


Research Article

Assessment of Food Safety Practices and Associated Factors Among Health Extension Model and Non-Model Households in Asella Town, South West Ethiopia, 2023

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Abstract

Background: Food safety is essential for preventing foodborne illnesses and ensuring the health of consumers. Unsafe food can lead to diseases that result in significant morbidity and mortality. **Objective:** This study aimed to assess food safety practices and associated factors among health extension model and non-model households in Asella Town, South West Ethiopia. **Methods:** A cross-sectional study was conducted among 660 model and non-model households. Data were collected using a questionnaire and analyzed using descriptive and logistic regression analyses. **Results:** The overall prevalence of good food safety practices was 49.1%, with significantly higher prevalence among model households (75.4%) compared to non-model households (22.4%). Factors associated with good food safety practices included being a model household, availability of solid and liquid waste disposal sites, good knowledge towards food safety, and a positive attitude towards food safety. **Conclusions and Recommendations:** The study findings indicate a low level of good food safety practices among households. Interventions are needed to improve household food safety practices, knowledge, and attitudes towards food safety.

Keywords

Food Safety Practice, Model and No-Model Households, Health Extension, Factors

1. Introduction

Globally, food safety is the primary public health concern for many countries. According to World Health Organization (WHO), food safety is defined as the conditions and measures that are necessary during the production, processing, storage, distribution, and preparation of food to ensure that it is safe, sound, and wholesome, and fit for human

consumption. Food-borne diseases remain a major public health problem globally and are responsible for significant morbidity and mortality [1]. Food safety is essential to prevent food-borne illness and enhance the well-being of humans. More than 600 million illnesses and 420,000 annual deaths worldwide are due to contaminated food, and about

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33 million disability-adjusted life years are attributable to foodborne infections globally [2].

Food is a source of nutrition, central to overall health and well-being of individuals and societies. If not handled, prepared, and stored appropriately, it can carry foodborne pathogens that transmit disease. Every year, one in 10 people fall ill and 33 million healthy life years are lost due to the consumption of unsafe foods [3].

Unsafe food is dangerous and causes diseases that lead significant morbidity and mortality if not processed, prepared and maintained in sanitary and safe conditions. Diseases such as diarrhea, Typhoid fever, cholera, Amoebiasis, Tapeworm, Anthrax, and Bovine are transmitted to man through contaminated unsafe food. When food stuff has been in contact with hazardous toxic chemicals during food production, processing, storage and handling it can also lead to chemical food poisoning. Foodstuffs contaminated by microbial pathogens or toxic chemicals as a result of poor handling are dangerous to human beings [4].

According to the World Health Organization, food borne diseases affect up to 30% of the population in rich nations each year, while up to 2 million people die in low- and middle-income countries (LMICs). Unsafe food containing harmful bacteria, viruses, parasites, or chemical substances is responsible for more than 200 diseases ranging from diarrhea to cancer. A substantial proportion of food-borne diseases are attributable to improper food preparation practices at consumers' homes [5].

WHO disclosed that one in 10 individuals worldwide are sick from food borne illnesses secondary to unsafe food practices and the use of contaminated foods [6]. Close to 75% of food-borne illness outbreaks are attributed to lack of safe food handling practices by food handlers in food service establishments [6]. Food handlers play a key role in ensuring strict adherence to food safety principles throughout the whole process [7].

There is growing evidence that food safety has been neglected in developing countries. In developing countries, particularly in Africa, food borne diseases may be an important contributor to gastrointestinal disease, and poor hygienic practices during food preparation, handling, and storage are one of the commonest causes of morbidity [8]. In Sub-Saharan Africa, evidence indicates that morbidity and mortality related to lack of food safety are a constant threat to public health organizations [1]. In Ethiopia, around 70% of diarrheal disease is associated with the consumption of contaminated food [4]. Nearly 10 to 20% of food-borne disease outbreaks are due to contamination by the food handler [9]. Moreover, it has also been reported that the majority of food borne diseases arise from food of animal origin. Sources of contamination during meat processing include the equipment, water, contact surfaces, and personnel [10].

Food safety standards or legislation governing the preparation, composition, and marketing of food intended for human

consumption should be based on all available scientific information and data to attain a high level of protection for human health and life. The ideas that have worked in developed countries cannot be automatically adapted to developing countries due to the vast differences in food systems and regulatory settings [11].

Food-borne-related illnesses have increased over the years, and negatively affect the health and well-being of people globally, and especially in developing nations, but evidence on FBD in low- and middle-income countries is still limited [12]. Unsafe food consumption results in, public health problems and also economic consequences owing to absenteeism, hospital fees, and international trade losses [13]. The full health effects, as well as the full economic costs of consuming unsafe food, are not well known, but the global impact on health, trade, and development is considered enormous [14].

Food-borne illnesses are a major public health concern in both developed and developing countries. Diarrheal diseases, mostly caused by microbial infections found in food or water, continue to be the major cause of illness and death globally [15]. According to Food and Agricultural organization (FAO), a household with access to safe and nutritious food, coupled with a sanitary surrounding, is said to be nutritionally secure. Safe food is an important component of food security and can be guaranteed through food safety measures [16].

The term food safety indicates the assurance that when food is consumed in the usual manner, it does not affect human health and wellbeing. However, Nearly 600 million people worldwide become ill after consuming contaminated food every year. Among these victims, an estimated 420,000 die, including 125,000 children under the age of 5 years. However, cases of food infections and food poisoning are often under report. Relative to their population, low- and middle-income countries in South Asia, Southeast Asia, and sub-Saharan Africa have a high burden of FBDs. They account 53% of all food-borne illnesses and 75% of related deaths [17]. Like other developing countries, foodborne diseases are prevalent in Ethiopia; the country's annual incidence of foodborne illnesses ranged from 3.4 to 9.3%, the median being 5.8% [8].

Food handlers have different food safety knowledge levels, adequate knowledge level does not translate into good hygienic practices when processing and handling food products [10, 11]. The three pillars such as food safety knowledge, attitude, and practice are playing a fundamental role in food poisoning outbreaks prevention and control Practice, knowledge regarding meat safety laws, regulations, and personal hygiene of meat handlers are poor [13, 14].

Disease transmission by food handlers is a prevalent and chronic concern worldwide; they also serve a critical role in guaranteeing food safety. In locations, where personal hygiene and environmental sanitation are lacking, parasitic diseases remain a serious public health concern [15].

While protocols in the preparation, handling and storage of food may vary depending on the food prepared and the

establishment in which it is served, the World Health Organization (WHO) advises "five keys to food safety" to prevent foodborne infections. These five simple keys to safe and healthy food are: keep clean, separate raw and cooked foods, cook thoroughly, keep food at safe temperatures, and use safe water and raw materials [1, 14, 18]. Any deviation from these recommendations in a business with hundreds or thousands of consumers has the potential to affect a large number of people.

There are many factors associated with food safety practices as reported by different studies globally. The major contributing factors for potential poor practice of food safety which leads to food-borne pathogen outbreaks are due to gender, age, marital status, educational status, household income, household family size, presence hand washing facility, presence of 24 hours running water, knowledge of solid and liquid waste disposal, cleanness of the compound, Knowledge of food borne diseases, receiving training on food safety handling, presence of supervision, types of households, poor knowledge on food safety practice and negative attitude on food safety practices [6-12, 15, 16, 18-25].

According to numerous studies undertaken in Ethiopia, safe food handling practices in food establishments range from 20% to 70%. Food handler hygiene, food safety training, facility sanitary conditions, the lack of disposal services, the legal status of the license, and environmental hygiene were all highlighted as key drivers of safe food handling [11, 15]. Ministry of Health of Ethiopia acknowledges the depth of the problem by stating that communicable diseases, particularly diarrheal diseases and intestinal parasites, are the leading causes for outpatient attendance and causes of hospitalization most of which are attributed to poor food safety [12]. Good personal hygiene and food safety practices are important for preventing the transmission of pathogens from food handlers to the consumers [11].

Food safety practices in Ethiopia are an important factor in ensuring the safety and quality of food. In Ethiopia, as in many countries, food-borne illness is a common problem, and proper food handling practices are essential in preventing the transmission of diseases through food. This includes practices such as washing hands before handling food, cooking food to appropriate temperatures, and storing food at the proper temperature to prevent the growth of harmful bacteria. It is also important for food handlers in Ethiopia to be aware of any food safety regulations and guidelines that are in place in order to ensure that they are following best practices in their work [18]. Unfortunately, many food handlers do not have an adequate understanding of proper food handling techniques to prevent the introduction of food-borne illness into the food supply. Therefore, this study aimed to assess food handling practice, and its associated factors among health extension model and Non-model households in Asella Town, South East Ethiopia.

2. Methods and Materials

2.1. Study Design and Period

Community based cross-sectional study was conducted from April, 1-30, 2023 among Health Extension Model and Non- Model Households in Asella Town, Oromia, South west Ethiopia.

2.2. Study Area

The study was conducted in Asella City, located in South-East Ethiopia. Asella City is situated approximately 175km southeast of the capital city of Addis Ababa. It has a latitude and longitude of 7°57'N 39°7'E, with an elevation of 2,430 meters. According to the 2007 Ethiopian census report, the total population of Asella City is 108,307, based on the annual population growth rate.

The study was conducted in four selected kebeles: Welkessa, Hunde Gudina, Halila, and Burkitu Kebeles. These kebeles had a total of 13,503 households, of which 5,829 households were certified as model households and 7,674 households were classified as non-model households.

Asella City has a range of healthcare facilities. It includes one governmental hospital, two private hospitals, 18 private medium clinics, two health centers, and three NGO clinics. These facilities play a vital role in providing healthcare services to the population of Asella City.

The town of Asella has a total of 459 food and drinking establishments. These establishments contribute to the availability of food and beverages for the residents and visitors of the city.

2.3. Source and Study Population

2.3.1. Source Population

The source populations of the study were all households in Asella City.

2.3.2. Study Population

The study populations were randomly selected households in the selected kebeles.

Inclusion criteria:-

Household heads aged >18 years in randomly selected kebeles in the study area.

The exclusion criteria

Mothers or household heads that were sick and unable to respond the interview was excluded from the study.

2.4. Sample Size and Sampling Procedure

2.4.1. Sample Size Determination

Sample size for 1st objective using magnitude of food safety practice

The sample size was calculated using Epi Info stat calc for population survey, considering the following assumptions:

- 1) 95% confidence level
- 2) A 4% margin of error ($d = 0.04$)
- 3) A proportion of 51.0% for the overall food safety practice [33]

Based on these assumptions, the calculated sample size was 600. To account for a 10% non-response rate, the final sample size was increased to 660 (330 for model households and 330 for non-model households).

Sample size for 2nd objectives

Considering risk factors, the sample size was calculated using Epi Info 7 statcalc for a comparative cross-sectional study. The following assumptions were made:

- 1) Power: 80%
- 2) Confidence interval (CI): 95%
- 3) Ratio: 1:1
- 4) Non-response rate: 10%

Based on these assumptions, and considering the following factors from a Northeast Ethiopian study [36]:

- 1) Types of household (AOR = 2.99, 95% CI: 1.98–4.52)
- 2) Sex (AOR = 3.13, 95% CI: 2.13–4.59)
- 3) Availability of latrine (AOR = 2.14, 95% CI: 1.33–3.47)
- 4) Knowledge of food safety practice (AOR = 20.5, 95% CI: 1.43–3.03)
- 5) Attitude toward food safety practices (AOR = 1.74, 95% CI: 1.22–2.48)

The calculated sample size was determined.

Table 1. Sample size determinations considering associated factors of Food Safety Practice.

Variables	% outcome in exposed group	% outcome in unexposed	Odds ratio	Sample size	Total sample size (10% non-response rate)
Types of household (Model Vs Non Model)	57.8	31.6	2.99	124	137
Sex (Male Vs Female)	52.4	29.4	3.13	116	128
Knowledge of food safety practice (Good vs poor)	49.2	39.1	2.05	270	297

When the sample size of 1st objective and 2nd objective compared the 1st objective give larger sample size using attitude toward food safety practices, which is 660 total sample and 330 for model household and 330 for non-model household.

2.4.2. Sampling Procedure

Among eight kebeles in Asella town, four kebeles were selected using simple random sampling methods. The 660 estimated samples were allocated equally to model (330 samples) and non-model (330 samples) households, and then equally to each selected kebele (165 samples to each kebele; 82 samples for model households and 83 samples for non-model households, rounded to the nearest whole number).

A systematic random sampling method was used to select households based on the list of households in each kebele from the records of Asella town health office. In situations where more than one household had more than one model family member, one model family member was selected randomly.

2.5. Variables of the Study

2.5.1. Dependent Variable

Food safety practice

2.5.2. Independent Variables

- 1) demographic and Socio-economic factors: Age, Sex, income, marital and Educational status family size
- 2) Behavioral factors: Knowledge and attitude
- 3) Environmental Factors
 - a. Latrine status
 - b. Disposal method
 - c. Base hand washing facility
 - d. Functional kitchen

2.6. Operational Definition

Model Household: Households heads who attended above 75% of the training or 96 hours of the 16 health extension packages were certified as model households.

Non-model household: Households not attending on 16 health extension packages.

Food Safety Practices: Eighteen items were utilized to assess food safety practices. Each criterion was assigned a value of 1 for a positive action in food safety practice or a correct response, and 0 for a negative action or an incorrect response. The total of these assessment indicators was calculated, and the mean score of all observations and interview questions was used as a threshold to categorize households into those with good or poor food safety practices.

Households practicing at or above the mean score of the

eighteen food safety practice assessment indicators were considered to have good food safety practices, while those practicing below the mean were considered to have poor food safety practices.

Food safety knowledge: To assess knowledge, 23 closed-ended questions with two possible answers ("yes" or "no") were utilized. These questions primarily focused on personal hygiene of food handlers, temperature control, cross-contamination, food storage, and equipment hygiene.

Each correct answer was assigned one point, while incorrect answers or unanswered questions received zero points. The responses to these questions were summed to generate a knowledge score ranging from 0 to 23. Food handlers who obtained a total score equal to or greater than the mean were considered to have "Good knowledge," while those with scores below the mean were considered to have "Insufficient knowledge."

Attitude of food handlers': Attitude was measured using a 10-item Likert scale questionnaire, with response options ranging from 1 (strongly disagree) to 5 (strongly agree). The minimum possible score was 10, and the maximum possible score was 50. To calculate the mean, all the scores were summed and then divided by the number of scores. Food handlers who responded with a mean score or higher were considered to have a "Favorable attitude," while those who responded with a mean score below the mean were considered to have an "Unfavorable attitude."

Data collection procedures (instruments, personnel, measurements).

A structured questionnaire was developed based on previous literature. The questionnaire was first drafted in English and then translated into Afan Oromo (the working language). To ensure consistency, it was then back-translated into English.

The questionnaire consisted of five parts:

- 1) Part I: Demographic and Socioeconomic Data
- 2) Part II: Environmental Factors
- 3) Part III: Knowledge Assessment
- 4) Part IV: Attitude Assessment
- 5) Part V: Food Safety Practices

Three nurses and three male environmental health officers with bachelor's degrees and extensive data collection experience were recruited as data collectors. Supervisors checked the data for completeness and consistency.

2.7. Data Quality Assurance

A pretest was conducted outside the study area in Tiyo woreda, Kulumsa kebele, on 5% of the total sample size (30 individuals). The pretest was conducted using the finalized questionnaire format before the actual data collection commenced. Based on the pretest results, necessary corrections were made to the format.

Prior to data collection, a one-day training session was conducted for the data collectors. The training covered the study's objectives and the contents of the questionnaire. Su-

pervision was carried out on-site by the principal investigator and a supervisor.

The collected data were checked daily by the principal investigator for completeness and clarity. Data cleaning and cross-checking were performed before the data were analyzed.

2.8. Data Processing and Analysis

The collected data were entered into Epi Info version 7 and exported to SPSS version 23 for cleaning and analysis. Descriptive analysis was used to describe the percentages and number distributions of the respondents based on their demographic and socioeconomic characteristics, as well as other relevant variables in the study.

Logistic regression was employed to assess the association between dependent and independent factors. All explanatory variables with a p-value less than 0.25 in the crude analysis were included in the multiple logistic regression analysis. The crude and adjusted odds ratios with their corresponding 95% confidence intervals were calculated. A p-value less than 0.05 was considered statistically significant.

2.9. Ethical Considerations

The study was conducted after obtaining ethical clearance from Arsi University College of Health Science, Research Ethics Review Committee (RERC). A formal letter was submitted to Asella Town Health Office to seek permission to conduct the study. Subsequently, the Kebele Administrations were notified about the study via a letter from Asella Town Health Office.

Before data collection, oral consent was obtained from the households after the purpose of the study was explained to them. The confidentiality of the information obtained was maintained throughout the study.

3. Result

3.1. Demographic and Socioeconomic Characteristics of the Study Participants

A total of 638 households participated in the study: 321 from health extension model households and 317 from health extension non-model households. The response rate was 96.67%. Among the participants, 526 (82.4%) were female, and the mean age (\pm SD) was 40.3 ± 12.0 years (40.4 ± 12.6 years for model households and 38.0 ± 10.9 years for non-model households).

Regarding their educational status, 1.9% of model households and 6.9% of non-model households were unable to read and write. In contrast, 57.6% of model households and 43.5% of non-model households had attended college or above.

Among the study participants, the majority (482 or 75.5%) were married, and three-quarters (418 or 65.5%) were Or-

thodox Christians. Approximately 37.0% (236), 30.3% (193), and 22.5% (144) of the participants were civil servants, merchants, and housewives, respectively.

About 60% of the study participants had less than five

family members. Additionally, 292 (91.0%) of the model households and 274 (86.4%) of the non-model households earned more than 1500.00 Ethiopian Birr (ETB) (Table 2).

Table 2. Demographic and Socioeconomic characteristics of respondents for the study of Food Safety Practice, Asella Town, Oromia Regional State, April 2023 (n = 638).

Characteristic	Types of Household		Total (%)
	Model F (%) n=321	Non Model F (%) n=317	
Sex			
Female	250 (77.9)	276 (87.1)	526 (82.4)
Male	71 (22.1)	41 (12.9)	112 (17.6)
Age			
18-27	24 (7.5)	55 (17.4)	79 (12.4)
28-37	106 (33.0)	109 (34.4)	215 (33.7)
38-47	96 (29.9)	91 (28.7)	187 (29.3)
>47	95 (29.6)	62 (19.6)	157 (24.6)
Education Level			
Cannot read and write	6 (1.9)	22 (6.9)	28 (4.3)
Primary school (1-8)	49 (15.3)	47 (14.8)	96 (15.0)
Secondary school (9-12)	81 (25.2)	110 (34.7)	191 (29.9)
College and above	185 (57.6)	138 (43.5)	323 (50.6)
Religion			
Orthodox	241 (75.1)	177 (55.8)	418 (65.5)
Muslim	40 (12.5)	100 (31.5)	140 (21.9)
Protestant	40 (12.5)	34 (10.7)	74 (11.6)
Other	0	6 (1.9)	6 (0.9)
Marital status			
Single	13 (4.0)	17 (5.4)	30 (4.7)
Married	241 (75.1)	241 (76.0)	482 (75.5)
Divorced	25 (7.8)	14 (4.4)	39 (6.1)
Widowed	18 (5.6)	12 (3.8)	30 (4.7)
Separated	24 (7.5)	33 (10.4)	57 (8.9)
Occupation			
Farmer	1 (0.3)	18 (5.7)	19 (3.0)
Merchant	119 (37.1)	74 (23.3)	193 (30.3)
Civil servant	119 (37.1)	117 (36.9)	236 (37.0)
Daily Laborer	6 (1.9)	40 (12.6)	46 (7.2)
Housewife	76 (23.7)	68 (21.5)	144 (22.5)
Ethnicity			

Characteristic	Types of Household		Total (%)
	Model F (%) n=321	Non Model F (%) n=317	
Oromo	167 (52.0)	184 (58.0)	351 (55.0)
Amahara	111 (34.6)	102 (32.2)	213 (33.4)
Gurage	35 (10.9)	17 (5.4)	52 (8.2)
Tigray	8 (2.5)	5 (1.6)	13 (2.0)
Other (Specify)	0	9 (2.8)	9 (1.4)
Family size			
<5	195 (60.7)	187 (59.0)	382 (59.9)
>=5	126 (39.3)	130 (41.0)	256 (40.1)
HHs income			
<=1500ETB	29 (9.0)	43 (13.6)	72 (11.3)
>1500	292 (91.0)	274 (86.4)	566 (88.7)

3.2. Household Facilities and Behavioral Factors

Only 258 (40.4%) of the total households had running water for 24 hours in their compound. Regarding the availability of functional hand washing facilities, 317 (98.8%) model households and only 29 (9.1%) non-model households had such facilities.

In terms of sanitation, 3.4% of the households in both model and non-model groups did not have access to an im-

proved pit latrine. For liquid waste disposal, 317 (98.8%) model households and 14 (4.4%) non-model households utilized properly constructed onsite sanitation management methods.

Solid waste disposal practices also varied between the two groups: 303 (94.4%) model households and 139 (43.8%) non-model households disposed of solid waste using properly constructed pits.

Concerning the cleanliness of compounds, 312 (97.2%) model households had clean compounds, while only 203 (64.0%) non-model households had clean compounds (Table 3).

Table 3. Households facilities and behavioral factors for the study of Food Safety Practice, Asella Town, Oromia Regional State, April 2023 (n = 638).

Characteristics	Types of Household		Total (%)
	Model F (%) n=321	Non-model F (%) n=317	
Household have water in home for 24 hrs			
No	125 (38.9) /321	255 (80.4)/317	380 (59.6)
Yes	196 (61.1) /321	62 (19.5)/317	258 (40.4)
Functional hand washing facility			
No	4 (1.2)/321	288 (90.9)/317	292 (45.8)
Yes	317 (98.8)/321	29 (9.1)/317	346 (54.2)
Availability of improved pit latrine			
No	2 (0.6)/321	20 (6.3)/317	22 (3.4)
Yes	319 (99.4)/321	297 (93.7)/317	616 (96.6)
Presence of liquid wastes disposal pit			

Characteristics	Types of Household		Total (%)
	Model F (%) n=321	Non-model F (%) n=317	
No	4 (1.2)/321	303 (95.6)/317	307 (48.1)
Yes	317 (98.8)/321	14 (4.4)/317	331 (51.9)
Presence of solid wastes disposal pit			
No	18 (5.6)/321	178 (56.2)/317	196 (30.7)
Yes	303 (94.4)/321	139 (43.8)/317	442 (69.3)
Hygienic condition of the compound			
Scattered refuse is seen	7 (2.2)/321	174 (54.9)/317	181 (28.4)
Scattered opened defecation seen	2 (0.6)/321	29 (9.1)/317	31 (4.9)
Free from refuse	152 (47.4)/321	81 (25.6)/317	233 (36.5)
Free from opened defecation	160 (49.8)/321	33 (10.4)/317	193 (30.3)

3.3. Knowledge on the Food Safety Practice Measurement Indicators

Nearly all respondents had heard about foodborne diseases. Regarding the causes of foodborne diseases, 317 (98.8%) model households knew that germs (bacteria, fungi, parasites, etc.) can cause foodborne diseases, compared to only 118 (37.2%) non-model households. Similarly, 310 (96.6%) model households correctly identified chemicals as a cause of foodborne diseases, while only 166 (52.4%) non-model households did.

Concerning the reuse of oil, 247 (76.9%) model households and 106 (34.4%) non-model households correctly responded that it is dangerous for health. Regarding the reduction of food contamination using reheating, 317 (98.8%) model households and 267 (84.2%) non-model households

responded that reheating reduces contamination.

About 307 (95.6%), 269 (84.8%), and 310 (96.6%) respondents in model households correctly answered questions on food safety practices. Additionally, 284 (88.5%) model households and 143 (45.1%) non-model households responded that fruits should be thoroughly washed before eating to reduce the risk of foodborne diseases.

The overall mean knowledge score was 17.82 ± 6.45 . Model households had a higher mean knowledge score (21.37 ± 2.47) compared to non-model households (14.22 ± 7.20). Regarding the categorization of knowledge as "good" or "poor," 453 (71.1%) of the respondents had good knowledge of food safety practices. When considering housing type, 317 (98.8%) model households had good knowledge, while only 136 (42.9%) non-model households had good knowledge (Table 4).

Table 4. Knowledge assessment on food safety practice among the respondents in Asella Town, Oromia Regional State, April 2023 (n = 638).

Characteristic	Types of Household		Total (%)
	Model F (%) n=321	Non-Model F (%) n=317	
Ever heard about food borne disease			
No	1 (0.3)/	14 (4.4)/	15 (2.4)
Yes	320 (99.7)/	303 (95.6)	623 (97.6)
Know that germs (bacteria, fungus, parasites, etc) cause food borne diseases			
No	4 (1.2)/	118 (37.2)	122 (19.1)
Yes	317 (98.8)/	199 (62.8)/	516 (80.90)
Know that chemicals cause food borne diseases			

Characteristic	Types of Household		Total (%)
	Model F (%) n=321	Non-Model F (%) n=317	
No	11 (3.4)	166 (52.4)	177 (27.7)
Yes	310 (96.6)	151 (47.6)	461 (72.3)
Know that food borne disease is transmitted by contaminated food, water and vectors			
No	4 (1.2)	108 (67.5)	112 (34.5)
Yes	317 (98.8)	209 (65.6)	526 (82.4)
Washing hands regularly before work is one part of personal hygiene			
No	6 (1.9)	130 (41.0)	136 (21.3)
Yes	315 (98.1)	187 (59.0)	502 (78.7)
Washing hands properly reduces risk of food contamination.			
No	4 (1.2)	108 (34.1)	112 (34.5)
Yes	317 (98.8)	209 (65.9)	526 (82.4)
Washing hands with only water can't clean enough			
No	65 (20.2)	117 (36.9)	182 (28.5)
Yes	256 (79.8)	200 (63.1)	456 (71.5)
Wearing apron, mask, gloves, and caps is one part of personal hygiene			
No	15 (4.7)	141 (44.5)	155 (24.5)
Yes	306 (95.3)	176 (55.5)	482 (75.5)
Food handlers should avoid touching their hair after washing hands			
No	9 (2.8)	136 (42.9)	145 (22.7)
Yes	312 (97.2)	181 (57.1)	493 (77.3)
Eating and drinking in the workplace increase the risk of food contamination			
No	29 (9.0)	137 (43.2)	166 (26.0)
Yes	292 (91.0)	180 (56.8)	472 (74.0)
Proper cleaning and handling of instruments reduce the risk of food contamination			
No	5 (1.6)	98 (30.9)	103 (16.1)
Yes	316 (98.4)	219 (69.1)	535 (83.9)
Food handlers cannot have long nails and make coloring it			
No	124 (38.6)	150 (47.3)	274 (42.9)
Yes	197 (61.4)	167 (52.7)	364 (57.1)
Use of gloves reduces the risk of transmitting infection to consumers			
No	20 (6.2)	149 (47.0)	169 (26.5)
Yes	301 (93.8)	168 (53.0)	469 (73.5)
Cleaning equipment after work can reduce cross contamination			
No	5 (1.6)	122 (38.5)	127 (19.9)
Yes	316 (98.4)	195 (61.5)	511 (80.1)

Characteristic	Types of Household		Total (%)
	Model F (%) n=321	Non-Model F (%) n=317	
Using hot water to clean equipment still decrease risk of contamination			
No	13 (4.0)	125 (39.4)	138 (21.6)
Yes	308 (96.0)	192 (60.6)	500 (78.4)
Separating dirty zone from clean zone can reduce cross contamination			
No	6 (1.9)	109 (34.4)	115 (18.0)
Yes	315 (98.1)	208 (65.6)	523 (82.0)
Contaminated foods always have some change in color, odor or taste.			
No	10 (3.1)	82 (25.9)	92 (14.4)
Yes	311 (96.9)	235 (74.1)	546 (85.6)
Reuse of oil is dangerous for health			
No	74 (23.1)	211 (66.6)	285 (44.7)
Yes	247 (76.9)	106 (34.4)	353 (55.3)
Reheating cooked foods reduces food contamination			
No	4 (1.2)	50 (15.8)	54 (8.5)
Yes	317 (98.8)	267 (84.2)	584 (91.5)
Raw meat transmit disease			
No	14 (4.4)	54 (17.0)	68 (10.7)
Yes	307 (95.6)	263 (83.0)	570 (89.3)
Raw milk transmit disease			
No	52 (16.2)	162 (51.1)	214 (33.5)
Yes	269 (83.8)	155 (48.9)	424 (66.5)
Raw vegetables transmit disease			
No	11 (3.4)	154 (48.6)	165 (25.9)
Yes	310 (96.6)	163 (51.4)	473 (74.1)
Fruits should be washed thoroughly before eating to reduce food born disease			
No	37 (11.5)	174 (75.4)	211 (33.3)
Yes	284 (88.5)	143 (45.1)	427 (66.9)
Overall mean knowledge scores	21.37±2.47	14.22±7.20	17.82±6.45
Knowledge of Food safety practice			
Poor	4 (1.2)	181 (57.1)	185 (29.0)
Good	317 (98.8)	136 (42.9)	453 (71.1)

3.4. Attitude on Food Safety Practice

Approximately half of the respondents (322 or 50.6%)

agreed that raw food should be kept separate from cooked food. Regarding the use of adornments, accessories, or jewelry, 120 (37.9%) non-model household respondents agreed that they can contaminate food, while 238 (74.1%) model

household respondents agreed with this statement.

The overall mean attitudinal score toward food safety practices was 33.92 ± 6.71 . Model household respondents had a higher mean attitude score (37.73 ± 3.90) compared to non-model household respondents (30.07 ± 6.77).

In terms of categorizing attitudinal scores as "positive" or "negative," 306 (95.3%) model household respondents and 116 (36.6%) non-model household respondents had positive attitudes toward food safety practices. (Table 5).

Table 5. Attitude on food safety practice of the respondents for the study of Food Safety Practice, Asella Town, Oromia Regional State, April 2023 ($n = 638$).

Characteristic	Types of Household		Total (%)
	Model F (%) n=321	Non Model F (%) n=317	
Raw and cooked food should be stored separately			
Strongly disagree	1 (0.3)	16 (5.0)	17 (2.7)
Disagree	3 (0.9)	117 (36.9)	120 (18.8)
Neutral	60 (18.7)	101 (31.9)	161 (25.2)
Agree	239 (74.5)	83 (26.2)	322 (50.6)
Strongly agree	18 (5.6)	0	18 (2.8)
The use of adornments, accessories or jewelry can contaminate food.			
Strongly disagree	0	5 (1.6)	5 (0.8)
Disagree	9 (2.8)	131 (41.3)	140 (21.9)
Neutral	58 (18.1)	61 (19.2)	119 (18.7)
Agree	238 (74.1)	120 (37.9)	358 (52.1)
Strongly agree	16 (5.0)	0	16 (2.5)
Wearing a cap is an important practice to reduce the risk of food contamination during handling.			
Strongly disagree	1 (0.3)	9 (2.8)	10 (1.6)
Disagree	3 (0.9)	112 (35.3)	115 (18.0)
Neutral	33 (10.3)	88 (27.8)	121 (19.0)
Agree	256 (79.8)	108 (34.1)	364 (57.1)
Strongly agree	28 (8.7)	0 (0.0)	28 (4.4)
Defrosted food must not be refrozen.			
Strongly disagree	1 (0.3)	11 (3.5)	12 (1.9)
Disagree	24 (7.5)	101 (31.9)	125 (19.6)
Neutral	81 (25.2)	100 (31.5)	181 (28.4)
Agree	184 (57.3)	89 (28.1)	273 (42.8)
Strongly agree	31 (9.7)	16 (5.0)	47 (7.4)
Eggs must be washed after purchase before being stored.			
Strongly disagree	2 (0.6)	30 (9.5)	32 (5.0)
Disagree	75 (23.4)	170 (53.6)	245 (38.4)
Neutral	107 (33.3)	79 (24.9)	186 (29.2)
Agree	111 (34.6)	29 (9.1)	140 (21.9)
Strongly agree	26 (8.1)	9 (2.8)	35 (5.5)

Characteristic	Types of Household		Total (%)
	Model F (%) n=321	Non Model F (%) n=317	
Food thawing can be performed in a bowl with or without water in the sink at room temperature.			
Strongly disagree	0	12 (3.8)	12 (1.9)
Disagree	23 (7.2)	97 (30.6)	120 (18.8)
Neutral	109 (34.0)	123 (38.8)	232 (36.4)
Agree	169 (52.6)	85 (26.8)	254 (39.8)
Strongly agree	20 (6.2)	0	20 (3.1)
Continued			
Food must be cooled at room temperature before being put in the fridge.			
Strongly disagree	2 (0.6)	7 (2.2)	9 (1.4)
Disagree	8 (2.5)	101 (31.9)	109 (17.1)
Neutral	76 (23.7)	117 (36.9)	193 (30.3)
Agree	211 (65.7)	91 (28.7)	302 (47.3)
Strongly agree	24 (7.5)	1 (0.3)	25 (3.9)
Improper food storage may pose risk to health.			
Strongly disagree	4 (1.2)	5 (1.6)	9 (1.4)
Disagree	1 (0.3)	53 (16.7)	35 (5.5)
Neutral	29 (9.0)	52 (16.4)	82 (12.9)
Agree	238 (74.1)	202 (63.7)	440 (69.0)
Strongly agree	49 (15.3)	23 (7.3)	72 (11.3)
Preparing food in advance reduces the risk of contamination.			
Strongly disagree	0	18 (5.7)	18 (2.8)
Disagree	6 (1.9)	73 (23.0)	79 (12.4)
Neutral	26 (8.1)	116 (36.6)	142 (22.3)
Agree	256 (79.8)	124 (39.1)	380 (59.6)
Strongly agree	33 (10.3)	7 (2.2)	40 (6.3)
Using non-sanitized fresh herbs in the decoration of a portion of broth or soup can contaminate these foods			
Strongly disagree	1 (0.3)	11 (3.5)	12 (1.9)
Disagree	9 (2.8)	86 (27.1)	95 (14.9)
Neutral	61 (19.0)	117 (36.9)	178 (27.9)
Agree	226 (70.4)	93 (29.3)	319 (50.0)
Strongly agree	24 (4.5)	10 (3.2)	34 (5.3)
The overall mean attitudinal scores±	37.73±3.90	30.07±6.77	33.92±6.71
Attitude toward Food safety			
Negative attitude	15 (4.7)	201 (63.4)	216 (33.9)
Positive attitude	306 (95.3)	116 (36.6)	422 (66.1)

3.5. Food Safety Practices

The majority of participants reported washing their hands before preparing food in both model and non-model households. However, the frequency of handwashing varied: 239 (74.5%) model households washed their hands "always," while 216 (68.1%) non-model households washed their hands "sometimes."

Regarding the place where food is prepared, 272 (84.7%) model households and 235 (74.1%) non-model households prepared food in the kitchen.

Most (253 or 78.8%) model households kept catering utensils on a shelf after cooking, while 181 (57.1%) non-model households kept utensils on the ground or in other places.

About 247 (76.9%) model household respondents had a clean kitchen, while 186 (58.7%) non-model household kitchens were unclean.

Over two-thirds (215 or 67.8%) of non-model households used unclean water to clean household utensils. In contrast, 69.8% of model households used clean water (the same as drinking water) for cleaning utensils.

Using hot water/detergent to clean equipment was practiced by 76.6% of model households, while only 67.8% of non-model households did not use hot water or detergent for

cleaning equipment.

Washing and sanitizing the knife after chopping raw foods were practiced by 76.0% of model households, while 70.7% of non-model households did not do so.

More than two-thirds (67.0%) of model households sanitized/washed their hands after sneezing (before touching food), while over three-quarters (78.2%) of non-model households did not sanitize/wash their hands after sneezing before touching food.

About 238 (74.1) model and 203 (64.0) non-model households did not prepare food when they were sick.

Approximately one-fourth (79 or 24.6) of the model households and 101 (31.9) non-model households rubbed their hands on their face, hair, etc. while preparing food. About 124 (38.6) model and 160 (50.5) non-model households wore jewelry and watches while preparing food.

The overall mean score of food safety practices among the households was 10.65 ± 4.64 (12.90 ± 4.12 for model households and 8.37 ± 3.99 for non-model households). The overall pooled prevalence of good food safety practices among the households was 49.1% (95% CI: 45.0–53.0%). There was a significant variation in food safety practices between the model and non-model households: 75.4% of model households had good food safety practices compared to only 22.4% of non-model households (Table 6).

Table 6. Food safety practice among households in Asella Town, Oromia Regional State, Ethiopia, April 2023 (*n* = 638).

Characteristic	Types of Household		
	Model F (%) n=321	Non-model F (%) n=317	Total (%)
Wash your hands before preparing food			
No	1 (0.3)	17 (5.4)	18 (2.8)
Yes	320 (99.7)	300 (94.6)	620 (97.2)
How often do you wash hands before cooking			
Some times	82 (25.5)	216 (68.1)	298 (46.7)
Always	239 (74.5)	101 (31.9)	340 (53.3)
The place food where prepared			
Other places	49 (15.3)	82 (25.9)	131 (20.5)
In the kitchen	272 (84.7)	235 (74.1)	507 (79.5)
Cleanness of the kitchen			
Not clean	74 (23.1)	186 (58.7)	260 (40.8)
Clean	247 (76.9)	131 (41.3)	378 (59.2)
Kitchen quarter shared with animals			
No	255 (79.4)	260 (82.0)	515 (80.7)
Yes	66 (20.6)	57 (18.0)	123 (19.3)
The place the catering utensils are kept after cooking			

Characteristic	Types of Household		
	Model F (%) n=321	Non-model F (%) n=317	Total (%)
Kept on the ground or other place	68 (21.2)	181 (57.1)	249 (39.0)
Kept on the shelf	253 (78.8)	136 (42.9)	389 (61.0)
Type of water is used to clean utensils			
Other (ground water, river, rain)	97 (30.2)	215 (67.8)	312 (48.9)
Clean water (the same as for drinking purpose)	224 (69.8)	102 (32.2)	326 (51.1)
Using hot water/ detergent to clean equipment			
No	75 (23.4)	215 (67.8)	290 (45.5)
Yes	246 (76.6)	102 (32.2)	348 (54.5)
Washing and sanitizing the knife after chopping raw chicken or meat or other raw food			
No	77 (24.0)	224 (70.7)	301 (47.2)
Yes	244 (76.0)	93 (29.3)	337 (52.8)
Cooked and raw foods kept separately			
No	70 (21.8)	164 (51.7)	234 (36.7)
Yes	251 (78.2)	153 (48.3)	404 (63.3)
Prepared foods covered			
No	49 (15.3)	106 (33.4)	155 (24.3)
Yes	272 (84.7)	211 (66.6)	483 (75.7)
Continued			
Check expire date of commercial product / foods			
No	118 (36.8)	251 (79.2)	369 (57.8)
Yes	203 (63.2)	66 (20.8)	269 (42.2)
Do you/ (other person preparing food) Shorten /trim finger nails			
No	161 (50.2)	171 (53.9)	332 (52.0)
Yes	160 (49.8)	146 (46.1)	306 (48.0)
Use hair cover/cape during food preparation			
No	68 (21.2)	165 (52.1)	233 (36.5)
Yes	253 (78.8)	152 (47.9)	405 (63.5)
Sanitize/wash hands after sneezing (before touching food)			
No	106 (33.0)	224 (78.2)	330 (51.7)
Yes	215 (67.0)	93 (29.3)	308 (48.3)
Prepare food when sick			
No	238 (74.1)	203 (64.0)	441 (69.1)
Yes	83 (25.9)	114 (36.0)	197 (30.9)
Rub hands on face, hair, etc. while working			
No	242 (75.4)	216 (68.1)	458 (71.8)
Yes	79 (24.6)	101 (31.9)	180 (28.2)

Characteristic	Types of Household		
	Model F (%) n=321	Non-model F (%) n=317	Total (%)
Use jewelries and wearing watch while working			
No	197 (61.4)	157 (49.5)	354 (55.5)
Yes	124 (38.6)	160 (50.5)	284 (44.5)
Over all mean practice score \pm sd	12.90 \pm 4.12	8.37 \pm 3.99	10.65 \pm 4.64
Food Safety Practice			
Poor	79 (24.6)	246 (77.6)	325 (50.9)
Good	242 (75.4)	71 (22.4)	313 (49.1)

3.6. Factors Associated with Food Safety Practices in Asella City

In the bivariate analysis, the following factors were significantly associated with food safety practices (p-value < 0.05):

- 1) Type of household
- 2) Availability of 24-hour running water
- 3) Availability of a functional hand washing facility
- 4) Availability of an improved pit latrine
- 5) Availability of a liquid waste disposal pit
- 6) Availability of a solid waste disposal pit
- 7) Knowledge of food safety practices
- 8) Attitude toward food safety practices

In the multivariate logistic regression analysis, the following factors remained significantly associated with food safety practices:

- 1) Type of household
- 2) Availability of a liquid waste management pit
- 3) Availability of a solid waste management pit

4) Knowledge of food safety practices

5) Attitude toward food safety practices

Model households were 9.25 times more likely (AOR: 9.25; 95% CI: 2.76, 31.02) to have good food safety practices compared to non-model households.

Households with a solid waste management pit were 2 times more likely (AOR: 2.10; 95% CI: 1.13, 3.76) to have good food safety practices than households without a proper solid waste management system.

Households with a liquid waste management pit were 3.81 times more likely (AOR: 3.81; 95% CI: 1.03, 14.17) to practice food safety compared to those without.

Households with good knowledge of food safety practices were 2.2 times more likely (AOR: 2.20; 95% CI: 1.02-4.66) to have good food safety practices than households with poor knowledge. Households with a positive attitude towards food safety practices were 2.45 times more likely (AOR: 2.45; 95% CI: 1.23-4.91) to have good food safety practices than households with a negative attitude. (Table 7).

Table 7. Bivariate and Multivariate Logistic Regression Analysis of factors associated with food safety practice among model and Non-model households in Asella Town, Oromia Region, Ethiopia, April 2023 (n = 638).

Characteristic	Food Safety Practice (FSP)		COR (95%CI)	AOR (95%CI)	P-value
	Poor	Good			
Housing Type					
Non-model	246 (77.6)	71 (22.4)	1		
Model	79 (24.6)	242 (75.4)	10.61 (7.36,15.31)	9.25 (2.76,31.02)	0.0001
Have 24 hours running water					
No	228 (60.0)	152 (40.0)	1	1	
Yes	63 (24.4)	161 (62.4)	2.49 (1.80,3.45)	0.93 (0.61,1.41)	0.719
Improved Pit latrine					

Characteristic	Food Safety Practice (FSP)		COR (95%CI)	AOR (95%CI)	P-value
	Poor	Good			
No	19 (86.4)	3 (13.6)	1		
Yes	306 (49.7)	310 (50.3)	6.42 (1.88,21.90)	2.93 (0.74,11.66)	.126
Functional base Hand washing					
No	222 (76.0)	70 (24.0)	1		
Yes	103 (29.8)	243 (70.2)	7.48 (5.25,10.66)	0.35 (0.10,1.21)	0.097
Liquid waste management					
No	238 (77.5)	69 (22.5)	1		
Yes	87 (26.3)	244 (73.7)	9.67 (6.73,13.91)	3.81 (1.03,14.17)	0.046
Solid waste management					
No	135 (68.9)	61 (31.1)	1	1	
Yes	190 (43.0)	252 (57.0)	2.94 (2.06,4.19)	2.10 (1.13,3.76)	0.019
Compound conditions					
Not Clean	161 (75.9)	51 (24.1)	1	1	
Clean	164 (38.5)	262 (61.5)	5.04 (3.48, 7.31)	01.31 (0.72,2.36)	0.374
Knowledge of Food safety practice					
Poor	139 (75.1)	46 (24.9)	1	1	
Good	186 (41.1)	267 (58.9)	4.34 (2.96,6.34)	2.20 (1.02,4.66)	0.047
Attitude toward Food safety					
Negative attitude	165 (76.4)	51 (23.6)	1	1	
Positive attitude	160 (50.9)	262 (62.1)	5.30 (3.66,7.67)	2.45 (1.23,4.91)	0.011

4. Discussion

This study aimed to assess food safety practices and associated factors among health extension model and non-model households in Asella Town, Southwest Ethiopia, in 2023. The study found that the overall prevalence of good food safety practices among households was 49.1% (95% CI: 45.0–53.0%).

This finding is similar to previous studies conducted in Ethiopia like Gondar City (49.0%) [22], Debarq Town (49.1%) [10] and Abobo district, southwest Ethiopia (51%) [21].

However, other studies in Ethiopia have reported slightly higher levels of food safety practice like study conducted in Dangila Town (52.5%) [23], and Debre Markos Town (54%) [33].

On the other hand, lower levels of food safety practice have been reported in different regions like Imo State, Nigeria (37%) [24], Northeast Ethiopia (44.7%) [37], Northwest

Ethiopia (40.1%) [18], Arba Minch Town (32.6%) [29] and West Arsi Zone (27.5%) [26].

The prevalence of good food safety practices in this study (49.1%) is lower than that reported in a study conducted in Paris, France (65%) [27]. This discrepancy may be due to variations in Training and supervision on health extension packages and interventions as well as level of social acceptance of practices among model households.

To improve food safety practices, different governmental and non-governmental organizations can increase the capacity of the community to actively participate in foodborne disease prevention and control activities through implementing various interventions.

There was a significant variation in food safety practices between health extension model and non-model households. Approximately three-quarters (75.4%) of model households had good food safety practices, while only 22.4% of non-model households had good practices. This finding is consistent with other studies conducted in Ethiopia like study conducted in Hawassa City, Sidama [28], Northeastern Ethiopia [37] and Abobo district, Southwestern Ethiopia [21].

This difference may be attributed to the fact that health extension model households are better implementers of food safety measures than non-model households. Health extension workers provide more attention, health education, training, practice, support, and follow-up on food safety measures to model households. Model households are also certified when they fully apply all of the recommended practices.

Frequent follow-up of model households enables them to improve their knowledge, attitude, and skills towards food safety practices. As a result, they have better food safety practices than non-model households due to the assistance of health extension workers and other professionals involved in community health education and training.

Another possible reason for the difference may be the improvements in health extension service approaches and other community health education services as interventions over time. For instance, successive training on food hygiene and safety in the current study area could have increased good food safety practices, as training is an effective intervention for improving knowledge, which is a key factor in improving practice.

The multivariate regression analysis indicated that the type of household was strongly associated with good food safety practices. Model households were 9.25 times (AOR: 9.25; 95% CI: 2.76, 31.02) more likely to have good food safety practices than non-model households.

This finding is consistent with previous studies conducted in Bangladesh [29], Saudi Arabia [30], Ghana [31], Imo State, Nigeria [24], Debark Town [10], Gondar City [22], Abobo district [21], Hawassa City, South Ethiopia [28] and Kombolcha town, Northeast Ethiopia [37].

This may be because model household heads receive training on food safety practices, personal hygiene, and environmental hygiene compared to non-model households. This training enables them to have a better understanding of safe food handling practices. Additionally, model household heads receive more support from health extension workers and other health professionals in the study area and other studies, which may contribute to their better food safety practices.

Other characteristics significantly associated with good food safety practices included: Having a solid waste management pit, Having a liquid waste management system, Good knowledge of food safety practices and Positive attitude towards food safety practices.

Households with a solid waste management pit were 2.10 times (AOR: 2.10; 95% CI: 1.13, 3.76) more likely to have good food safety practices than households with improper solid waste management. This finding is supported by previous studies conducted in Kombolcha Town, Northeast Ethiopia, Shashemene Town, Southeast Ethiopia, Sheko district, Southwest Ethiopia.

This association may be because health extension workers educate respondents about environmental sanitation. Respondents may be more aware that solid waste is a type of solid waste that can cause food contamination if improperly

disposed of. Proper solid waste management helps to keep the environment clean, which is essential for good food safety practices.

Similarly, households with a liquid waste management system were 3.81 times more likely (AOR=3.81; 95% CI: 1.03, 14.17) to practice food safety compared to those without a liquid waste management system. This finding is supported by previous studies conducted in: Kombolcha Town, Northeast Ethiopia and Abobo district, Southwest Ethiopia.

This association may be due to a change in household behavior regarding the health risks of indiscriminate and unsafe disposal of liquid waste. Households' knowledge of liquid waste disposal may be directly related to good food hygiene practices.

Another finding of this study is that households with good knowledge of food safety practices were 2.20 times (AOR: 2.20; 95% CI: 1.02-4.66) more likely to have good food safety practices than households with poor knowledge.

This finding is consistent with previous studies conducted in Asia like Bangladesh [29], Sarawak [32], Petaling Jaya, Malaysia [31] and in Africa like Ghana [31], Imo State, Nigeria [24] and in Ethiopia like Debark Town, Northwest Ethiopia [10], Dangila Town [23], Gondar City [22], Debre Markos Town, North Ethiopia [34], Shashemene Town, Central Ethiopia [26] and Bole Sub-city, Addis Ababa [16].

This association indicates that good food safety practices are likely acquired through the frequent visits of health extension workers and other community health cadres to households. Another possible justification is that knowledge may also be obtained from different media sources.

A positive attitude towards food safety was also another characteristic that showed a significant association with good food safety practices. Households with a positive attitude towards food safety practices were 2.45 times (AOR: 2.45; 95% CI: 1.23-4.91) more likely to practice good food safety than households with a poor attitude.

This finding is consistent with results from different studies globally, regionally, and nationally, including: Sarawak and Petaling Jaya, Malaysia [28, 31], Kuwait [34], Lahore, Pakistan [35], Imo State, Nigeria [24], Kenya [36], Bole Sub-city, Addis Ababa [16], Northwest Ethiopia [18], Debark Town [10], Debre Markos Town, Ethiopia [33].

This association suggests that training in food safety measure packages by community health agents, health extension workers, and other health professionals can lead to a positive attitude, which may improve food safety practices among households.

5. Conclusion

The overall level of food safety practices among households in Asella Town was 49.1%, with significant variation between model and non-model households. Being a model household and having access to Solid waste management, Liquid waste disposal site, Good knowledge of food safety

practices and Positive attitude towards food safety practices were determinant factors for food safety practices:

Abbreviations

FAO	Food and Agricultural Organization
FBD	Food Borne Disease
HEP	Health Extension Program
KAP	Knowledge Attitude Practice
LMICs	Low and Middle-Income Countries
MOH	Ministry of Health
SPSS	Statistical Package for Social Science Studies
WHO	World Health Organization

Declarations

Ethics Approval and Consent to Participate

This research was approved by Institutional Review Board of Arsi University College of Health Sciences.

Consent for Publication

This section is not applicable because the research does not include individuals' image or videos.

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Data Availability of Statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest

The authors declare no conflicts of interest.

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