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Original Article

Sanitation and Hygiene Status of Food Establishments and Associated Factors in Arba Minch Town, Ethiopia

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Abstract

Background: Foodborne illness is a significant global health issue, particularly in low-income countries like Ethiopia, where inadequate food safety regulations and poor hygiene conditions are prevalent. This study aims to evaluate the factors affecting the sanitation and hygiene status of food establishments in Arba Minch town, Ethiopia, to fill the existing evidence gap.

Methods: A cross-sectional study involving 420 food establishments in Arba Minch town was conducted from January 25, 2025, to February 23, 2025, using structured questionnaires. Data were analyzed using SPSS version 25, with descriptive statistics such as mean, median, standard deviations, and range values for continuous data, and percentage and frequency tables for categorical data. Bivariate and multivariable analysis was conducted to see the existence of an association. An adjusted odds ratio with a 95% confidence interval at p-value <0.05 was used to declare the level of significant association**.**

Result: The prevalence of good sanitation and hygiene status was 21% (95% CI: (17.3-25.2). Trained managers about sanitation and hygiene (AOR:0.28, 95% CI: 0.13-0.60). Small type of food establishment (AOR:0.30, 95% CI: 0.11-0.84), workers trained on food hygiene and sanitation (AOR: 0.15, 95% CI: 0.07-0.33), and monthly income of less than 20,000 of the food establishment (AOR: 0.21, 95% CI: 0.05-0.91) were factors that significantly associated with good sanitation and hygiene status.

Conclusion: One out of four food establishments demonstrated good sanitation and hygiene. Key determinants influencing their hygiene status included manager training, the type of establishment, whether workers received hygiene training, and monthly income. Emphasizing training and enforcement of sanitation standards among managers and regulators is vital for reducing foodborne illness risks.

Keywords: Sanitation status, hygiene status, hygienic practice, food establishment, Ethiopia

Introduction

Most foodborne illnesses are caused by foodborne pathogens, which are prevalent worldwide, particularly in urban areas. Infections caused by food were expected to impact 550 million people worldwide in 2010 and result in 230,000 fatalities every year (1). People are eating out more often due to growing urbanization and changes in lifestyle, which have led to the uncontrolled opening of restaurants that typically have poor sanitation conditions, such as dirty kitchens, difficult-to-reach latrines, and inadequate food handling training (2).

Globally, foodborne illness continues to be a serious public health concern (3–5). It is particularly severe in low-income nations because of inadequate food safety regulations, inadequate sanitation, and frail regulatory frameworks (6,7). The highest rates of foodborne illness and death are found in Southeast Asia and Africa (8). Specifically, the Sub-Saharan African countries have been heavily burdened with foodborne and waterborne sickness due to inadequate sanitation facilities and poor water quality (9–11).

Good hygiene, access to drinkable water, and acceptable sanitation are essential for both social and profitable growth as well as overall health (12). For this reason, several academics have argued that sanitation is more important than independence (13).

There is a need to reduce food risks in the food supply chain, which must begin at the farm level, extend through the production chain, and include retail outlets, food establishments, and storage conditions. However, food establishments are the most vulnerable regions to cross-contamination of food. According to estimates from the World Health Organization, inadequate sanitation and hygiene standards exacerbate up to 2 million fatalities annually in impoverished nations (1).

It is difficult to determine the burden of foodborne infections because the majority of the dangers that result in these illnesses are not only transmitted by food. (14). In a similar vein, data from the Centers for Disease Control and Prevention shows that in the United States alone, foodborne illness results in 48 million illnesses, 128,000 hospital admissions, and 3,000 fatalities annually.

The 2019 Ethiopia Mini Demographic and Health Survey report states that 27% of Ethiopian households lack a toilet, with 35% of them located in rural areas and 10% in urban areas (15). Like other underdeveloped nations, Ethiopia lacks sufficient and trustworthy data on infectious foodborne illnesses. Ethiopia had an annual incidence of foodborne diseases ranging from 3.4 to 9.3%, with a median of 5.8% (16).

Ensuring the safety and wholesomeness of food items is the duty of any food establishment serving a large number of patrons. These food and drink establishments' unhygienic conditions have an impact on the safety of the food and beverages they offer, increase the possibility that customers will contract foodborne illnesses, and can even spark disease outbreaks (17–19). The community in Addis Ababa is experiencing a variety of health issues as a result of the rising food consumption in food service establishments like hotels, restaurants, and snack bars. One such health issue is severe watery diarrhea (20).

Rapid urbanization and lifestyle changes encouraged people to dine out more often, which in turn led to the growth of numerous food enterprises with subpar sanitary conditions, such as dirty kitchens, difficult access to water supplies, and inadequate liquid and solid waste management procedures (21). Even so, food outlets continue to be the source of foodborne illness outbreaks. As such, each food establishment that serves a sizable number of patrons has a duty to ensure the food's safety and

wholesomeness. The Ethiopian federal government implemented food and water safety packages in Addis Ababa in 2009; however, outbreaks of foodborne and waterborne illnesses still occur often in the nation's capital (22).

Like other developing countries, Ethiopia is afflicted by the increasing burden of food-borne diseases; primary food safety concerns are caused by physical, chemical, and microbiological contamination. According to several studies, inadequate infrastructure, understaffing, a lack of hygienic knowledge, a lack of potable water, the use of unsanitary materials, failing to keep food at a safe temperature, inadequate storage facilities, and inappropriate settings for food operations, such as being close to sewers and landfills, can create an environment where bacteria and other infectious agents can easily grow, multiply, and spread in food and drinking establishments (23–25). Additionally, most existing studies are localized and do not provide a full national or regional viewpoint, leaving critical drivers such as training, regulatory compliance, infrastructure, and resource availability underexplored (18,26–29). It is essential to comprehend these factors since improper food handling techniques continue to be a major contributor to foodborne illnesses in Ethiopia, which have a significant negative impact on public health and financial losses (30,31). As a result, this study is crucial to fill the evidence gap regarding structure, management training, the kind of food businesses, and behavioral variables, rather than only stating contamination prevalence. Thus, the objective of this study was to assess the sanitation and hygiene status of food establishments and associated factors in Arba Minch Town, Ethiopia.

Methods and materials

Study Area

This study was conducted at Arba Minch town in the Gamo Zone. Arba Minch is a city and separate woreda in the southern part of Ethiopia. "Arba Minch" means "40 Springs", originating from the presence of more than 40 springs. It is located in the Gamo Zone of the South Ethiopia Regional State, about 500 kilometers south of Addis Ababa, at an elevation of 1285 meters above sea level. It is the largest town in the Gamo Zone. It is surrounded by Arba Minch Zuria woreda. Geographically, the town is situated in a gorgeous environment between Lakes Chamo and Abaya and at the foothills of the Gamo Highlands, making it one of the key tourist destination cities in the country. Arba Minch is widely famous for its natural attractions, including Nech Sar National Park, the Forty Springs (“Arba Minch”), crocodile market, diversified animals, and rich cultural legacy. These qualities attract both domestic and international tourists throughout the year, adding considerably to the town’s economic activity. Arba Minch Town has a population of approximately 340,077 residents, distributed across its three sub-cities, Secha, Seqela, and Abaya, and eight kebeles. According to the 2023 report of Arba Minch Food and Drug Authority (AFDA), there are 529 licensed large and small types of food establishments, including Hotels, Bars, Restaurants, Ice cream shops, Juice vendors, Snack bars, Sandwich shops, small restaurants (local food houses), Fast-food kiosks, Pastry shops, in Arba Minch town.

Study Design and Period

An institution-based cross-sectional study was carried out among food establishments of the Arba Minch town administration from January 25, 2025, to February 23, 2025.

Source and Study population

The Arba Minch town's food and beverage establishments were the study's primary focus. These types of businesses serve food and beverages to the general public and include cafeterias, hotels, restaurants, snack shops, butcher shops, and juice bars. All selected large

and small types of food establishments located in the Arba Minch town administration listed on the sampling frame were this studies study population.

Eligibility criteria

All food establishments that have been providing service for at least 6 months in the Arba Minch town were the criteria. The study excluded food establishments in Arba Minch town that have been providing service for less than 6 months, those that are outside the study settings, and those that are permanently closed.

Sample Size Determination

The sample size was calculated using a single population proportion formula with the assumption of 50% proportion (P), acceptable margin of error 0.05 (d), and with 95% confidence level (Z α/2), and the sample size was calculated.

$$n = \frac{z^2(1-\alpha/2)p(1-P)}{d^2} = \frac{(1.96)^2 * 0.5 * 0.5}{(0.05)^2} = 384$$

Where P is the anticipated proportion (50%) of the food outlets' sanitary and hygiene state, d is the marginal error (5%), "n" is the computed sample size, and z is the standard score representing the 95% confidence interval (CI). For the non-response rate, 9% contingency was also considered, i.e., 36. As a result,

n= 384+36 = 420

Therefore, 420 was the total sample size (n) for this investigation.

Sampling Procedures

A list of all establishments in the study area was used as a sampling frame, and establishments were stratified by the type of service they provide in order to make the sampling method more representative. Finally, study participants - managers or food establishment owner was selected from selected food establishments to participate in the study based on proportionally allocating the sample to three sub-cities (Figure 1).

Using proportional allocation from each of the sub-cities, samples were obtained as follows: Secha sub-city out of 194 Food Establishments = (194x420)/529=154 Food Establishments

- NechSar sub city out of 94 Food Establishment = (94x420)/529=75 Food Establishment
- Sikela sub city out of 241 Food Establishment = (241x420)/529=191 Food Establishment

The Arba Minch town Food and Drug Authority provided 529 public food establishments, categorized as 48 hotels, 27 bars, 41 restaurants, 12 ice cream shops, 55 juice vendors, 32 snack bars, 47 sandwich shops, 229 small restaurants (local food houses), 33 fast-food kiosks, and 5 pastry shops. Purposive sampling techniques and sample proportional allocation were used to represent food establishments in each sub-city. This was because certain food establishment categories, such as pastry shops, ice cream shops, snack bars, etc., had very few establishments and were not distributed equally in all sub-cities, and some of these establishments were non-operational. In each category and sub-city: 38 hotels, 21 bars, 33 restaurants, 10 ice cream shops, 44 juice vendors, 25 snack bars, 37 sandwich shops, 182 small restaurants (local food houses), 26 fast-food kiosks, and 4 pastry shops. The lottery method determined the starting point to identify the selected establishments until the required sample size was reached.

Variables

Dependent variables: Sanitary and hygiene status of food and drink establishments

Independent variables: Socio-demographic factors: (Age, Sex, Managers' educational Level, Managers' training on Hygiene and Sanitation, Presence of License, Regulatory Inspection,

Workers' Training on Hygiene & Sanitation, Environmental Condition: (Kitchen, Latrine Facility, Liquid Waste Management, Solid Waste management, Dish washing Facility, Water supply, Hygiene and Sanitation Related Factor: (The type of Facility, age of the facility, Housing Condition, License status of the facility.

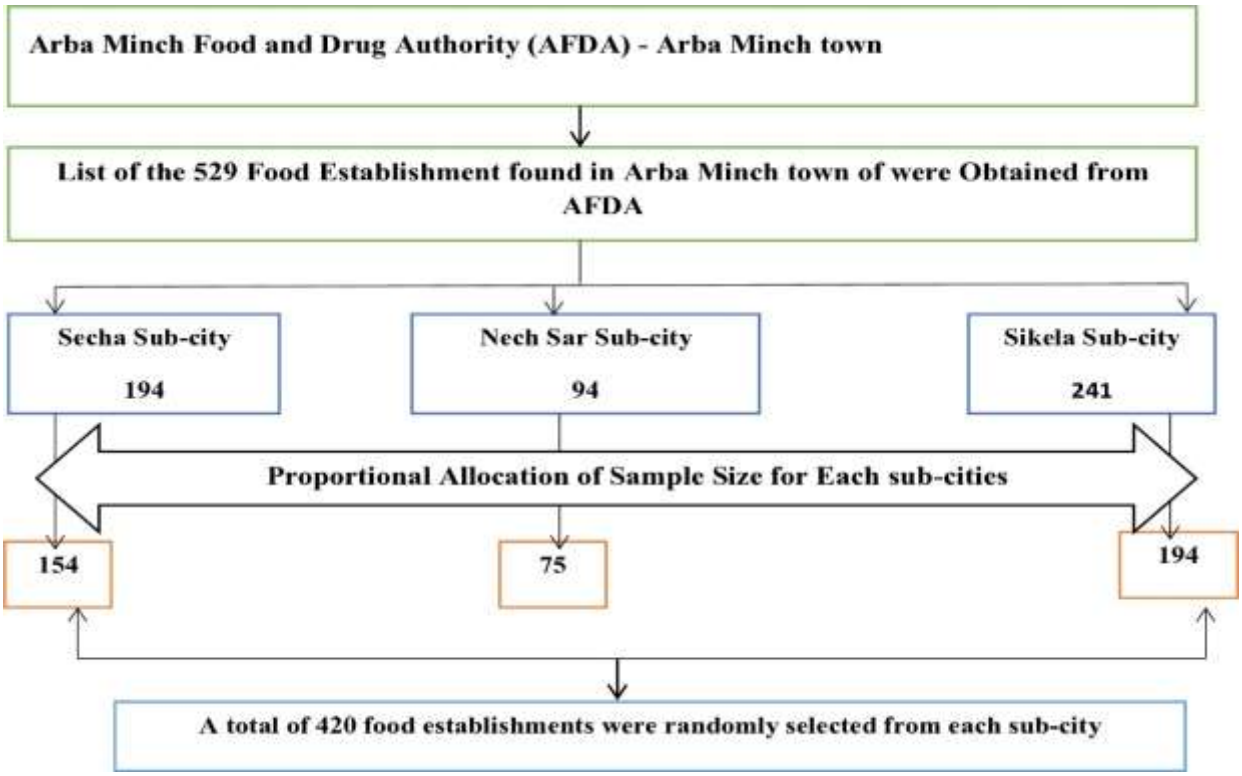

Figure 1: Sampling Procedure to select a sample Food Establishment to assess the determinants of sanitation status in Arba Mnich town, 2025

Operational Definitions

Sanitation and Hygiene status: is the dependent variable of this study, which was calculated by taking the summation of responses from 22 items. Each response was given a value of 1 for the presence of a sanitary facility and 0 for the absence. The sums of these available facilities were calculated, and the average score of all responses was used as a cut-off point to categorize establishments as good or poor (19,24,32). Therefore, food and drink establishments with scores higher than or equal to the mean value (≥17, ≥77.3%) were categorized under a good level of sanitation and hygiene status, and those with scores less than the mean value (<17, <77.3%) were considered a poor level of sanitation and hygiene status.

Food establishment: means any operations, including public venues that store, prepare, package, serve, vend, or otherwise provide food for human consumption, including small and large food establishments. This includes Hotels, Bars, Restaurants, Ice cream shops, Juice vendors, Snack bars, Sandwich shops, small restaurants (local food houses), Fast-food kiosks, Pastry shops,

Type of food establishment: for this study, the type of food establishment was classified based on the service provided. These are small and large types of food establishments.

Small type of food establishment: for this study, small types of food establishments include

ice cream shops, juice vendors, snack bars, sandwich shops, small restaurants (local food houses), fast-food kiosks, and pastry shops. **Large type of food establishment**: for this study, the large type of food establishments includes hotels, bars, and restaurants.

Data collection tools and procedures

Data were collected using a structured pre-tested questionnaire and observation checklist adopted from related literature (19,32). The purpose of the observation checklist was to evaluate the hygienic facilities' availability, usage, cleanliness, and state of upkeep. Data were collected by ten (10) trained BSc. Environmental Health professional data collectors. All food establishments' managers (n = 420) were included in the study.

The questions were about hand washing habits, waste management, pest and rodent control, and the availability of clean water are all included in the section on the sanitation and hygiene status questionnaire. There were 22 questions in this part, and there are two possible answers: "yes" and "no." One (1) point was awarded for each correctly reported practice.

Data Quality Control

The questionnaire was first prepared in English, translated into the Amharic language, and translated back to English to check for any inconsistencies. The quality of the data was ensured via daily rechecks of completed questionnaires, close monitoring, and training for supervisors and data collectors. Additionally, a pre-test was conducted; based on the gaps found during the pre-test, repairs and modifications were carried out.

Data entry and Analysis

Consistency and completeness of data were verified during collection, entry, and analysis. Descriptive statistics, mean, median, standard deviations, and range values for continuous data; percentage and frequency tables for categorical data were included. Bivariate analysis was conducted to see the existence of a crude association. Model fitness was checked by the Hosmer and Lemeshow test, and multi-collinearity was checked by tolerance and VIF. Those variables with a p-value < 0.25 in bivariate analysis were included in the multivariable logistic regression model to control possible confounders. Finally, AOR with 95% confidence interval at p-value <0.05 was used to declare the level of significant association.

Results

Socio-demographic characteristics of food establishment managers

The study assessed a total of 420 food establishments. Out of the 420 managers representing those food establishments, 420 participated in the study with a response rate of 100%. Of the total participating managers of the food establishments, 52.1% them were male. 42.6% of the managers were found to be above 36 years old. The age of participants representing the food establishments ranges from 18 to 60 years, with a mean age of 36.07 years. Only 72.6% of the restaurants, nevertheless, had their licenses renewed. Of the total observed food establishments, 56.9% were small food establishments. The mean year of service of the food establishments was 6.08 years, ranging from 1 to 25 years. The majority (43.6%) of the food establishment managers were found to have a diploma or above. But only 18.8% and 15.2%, respectively, of the managers and food handlers in food establishments received sanitation and hygiene training in the previous year. Furthermore, the majority (65%) of the managers owned the food establishment building (Table 1).

Table 1: Socio-demographic characteristics of food establishment managers in Arba Minch, Ethiopia (n = 420)

Respondents' information	Category	N (%)
Respondents gender	Male	219 (52.1%)
	Female	201 (47.9%)
Age of respondents	<25	33 (7.9%)
	25-30	109 (26.0%)
	31-36	99(23.6%)
	>36	179 (42.6%)
Educational status of managers	Primary education	71 (16.7%)
	Secondary education	166 (39.5%)
	Diploma and above	183 (43.6%)
Marital status	Married	202 (48.1%)
	Unmarried	192 (45.7%)
	Widow	7 (1.7%)
	Divorced	19 (4.5%)
Manager training on food hygiene and sanitation	No	341 (81.2%)
	Yes	79 (18.8%)
Renewed license status	No	115 (27.4%)
	Yes	305 (72.6%)
Ownership of the food establishment building	Private	273 (65.0%)
	Rent	147 (35.0%)
Service year of food establishment Owner	<5	154 (36.7%)
	5-9	134 (31.9%)
	10-14	105 (25.0%)
	15-19	24 (5.7%)
	>19	3 (0.7%)
Type of food establishment	Small	239 (56.9%)
	Large	181 (43.1%)
Worker's trained about food hygiene and sanitation.	No	356 (84.8%)
	Yes	64 (15.2%)
Monthly income of food establishments	<20000	125 (29.8%)
	20000-50000	120 (28.6%)
	50001-80000	48 (11.4%)
	80001-110000	24 (5.7%)
	>110000	103 (24.5%)
Service year of food establishments	<5	237 (56.4%)
	5-9	101 (24.0%)
	10-15	65 (15.5%)
	> 15	17 (4.0%)

Prevalence of Sanitation and hygiene status of food establishments

The general state of the food outlets' sanitation and hygiene was evaluated in this study. Based on the cut-off point, only 21% (95% CI: (17.3-25.2) of food establishments had good sanitation and hygiene status. Three dishwashing systems were present in nearly half (46.2%) of the food

outlets, which helped to lower contamination and food-borne illness. More than half (69.8%) of food establishments had functional refrigerators, while 51.2% had separate latrines for males and females. Additionally, 67.1% had hand-washing facilities with soap, but 70.7% lacked running hot water for cleaning. Alarmingly, 45% did not maintain a 10m distance between kitchens and toilets. Regulatory inspections occurred in 61.4% of establishments, with 69.8% having septic tanks for waste disposal and 65.2% having solid waste storage. Only 38.1% separated solid waste, 42.6% of workers wore protective gear, and 41.2% had separate dressing rooms. Furthermore, 42.9% had storage for non-perishables and 56.2% had adequate ventilation (Table 2).

Table 2: Availability of sanitation and hygiene facilities among food establishments in Arba Minch, Ethiopia (n = 420)

Availability of facilities	**Response**	
	Yes N (%)	**No N (%)**
Insect or rodent infestations not found	196(46.7%)	224(53.3%)
Availability of a standard ceramic stand hand-washing facility	246(58.6%)	174(41.4%)
Availability of a functional refrigerator	293(69.8%)	127(30.2%)
Kitchen room floor repair condition	195(46.4%)	225(53.6%)
At least 10 m distance between the toilet and the kitchen	231(55.0%)	189(45.0%)
Properly managed latrine facility	233(55.5%)	187(44.5%)
Availability of a store room for non-perishable foods	180(42.9%)	240(57.1%)
Availability of containers for solid waste storage	274(65.2%)	146(34.8%)
Use of hot water for washing glasses	123(29.3%)	297(70.7%)
Food handlers wearing appropriate hair cover	179(42.6%)	241(57.4%)
Separate latrine for males and females	215(51.2%)	205(48.8%)
Functional hand-washing facility with Soap near the toilet in food establishments	282(67.1%)	138(32.9%)
Practicability of proper storage of food utensils	195(46.4%)	225(53.6%)
Proper liquid waste disposal	293(69.8%)	127(30.2%)
Availability of three compartments for dish washing	194(46.2%)	226(53.8%)
Proper drinking water storage materials	234(55.7%)	186(44.3%)
Soap near the hand-washing facility in food establishments	268(63.8%)	152(36.2%)
Availability of a separate dressing room for food handlers	173(41.2%)	247(58.8%)
Solid wastes taken from the food establishments' containers within 7 days. Practice	280(66.7%)	140(33.3%)
Inspection by the regulatory body at least within a month	258(61.4%)	162 (38.6%)
Practice of segregation of combustible and non-combustible solid wastes	160(38.1%)	260 (61.9%)
Adequate ventilation	236(56.2%)	184(43.8%)

Factors associated with sanitation and hygiene status among food establishments

Ten predictor factors were included in the binary logistic regression analysis: respondents' age, gender, and presence of skilled food handlers. The managers' educational background, their training in food safety and sanitation, license status, ownership of food establishment building, Type of food establishment, workers trained about food hygiene and sanitation, monthly income of the establishments, and service year of

Food establishments were significantly associated (P-value < 0.25 at 95% CI) with the sanitation and hygiene status of the food establishments. The 10 significant explanatory variables were fitted to the condensed model of multivariable analysis in order to control confounders. However, in the multivariable analysis, only 4 explanatory variables, including manager training on food hygiene and sanitation, type of food establishment, workers trained about food hygiene and sanitation, and the Monthly income of the establishments, were significantly associated (P-value < 0.05 at 95% CI) with sanitation and hygiene status. To determine the explanatory variables of the food establishments' hygienic and sanitary status, a final multivariable analysis model was developed. Accordingly, food establishments with untrained managers were 72% less likely to have good sanitation and hygienic conditions compared to those with trained managers (AOR = 0.28, with 95% CI: 0.13-0.60). Furthermore, food establishments that have a small type of food establishment were 70% less likely to have good sanitation and hygiene conditions compared to large types of food establishments (AOR = 0.30 with 95% CI: 0.11-0.84). On the other hand, workers who were not trained about food hygiene and sanitation were 85% less likely to maintain good sanitation and hygiene conditions compared to trained workers (AOR= 0.15 with 95% CI: 0.07-0.33). Besides, food establishments with a monthly income of less than 20,000 ETB were 79% less likely to have good sanitary conditions compared to those with a monthly income of greater than 110,000 ETB (AOR = 0.21 with 95% CI: 0.05-0.91) (Table 3).

Table 3: Multivariable logistic regression analysis of factors associated with sanitation and hygiene status among food establishments in Arba Minch, Ethiopia

Variables	Category	Sanitation and Hygienic Status		COR (95% CI)	AOR (95% CI)
		Poor	Good		
Respondents gender	Male	160	59	2.19(1.56-3.58)	1.29(0.65-2.60)
	Female	172	29	1	1
Age of respondents	<25	29	4	0.33(0.11-0.98)	2.05(0.47-8.91)
	25-30	93	16	0.41(0.22-0.76)	2.28(0.82-6.33)
	31-36	84	15	0.43(0.23-0.80)	1.0(0.39-2.56)
	>36	126	53	1	1
Educational status of managers	primary	64	7	0.22(0.10-0.52)	1.0(0.32-3.15)
	secondary	145	21	0.29(0.17-0.52)	0.80(0.37-1.72)
	College and above	123	60	1	1
Manager training on food hygiene and sanitation	No	297	44	0.12(0.07-0.20)	**0.28(0.13-0.60)***
	Yes	35	44	1	**1**
License status	No	111	4	0.10(0.03-0.27)	0.42(0.13-1.35)
	Yes	221	84	1	1
Ownership of the food establishment building	Rent	124	23	1.69(1.0-2.85)	1.08(0.52-2.26)
	Private	208	65	1	1
Type of food establishment	Small	225	14	0.09(0.05-0.17)	**0.30(0.11-0.84)***
	Large	107	74	1	1
Worker's trained about food hygiene	No	311	45	0.07(0.04-0.13)	**0.15(0.07-**

and sanitation					**0.33)***
	Yes	21	43	1	1
Monthly income of the establishments	< 20000	120	5	0.04(0.01-0.10)	**0.21(0.05-0.91)***
	20000-50000	107	13	0.12(0.05-0.21)	0.19(0.07-0.52)
	50001-80000	38	10	0.23(0.10-0.51)	0.26(0.09-0.77)
	80001-110000	19	5	0.23(0.08-0.66)	0.22(0.05-0.88)
	>110000	48	55	1	1
Service year of the food establishment	less than 5	213	24	0.05(0.02-0.15)	0.20(0.04-1.06)
	5-9	72	29	0.17(0.05-0.52)	0.30(0.06-1.46)
	10-15	42	23	0.23(0.07-0.73)	0.39(0.08-2.02)
	>15	5	12	1	1

***Significant at P-value<0.05, COR = Crude Odd Ratio, CI= Confidence interval, AOR=Adjusted odd ratio**

Discussion

The findings of the study revealed that 21% of the food establishments were in a condition of good sanitation and hygiene status. Potential contributing factors include the presence of food hygiene and sanitation training for managers, the size of the food establishment, worker training, and the establishment's monthly revenue. Furthermore, poor sanitation and hygiene conditions may be a major contributing cause to the rise in foodborne illnesses in the city.

The findings of this study are almost similar to a study conducted in Bahir Dar town, where 21.3% of food establishments had good sanitation and hygiene status (18). In contrast, only 17.1% of the food enterprises in Mekelle Town, Tigray, North Ethiopia, had good hygienic status, according to research done there (17). This approximate difference may be attributed to the socio-economic status of the research areas as well as the capital city's rapid development and urbanization.

In this study, the presence of manager training on food hygiene and sanitation, the type of food establishment, workers trained about food hygiene and sanitation, and the monthly income of the establishments had a significant relationship (P-value < 0.05 at 95% CI) between the predictor variables and the state of sanitation and hygiene.

Furthermore, food establishments with untrained managers were 72% less likely to have good sanitation and hygienic conditions compared to those with trained managers. Numerous studies have shown that managers' and employees' knowledge and training in sanitation and hygiene directly affect how well food establishments are generally able to maintain sanitation and hygiene (20,33). According to this, receiving training can help ensure that food establishments are clean and hygienic, as well as improve food safety procedures, which in turn lowers the risk of foodborne illnesses. This is supported by a study conducted by Hedberg et al (34), which stated that managers who took food hygiene and sanitation training were associated with a reduced risk for foodborne illness. Furthermore, several studies demonstrated that the sanitation and hygiene conditions of food establishments are directly impacted by managers' knowledge and training in these areas. By guaranteeing the availability and hygiene of hygienic facilities, appropriate waste management, and food safety procedures, they play a crucial role (18,35)

The results of this study showed that food establishments that have a small type of food establishment were 70% less likely to have good sanitation and hygiene conditions

compared to large types of food establishments. This study is in line with a study conducted in Bishofitu town, Ethiopia (36). This implies that improving the food establishment working area for better sanitation and hygiene practices is very important.

On the other hand, workers who were not trained in food hygiene and sanitation were 85% less likely to maintain good sanitation and hygiene conditions compared to trained workers. Training is positively linked to improved sanitary and hygienic outcomes in Ethiopia, though the effect size differs among studies. Research indicates that facilities with trained staff or food handlers demonstrate significantly better sanitation practices, as highlighted by Girmay et al., who found that trained establishments have much higher odds of maintaining good sanitation (24). Gebremariam et al. reported that establishments whose staff had received training were about 2.6 times more likely to keep good sanitary status (32). Training is still a major positive predictor of hygiene and sanitation results, according to more recent local cross-sectional research (37). This suggests that formal training is closely linked to better sanitation and hygiene; this is consistent with Ethiopian empirical literature as well as national and international best practices. Therefore, as a fundamental part of food safety initiatives, policymakers should continue and grow training programs (24).

Besides, food establishments with a monthly income of less than 20,000 ETB were 79% less likely to have good sanitary conditions compared to those with a monthly income of greater than 110,000 ETB. Different studies indicated that the monthly income of food establishments and staff on sanitation and hygiene has a direct relationship with the overall sanitation and hygiene improvement of food establishments (6,38). The monthly income of a food establishment has a greater role in ensuring the sanitation and hygiene status of the food establishment. This is linked to might be that the monthly income of food establishments is important in improving access to sanitation and hygiene products and paying appropriate salaries for workers, which indirectly determines the sanitation and hygiene practice.

Conclusion

Good sanitation and hygiene conditions were discovered in a lower percentage of the food establishments than the average. In this study, manager training on food hygiene and sanitation, type of food establishment, workers trained about food hygiene and sanitation, and Monthly income of the establishments were the primary associated variables that affect the hygienic and sanitation status of food establishments. The study introduces core determinants useful for increasing community awareness, financing in the water, sanitation, and hygiene sector, as well as enhancing the capacity training programs in food hygiene and handling practice, water, sanitation, and hygiene, monitoring, evaluation, and learning system among the food establishments, which have paramount importance for the sustainability of the sector.

Recommendations

According to this study's findings, managers of food establishments should receive both official and informal training on sanitation and hygiene in order to lower the incidence of foodborne illnesses. Adopting strict guidelines and plans for food and water safety will help to raise the standard of sanitation in food establishments. Improving the surface area for basic sanitation and hygienic activity is very important to maintain the sanitation and hygienic status of food establishments, and this leads to better health for the customers as well as for the workers.

The regulatory body should have strict follow-up for those who are getting a lower monthly income for their fulfillment of the conditions that maintain the sanitation and hygiene status of food establishments. Additionally, regular,

mandatory training in food hygiene and sanitation should be given to all food handlers.

Therefore, maintaining hygienic conditions is a priority for the food establishment's owners and managers. Furthermore, the researchers suggest conducting additional research to investigate additional factors that impact the sanitation and hygiene standards of the food enterprises within the study area.

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Ethical considerations

Ethical clearance was obtained from the Institutional Review Board (IRB) of Arba Minch University. Both verbal and written consent were considered and supportive letters from Arba Minch University and different stakeholders have been secured.

Data availability statement

All necessary data were included in the manuscript.

Conflicts of interest

The authors declared that no conflicts of interest exist.

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