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Food Hygiene Practices and Associated Factors Among Street Food Vendors in Urban Areas of Gedeo Zone, Southern Ethiopia

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ABSTRACT

BACKGROUND: Street food is expanding all around Ethiopia. Street vendors have become commonplace near schools, hospitals and bus stations. Because street vended food is sold in unsanitary surroundings near streets, it can be contaminated with variety of pathogens, exposing consumers to foodborne illnesses. There haven't been enough studies on Ethiopian street food, and little is known about how hygienic these foods are. The local authorities don't even have a regulatory system to ensure food safety for street food vendors. Thus, this study aimed to assess food hygiene practices among street food vendors and associated factors.

METHODS: Community-based cross-sectional analytical study design was conducted from June, 2021 to July, 2021 including 402 respondents. Structured questionnaire and observational checklists were used for assessing food hygiene practices. Data were analyzed using SPSS statistics (version 25.0). Binary logistic regression analyses were used to check association of covariates with food hygiene practices. Adjusted odds ratio, and *P*-value less than 0.05 at 95% confidence interval were used to report significant association.

RESULTS: Out of 402, 390 individuals responded. About 123 (31.5%) (95% CI: 27.2-36.4) of vendors had good food hygiene practices. Being female (AOR = 0.15; 95% CI: 0.09-0.27), age (19-25 years (AOR = 0.29; 95% CI: 0.11-0.81) and 26 to 35 years (AOR = 0.24; 95% CI: 0.08-0.74), marital status (being married (AOR = 0.52; 95% CI: 0.29-0.93), educational status (college and above (AOR = 3.42; 95% CI: 1.35-8.62), monthly income (1001-2000 Ethiopian Birr (AOR = 0.36; 95% CI: 0.19-0.68), being inspected (AOR = 13.15; 95% CI: 2.76-62.66) and lack of water at vending site (AOR = 0.40; 95% CI: 0.17-0.97) were factors significantly associated with food hygiene practices of street vendors.

CONCLUSION: Few street food vendors who adhered to good food hygiene were present. Significant variables of food hygiene behaviors included gender, age, marital status, education level, monthly income, inspection frequency, and the availability of water at vending sites. The vendors' food hygiene practices needed to be improved, which necessitated continual assistance, frequent inspections, and public awareness campaign.

KEYWORDS: Food hygiene practice, street food, vendors, Ethiopia

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Background

Food hygiene is one of the fundamental and essential public health issues since it affects every population groups regardless of any socio-demographics.[1] Street foods are ready-to-eat, convenient, inexpensive, and easily available to consumers, providing a source of income for many disadvantaged people and providing job opportunities for those who are unemployed.[2,3]

Vendors are frequently unlicensed, untrained on food safety and hygiene, unsupervised, and operate under unsanitary conditions with little or no awareness of the causes of foodborne illness.[4] Vending locations near busy roads with heavy automobile traffic, which exacerbate airborne particles or garbage disposal sites, contribute to contamination.[5]

Street vended foods' hygiene, which seems neglected issue in developing countries, is one of the important areas of concern in public health. Because of the difficulty in maintaining hygiene and safety standards, street-vended foods might pose a significant health risk to consumers. It may have been affecting individuals of all ages, races, genders, and educational levels all around the world. It has been linked to the rise of global foodborne illnesses.[2,6]

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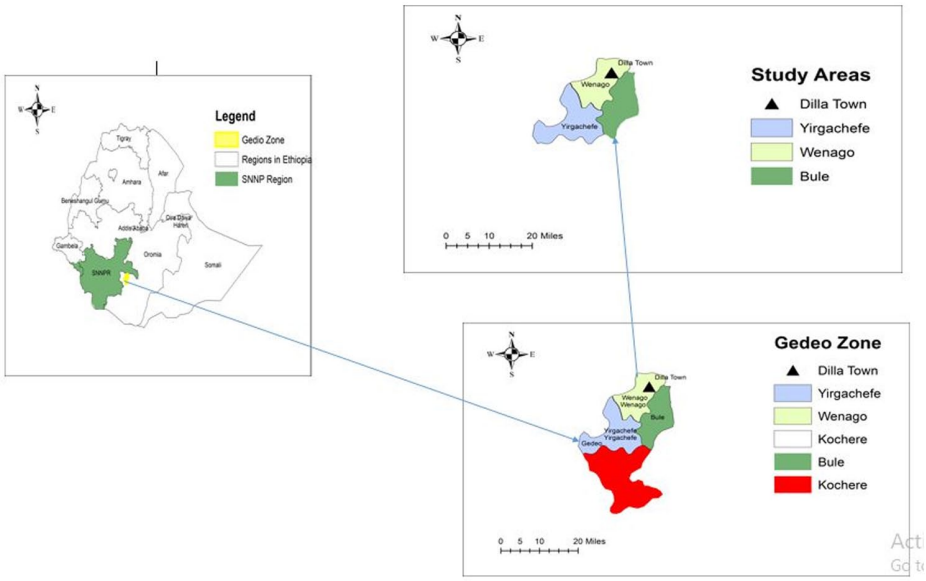


Figure 1. Study areas description map.

Diarrheal diseases are the most common single outcome among the 31 foodborne hazards listed by the Foodborne Epidemiology Reference Group (FERG),[7] causing 550 million cases and 230 000 deaths, and accounting for more than half of global foodborne disability adjusted life years (DALYs).[8] Almost 1 out of every 10 individuals in the globe becomes unwell after eating tainted food, and 420 000 people die each year, resulting in 33 million years of healthy life lost. With 125 000 deaths every year, children under the age of 5 make up 40% of all burden of foodborne disease deaths.[8]

Studies conducted in some towns of Africa like in Ethiopia,[9] Kenyan,[10] Nigeria,[11] and Ghana[12] show that, food handlers of a street food shop were less likely to wear a gown during food handling than food handlers in food establishments. In these areas, yet food hygiene and handling practices are poor.[13] This may increase the chance of food to get contaminations with pathogenic microorganisms.[14] Foodborne diseases are therefore a public health problem in developed and developing countries[8] which is also true for Ethiopia. On the other hand, unhygienic food handling practices and food safety incidents cause destruction of edible products, shake consumer confidence, and impose economic losses.[15]

In our time, street foods are thriving in many towns of Ethiopia including urban areas in Gedeo zone. It becomes common to watch street vendors around school, bus stations and other places where several people congested. Many people are involved in street foods business in the deficiency of knowledge about food safety and hygiene measures.

Based on authors' daily observations, various types of street foods are sold on the street in Gedeo zone of Southern Ethiopia which have been consumed by all age groups. This indicates that demand for relatively inexpensive and "ready-to-eat" food has been increased countrywide in Ethiopia. Since street vended food is operated under poor sanitary conditions that is, generally near the street, it can be contaminated with many pathogens that can expose consumers for various foodborne diseases.[2] This is might be the reason why foodborne infections have been reported in hospitals of Gedeo Zone frequently. A current systematic review and meta-analysis study conduct in Ethiopia on hygienic food handling practice[14] hardly included studies considering street food handling. This revealed that a little is known about street-vended food hygiene measures, as well as the factors that influence them, in the Gedeo zone of Southern Ethiopia where this study was conducted in particular. Moreover, until this investigation made, there was no regulatory system in place for street food vendors to guarantee food safety by local authorities.

These situations require an evaluation of hygienic status of street foods being served in urban areas in order to prevent them from developing into health risks. To our searching, studies were limited regarding street food issues. Even food hygiene practice is a community measures be reevaluated in the light of scientific knowledge which is critical in addressing foodborne outbreak prevention.[16] This study, therefore, aimed to assess food hygiene practices among street food vendors and associated factors in urban areas of Gedeo zone of Southern Ethiopia.

Methods and Materials

Study area description

The study was conducted in 4 urban areas, Dilla, Yirga cheffe, Wonago and Bule towns, of Gedeo Zone in Southern Nation Nationality People (SNNP) Regional State of Ethiopia (Figure 1). All the study areas are categorized in the climatic zone locally known as woina dega (subtropical zone) except Bule which is located at dega (higher altitude).

According to our early survey, the Gedeo zone had over 957 active street food vendors. However, according to information from the zonal health department, there was no defined procedure to control street food vendors and guarantee the safety of street-vended foods prior to this study.

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Study design and period

A community-based cross-sectional analytical study design was conducted from June, 2021 to July, 2021.

Source and study population

All street food vendors in Gedeo Zone served as source populations. Those randomly selected street vendors in the selected urban areas were the study populations.

Inclusion and exclusion criteria

All street food vendors who were available at vending site during study period and gave their consents were included in this study. Street food vendors who were lived in the study area for less than 6 months were excluded.

Sample size determination

The sample size for this study was determined by using single population proportion formula using assumptions: margin of error 5, 95% CI: the estimated good food hygiene practice among street food vendors, 53% from a study conducted in Dessie town, Ethiopia[9] and adding 5% for non-response rate. The final sample size becomes 402 street food vendors.

Sampling procedures and techniques

Preliminary survey was conducted in urban areas of Gedeo zone to estimate the number of street food vendors and then to select the representative towns respective to their vendor and vending sites availability. On this basis, in the surveyed urban areas of Gedeo zone, there were approximately 957 active street food vendors in 4 towns alone, which were considered as representative study areas. The number of study participants (street food vendors) was determined using a proportional sample size allocation method. Accordingly, actual sample size (402) was allocated to the selected towns: Dilla (210), Yirga cheffe (80), Bule (50), and Wonago (62) in the zone (Figure 2). A simple random sampling technique was applied through a lottery method to select the study participants.

Data collection tools and data quality assurances

Data was collected from study participants using a pre-tested, interviewer-administered structured questionnaire and observational checklist. The data gathering tools were written in English first and translated into Amharic, then to the local language Gedeoffa, and then back to English. To assess the questionnaire's validity and its understandability to vendors, it was pre-tested on 10% of the total sample size in randomly selected town surrounding the study areas. Following the pre-test, changes were made to the questionnaires.

The principal author was provided 2 days of training to 8 data collectors on how to administer the questions and conduct

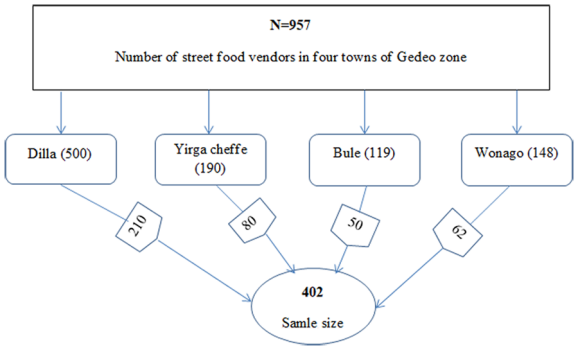


Figure 2. Sampling procedures and proportional allocation of sample size.

interviews with selected vendors with adhering to ethical principles. The data was supervised on a daily basis by co-authors and supervisors including the principal author, to ensure that it was complete and reliable.

Data analysis

Data entry was done using Epi-data version 4.1 and analysis was carried out using SPSS statistics software (version 25.0). The results were reported with frequency and proportion. For categorical data, proportions were utilized as descriptive measures, whereas for continuous variables, mean ± SD (standard deviations) were used.

The strength of the association between different variables and food hygiene practices was assessed using bivariate and multivariable logistic regressions analyses with corresponding 95% confidence intervals (CIs). In the bivariate analysis, variables with a *P*-value of less than .25 were considered candidates for inclusion in the multivariable analysis. In the final model, variables with a *P*-value less than .05 were considered statistically significant and associated with food hygiene practices among street food vendors.

Operational definition

Food hygiene practice level. The level of food hygiene practice among street food vendors was assessed using 16 food hygiene practice questionnaires, as well as direct observation based on previous studies in North Ethiopia[17] and China.[18] Food hygiene practices of vendors were classified as poor if they scored below 75% and good if they scored above or equal to 75%[18] using the mean score of 12.

Knowledge level of street food vendors. Street food vendors' knowledge level toward food hygiene practices was measured using 13 "yes/no" questions; and it was computed and categorized as low knowledge if they answered less than 10 questions (less than mean scored; $< 75\%$) otherwise good level of knowledge (greater or equal to mean score; $\geqslant 75\%$).[18]

Attitudes of street food vendors toward food hygiene practices. Street food vendors' attitude toward food hygiene

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Table 1. Socio-demographic characteristics of street food vendors in Gedeo Zone, Southern Ethiopia.

VARIABLES	CATEGORIES	FREQUENCY	PERCENTAGE (%)
Gender	Male	133	34.1
	Female	257	65.9
Age	⩽18 years	28	7.2
	19-25 years	184	47.2
	26-35 years	116	29.7
	⩾36 years	62	15.9
Marital status	Single	166	42.6
	Married	201	51.5
	Divorced	9	2.3
	Widowed	14	3.6
Educational status	No formal education	69	17.7
	Primary school	174	44.6
	Secondary school	78	20
	College & above	69	17.7
Experience	⩽1 year	136	34.9
	2-5 years	213	54.6
	6 years and above	41	10.5
Income	⩽1000 Ethiopian Birr	138	35.4
	1001-2000 Ethiopian Birr	167	42.8
	2001-3000 Ethiopian Birr	50	12.8
	⩾3001 Ethiopian Birr	35	9
Any attended training on food safety and hygiene	Yes, attended	18	4.6
	No, not attended	372	95.4
Receive medical checkup per 3 month basis	Yes, received	7	1.8
	No, not received	383	98.2

practices was measured using 14 "likert scale" (1. Strongly disagree, 2. Disagree, 3. Neutral, 4. Agree and 5. Strongly agree) questions. It was computed and categorized as "negative attitude" if their score is less than 11 questions (scored < 79%) or otherwise "positive attitude" if they answered greater than 11 questions (scored ⩾ 79%).[19]

Results

Socio-demographic characteristics of participants

The response rate of street food vendors in this study was 390/402 (97%). The majority 257 (65.9%) of the respondents were females. Age wise, higher proportions (47.2%) of respondents were in the range 19 to 25 years categories with mean average age of 27.2 ± 7.9 years. More than half 201 (51.5%) of the respondents were married. Regarding educational status, 174 (44.6%) of them were completed primary school.

In terms of vendors' service year, most of 213 (54.6%) the vendors have served foods on street for 2 to 5 years with an average of 3.01 ± 3.067 years of experience. The respondents generated a monthly income of 1788.38 ± 1415.55 Ethiopian Birr from their street vended foods. Less than 5% of vendors had attended on food safety training provided by health professionals while considerable proportions 372 (95.4%) of them not get the opportunity to attain any training related to food safety and hygiene. Similarly, the majority (98.2%) of the vendors hadn't received medical checkup from healthcare facilities on every 3-month basis (Table 1).

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Table 2. Food hygiene practices of street food vendors in Gedeo Zone, Southern Ethiopia.

VARIABLES	VENDORS RESPONSES	
	YES, N (%)	NO, N (%)
Does the vendor handle food with bare hands? (Observed)	305 (78.2)	85 (21.8)
Did vendors' nails were clean and short? (Observed)	125 (32.1)	265 (67.9)
Was vendors' hair covered when handling, preparing or serving food? (Observed)	98 (25.1)	292 (74.9)
Do you wear an apron when handling, preparing or serving food? (Observed)	6 (1.5)	384 (98.5)
Vendors' clothes were clean and presentable? (Observed)	135 (34.6)	255 (65.4)
Do you wash your hands each time before touching, handling, or serving ready to eat foods?	11 (2.8)	379 (97.2)
Do you wash your hands after toilet visit?	356 (91.3)	34 (8.7)
Do you handle money while serving food? (Observed)	386 (98.9)	4 (1.1)
Did vendors wash their hands after handling money? (Observed)	105 (27)	285 (73)
Dirty removed by bare hands? (Observed)	194 (49.7)	196 (50.3)
Do you wash your hands after touching garbage?	364 (93.3)	26 (6.7)
Do you wash your hands after touching nose and body part?	104 (26.7)	286 (74.3)
Do you avoid hand and environmental contact of ready to eat foods?	212 (54.3)	178 (45.7)
Utensils were adequately cleaned following the three-compartment dishwashing system? (Observed)	38 (9.7)	352 (90.3)
Utensils were covered? (Observed)	21 (5.4)	369 (94.6)
Do you use soap when washing fruits?	80 (20.5)	310 (79.5)

Food hygiene practices among street food vendors

Table 2 shows the level of food hygiene practices of street food vendors. At the time of our observation, only about 2.8% of the vendors washed their hands with clean water before handling or serving food. The majority 384 (98.5%) of the street vendors did not have an apron. About 255 (65.4%) of vendors' clothes were not (partially) clean and presentable. Nearly, all 386 (99%) vendors were handled money while serving ready to eat foods, on other hand, hardly any (5.1%) of these were washed their hands. Almost one-fourth (26.7%) of the vendors were washed their hands after sneezing, coughing, touching face, nose, and other their body parts.

In this analysis, about 123 (31.5%) (95% CI: 27.2, 36.4) of vendors had good level of food hygiene practices (Figure 3).

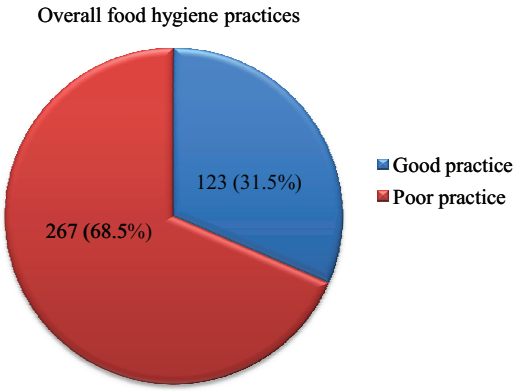


Figure 3. The overall food hygiene practice among street food vendors in urban areas of Gedeo zone, Southern Ethiopia.

Street vended foods, vending site locations and its surrounding environmental conditions

The common (41.3%) vended type of ready to eat food was Sambusa, Bombolino, Bread next to Coffee (77.7%). On top of this, Ambasha with cabbage (39.2%), and 21.8% of vended foods were potato with boloke, avocado, and daxa (Figure 4).

More than three-fourth (76.4%) of vending sites in Gedeo zone were located at the street corner; about one-fourth (24.1%) were found in the market (Figure 5).

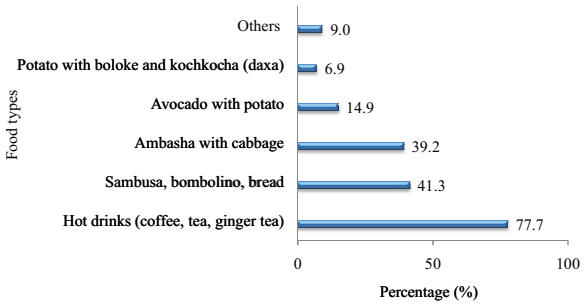


Figure 4. Types of street vended foods in urban areas of Gedeo zone, Southern Ethiopia.

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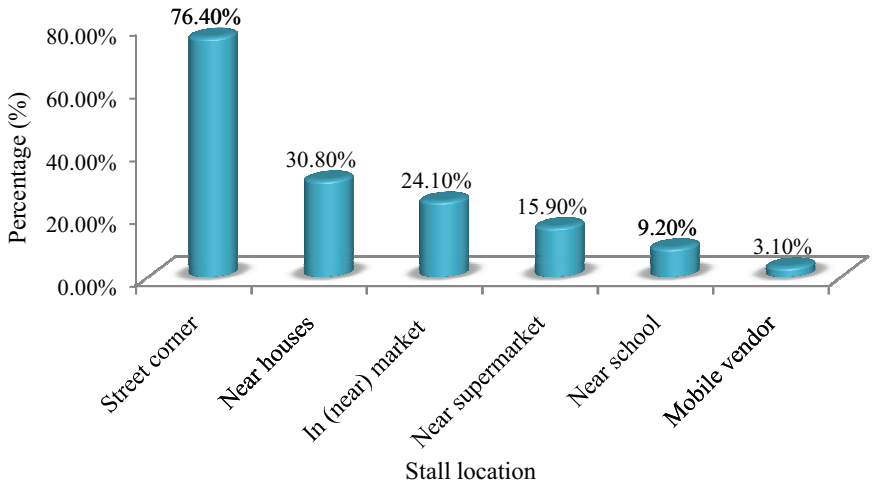


Figure 5. Locations of vending sites for street vended foods in urban areas of Gedeo zone, Ethiopia.

Table 3. Environmental conditions near vending sites in urban areas of Gedeo zone, Southern Ethiopia.

OBSERVED ENVIRONMENTAL CONDITIONS	CATEGORY	FREQUENCY	PERCENTAGE (%)
Is the environment around the stall clean?	Yes	73	18.7
	No	317	81.3
Is there access to tap water at the site or close to the site?	Yes	48	12.3
	No	342	87.7
Adequate hand washing facilities available around the stall? (Presence of soaps, water)	Yes	18	4.6
	No	372	95.4
Adequate wastewater or food disposal facilities available?	Yes	0	0
	No	390	100
Is the stall far from rubbish?	Yes	91	23.3
	No	299	76.7
Is the stall far from wastewater?	Yes	180	46.2
	No	210	53.8
Is the stall far from toilet facilities and open drains?	Yes	188	48.2
	No	202	51.8
Is the stall far from animals?	Yes	246	63.1
	No	144	36.9
Are there flies on the stall?	Yes	304	77.9
	No	86	22.1

About 317 (81.3%) of the observed environment near to the stalls was not clean; 87.7% of vending sites were lacked access to water; 95.4% were hadn't adequate hand washing facilities such as soaps or detergents, water and sinks. Totally, (100%), there were no waste storage or disposal facilities. Three-fourth (76.7%) of the stalls or vending sites were near to rubbishes. More than half (51.8%) of the vending sites were close to the open drains that were not far away from wastewater (53.8%). Flies were observed all over 77.9% of vending sites (Table 3).

Based on our observation, vendors were prepared street vended foods on site which was mostly (52.5%) within uncovered premises along to road side. Almost 1 out of 8 (11.6%) premise was semi-container which is partially enclosed stall where the vendors prepare or used to store the food; while 35.9% of them were canopy.

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Factors associated with food hygiene practices

Gender, age, marital status, educational level, monthly income, attitude, food safety training, inspection made by health workers and access to water at vending site were candidate variables with food hygiene practices among street food vendors ($P < 0.25$).

However, using multivariable logistic regression analysis; gender, age, marital status, educational level, monthly income, access to water at vending site and inspection made by health extension workers were significantly associated with food hygiene practices ($P < 0.05$) among street food vendors in this study.

Our finding shown that compared to male vendors, female vendors were 85% less likely performed good level of food hygiene practices in current study (Adjusted Odds Ratio [AOR] = 0.15; 95% CI: 0.09-0.27). Age wise, vendors with age between 19 and 25 years were 71% less likely to carried out food hygiene practices compared to vendors with below 18 years (AOR = 0.29; 95% CI: 0.11-0.81). Similarly, vendors of age between 26 and 35 years were 76% less likely to perform good level of food hygiene practices compared with vendors of age less or equal to 18 years (AOR = 0.24; 95% CI: 0.08-0.74).

The current study also revealed that married street food vendors were 48% less likely to had good level of food hygiene practices than their unmarried counterparts (AOR = 0.52; 95% CI: 0.29-0.93). Alternatively, educational status of the participants was found to be linked with food hygiene practice. Hence, vendors with college and above educational level were 3.42 times more likely to have and perform a good level of food hygiene practices compared to vendors with no formal education (AOR = 3.42; 95% CI: 1.35-8.62).

Vendors earning monthly income between 1001 and 2000 Ethiopian Birr were 64% times less likely to carry out food hygiene practices compare to those vendors earning less than 1000 Ethiopian Birr (AOR = 0.36; 95% CI: 0.19-0.68). Compared to vendors who did not have regular inspection by healthcare workers, those who had regularly inspected were 13.15 times more likely to practice food hygiene (AOR = 13.15; 95% CI: 2.76-62.66). On the other hand, this study was revealed that vendors those who hadn't water near to their vending sites were 60% less likely to practice good food hygiene than those who had water at vending site (AOR = 0.40; 95% CI: 0.17-0.97) (Table 4).

Discussion

The present study was found that, 31.5% of street food vendors had a good level of food hygiene practices. This result is almost consistent with the study conducted in Gondar (30.3%)[19]; and higher than the study conducted in Bole sub-city of Addis Ababa (27.4%)[20] and Plateau state of Nigeria (24%).[21] However, it is lower than previous studies conducted in other parts of Ethiopia like in Dessei (53%)[9]; Dangila (52.5%)[22]; Debarq (49.6%)[23] and University of Gondar (46.7%).[24] The possible justification is maybe the difference in sample size among studies conducted. Furthermore, these differences could be attributed to differences in study design applied; training provided and the supply of food hygiene information and education delivered for vendors. On the other hand, this finding is much more lower than the study conducted in Dayi district of Ghana (62.9%)[25] and in Wa Municipal of Ghana (87%)[12] among 266 street food vendors. The main discrepancy can be arisen from either the level of hygiene education delivered and information disseminated by concerned bodies or level of information received by vendors.

For instance, Dun-Dery and Addo[12] states that in Ghana 52% of street food vendors received hygiene education and information from hygiene inspectors and nurses; 33% of them from Radio and Television which was delivered monthly to address 34% of vendors and yearly to educate 20% of vendors. While in Gedeo zone of Southern Ethiopia, almost all (95.4%) of street food vendors neither attained any form of training on food safety and hygiene issues nor received any form of hygiene education and information from hygiene inspectors.

Females made the majority (65.9%) of street food vendors, which is consistent with research undertaken in Gondar, Ethiopia (66.8%),[24] Ghana (93.6%),[12] Southwestern Nigeria,[11] and Nasarawa state of Nigeria.[26] This may represent the sociocultural role of female to prepare and handle food in most developing nations[27] including Ethiopia. Females are expected to prepare foods in their houses, which explains their dominance in street food vending.[28] This study, however, contrasts from others done in Kenya's Kiambu County[10] and Kolkata, India,[29] where male vendors were in the majority. Females being a minor proportion of respondents in some research may reflect population demographics.[30]

Furthermore, this study revealed that gender, age, marital status, educational level, monthly income, regular inspection and access to water were found to be factors significantly associated with food hygiene practices ($P < 0.05$). On this basis, our study discovered that male vendors had better food hygiene procedures than their female counterparts ($P = 0.00$). This study's findings in line with study result reported from Northwest Ethiopia[24] and Shiraz of Iran,[31] who found that male vendors practiced better food hygiene measures than female vendors. Possible explanation might be due to the difference in street food types vended by male and female vendors. From this study author's observation, most male vendors sold Sambusa and hot drinks. However, this study findings' contradicts with those of comparable studies conducted in Ghana,[12,28] who explained as being experienced in food preparation, processing, and handling at their homes in cultural perspective; female street food vendors had a high degree of food hygiene practices than male. The study in North of Jordan[32] also stated that females, in mother personality, have an important role in food hygiene practices to prevent and reduce foodborne illnesses. On the contrary, some of previous studies found that gender had no statistically significant influence on food hygiene practices.[33-36]

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Table 4. Factors associated with food hygiene practice among street food vendors in Gedeo zone.

VARIABLES	CATEGORY	AOR (95% CI)	*P*-VALUE
Gender	Male	Reference	
	Female	0.15 (0.09-0.27)	.00*
Age	⩽18	Reference	
	19-25	0.29 (0.11-0.81)	.02*
	26-35	0.24 (0.08-0.74)	.01*
	⩾36	0.55 (0.17-1.82)	.33
Marital status	Single	Reference	
	Married	0.52 (0.29-0.93)	.03*
	Divorced	2.86 (0.50-14.51)	.25
	Widowed	2.55 (0.59-11.16)	.21
Educational level	No formal education	Reference	
	Primary school	0.58 (0.26-1.31)	.19
	Secondary school	1.05 (0.41-2.70)	.92
	College & above	3.42 (1.35-8.62)	.01*
Work experience	⩽1 year	Reference	
	2-5 years	1.17 (0.65-2.12)	.60
	6 years and above	0.61 (0.23-1.59)	.31
Monthly income	⩽1000 Ethiopian Birr	Reference	
	1001-2000 Ethiopian Birr	0.36 (0.19-0.68)	.01*
	2001-3000 Ethiopian Birr	0.43 (0.18-1.03)	.06
	⩾3001 Ethiopian Birr	0.78 (0.30-2.02)	.61
Knowledge level	Low knowledge level	Reference	
	Good knowledge level	1.33 (0.74-2.41)	.33
Attitude	Negative attitude	Reference	
	Positive attitude	0.79 (0.45-1.4)	.42
Any attended training on food safety/hygiene	Yes, attended	Reference	
	No, not attended	1.54 (0.49-4.75)	.45
Inspection made	Yes, inspected	Reference	
	No, not inspected	13.15 (2.76-62.66)	.01*
Medical checkup made	Yes, received	Reference	
	No, not received	1.18 (0.10-13.94)	.89
Access to water at site?	Yes, accessible	Reference	
	No, not accessible	0.40 (0.17-0.97)	.04*

"*" indicates the variable is statistically significant at 95% confidence interval.

In this survey, more than three-fourth (76.9%) of the vendors that participated were between ages of 19 and 35 years. This was somewhat comparable to the findings of research done among food vendors in Southwestern Nigeria.[11] In the previous study, there was no statistical association between age and food hygiene practices.[23] However, the current study

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discovered a significant association between food hygiene practices and vendors' age. Compared to vendors with less than 18 years old, street food vendors with age range of 19 to 35 years had a low performance in practicing food hygiene measures. This difference might be arisen from the types of vended foods, vending site environmental conditions like access to adequate safe water, washing facilities availability and waste management practices near vending sites. Another possible explanation might be that the younger food vendors could fetch water from far away from their vending site for their regular vending activities. So, in the deficiency of necessary conditions at vending sites, vendors with any age categories might be intended to practice low performance of food hygienic practices.

This study also found that street vendors with a college or higher educational status had excellent food hygiene practices than those with no formal education or a low level of education. It suggests that street food vending became a viable business option for those with higher levels of education. This is in line with previous studies conducted in Debarq of Ethiopia[23] and Dayi district in Ghana.[25] Even though basic food hygiene measures input would be learned from friends, hygiene inspectors and media, formal education level found to be a means in which vendors engaged in improving food hygiene practices.[12] Education level has reportedly been found to be a significant factor in improving food handlers' attitudes and practices toward food hygiene by increasing their knowledge about food safety.[27] A lower level of education, on the other hand, may restrict awareness, whereas a higher education level results in better knowledge and favorably influences attitudes toward food safety, which improves practices relating to food hygiene. It means that street food vendors should be encouraged to attain at least basic food safety and hygiene training before engaging in food vending activities, despite the fact that it is one of the most common sources of income for the majority of illiterate individuals in society.

Vendors' monthly income was other determinant factor significantly associated with food hygiene practices of street food vendors. In the current study, vendors with lower income had improved food hygiene practices. This agreed with previous findings[22] which shown that income was not found to be a major factor in influencing food hygiene practices among vendors. However, this study findings' inconsistent with prior studies[19,24] which revealed that improved food hygiene practices are related to having an adequate quantity of cleaning supplies such as soaps, detergents, sanitizer or other means[37] which requires income.

Food hygiene practices were found to be substantially linked with regular inspection. Vendors who were inspected by health professionals were more likely to have appropriate food hygiene practices than those who were not. A study conducted in some parts of Ethiopia like in Gondar[38] and Arba Minch town[39] as well in Kiambu County of Kenya[10] were agreed with this finding. Furthermore, not only this study on street food vendors, but also a study conducted in Northwestern Ethiopia at some hotels and restaurants discovered that a lack of regular expert inspection was recognized as a determinant factor of food hygienic practices.[34] This could be as a result of supervisors providing guidance to food workers and owners. It implies that health workers should regularly inspect vendors and look for questionable conditions to forward their professional judgment for improving food hygiene practices. So, street food vendors would be examined in the same way that formal handlers in hotels and restaurants are. They would also be connected to training programs such as on World Health Organization's (WHO) Five Keys[40] acknowledged criteria for creating and maintaining safer as well as hygienic food.[41]

Moreover, this study found that access to water at vending site was significantly associated with food hygiene practices ($P = .04$). This is agreeing with the study conducted in Bangladesh[42] which states that lack of tap water near vending site and inadequate washing facilities hindered vendors to carry out good level of food hygiene practices. Due to a lack of clean, appropriate water and sanitation, it is difficult to prepare food in hygienic manner; this increases the risk of food contamination.[43] These situations revealed that in developing countries like Ethiopia, there are no regulatory standards for street-vended foods and even those standards that do exist are poorly enforced. This approach, therefore, does not always ensure the quality of foods sold on the street.[3] The most efficient way to improve the food hygiene activities of vendors will be improving the existing environmental conditions and conducting regular surveillance.

This study would have several limitations. This study focused only on street food vendors and it was not considered food handlers working in food and drinking establishments. It also centered mainly on food hygiene measures; it was better if food safety issues were also addressed. Furthermore, being cross-sectional; the study shows a time specific cause and effect relationships.

Conclusions

Food hygiene practices among street food vendors were low in this study. Gender, age, marital status; educational level, monthly income, regular inspection, and access to water were found to be factors significantly associated with food hygiene practices. Our findings support the need for continuous regular inspections by healthcare workers to improve food hygiene practices of street food vendors. It is highly needed to train vendors on food hygiene measures to improve their understanding of causes and prevention of foodborne illnesses. Moreover, the authors kindly recommended that follow-up studies and laboratory-based microbial analysis of street vended foods to be conducted.

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Author Contributions

BN wrote the proposal, developed the methodology, developed the manuscript, and conducted the statistical analysis. ASA contributed to the statistical analysis. ATA contributed to the first proposal development. BTS contributed in developing methodology. KDU developed study design. NES helped to edit the manuscript. BGD, GW, and GGK contributed in proof reading of the manuscript draft. The final version of the manuscript was checked and confirmed by all authors.

Availability of Data and materials

The corresponding author BN can provide the data that back up this study's conclusions. Currently, these data are not publicly available; however, the relevant author can provide data upon reasonable request.

Ethical Approval

The Institutional Ethical Review Board of Dilla University College of Medicine and Health Sciences provided ethical clearance (IRB 014/20-10). Study participants provided their formal written consent before conducting the interview. Everyone who responded was given the assurance that the data they provided would be kept private and used only for this study.

Informed Consent

In addition to letter of clearance from Dilla University, written consent was obtained prior to the study. A permission letter from the relevant bodies was also obtained.

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REFERENCES

1. Gizaw Z. Public health risks related to food safety issues in the food market: a systematic literature review. *Environ Health Prev Med*. 2019;24:68.
2. Lopes Nonato I, Almeida Minussi LOD. Nutritional issues concerning street foods. *J Clin Nutr Diet*. 2016;2:1-9.
3. Lamuka PO. Public health measures: challenges of developing countries in management of food safety. *Encycl Food Saf*. 2014;4:20-26.
4. Nicolas B, Razack BA, Yollande I. Street-vended foods improvement: contamination mechanisms and application of Food Safety objective strategy: critical review. *Pak J Nutr*. 2006;6(1):1-10.
5. Gawande HA, Mishra AA, Shukla RN, Jyoti J. Socio-economic profile of street food vendors and quality evaluation of samosa and Panipuri in Allahabad City, (UP) India. *Int J Agric Sci Food Technol*. 2013;4:275-280.
6. Temesgen E. Hygienic and sanitary practices of street food vendors in the city of Addis Ababa, Ethiopia. *Food Sci Qual Manage*. 2016;50:32-38.
7. Havelaar AH. *The public health burden of unsafe foods: a need for global commitment*. Paper presented at: The First FAO/WHO/AU International Food Safety Conference; 2019, FAO/WHO/WTO/AU; Addis Ababa, Ethiopia.
8. World Health Organization. *WHO Estimates of the Global Burden of Foodborne Diseases*. Food Safety, 2015.
9. Adane M, Teka B, Gismu Y, Halefom G, Ademe M. Food hygiene and safety measures among food handlers in street food shops and food establishments of Dessie town, Ethiopia: a community-based cross-sectional study. *PLoS One*. 2018;13:e0196919.
10. Johnson M, Samuel I, Irene O, Paul K. Food safety knowledge and practices of street food vendors in selected locations within Kiambu County, Kenya. *Afr J Food Sci*. 2020;14:174-185.
11. Faremi F, Olatubi M, Nnabuife G. Food Safety and hygiene practices among food vendors in a tertiary educational institution in South Western Nigeria. *Eur J Nutr Food Saf*. 2018;8:59-70.
12. Dun-Dery EJ, Addo HO. Food hygiene awareness, processing and practice among street food vendors in Ghana. *Food Publ Health*. 2016;6:65-74.
13. Amaami AJ, Dominic D, Collins D. Factors associated with poor food safety compliance among street food vendors in the Techiman Municipality of Ghana. *Afr J Food Sci*. 2017;11:50-57.
14. Negassa B, Ashuro Z, Soboksa NE. Hygienic food handling practices and associated factors among food handlers in Ethiopia: A systematic review and meta-analysis. *Environ Health Insights*. 2022;16:11786302221105320.
15. Spalding A, Goodhue RE, Kiesel K, Sexton RJ. Economic impacts of food safety incidents in a modern supply chain: *E. coli* in the romaine lettuce industry. *Am J Agric Econ*. 2023;105:597-623.
16. FAO/WHO. *Risk Communication Applied to Food Safety Handbook*. Food Safety and Quality Series. FAO/WHO; 2016.
17. Derso T, Tariku A, Ambaw F, Alemenhew M, Biks GA, Nega A. Socio-demographic factors and availability of piped fountains affect food hygiene practice of food handlers in Bahir dar town, northwest Ethiopia: a cross-sectional study. *BMC Res Notes*. 2017;10:1-7.
18. Ma L, Chen H, Yan H, Wu L, Zhang W. Food safety knowledge, attitudes, and behavior of street food vendors and consumers in Handan, a third tier city in China. *BMC Public Health*. 2019;19:1128.
19. Gizaw Z, Gebrehiwot M, Teka Z. Food safety practice and associated factors of food handlers working in substandard food establishments in Gondar Town, Northwest Ethiopia, 2013/14. *Int J Food Sci Nutr Diet*. 2014;3:138-146.
20. Abdi AM, Amano A, Abrahim A, Getahun M, Ababor S, Kumie A. Food hygiene practices and associated factors among food handlers working in food establishments in the Bole Sub City, Addis Ababa, Ethiopia. *Risk Manag Healthc Policy*. 2020;13:1861-1868.
21. Emmanuel A, Mangai JM, Kayong EA, et al. Assessment of practice of food safety and hygiene among food vendors within Jos North local government area of Plateau State, Nigeria. *Int J Med Health Rev*. 2015;1:83-86.
22. Tessema AG, Gelaye KA, Chercos DH. Factors affecting food handling practices among food handlers of Dangila town food and drink establishments, North West Ethiopia. *BMC Public Health*. 2014;14:1-5.
23. Dagne H, Raju RP, Andualem Z, Hagos T, Addis K. Food safety practice and its associated factors among mothers in Debarq town, Northwest Ethiopia: Community-based cross-sectional study. *Biomed Res Int*. 2019;2019:1549131.
24. Lema K, Abuhay N, Kindie W, Dagne H, Guadu T. Food Hygiene Practice and its determinants among food handlers at University of Gondar, Northwest Ethiopia, 2019. *Int J Gen Med*. 2020;13:1129-1137.
25. Tuglo LS, Agordoh PD, Tekpor D, Pan Z, Agbanyo G, Chu M. Food safety knowledge, attitude, and hygiene practices of street-cooked food handlers in North Dayi District, Ghana. *Environ Health Prev Med*. 2021;26:54.
26. Yusuf TA, Chege DPM. Awareness of food hygiene practices and practices among street food vendors in Nasarawa State, Nigeria. *Int J Health Sci Res*. 2019;9:227-233.
27. Addo-Tham R, Appiah-Brempong E, Vampere H, Acquah-Gyan E, Gyimah Akwasi A. Knowledge on food safety and food-handling practices of street food vendors in Ejisu-Juaben Municipality of Ghana. *Adv Public Health*. 2020; 2020:1-7.
28. Katiyo W, de Kock HL, Coorey R, Buys EM. Assessment of safety risks associated with handling chicken as based on practices and knowledge of a group of South African consumers. *Food Control*. 2019;101:104-111.
29. Mukherjee S, Mondal TK, De A, Misra R, Pal A. Knowledge, attitude and practice of food hygiene among street food vendors near a tertiary care hospital in Kolkata, India. *Int J Community Med Public Health*. 2018;5:1206.
30. Nkosi NV, Tabit FT. The food safety knowledge of street food vendors and the sanitary conditions of their street food vending environment in the Zululand District, South Africa. *Heliyon*. 2021;7:e07640.
31. Askarian M, Kabir G, Aminbaig M, Memish ZA, Jafari P. Knowledge, attitudes, and practices of food service staff regarding food hygiene in Shiraz, Iran. *Infect Control Hosp Epidemiol*. 2015;25:16-20.

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32. Osaili TM, Obeidat BA, Abu Jamous DO, Bawadi HA. Food safety knowledge and practices among college female students in north of Jordan. *Food Control*. 2011;22(2):269-276.
33. Suryani D, Sutomo AH, Aman AT. The factors associated with food safety practices on food handlers in primary school canteens. *Unnes J Public Health*. 2019;8:1-9.
34. Admasu M, Kelbessa W. Food safety knowledge, handling practice and associated factors among food handlers of hotels/restaurants in Asosa Town, North Western Ethiopia. *SM J Public Health Epidemiol*. 2018;4:1-9.
35. Alqurashi NA, Priyadarshini A, Jaiswal AK. Evaluating food safety knowledge and practices among foodservice staff in Al Madinah Hospitals, Saudi Arabia. *Safety*. 2019;5:9.
36. Stratev D, Odeyemi OA, Pavlov A, Kyuchukova R, Fatehi F, Bamidele FA. Food safety knowledge and hygiene practices among veterinary medicine students at Trakia University, Bulgaria. *J Infect Public Health*. 2017;10:778-782.
37. Kabir A, Roy S, Begum K, Kabir AH, Miah MS. Factors influencing sanitation and hygiene practices among students in a public university in Bangladesh. *PLoS One*. 2021;16:e0257663.
38. Azanaw J, Gebrehiwot M, Dagne H. Factors associated with food safety practices among food handlers: facility-based cross-sectional study. *BMC Res Notes*. 2019;12:683.
39. Legesse D, Tilahun M, Agedew E, Haftu D. Food handling practices and associated factors among food handlers in Arba Minch Town public food establishments in Gamo Gofa Zone, southern Ethiopia. *Epidemiol Open Access*. 2017; 07(2):1-6.
40. Fontannaz-Aujoulat F, Frost M, Schlundt J. WHO five keys to safer food communication campaign - evidence-based simple messages with a global impact. *Food Control*. 2019;101:53-57.
41. Lamin-Boima PT. Knowledge, attitude and practice of street food vendors in selected schools within Bo City Southern Sierra Leone. *Int J Sci Technol Res*. 2017;6:254-272.
42. Khairuzzaman M, Chowdhury FM, Zaman S, Al Mamun A, Bari ML. Food safety challenges towards safe, healthy, and nutritious street foods in Bangladesh. *Int J Food Sci*. 2014;2014:1483519.
43. World Health Organization. *Food Safety*. WHO; 2010:148-157.

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