

Assessing of Street Food Vendors Knowledge Regarding Food Safety and Sanitary Conditions in Tikrit City in 2021

By

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Abstract

Background: Low cost public meals were provided by street food vendors and usually characterized by poor hygienic circumstances. Defect in food preparation or storage can lead to food poisoning or illness results from different microorganisms or chemical toxins. **The aim of this study** is to explore the food vendors knowledge regarding sanitary environment of street food preparation in Tikrit city. **Subjects and method:** Cross-sectional study conducted in Tikrit city from 11 November 2021 to 15 March 2022. The study sample enrolled about 220 food vendors in Tikrit city chosen by convenient sampling technique mainly from Al-Zhoor and Al-Arbaeen Streets in Tikrit city. Data obtained from questionnaire and checklist are analyzed manually and by statistical tests. Knowledge score and hygiene assessment score range between (1-1.49) for good knowledge and hygiene (yes) and (1.5-2) for not. Approval of the college and the Family- Community medicine department to collect data and complete the research verbal consent from vendors was carried. **Results:** The results showed that most vendor's age between 26 and 30 years 65 (29.6%), and 202(91.8%) of vendors lived in urban area. Current study found that 106 (48.1%) of street food vendors have low socioeconomic status. About 95.4% of the vendors thought that hand washing important before meals preparation but 14(6.3%) didn't believe that protective thing for example hand gloves, face mask and head caps are important points to maintain food hygiene. Most of the food vendors 197 (89.5%) had enough knowledge about food safety and only 23 (10.5%) had insufficient knowledge. **Conclusions:** Most of Street food vendors had good knowledge about hygienic preparation and maintenance of safe food but they didn't practiced this knowledge during their work.

Keywords : Food Vendors ; Food Safety ; Sanitary Conditions ; Tikrit City

Introduction:

The Food and Agriculture Organization (FAO) and the World Health Organization (WHO) define street foods as "ready-to-eat foods and beverages prepared and/or sold by vendors or hawkers especially in the streets and other similar places"⁽¹⁾. Street food is defined as any food sold in the roads nearby public or private places even hot or cold food. In developing countries as in Iraq, street food is very bad hygienic conditions and low cost.⁽¹⁾

In developing countries, food vending in the street or roads is a thriving business, and it is most common business practices globally in these countries to obtain income in the low income households⁽²⁾.

The National Policy on Urban Street Vendors broadly define a Street vendors as "a person who offers goods for sale to the public without having a permanent built up structure but with a temporary static structure or mobile stall (or head load)"⁽³⁾. Street vendors may be stationary in the specific places or may be moved from area to area.⁽³⁾

The important aspect of food leading illness is improper food processing or inappropriate food handler hygiene. The safety of vended food that sold in the street plays an important role in population life and their culture. World health organization studies revealed that food poisoning outbreaks occur because of incorrect handling of food by food handlers that include inappropriate storage, cooking of food and cross contamination between raw and processed food items and utilizing contaminated cooking utensils and equipment⁽⁴⁾.

Knowledge of safe food handling is very important to decrease foodborne infections⁽⁵⁾. Food hygiene need follow up and monitoring by health teams. Also many other factors aid to improve food hygiene as safe water supply, practices safety measures by workers^(6,7). Most of the street vendors also have poor sanitary practices as they do not have immediate access to water, thus, water challenges could result in street food vendors recycling water for either hand washing or dish washing⁽⁸⁾. Poor sanitary conditions, lack of running water, and inappropriate food cooking or preparation may be associated with many food borne diseases that presented in patients by nausea alone or with vomiting, diarrhea, and abdominal pain⁽⁹⁾. Food poisoning may lead to significant illness and even death⁽¹⁰⁾.

Foodborne illnesses caused by microorganisms multiplication lead to infection, or releasing toxins that lead to disease and even death. Foodborne illnesses can be presented by severe diarrhea or may lead to long lasting complications and death⁽¹¹⁾. More than two hundred fifty different types of bacteria, viruses, parasites, metals, toxins, and prions are associated with human foodborne diseases⁽¹²⁾.

Aim: Evaluate the food safety awareness of street food vendors in Tikrit city and the sanitary conditions of their vending places.

Objectives:

1. Describe food safety conditions of street vendor trollies and their environment
2. Clarify food safety and hygiene knowledge among street food vendors
3. Identify the obstacles that affect the safety and cleanliness of the food
4. Clarify the presence of gastrointestinal infectious diseases among vendors in study group.

Subjects and method

Study design: this study is (cross-sectional) study conducted in Tikrit city from 11th November 2021 to 15th March 2022.

Type of sample: The study include 220 food vendors in Tikrit city chosen by convenient sample mainly from Al-Zhoor and Al-Arbaeen streets in addition to other places in Tikrit city.

Data collection: structured questionnaire used to collect data evaluating the level of knowledge and practice of food handlers regarding food sanitary conditions. The questionnaire data collected by direct interview with street food vendors, also general stool examination was done for vendors.

Data presentation and analysis: Knowledge score and hygiene assessment score range between (1-1.49) for good knowledge and hygiene (yes) and (1.5-2) for not. Data presented by suitable tables and figures using Microsoft office programs

Ethical consideration: At first research topic and methods agreement were obtained from Tikrit medical college/ scientific committee in community medicine department. Agreement was taken from all participants after brief explanation about aim of survey and methods of data collection. Researches were reassured to vendors that all information are private and confidential.

Results :

Socio-demographic characteristics of street food vendors:

From table (1) the results showed that 65 (29.6%) of vendors their age group 26-30 years but only 20(9%) of them are more than 40 years old. About 91.8% of the vendors were from urban areas. The study revealed that 106 (48%) of street food vendors are married. Current study found that 106(48.1%) of street food vendors have low socioeconomic state and only 22 (10%) have high state. The results showed that about 125(56.8%) of the respondents were smoker. The study revealed that about 86 (39%) of the respondents have primary education.

Table (1): Socio-demographical features of vendors

Item	No.	Percent
1-Age in year		
15-20	24	10.9
21-25	51	23.3
26-30	65	29.6
31-35	34	15.5
36-40	25	11.4
	21	9.5

>40		
	Mean age 29.75±8.87	
2- Residence		
Urban	202	91.8
Rural	18	8.2
3- Marital status		
Married		
Single	106	48.0
divorced	9	45.0
	15	6.8
4- Socioeconomic state		
Low	106	48.2
Medium	92	41.8
High	22	10.0
5- smoking habits		
Yes	125	56.8
No	95	43.2
6-Educational level		
Illiterate	30	13.6
Primary school	86	39.1
Secondary school	66	30.0
Higher education	38	17.3

The knowledge of street food vendors to food safety were assessed according to their level of education and showed that 75 (38.1%) of vendors that have good knowledge are of primary school level while only 1 (4.3%) of poor knowledge are of university level, as shown in table (2).

Table (2): Knowledge of food vendors about safe food preparation

Statement	Yes		No	
	No	%	No	%
1- Regular hand washing is important for people health.	210	95.4	10	4.5
2- Hands washing can minimize food pollution.	208	94.5	12	5.4
3- Water alone not enough to clean hands.	184	83.6	36	16.3
4- Wearing apron, facial mask, caps and gloves is important for personal hygiene.	206	93.6	14	6.3
5- Workers shouldn't touch their clothes or hair after hands cleaning.	192	87.2	19	8.6
6- Eating and drinking in the workplace enhance contamination of food .	173	78.6	47	21.3
7- food contamination can be reduced by cleansing of instruments	204	92.7	16	7.2
8-Worker mustn't have long, dirty, infected nails or coloring nail	208	94.5	12	5.4

9- Gloves must be changed frequently.	205	93.1	15	6.8
10- Cleansing instruments and equipment after work can prevent cross contamination.	213	96.8	7	3.1
11- Hot water used to clean equipment can decrease pollution.	199	90.4	21	9.5
12- Any changes in food's odor or color or taste mean spoiled food.	209	95	11	5
13- Re-use of oil is so dangerous for health.	192	87.2	28	12.7
14- Re-heating of cooked foods once or more can associate with food poisoning or contamination.	176	80	44	20
15- Wearing accessories may increase food contamination chances	159	72.2	61	27.7
16- Regular medical examination and investigation for vendors	171	77.7	49	22.2
17- Regular check of food expiry date is very important	209	95	11	5
18- Changing of water is necessary to wash utensils	212	96.3	8	3.6
19- Improve food safety from contamination by covering food	214	97.2	6	2.7
Overall knowledge				
	Freq.		Percentage %	
Yes (1-1.49)	197		89.5	
No (1.5-2)	23		10.5	
Total	220		100	

Current study revealed that 69 (31.3%) of street food vendors have 1.1-5 years' experience and about 39 (17.7%) have experience less than 1 year, among them only 29 (14.6%) have good knowledge about food safety. The results also showed that most of vendors having more than 10 years' work experience have good knowledge 45 (22.7%) and only 4(18.2%) have poor knowledge. the best knowledge (32.3%) was among vendors which have 1.1-5 years' experience, and surprisingly the worst knowledge (18.2%) were among vendors having more than

5 years' experience. Chi square =9.7, correlation=0.2 and p-value=0.02 which mean there is significant association. As in table (3)

Table (3): Food safety knowledge of street food vendors in relation to their work experience.

The knowledge of street food vendors to food safety were assessed according to their level of education and showed that 75 (38.1%) of vendors that have good knowledge are of primary school level while only one (4.3%) of poor knowledge are of university level as in table (4).

Table (4): Relation between knowledge of food safety and vendors' education level.

Overall knowledge	Not educated		Primary		Secondary		University		Total	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Yes (1-4.9)	23	11.7	75	38.1	61	30.9	38	19.3	197	89.5
No (1.5-2)	7	30.4	10	43.6	5	21.7	1	4.3	23	10.5
Total	30	13.6	85	38.7	66	30	39	17.7	220	100

Table (5) represents that about half of the vendors 101 (45.9%) practiced hand washing before food preparation. 180 (81.8%) of participants kept short. The results proved that only 63 (28.6%) of food, vendors wore facemask during food handling while 35.5% of them wore gloves and covered hair. The current study also found that 111(50.4%) of vendors were using utensils without washing all the day. About smoking results showed 89 (40.4%) of vendors smoke during food preparing.

Table (5): Personal hygiene of street food vendors in relation to their education level

Personal hygiene level	Not educated		Primary		secondary		University		Total	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Yes (1-1.49)	8	8.3	37	38.1	26	26.8	26	26.8	97	44.1
No (1.5-2)	21	17.1	49	39.8	39	31.7	14	11.4	123	55.9

Overall knowledge	0-1 years		1.1-5 years		5.1-10 years		>10 years		Total	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Yes (1-1.49)	29	14.6	64	38.3	60	30.3	45	22.7	108	90
No (1.5-2)	9	40.9	5	22.7	4	18.2	4	18.2	22	10
Total	38	17.3	69	31.4	64	29.1	49	22.2	220	100

The environmental conditions that surround the street vending site also observed and revealed that majority 141(64%) of street food vending sites are kiosk, push car or full building which are eligible. Only 78 (35.4%) of vending sites surrounded by clean environment, but about half of them 112 (50.9%) were away from the sun and about 142 (64.5%) were away from flies and animals. Besides, over 48.6% of vendors clean the utensils adequately every time after usage. Disappointingly only 82(37.2%) of them used soap and water in cleaning of utensils. Just above half (61.8%) of the vendors had refrigerator or freezer in the vending site and a good number (71.8%) of them store raw and cooked food items separately. Table (6)

Environmental conditions	No.	%
Clean environment surrounded the vending machine	78	35.4
Vending site on kiosk, push car or full building	141	64
The vending site is stall or cart	88	40
The vending site is away from the sun	112	50.9
The vending site is away from flies and animals	142	64.5
Cooked food separated from raw	158	71.8
Utensils cleaned adequately every time after usage	107	48.6
The food stored in refrigerator, freezer or cooler	136	61.8
Utensils cleaned with soap water	82	37.2
Personal hygiene		
Periodic hand washing of food vendors	101	45.9
Face mask is worn during food handling	63	28.6
Hand gloves worn and exchanged food processing	78	35.4
Food vendors are cigarette smoked during food handling	89	40.4
Using unwashed utensils all day	111	50.4
Nails neat and short	180	81.8
Hair covered at all times	79	35.9
Jewellery worn	73	33.1

Table(6): Environmental conditions and personal hygiene of street food vendors

The study results about the obstacles that interfere with application of safety measures by street food vendors revealed that majority (62.2%) of vendors do not apply the safety measures because they are neglected and do not care about the outcome, while only (7.7%) had no obstacles and they apply all the safety measures. Other vendors do not apply the measures because of financial obstacles, water or electricity supply to the vending site, all results were shown in figure (1).

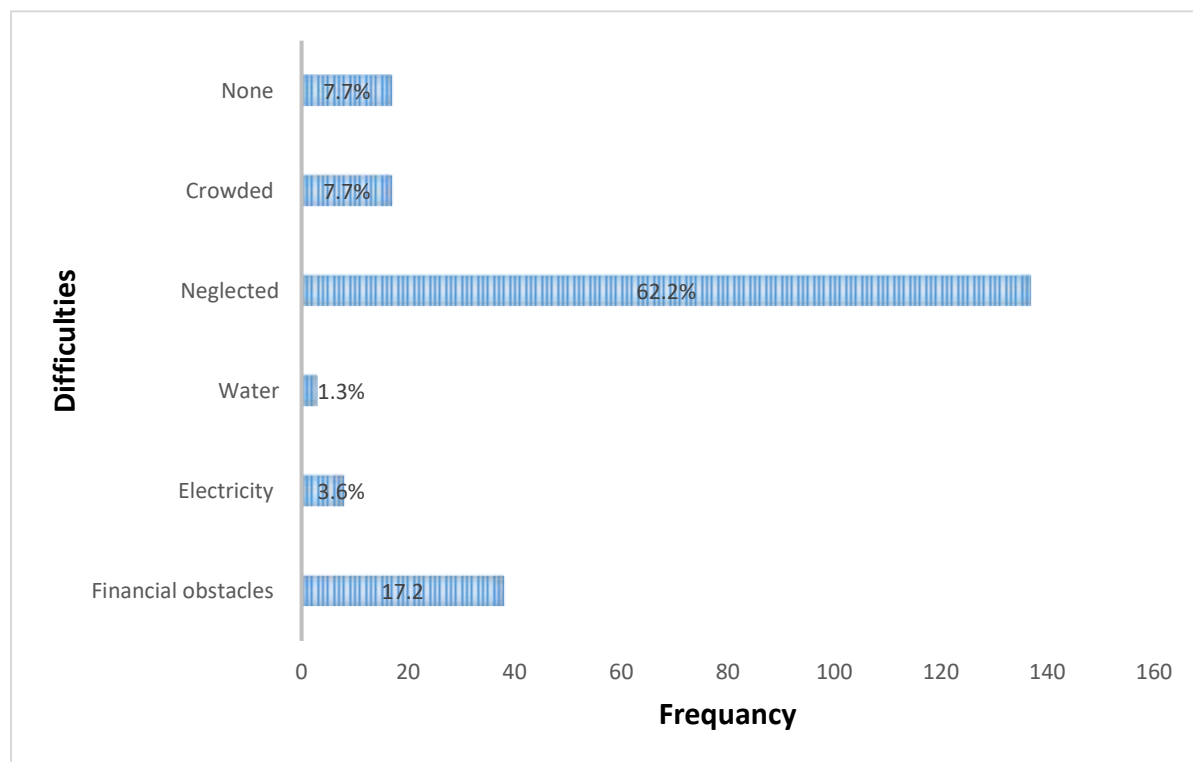


Figure (1) :Obstacles that interfere with application of safety

The general stool examination of 25 street food vendors were revealed that all of them had bacteria in there stool but only 5 had 3+ which mean significant. About the *Candida*, 18 vendors had it in their stool but only 1 had 3+. The parasite *E.histolytica* was found in stool of 2 vendors.

Table (7): infectious microorganisms in stool of 25 street food vendors

Microorganisms	Nil	+	++	+++
Monilia	7(28%)	12(48%)	5(20%)	1(4%)
Bacteria	0(0%)	11 (44%)	9 (36%)	5 (20%)
<i>E.histolytica</i>	23	Positive		
		2 (8%)		

Discussion

The socio-demographic characteristics showed that all of the respondents were males, this contrasted with the results of similar study in (South Africa) which show that the majority of responders were females (59.7%)⁽¹³⁾. This may be interpreted that women in Iraq especially Tikrit city are appreciate societal norms. However, high percent of vendors age (29.6%) were (30- 26) years, this result agreed the study of safe Food Handling Knowledge and Practices of Street Food Vendors in (South Africa) where high frequency (61%) of vendors were (14- 71) years⁽¹³⁾.

This results agreed with other studies in Ghana⁽¹⁴⁾ and India⁽¹⁵⁾, with about seventy percent were also within this age group. About the residence the study found that Approximately, more than two third 202(91.8%) of vendors were from urban areas whereas only 18 (8.1%) of them were from rural areas but all of them work in Tikrit city. The marital status of street food vendors in Tikrit city revealed that 106 (48%) of them are married. While another study in (Brazil) proved that most of road food vendors were unmarried⁽¹⁰⁾. The socio-economic state of street food vendors calculated by WHO social level Scoring method⁽¹⁾ found that 106(48.1%) of street food vendors have low socioeconomic state and only 22 (10%) have high state. Those of higher level may be the owners of the vending site. Smoker vendors has health risks to customers because smoke and other chemical materials will accumulate on the open food. Unfortunately, current study showed that about 125(56.8%) of the respondents were smoker and only 95(43.1%) were not but only 40.4% of them smoke during food preparation. The prevalence of smoking among food vendors was (68.5%) in India⁽¹⁵⁾.

Regarding awareness of street vendors about safe food, 95.4% of surveyed vendors know that hand washing is essential before work and 208(94.5%) had belief that this action will decrease food contamination, but just 5.4% felt that there is no relation between hand washing and safety of food. In comparison with 184(83.6%) be assured that water alone without cleansing material lead to improper hands cleaning. In a study conducted in (South Africa) that 30.8 percent of the participants were followed correct maneuver in hands washing, when they prepare the meals or introduce orders to customers, so they are washing hands with warm water and soap then dry hands with a clean dry towel⁽¹⁶⁾. Lack of training of street food vendors regarding safe and

hygienic food preparation and inadequate clean water supply will increase the problems caused by food vending in the street⁽¹⁷⁾. About personal protective equipment, 14(6.3%) did not know that apron, head caps, facemask, and hand gloves are important for personal hygiene. This results are similar to a study in (Bangladeshi) where 100% of street vendors believed in hand washing before food preparation or handling⁽¹⁸⁾. In this study 204 (92.7%) of vendors had good knowledge about proper handling and washing of cooking utensils, this can reduce food contamination and 213 (96.8%) were knew that cleaning equipment after work can reduce cross-contamination. Similarly, in a study of street food vending knowledge found that 94.5% of them knew that proper instruments cleaning minimize food contamination, while 91.5% of Indian study participants were be cleaned the cooking and serving equipment after they finished work to prevent food contamination⁽¹⁹⁾. About nails, 208 (94.5%) of vendors were know that long , dirty nails lead to food contamination. In (Brazil) found some (46%) of vendors knew that food handing without gloves cause pathogenic food contamination⁽¹²⁾. Using same oils in cooking or frying are carrying health hazards to costumers⁽²⁰⁾. So knowledge of its dangerous effect must be good as in our study, 192 (87.2%) of vendors knew that re-using of oil is unhealthy. About expiry date labels, 209 (95%) vendors knew that it is important to check it. In a study done in (Brazil), found that expiry date of food product was checked by male vendors than females⁽²¹⁾.

The overall knowledge of safe food score of street food vendors is good in 89.5% of them, this results is different from a study done in 2020 in (Jordon) and the reason behind this results may be due to low educational level⁽²²⁾.

The educational state of street food vendors in Tikrit city was 39% of them have attended primary school while only 13.6% are not educated. This education level revealed a significant association with food safety knowledge in that most of the university level (19.3%) had good knowledge while only (4.3%) of them had poor knowledge. Conversely, among non-educated vendors only (11.7%) had good knowledge about food safety while (30.4%) of them had poor knowledge, this result is similar to that in (Vietnam) where the most of street food vendors trained and they had good knowledge then practice food safety and reduce food illnesses⁽²³⁾

Work experience of street food vendors were mostly (31.3%) between 1.1-5 years and about 17.7% have experience less than 1 year, among the latter only 14.6% have good knowledge about food safety while the best knowledge were among vendors having 1.1-5 years of experience, and surprisingly the worst knowledge (18.2%) were among vendors having more than 5 years' experience. This means there is significant association between the work experience and food safety knowledge. A study in (Bangladesh) showed that increased experienced years improving food safety⁽²⁴⁾.

Personal hygiene also an important requirements to ensure food safety, such as washing hands periodically, wearing face mask during handling food, wearing gloves during handling food, smoking during food preparation, the nails must be neat and short, hair must be covered at all times and jeweler not worn because it is nodes for infection⁽²⁵⁾. Although large number of the vendors included in Tikrit study demonstrated a high level of knowledge but not applied safe

food handling practices. About hand washing about 45.9% of the vendors always wash their hands prior to food preparation more 48.6% of vendors clean the utensils adequately every time after usage. In (South Africa), the street food vendors response show better practice that up to eighty eight percent were hand washing preceding food handling. Proper washing to raw food was presented in 82.1% of vendors and about 45.2% of vendors re-used same water many times in washing⁽¹⁰⁾. Another study conducted in (Bangladesh), 86% of the street food vendors were always washed hands before food processing⁽²⁴⁾. The lower percentages of washing hands in our study may be due to inadequate water supply to vending site or because of poor food safety training of street food vendors.

About obstacles that facing street food vendors, (62.2%) of vendors do not apply the safety measures neglecting the risk of not applying it and do not care what the consequences would be, that was the major cause of not applying food safety measures in this study, while only (7.7%) had no evidence of any kind of obstacles and were apply all the safety measures. In addition to that, some of vendors was not apply the measures because of financial obstacles, water or electricity supply to the vending site. In other study, barrier factors included unavailable electricity and water that may interfere with proper food practices⁽²⁶⁾. Financial obstacles may also prevent the vendors from application of food safety instructions⁽¹⁸⁾.

In regard to general stool examination, this study sample was a total of 25 street food vendors. It is done for the presence of *Monilia*, bacteria and *E.histolytica*. majority of them were positive to *monilia* (18) and all of them have bacteria (25) were *E.histolytica* presence almost unremarkable (only 2). That gives a clue to how health and sanitary conditions may effect both the street food vendors as well as costumers, so regular medical screening aids to discover infected and pathogen carriers food handlers to protect consumers from foodborn infection⁽¹⁾. In (Vietnam), the law obligate street food processors or vendors to do annual physical examination, stool and urine investigations to give health permission certificate⁽²⁷⁾.

Conclusions:

- 1- Adequate knowledge 89.5% of street food vendors about safe food handling.
- 2- There were a positive correlation between vendor's educational level and food hygiene and safety knowledge.
- 3- There is significant association between food safety knowledge and practice with work experience of vendors, in which there is higher knowledge in those working more than 5 years.
- 4- Vendors personal hygiene is inadequate during food preparation and handling.
- 5- Many obstacles prevent the vendors from applying the food safety measures such as water supply and electricity, but the major cause of non-applying the measures is neglected vendors.

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