food handling practices

As indicated in table 9, several predictors were analyzed using bivariate logistic regression, and out of the 8 variables, 5 were significantly associated with the safe food handling practices of the participants. According to the findings, participants who were older than the age of 49 years were more than 2 times better than those who were younger (COR = 2.313; 95% CI = 0.705 - 7.590; p = 0.167). Additionally, there were significant differences between the family size (COR = 3.019; 95% CI = 0.608 - 4.997; p = 0.177); furthermore, the educational level, training in food safety, and family income were significantly different in the safe handling practice.

## Multivariate logistic regression of safe food handling practices

During multivariable logistic regression analysis, five variables were significant during bivariate analysis, and out of those five variables, two were significant during multivariate

**Table 5:** Bivariate analysis of factors associated with safe food handling knowledge.

| Variable | Category | Level of knowledge | | COR | P value |
|---|---|---|---|---|---|
| | | Good knowledge N (%) | Poor knowledge N (%) | | |
| Sex | Female | 11 (8.5%) | 29 (10.70%) | 1 | 0.478 |
| | Male | 119 (91.50%) | 241 (89.30%) | 1.302 (0.629 - 2.696) | |
| Ages (Years) | 10 - 22 | 89 (68.50%) | 173 (64.10%) | 1 | - |
| | 23 - 35 | 23 (17.70%) | 54 (20.0%) | 0.822 (0.389 - 1.741) | 0.609 |
| | 36 - 48 | 7 (5.40%) | 17 (6.30%) | 0.993 (0.421 - 2.341) | 0.988 |
| | 49 - 70 | 11 (8.5%) | 26 (9.6%) | 1.027 (0.333 - 3.173) | 0.962 |
| Marital status | Divorced | 0 | 2 (0.7%) | 1 | - |
| | Married | 38 (29.2%) | 82 (30.4%) | 0.622 (0.246 - 1.296) | 0.614 |
| | Separated | 0 | 1 (0.4%) | 0.866 (0.139 - 4.327) | 0.871 |
| | Single | 91 (70.0%) | 183 (67.8%) | 2.158 (1.468 - 3.170)* | 0.00 |
| | Widow | 1 (0.8%) | 2 (0.7%) | 0.267 (0.103 - 1.083) | 0.991 |
| Family size | ≤ 2 children | 2 (20%) | 8 (80%) | 1 | - |
| | 3 - 4 children | 104 (35%) | 193 (65%) | 4.00 (0.849 - 5.835)* | 0.080 |
| | > 4 children | 24 (25.80%) | 69 (24.20%) | 1.856 (1.462 - 2.355)* | 0.000 |
| Educational level | Can read and write | 47 (36.20%) | 115 (42.60%) | 1 | - |
| | University degree | 2 (1.5%) | 6 (2.20%) | 2.447 (1.743 - 3.45)* | 0.000 |
| | Elementary school | 30 (23.10%) | 5.8 (21.50%) | 3.000 (0.606 - 4.864)* | 0.178 |
| | High school | 17 (13.10%) | 25 (9.30%) | 1.933 (1.244 - 3.001)* | 0.003 |
| | Illiterate | 34 (26.20%) | 66 (24.40%) | 1.471 (0.794 - 2.723)* | 0.220 |
| Training on food safety | No | 94 (72.3%) | 205 (75.9%) | 1 | - |
| | Yes | 36 (27.7%) | 65 (24.1%) | 2.181 (1.708 - 2.784)* | 0.000 |
| Family income | Low income | 7 (5.4%) | 14 (5.2%) | 1 | - |
| | Middle income | 110 (84.6%) | 233 (86.3%) | 1.130 (0.364 - 3.513) | 0.832 |
| | High income | 13 (10.0%) | 23 (8.5%) | 1.197 (0.585 - 2.452) | 0.623 |
| Years of work | < 6 months | 99 (76.20%) | 196 (72.60%) | 1 | - |
| | ≥ 6 months | 31 (23.80%) | 74 (27.40%) | 0.829 (0.511 - 1.346) | 0.449 |

**Note:** * is significance at p value < 0.25.

**Table 6:** Multivariate analysis of factors associated with safe food handling knowledge.

| Variable | Category | Level of knowledge | | AOR | P value |
|---|---|---|---|---|---|
| | | Good knowledge N (%) | Poor knowledge N (%) | | |
| Marital status | Divorced | 0 | 2 (0.7%) | 1 | - |
| | Married | 38 (29.2%) | 82 (30.4%) | 0.204 (0.603 - 0.567) | 0.081 |
| | Separated | 0 | 1 (0.4%) | 0.423 (0.216 - 1.437) | 0.069 |
| | Single | 91 (70.0%) | 183 (67.8%) | 0.0269 (0.070 - 2.125) | 0.198 |
| | Widow | 1 (0.8%) | 2 (0.7%) | 0.201 (0.067 - 0.744) | 0.091 |
| Family size | ≤ 2 children | 2 (20%) | 8 (80%) | 1 | - |
| | 3 - 4 children | 104 (35%) | 193 (65%) | 0.719 (0.143 - 3.623) | 0.689 |
| | > 4 children | 24 (25.80%) | 69 (24.20%) | 1.549 (0.919 - 2.611) | 0.100 |
| Educational level | Can read and write | 47 (36.20%) | 115 (42.60%) | 1 | - |
| | University degree | 2 (1.5%) | 6 (2.20%) | 0.793 (0.465 - 1.355) | 0.396 |
| | Elementary school | 30 (23.10%) | 5.8 (21.50%) | 0.647 (0.124 - 3.379) | 0.606 |
| | High school | 17 (13.10%) | 25 (9.30%) | 1.004 (0.549 - 1.838) | 0.990 |
| | Illiterate | 34 (26.20%) | 66 (24.40%) | 1.320 (0.628 - 2.773) | 0.463 |
| Training on food safety | No | 94 (72.3%) | 205 (75.9%) | 1 | - |
| | Yes | 36 (27.7%) | 65 (24.1%) | 0.828 (0.515 - 1.331) | 0.436 |

**Note:** ** is significance at p value < 0.05.

**Table 7:** Bivariate analysis of factors associated with safe food handling attitude.

| Variable | Category | Level of attitude | | COR | P value |
|---|---|---|---|---|---|
| | | Good attitude N (%) | Poor attitude N (%) | | |
| Sex | Female | 20 (12.5%) | 20 (8.3%) | 1 | - |
| | Male | 140 (87.5%) | 220 (91.7%) | 1.571 (0.331 - 1.225) | 0.176 |
| Ages (Years) | 22 - 22 | 105 (65.6%) | 157 (65.4%) | 1 | - |
| | 23 - 35 | 31 (19.4%) | 46 (19.2%) | 1.417 (0.710 - 2.825) | 0.323 |
| | 36 - 48 | 6 (3.8%) | 18 (7.5%) | 1.406 (0.638 - 3.095) | 0.398 |
| | 49 - 70 | 18 (11.2%) | 19 (7.9%) | 2.842 (0.921 - 8.768)* | 0.069 |
| Marital status | Divorced | 0 | 2 (0.8%) | 1 | - |
| | Married | 47 (29.4%) | 73 (30.4%) | 0.219 (0.601 - 1.714) | 0.809 |
| | Separated | 0 | 1 (0.4%) | 0.402 (0.531 - 059) | 0.503 |
| | Single | 113 (70.6%)) | 161 (67.1%) | 0.824 (1.204 - 4.598) | 0.814 |
| | Widow | 0 | 3 (1.2%) | 0.323 (0.416 - 0.487) | 0.469 |
| Family size | ≤ 2 children | 8 (5.0%) | 2 (0.8%) | 1 | - |
| | 3 - 4 children | 120 (75.0%) | 177 (73.8%) | 0.131 (0.026 - 0.654)* | 0.013 |
| | > 4 children | 32 (20.0%) | 61 (25.4%) | 0.774 (0.476 - 1.259) | 0.302 |
| Educational level | Illiterate | 34 (21.2%) | 66 (27.5) | 0.758 (0.361 - 1.591) | 0.463 |
| | University degree | 3 (1.9%) | 5 (2.1%) | 0.694 (0.414 - 1.165)* | 0.167 |
| | Elementary school | 37 (23.1%) | 51 (21.2) | 0.859 (0.194 - 3.809) | 0.841 |
| | High school | 17 (10.6%) | 25 (10.4%) | 0.710 (0.393 - 1.283) | 0.257 |
| | Can read and write | 69 (43.1%) | 93 (38.8%) | 1 | - |
| Training on food safety | No | 126 (78.8%) | 173 (72.1%) | 1 | - |
| | Yes | 34 (21.2%) | 67 (27.9%) | 2.697 (0.434 - 1.117)* | 0.134 |
| Family income | Low income | 7 (4.4%) | 14 (5.8%) | 1 | - |
| | Middle income | 141 (88.1%) | 202 (84.2%) | 1.000 (0.319 - 3.132) | 0.479 |
| | High income | 12 (7.5%) | 24 (10.0%) | 0.716 (347 - 1.480) | 0.367 |
| Years of work | < 6 months | 122 (76.2%) | 173 (72.1%) | 1 | - |
| | ≥ 6 months | 38 (23.8%) | 67 (27.9%) | 0.804 (0.507 - 1.275) | 0.354 |

**Note:** * is significance at p value < 0.25.

logistic regression analysis and had a p value of less than 0.05, which included the sex of the participants and family income table 10.

## Discussion

This study explored safe food handling practices and associated factors among food handlers. The findings shown that 360 participants (90%) demonstrated good knowledge regarding food contamination and maintained the belief that cooked foods are free from microbes. This finding brings into line with a study conducted in Debre Markos town, northwest Ethiopia, where 86.8% of participants acknowledged the absence of microbes in cooked foods [1].

**Table 8:** Multivariate analysis of factors associated with safe food handling attitude.

| Variable | Category | Level of attitude | | AOR | P value |
|---|---|---|---|---|---|
| | | Good attitude N (%) | Poor attitude N (%) | | |
| Sex | Female | 20 (12.5%) | 20 (8.3%) | 1 | - |
| | Male | 140 (87.5%) | 220 (91.7%) | 1.571 (0.816 - 3.026) | 0.176 |
| Ages (Years) | 22 - 22 | 105 (65.6%) | 157 (65.4%) | 1 | - |
| | 23 - 35 | 31 (19.4%) | 46 (19.2%) | 0.706 (0.354 - 1.408) | 0.323 |
| | 36 - 48 | 6 (3.8%) | 18 (7.5%) | 0.711 (0.323 - 1.566) | 0.398 |
| | 49 - 70 | 18 (11.2%) | 19 (7.9%) | 0.325 (0.114 - 1.086) | 0.069 |
| Family size | ≤ 2 children | 8 (5.0%) | 2 (0.8%) | 1 | - |
| | 3 - 4 children | 120 (75.0%) | 177 (73.8%) | 7.625 (1.528 - 38.050)** | 0.013 |
| | > 4 children | 32 (20.0%) | 61 (25.4%) | 1.292 (0.794 - 2.102) | 0.302 |
| Educational level | Illiterate | 34 (21.2%) | 66 (27.5) | 1.440 (0.858 - 2.417) | 0.167 |
| | University degree | 3 (1.9%) | 5 (2.1%) | 1.165 (0.263 - 5.168) | 0.841 |
| | Elementary school | 37 (23.1%) | 51 (21.2) | 1.408 (0.779 - 2.773) | 0.257 |
| | High school | 17 (10.6%) | 25 (10.4%) | 1.320 (0.628 - 2.773) | 0.463 |
| | Can read and write | 69 (43.1%) | 93 (38.8%) | 1 | - |
| Training on food safety | No | 126 (78.8%) | 173 (72.1%) | 1 | - |
| | Yes | 34 (21.2%) | 67 (27.9%) | 1.435 (0.895 - 2.302) | 0.134 |

**Note:** ** is significant at p value ≤ 0.05.

**Table 9:** Bivariate analysis of factors associated with safe food handling practice.

| Variable | Category | Level of practice | | COR | P value |
|---|---|---|---|---|---|
| | | Good practice N (%) | Poor practice N (%) | | |
| Sex | Female | 8 (5.2%) | 32 (13.0%) | 1 | - |
| | Male | 146 (94.8%) | 214 (87.0%) | 2.729 (1.223 - 6.090) | 0.014 |
| Ages (Years) | 22 - 22 | 106 (68.8%) | 156 (63.4%) | 1 | - |
| | 23 - 35 | 29 (18.8%) | 48 (19.5%) | 0.896 (0.441 - 1.820) | 0761 |
| | 36 - 48 | 5 (3.2%) | 19 (7.7%) | 1.007 (0.449 - 2.262) | 0.986 |
| | 49 - 70 | 14 (9.1%) | 23 (9.3%) | 2.313 (0.705 - 7.590)* | 0.167 |
| Marital status | Divorced | 0 | 2 (0.8%) | 1 | - |
| | Married | 48 (31.2) | 72 (29.3%) | 0.547 (0.632 - 0674) | 0.879 |
| | Separated | 1 (0.6%) | 0 | 0.001 (750 - 066) | 0.816 |
| | Single | 104 (67.5%) | 170 (69.1%) | 0.873 (0.817 - 9.216) | 0.998 |
| | Widow | 1 (0.6) | 2 (0.8%) | 0.073 (0.343 - 0.981) | 0.870 |
| Family size | ≤ 2 children | 2 (1.3%) | 8 (3.3%) | 1 | - |
| | 3 - 4 children | 112 (72.2%) | 185 (75.2%) | 3.019 (0.608 - 4.997)* | 0.177 |
| | > 4 children | 40 (26.0%) | 53 (21.5%) | 1.247 (0.777 - 2.000) | 0.361 |
| Educational level | Can read and write | 56 (36.4%) | 106 (43.1%) | 1 | - |
| | University degree | 5 (3.2%) | 3 (1.2%) | 1.428 (0.856 - 2.381)* | 0.172 |
| | Elementary school | 30 (19.5%) | 58 (23.8%) | 0.453 (0.103 - 1.999) | 0. 295 |
| | High school | 20 (13.0%) | 22 (8.9%) | 1.458 (0.806 - 2.638)* | 0.212 |
| | Illiterate | 43 (27.9%) | 100 (23.0%) | 0.830 (0.403 - 1.711) | 0.613 |
| Training on food safety | No | 111 (72.1%) | 188 (76.4%) | 1 | - |
| | Yes | 43 (27.9%) | 58 (23.6%) | 2.256 (0.794 - 1.987)* | 0.131 |
| Family income | Low income | 6 (3.9%) | 15 (6.1%) | 1 | - |
| | Middle income | 125 (81.2%) | 218 (88.6%) | 4.423 (1.379 - 4.190)* | 0.012 |
| | High income | 23 (14.9%) | 13 (5.3%) | 3.086 (1.510 - 6.306)* | 0.002 |
| Years of work | < 6 months | 111 (72.8%) | 184 (74.8%) | 1 | - |
| | ≥ 6 months | 43 (27.2%) | 62 (25.2%) | 1.150 (0.730 - 1.812) | 0.548 |

**Note:** * is significance at p value < 0.25.

Similarly, this study's results showed that 358 participants (89.50%) recognized the importance of proper utensil cleaning in preventing microbial contamination of food. This observation is consistent with the findings of the Debre Markos study, where 86.8% of participants emphasized the significance of pre-use utensil washing for food safety [1].

Regarding hand hygiene practices, most participants (91.75%) reported adherence to proper right-hand washing procedures. This finding parallels a study conducted in Fiche Town, northern Shewa, Ethiopia, where 70% of food handlers engaged in pre-work handwashing with soap [9]. However, handwashing compliance varied widely in other studies, with

**Table 10:** Multivariate analysis of factors associated with safe food handling practice.

| Variable | Category | Level of practice | | AOR | P value |
|---|---|---|---|---|---|
| | | Good practice N (%) | Poor practice N (%) | | |
| Sex | Female | 8 (5.2%) | 32 (13.0%) | 1 | - |
| | Male | 146 (94.8%) | 214 (87.0%) | 0.366 (0.164 - 0.818)** | 0.014 |
| Ages (Years) | 22 - 22 | 106 (68.8%) | 156 (63.4%) | 1 | - |
| | 23 - 35 | 29 (18.8%) | 48 (19.5%) | 1.116 (0.550 - 2.268) | 0.761 |
| | 36 - 48 | 5 (3.2%) | 19 (7.7%) | 0.993 (0.442 - 2.228) | 0.986 |
| | 49 - 70 | 14 (9.1%) | 23 (9.3%) | 0.432 (0.132 - 1.419) | 0.167 |
| Family size | ≤ 2 children | 2 (1.3%) | 8 (3.3%) | 1 | - |
| | 3 - 4 children | 112 (72.2%) | 185 (75.2%) | 0.331 (0.067 - 1.646) | 0.177 |
| | > 4 children | 40 (26.0%) | 53 (21.5%) | 0.802 (0.500 - 1.287) | 0.361 |
| Educational level | Can read and write | 56 (36.4%) | 106 (43.1%) | 1 | - |
| | University degree | 5 (3.2%) | 3 (1.2%) | 0.700 (0.420 - 1.186) | 0.172 |
| | Elementary school | 30 (19.5%) | 58 (23.8%) | 2.209 (0.500 - 9.755) | 0.295 |
| | High school | 20 (13.0%) | 22 (8.9%) | 0.686 (0.379 - 1.240) | 0.212 |
| | Illiterate | 43 (27.9%) | 100 (23.0%) | 1.205 (0.585 - 2.484) | 0.613 |
| Family income | Low income | 6 (3.9%) | 15 (6.1%) | 1 | - |
| | Middle income | 125 (81.2%) | 218 (88.6%) | 0.226 (0.070 - 0.725)** | 0.012 |
| | High income | 23 (14.9%) | 13 (5.3%) | 0.324 (0.159 - 0.62)** | 0.002 |

**Note:** * is significance at p value < 0.25 and ** is significant at p value < 0.05.

rates ranging from 5% to 50% among food handlers across different food service facilities [10]. Notably, a study in South Africa reported a substantially higher compliance rate of 94% [11]. In terms of overall safe food handling practices, our study revealed that 270 food handlers (67.50%) demonstrated good knowledge, while 130 (32.50%) exhibited poor knowledge. This finding is consistent with a study conducted in Asosa town, northwest Ethiopia, where 75.8% of food handlers demonstrated adequate knowledge [12]. Similarly, 240 participants (60%) exhibited positive attitudes toward food handling practices, consistent with previous findings [13]. Finally, this study demonstrated that 246 participants (61.50%) showed good food handling practices, whereas 154 (38.50%) showed poor practices. This finding supports previous research indicating satisfactory overall practice rates of 67.8% [14]. Generally, this study underscores the importance of promoting and sustaining safe food handling practices among food handlers to mitigate the risk of foodborne illnesses.

## Conclusions

The study shows the complex landscape of safe food handling procedures among restaurant workers in Gode town, suggesting varying levels of adherence to traditional food safety standards. Although many workers have adequate knowledge and positive attitudes toward safe food handling, conveying this knowledge into consistent behaviors remains challenging. Targeted interventions, including increased training programs and particular awareness campaigns, are required to fill this gap and meet the specific requirements of Gode workers in restaurants. Furthermore, increasing regulatory enforcement and developing an environment that promotes food safety within the restaurant sectors are critical for reducing the risks associated with foodborne illnesses. However, the study's cross-sectional approach and reliance on self-reported data have limitations, requiring further research employing long-term or qualitative methodologies to obtain deeper insights into safe food handling practices in Gode and similar settings.

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## Conflict of Interest

None.

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