

## Research Article

# Food Safety Practice and Associated Factors among Street Food Vendors in City Administrations of West Gojjam Zone, Northwest Ethiopia, 2021

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**Background:** The street foods provide a source of affordable nutrients to the majority of people, especially in developing countries including Ethiopia. But, since street foods are prepared and sold under unhygienic conditions, they are prone to be contaminated. So, venter's practices towards food safety under this environment should be strictly studied. Thus, the aim of this study was to determine the level of safety practice and determinant factors of street food vendors.

**Methods:** A cross sectional study was conducted among 422 street food vendors to assess food safety practices and associated factors in City Administrations of West Gojjam Zone from February to March 2021. Epicollect5 software was used for data collection through smart phones. The data was bringing to MS-Excel and then to SPSS version 23 for analysis. Bivariable and Multivariable logistic regression analysis was done to identify associated factors and to control the effect of confounding variables, respectively. Significance of association was identified by p-value of < 0.05 and its strength was described using odds ratio and 95% CI.

**Results:** Of 422 street food vendors, 418 (99%) responded to the questions. From 418 street food vendors, 418 (100%), 232 (55.51%), 271 (64.83%), 418 (100%) and 361 (86.36%) were females, aged 20-24 years, single, orthodox, and income of 1500-5000 ETB, respectively. About 215 (51.40%) street food vendors had good food safety practice. Primary educational status (AOR=0.57, 95% CI=0.35-0.99), cannot read and write (AOR=0.17, 95% CI=0.08-0.37), monthly income 5001-8500 ETB (AOR=2.57, 95% CI=1.06-6.22), inspection (AOR=3.64, 95% CI=2.05-6.46), training (AOR=3.73, 95% CI=1.94-7.16), vending experience 4-6 years (AOR=1.89, 95% CI=1.14-3.13), vending experience 7-9 years (AOR=3.67, 95% CI=1.21-11.11) and poor knowledge of food safety (AOR=0.48, 95% CI=0.30-0.78) were factors showed statistical significance.

**Conclusion:** In this study, half of the study subjects were found in practicing a better way to keep food safety and healthy. Regular training and improving knowledge level, support in improving economic status and inspection are important activities to be held to improve food safety practices of street food vendors.

**Keywords:** Street foods; Food safety; Food safety practice; West gojjam; Ethiopia

## Introduction

Street vended foods are defined as Ready-To-Eat (RTE) foods and beverages that are sometimes prepared by vendors in the streets and other public places, and mostly sold to consumers for immediate or later consumption without any further preparation or processing [1-3]. Street-vended foods include foods as diverse as meat, fish, fruits, vegetables, grains and cereals based ready to eat foods, frozen produce and beverages [2]. However, Street foods, as those are generally prepared and sold under unhygienic conditions, with limited access to safe water, sanitary services, or garbage disposal facilities they are exposed to food poisoning, food borne diseases

and food safety problems [2,4]. Most of the foods provided by street vendors are not protected against insects, dust etc., which may harbor foodborne pathogens [5]. The rising concern about food-borne illness has questioned the knowledge of the street food vendors to constitute safety practices for food handling [6]. Food safety problems are particularly becoming an increasingly serious threat to public health in developing countries [7]. Food Borne Diseases (FBD) are an important cause of morbidity and mortality worldwide. The burden arising from unsafe food handling and chemical and parasitic contaminants in the food [8]. World Health Organization, Foodborne Disease Burden Epidemiology Reference Group (FERG) estimated that 31 Food Borne Diseases (FBDs) resulted in over 600 million illnesses and

420,000 deaths worldwide in 2010 [9]. Studies from different parts of the world approved that street vended foods have remarkable contribution to the increased burden of foodborne diseases. Bacteriological assessments done on street vended food in the globe indicates about 80 - 93% were contaminated with pathogenic bacteria [10,11]. In Ethiopia, as in other developing countries, it is difficult to evaluate the burden of food borne pathogens because of the limited scope of studies and lack of coordinated epidemiological surveillance systems. Under-reporting of cases and the presence of other diseases considered to be of high priority may have overshadowed the problem of foodborne pathogens [12-14]. Unsafe food-production processes and food safety practices aggravate the burden of food borne diseases. To the best of our awareness, food handlers' safety practices have a great role in the production of healthy food for consumers; so as to minimize the level of contamination and the burden of food borne diseases. In urban areas like City Administrations in West Gojjam Zone, dining outside home in street vendors observed as a common practice among numerous consumers due to increased urbanization, increased number of labor workers and seeking of low cost foods for low income groups. Therefore, the finding of this study is important for respective health offices to know the gap of Street Food Vendor's on Food Safety practices so as to formulate intervention mechanisms. This research can add new knowledge in the area about the practice of street vendors. The finding also important for health department to plan successful monitoring and evaluation systems of health offices on methods formulated to improving food safety among street food vendors. For researchers, it serves as source of information concerning vendor's status of practice and factors associated to conduct other researches in the area for the future.

## Methods and Materials

### Study design and settings

A cross-sectional study was conducted to assess food safety practice and associated factors among street food vendors in City Administrations in west Gojjam zone. The study was conducted from February to March, 2021. The study was conducted in City Administrations in West Gojjam Zone, Amhara Regional State. West Gojjam Zone has 6 city administrations namely Adet, Merawi, Durbete, Bure, Finoteselam and Demebecha city administrations. They all are found about in northwest of Addis Ababa with different distance and to west and South directions from Bahir Dar. The total population in six City Administrations is 164 292, of which about 81 137 are males while 83 155 are females. The out dining establishments observed in West Gojjam are hotels, restaurants, and street/small scale/ food vendors. From those establishments, maximum numbers of customers flow to small scale/street/ food vendors due to their fair costly and easily accessibility of those establishments around working areas. The total numbers of licensed street food vendors in those Cities are 1096/Sources: respective City Administrations Trade and Market development office. Due to dramatic increment of unemployment and expansion of urbanization, both the number of street food vendors and the customers for street foods become increased. Shero, Firfir, Pasta, Mekoreni, Tomato, Egg, Ambasha, Vegetables etc... are the common street food types provided by vendors in the study area.

### Source and study population

Street food vendors found in City Administrations of West

Gojjam Zone are the source population. Street food vendors found in six Cities, which are on work during the data collection time, are the study population.

### Inclusion and exclusion criteria

Street food vendors in Demebecha, Finote selam, Bure, Durbete, Merawi and Adet City Administrations were included in the study. Street food vendors who are licensed but not functional due to different reasons during data collection have been excluded from the study.

### Sample size determination and sampling procedures

The sample size was determined by using proportion of practice via using single population proportion formula ( $n = \frac{z\alpha/2 \sqrt{p(1-p)}}{d^2}$ ) with the assumptions of 95% CI, 5% marginal error, 53% of the study units have good practice of food safety and 10% non-response rate. Based on this 383 subjects and when add 10 % none response rate the sample units become 422. But since the target population is below 10000, the sample size was adjusted by correction formula  $N \cdot n / N + n$ . Then total street food vendors in the study area are 1096, so adjusted sample size was 305. However, in order to increase accuracy and precision, the first sample size as it is (422) was used. List of street food vendors in all six Cities were taken from Trade and Market Development office, Registration and Licensing unit. Then all street food vendors from six/6/ Cities were merged and numbered together. The study subjects then selected by using simple random sampling technique/online random number generator calculator/.

### Data collection tools and techniques

Data was collected through a face-to-face interview using structured questionnaires and observational checklists. The questionnaire and checklist designing processes was guided by relevant information from previous literatures and the guidelines provided by WHO regarding street food vending safety practices. The questionnaire and checklist was prepared in English first and then translated into the local language (Amharic) to have a clear and common understanding of all respondents who have been participated in this study. The data collectors and supervisors were degree holder officers/Environmental Health/Sanitary Officers/ in the Health Sector of those City Administrations. Smart mobile was used as a tool for data collection through Epicollect5 Software. The project template was created on Epicollect5 software by the investigator carefully with all required indicators. The purpose and objectives of the study have been clearly explained to each study participants before beginning of data collection.

### Study variables

**Dependent/outcome variable:** Food safety Practice of street food vendors (Good or Poor) Independent variables/study variables Socio demographic variables: Age, Sex, Marital status, Educational status, Religion, Family size and Income level.

Food safety knowledge of street food vendors;

**Access to information and regulation variable:** Training, Inspection by supervisors, Vending experience, Feedback from customer and Health certificate.

**Conditions of vending environment:** Availability of Water, Type of water source, Availability of Waste disposal system (Liquid

waste disposal system and Municipal solid waste collection) and Availability of latrine.

**Operational definitions**

**Food safety knowledge:** The knowledge on food safety was measured by providing 14 questions for the participants. The answers were registered as one for correct responses and zero for incorrect responses. The scores then changed to percent. Vendors who can give true answer for at least 8 or above questions (>50%) have been classified as having good knowledge whereas vendors who can answer 7 or below questions correctly (<50%) was considered as having poor knowledge.

**Food safety practice:** The food safety practice was assessed by providing 22 questions for participants. Participants practicing correctly were score 1 while those practicing incorrectly were score 0. The result from 22 questions was again changed to 100 (percent). Vendors who are practicing 12 or more correctly (> 50%) have been considered as having good practice while those vendors who are practicing 11 or bellow (<50%) was considered as having poor practice.

**Availability of water:** Based on WHO guideline for street food vendors, to say there is access for water, the production and sales unit should have their own supplies of potable water whether it is from a central system or an individual source, such as a hand pump [2].

**Availability of waste disposal systems:**

**Liquid waste disposal:** Based on WHO standard for street food vendors, to the liquid waste is disposed in appropriate way; it should be emptied into the nearest sewer or drain. Some form of a trap should be used to ensure that only liquid waste is discharged into the sewer or the drain [2].

**Solid waste disposal:** Based on the standard provided by WHO, solid waste generated from street food production should be kept in covered containers on site to be removed at least once daily by the public garbage collection system provided by the municipalities [2].

**Availability of latrine:** In small food establishments, the minimum requirement is one toilet for every 30 women and every 60 men employee and customers.

**Data quality assurance**

Quality of data was assured by designing the template intensively and pre-testing of the questionnaires/template in 5% of participants on street food vendors selected from Jiga town and completeness of the template was assessed before the actual data collection. The data collectors and supervisors were first take training about data collection to have common understanding and let them to practice on Epicollect5 Software until become perfect to collect the required data by already prepared template. At every moment the collected data was uploaded and the supervisors were checking each sample immediately after collection for its completeness. If anything found that to be corrected, then the supervisors were informing the data collector immediately before the completion of data collection.

**Data management and analysis**

The data collected through Epicollect5 were exported directly to MS-Excel and then exported to SPSS version 23 for analysis.

To describe the study subjects, descriptive statistics, including frequencies, mean, standard deviation, and percentage have been used. Bivariable logistic regression analysis was done to identify factors associated with knowledge and practice of food safety and hygiene. Multivariable logistic regression analysis was used to control the effect of confounding variables. Variables with p-value < 0.05 have considered as statistically significant. The association and its strength also noticed by using odds ratios with 95% confidence interval/CI/. Variables with significant association were identified by the basis of, CI and p-value. Data presentation of the results after analysis has done by using graphs, tables, and narration.

**Ethical considerations**

Ethical clearance was obtained from Bahir Dar University College of Medicine and Health Sciences Institutional Review Board (IRB). Written permission was also taken from Health and Trade Department in west Gojjam zone, and then oral permission from each City Administration health and trade sector leaders was obtained to get important information and to collect the data. Informed consent was again obtained from each study participant after explaining the objective of the study. All the information about the study participants have been kept in a file without name but a code for each and not be given to anyone except the principal investigator. Participation was voluntary based.

**Results**

**Socio demographic status of street food vendors**

About 422 respondents were proposed to participate in the study, but 418 participants were participated which indicates about 99% of response rate. From the total vendors participated, all of them were females in gender and orthodox followers in religion. The age group of 20-24 years was 232 (55.51%) while others were below and above this. Regarding educational level, 171 (40.91%) had primary school

**Table 1:** Socio-demographic characteristics of SFVs in City Administrations of West Gojjam Zone, Ethiopia, 2021.

Socio-demographic characteristics	Frequency	Percent
Sex	Female	418 100
Age group /in year/	15-19	34 8.13
	20-24	232 55.51
	25-29	152 36.36
Marital status	Single	271 64.83
	Married	105 25.2
	Divorced	42 10.05
Religion	Orthodox	418 100
Educational status	Can't read and write	68 16.27
	Can read and write	43 10.29
	Primary level	171 40.91
	Can't read and write	136 32.54
Family Size	3-Jan	404 96.65
	6-Apr	14 3.35
Income	1500-5000	361 86.36
	5001-8500	51 12.2
	8501-12000	6 1.44

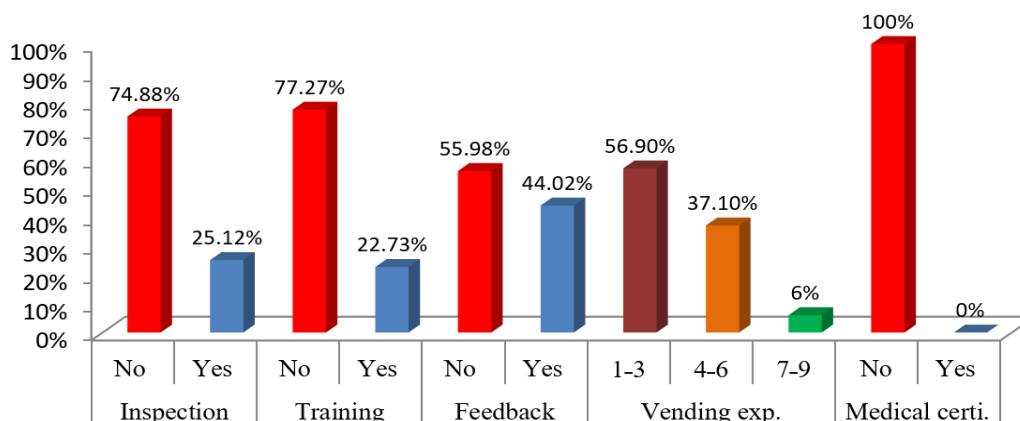


Figure 1: Access to Information and Regulation Related Issues of SFVs in City Administrations of West Gojjam Zone, Ethiopia, 2021.

education and 361 (86.36%) of the respondents earned 1500 -5000 Ethiopian Birr (ETB) monthly Table 1.

**Access to information and regulations related issues of SFVs**

From 418 respondents, 391 (93.54%) did not know the inspectors. Only 105 (25.12%) and 95 (22.73%) street food vendors had been supervised by EHIs and took training on food safety, respectively Figure 1.

**Vending environmental situations of SFVs**

All street food vendors have a pipe water sources and some of them are supplemented with spring and river sources. Only 78 (18.66%) street food vendors have functional latrine and vendors who did not have latrine their customers used public latrine and shared from their neighbors Table 2.

**Knowledge of SFVs about food safety**

The level of knowledge about food safety have determined by giving a score as the answer true scored as 1 while answers false scored 0. The maximum knowledge score found was 85.71% while the minimum score was 35.71%. The mean score of knowledge was 57.13% with standard deviation of 13.62 (Table 3).

**Food safety practice of SFVs**

The food safety practice had determined by giving a score as the correct answer scored to 1 while wrong answers scored 0. On this base, the maximum practice score was 77.27% while the minimum score was 31.82%. The mean score of food safety practice was 52.69% with standard deviation of 12.90. Among participants 215(51.40%) vendors have good level of food safety practice while 203 (48.60%) SFVs found to have poor level of food safety practices (Table 4).

**Factors affecting food safety practices of SFVs**

Based on multivariable logistic regression analysis, street food vendors/handlers who had primary level educational and those who can't read and write were 41.4% (AOR=0.586, 95% CI=0.345-0.993) and 82.9% (AOR=0.171, CI=0.079-0.370) respectively, less likely to have good food safety practice as compared with those who had secondary educational. SFVs who have Average Monthly Income (AMI) of 5001-8500 ETB were 2.6 times more likely to have good food safety practice as compared with those having AMI less than

Table 2: Vending Environmental Situations of SFVs in City Administrations of West Gojjam Zone, Ethiopia, 2021.

	Frequency	Percent
Nearby water sources	Yes	351 83.97
	No	67 16.03
Source of water	Pipe	139 33.25
	Pipe, river	175 41.87
	Pipe, spring	104 24.88
Functional latrine	No	363 86.84
	Yes	55 13.16
If no latrine Where to go to defecate	Public latrine	228 62.81
	Share with neighbor	128 35.26
	Open field	7 1.93
liquid waste disposal system	Open field	215 51.44
	Soak pit	203 48.56
Municipal Solid waste collection	Yes	320 76.56
	No	98 23.44

5000 ETB (AOR=2.566, 95% CI=1.059-6.217). SFVs who have got the chance of inspection, and received training on food safety were 3.6 (AOR=3.639, 95% CI=2.050-6.460), and 3.7 (AOR=3.729, 95% CI=1.942-7.159) times more likely to have good food safety practice as compared with their counterparts food handlers, respectively. The odds of having good food safety practice were 1.9 and 3.7 times higher among SFVs who had vending experience of 4-6 and 7-9 years (AOR=1.887, 95% CI=1.139-3.125; AOR=3.671, 95% CI=1.213-11.112), respectively, than SFVs having experience of less than 3 years. As well as SFVs who have poor knowledge on food safety were 51.7% less likely to have good food safety practice as compared with SFVs who had good knowledge on food safety (AOR=0.483, 95% CI=0.299-0.780) Table 5.

**Discussion**

This cross-sectional study was conducted to assess the food safety practice and associated factors of street food vendors in west Gojjam zone city administrations, Ethiopia. The quality and safety of street vended foods are of a great concern for public health. Street

**Table 3:** Knowledge of SFVs about Food Safety in City Administrations of West Gojjam Zone, Ethiopia, 2021. (N=418).

		No	Percent
Wiping Cloths can spread microorganisms	False	317	75.84
	True	101	24.16
Refrigeration reduces/inhibits MOs in food	False	31	7.42
	True	387	92.58
The same cutting board used for raw foods and cooked foods	False	257	61.48
	True	161	38.52
Raw foods stored separately from cooked foods	False	187	44.74
	True	231	55.26
Cooked foods do not need to be thoroughly reheated	False	55	13.16
	True	363	86.84
Skin infections can contaminate food	False	94	22.49
	True	324	77.51
Leaking saliva during holding paper and counting money may contaminate the food	False	280	66.99
	True	138	33.01
Mouth, nose and hair should be covered	False	255	61
	True	163	39
Food borne diseases causing microorganisms are found every where	False	297	71.05
	True	121	28.95
Microorganisms are present on human skin	False	230	55.02
	True	188	44.98
Human beings emit microorganisms during sneezing and talking	False	137	32.78
	True	281	67.22
Food may be contaminated during sneezing, taking and touching by our hands	False	115	27.51
	True	303	72.49
Microorganisms cannot survive in clod and cooked foods	False	206	49.28
	True	212	50.72
Leftover foods can cause diseases	False	50	11.96
	True	368	88.04
Over all Knowledge level	Good	264	63.2
	Poor	154	36.8

food vendors feed a large group of population so that the health of those costumers again falls on the hand of those vendors. Due to this, the practice of street food vendors become questioned to constitute safety measures for food handling [6,15]. The level of street food safety practice was found to be approximately consistent with the research findings from Dangila (52.5%) [16], facility based cross sectional study in Gondar (49%) [17], community based study in debark (49.6%) [18]. However, this finding is higher than the findings of cross sectional study conducted in Shashemane (27.5%) [19]. The reason for this variation can be the difference in legality of street food vendors. The study conducted in Shashemane had incorporated informal/not licensed/ street food vendors. Those informal traders are out of regulations and working with very limited dining and cleaning materials which in turn leads for poor safety practices. On the other hand, the practice level in the current study was found to be lower as compared with the research findings from Brazil and study

**Table 4:** Food safety practice of SFVs in City Administrations of West Gojjam Zone, Ethiopia, 2021.

		No	Percent
Tap/water container to carry water	Correct	414	99.04
	Wrong	4	0.96
Basin/sink/bucket for hand wash	Correct	347	83.01
	Wrong	71	16.99
Soap for hand wash	Correct	120	28.71
	Wrong	298	71.29
Bowl/bucket for utensil washing	Correct	259	61.96
	Wrong	159	38.04
Soap to wash utensil	Correct	332	79.43
	Wrong	86	20.57
Clean cloth to cover food	Correct	34	8.13
	Wrong	384	91.87
Wearing of apron	Correct	160	38.28
	Wrong	258	61.72
Separate knife and cutting board	Correct	191	45.69
	Wrong	227	54.31
Separate store for raw and cooked food	Correct	149	35.65
	Wrong	269	64.35
Utensil and food store 60cm above ground	Correct	60	14.35
	Wrong	358	85.65
No crack/scratched on utensil	Correct	294	70.33
	Wrong	124	29.67
Hair cover during working	Correct	266	63.64
	Wrong	152	36.36
No decored hand nail or jewelries	Correct	177	42.34
	Wrong	241	57.66
Short nail and clean hand	Correct	290	69.38
	Wrong	128	30.62
Temporary solid waste storage container	Correct	363	86.84
	Wrong	55	13.16
Wash hands after money hair skin touch	Correct	110	26.32
	Wrong	308	73.68
No fingering nose and ear	Correct	300	71.77
	Wrong	118	28.23
No leaking of fingers to pick paper or money	Correct	185	44.26
	Wrong	233	55.74
No wiping hands on dirty cloth	Correct	207	49.52
	Wrong	211	50.48
No touch inside and rim of cups/glasses	Correct	78	18.66
	Wrong	340	81.34
No chewing gum	Correct	337	80.62
	Wrong	81	19.38
Store food in refrigerator	Correct	173	41.39
	Wrong	245	58.61
Over all practice level	Good	215	51.4
	Poor	203	48.6

**Table 5:** Factors associated with practice of food safety of SFVs in City Administrations of West Gojjam Zone, Ethiopia, 2021.

Variables	Practices		COR/95% CI	AOR/95% CI
	Poor N (%)	Good N (%)		
<b>Age group</b>				
25-29	57 (37.50)	95 (62.50)	1	
20-24	127 (54.74)	105 (45.26)	0.496 (0.327 – 0.753)*	
15-19	19 (55.88)	15 (44.12)	0.474 /0.223 – 1.005/	
<b>Marital status</b>				
Single	138 /50.92/	133 (49.08)	1	
Married	44 /41.90/	61 (58.10)	1.439 (0.913 – 2.267)	
Divorces	21 /50.00/	21 (50.00)	1.038 (0.542 – 1.988)	
<b>Educational status</b>				
Secondary level	48 /36.09	88 (63.91)	1	1
Primary level	81 /47.37/	90 (52.63)	0.606 (0.382 – 0.962)*	0.586 (0.345 – 0.993)*
Can read and write	23 /53.59/	20 (46.41)	0.474 (0.237 – 0.950)*	0.527 (0.234 – 1.189)
Can't read	51 /75/	17 (25)	0.182 (0.095 – 0.349)*	0.171 (0.079 – 0.370)*
<b>Family size</b>				
1-3	200 /49.50/	204 (50.50)	1	
4-6	3 /21.43/	11 (78.57)	3.595 (0.988 – 13.078)	
<b>Average monthly income</b>				
1500-5000	193 /53.46/	168 (46.54)	1	1
5001-8500	9 /17.65/	42 (82.35)	5.361 (2.535 – 11.339)*	2.566 (1.059 – 6.217)*
8501-12000	1 /16.67/	5 (83.33)	5.744 (0.664 – 49.657)	2.903 (0.290 – 29.112)
<b>Inspection</b>				
No	181 /57.83/	132 (42.17)	1	1
Yes	22 /20.95/	83 (79.05)	5.173 (3.073 – 8.708)*	3.639 (2.050 – 6.460)*
<b>Training</b>				
No	187 /57.89/	136 (42.11)	1	1
Yes	16 /16.84/	79 (83.16)	6.789 (3.798 – 12.137)*	3.729 (1.942 – 7.159)*
<b>Feedback from customer</b>				
No	130 (55.56)	104 (44.44)	1	
Yes	73 (39.67)	111 (60.33)	1.901 (1.284 – 2.813)*	
<b>Vending experience/yrsl</b>				
1-3	142 (59.66)	96 (40.34)	1	1
4-6	53 (34.19)	102 (65.81)	2.847 (1.869 – 4.337)*	1.887 (1.139 – 3.125)*
7-6	8 (32)	17 (68)	3.143 (1.305 – 7.573)*	3.671 (1.213 – 11.112)*
<b>Presence of nearby water sources</b>				
Yes	165 (47.00)	186 (53.00)	1	
No	38 (56.72)	29 (43.28)	0.677 (0.400 – 1.146)	
<b>Types of water sources</b>				
Pipe	74 (53.24)	65 (46.76)	1	
Pipe, river	85 (48.57)	90 (51.43)	1.205 (0.772 – 1.883)	
Pipe, spring	44 (42.31)	60 (57.69)	1.552 (0.930 – 2.591)	
<b>Liquid waste disposal system</b>				
Soak pit	94 (43.72)	121 (56.28)	1	

Open field	109 (53.69)	94 (46.31)	0.670 (0.456 – 0.985)*	
<b>Municipal Solid waste collection</b>				
Yes	148 (46.25)	172 (53.75)	1	
No	55 (56.12)	43 (43.88)	0.673 (0.427 – 1.061)	
<b>Knowledge</b>				
Good	104 (39.39)	160 (60.61)	1	1
Poor	99 (64.29)	55 (35.71)	0.361 (0.239 – 0.545)*	0.483 (0.299 – 0.780)*

in Vietnam (98.5%) [20-22]. The reason for this discrepancy expected to be geographical difference that is the demographic characteristics observed in Brazil and Vietnam and their level of understanding and controlling systems might have visible difference with our community. Variation in the time of study can also be an important reason for the observed difference since the flow of information and level of understanding are found to be changing through time. In this study concerning personal hygiene, about 61.72% of vendors do not wear protective cloth/apron/, 36.36% do not have hair cover during food processing, 57.66% have decorative on nail and jewelries, 30.62% do not have short nail and clean hand. These findings were found to be lower than findings from research done in Ethiopia, Addis Ababa in which about 95% had uncovered hair, 88.6% of vendors did not wear aprons and 100% of them handled money with bare hands [23]. However, Long nails (20.9%) as well as nail polish (15.5%) were found lower than the report in the current study. These differences might be due to variations in study area (being capital city vs district towns), chance of obtaining training and monitoring and inspection activities from responsible officers. The practice level of vendors on separate storage for raw and cooked foods were only 35.65% which is very low as compared with the finding of a cross sectional study conducted in Brazil (91%) [22] and which is high as compared with the report in Nigeria (12.2%) [24]. Differences on geographic locations, demographic characteristics and awareness of both vendors and customers are the possible reasons for the observed variations on storage activities. Moreover, in the current study higher number of vendors (73.68%) found no to wash their hands after touching money. This finding is lower as compared with the finding conducted in different scholars [15,22,25,26]. The possible reasons for these differences may come from geographical differences, individuals' perception differences, as well as it may also be affected by customer type. In this study vendors with educational status of primary level and those who can't read and write were found to be statistically significant with the level of food safety practice. The current report also supported by different scholars that identify education as independent predictor [17,18,27,28]. This comes in line with theoretical truth that education brings a change in thinking and understanding ability on everything in life. In addition, in the current finding SFVs who have average monthly income of 5001-8500 ETB were also found to be independent predictor with food handling practice. Similar studies also described that vendors with better income level have better safety and hygienic practices [17,29,30]. The possible justifications may be SFVs who have better income level can afford to avail different sanitary materials and equipment, these can in turn leads to have good practice. They will also have independent toilet services, access to water and protective equipment. Based on the finding of this research, SFVs having history of supervision/

inspection by EHI and took training about food safety were positively associated with food safety practice. This finding was also supported by former researches [6,26,30]. The possible reasons for these can be; first, inspection by inspectors and training are mechanism to bring improvements from the usual and traditional activities by giving important information about food safety. Second, vendors that do not bring change after comments given during inspection/supervision can also be exposed for penalty. So the only options they will have are either stopping their business or working based on recommendations given during inspection. This can be improving the practice of food safety practice. Whereas training on food safety provides good information on activities towards food safety and creates motivation to bring with a better practice. We have also found out that vending/working experience became determinant factor for food safety practice of SFVs. This finding also supported by different articles [17,25,30,31]. It is theoretically acceptable that work experience brings an improvement on usual activities, because individuals can learn from their daily activities as well as from their neighbors. In addition, at each and every day, the customers can give a feedback about what is good and bad which gives a chance to make corrective measures for customer satisfaction. Moreover, knowledge about food safety showed statistically significant association with food safety practice of SFVs. Different research findings also described as knowledge have a significant effect on food safety practice level of vendors [18,30]. Normally, it is the usual truth that if SFVs have good knowledge about food safety and its importance on consumers, it is expected that they can apply in the way of that it could be good. In addition, since it is a business, SFVs expected to do the best as much as they know to attract the customer; as well as to hold their customer for longer period.

## Conclusion

More than half of street food vendors had good food safety practice. In the current study educational status monthly income, inspection, training, vending experience and knowledge level on food safety were identified as factors that can determine food safety practices of Street Food Vendors. Vendors with minimum experience and those with lowered startup capital need a special support on food safety activities.

## Declaration

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**Authors' contributions:** Conceptualization and design of the study: CC; Data collection and processing: CC, MA; Methodology and data analysis: CC, MA; Project management: CC; Supervising work procedure: MA, MH; Developing a manuscript draft: CC; Reviewing the drafted manuscript: MA, MH; Approval of the submission: CC, MA, MH.

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