

# Typhoid Fever Preventive Knowledge, Attitude and Practice Among Food Handlers in Mettu University Students' Cafeteria, Southwest Ethiopia, 2022: Mixed Method

Melese Workneh Fego<sup>1,\*</sup>, Engedawerk Tilahun<sup>2</sup>

<sup>1</sup>Department of Nursing, College of Health Sciences, Mettu University, Mettu, Ethiopia

<sup>2</sup>Teaching Comprehensive Specialized Hospital, College of Health Sciences, Wolaita Sodo University, Sodo, Ethiopia

## Email address:

meleseworknehfego@gmail.com (Melese Workneh Fego), engedawerktilahun27@gmail.com (Engedawerk Tilahun)

## To cite this article:

Melese Workneh Fego, Engedawerk Tilahun. Typhoid Fever Preventive Knowledge, Attitude and Practice Among Food Handlers in Mettu University Students' Cafeteria, Southwest Ethiopia, 2022: Mixed Method. *American Journal of Nursing and Health Sciences*. Vol. 4, No. 2, 2023, pp. 35-42. doi: 10.11648/j.ajnh.20230402.11

**Received:** January 20, 2023; **Accepted:** June 21, 2023; **Published:** July 6, 2023

**Abstract:** Background: Typhoid Fever is a group of diseases reported as food borne illness. Food handlers are a person who directly engages and comes into contact with foods. Lack of knowledge, poor food handling practices and negative attitudes are the major risk factors for typhoid fever. The study was conducted to identify level of knowledge, attitude and practice of food handlers towards prevention of typhoid fever in Mettu University student's Cafeteria, 2022. Methods: An institution-based cross-sectional study design supplemented by in-depth interview was employed. A simple random sampling technique was used to select a total of 189 subjects. Data were collected using a structured relevant questionnaire from 5 January to 8 February 2022. Data were entered using epi-data 3.0 and exported to SPSS. The recorded qualitative data were appropriately transcribed and translated. Finally the result was summarized by descriptive statistics and triangulated with the qualitative findings. Result: A total of 180 subjects were participated in the study giving a response rate of 95%. The study shows that 80 (44.4%), 140 (77.8%), 69 (38.3%) had good knowledge, good practice and a favorable attitude towards typhoid fever prevention respectively. The interview finding reveals that work overload, scarce equipment's, poor training, overcrowding, and interrupted water supply were explored as favorable factors for typhoid fever transmission. Conclusion: While the significant numbers had a good practice for typhoid fever prevention, most of them had poor knowledge and unfavorable attitude. Thus, health information, training and regular hygiene promotion is demanded for food handlers in the study area.

**Keywords:** Attitude, Knowledge, Food Handler, Practice, Typhoid Fever Prevention

## 1. Introduction

Typhoid Fever is a group of diseases reported as food borne illness which is a systemic sustained febrile illness caused by certain *Salmonella* serotypes including *Salmonella* (S) typhi, S. paratyphoid A, B and C. It is a life threatening systemic disease categorized by ladder type rise of fever (38-41°C) and frequent diverse abdominal signs. It continued to be a major endemic disease in developing countries including Ethiopia where unsanitary practices are widely reported [1]. Food handlers are a person who directly engages and comes into contact with foods from preparation up to ready for consumption. Fecal contamination with food, water, and fingers, etc., may suggest the importance of feco-oral or human to human transmission. *Salmonella* is one of the most

medically significant bacteria which is gram negative rod shaped, flagellated, motile and facultative anaerobic [2]. After ingestion of food or water typhoid organisms pass through the pylorus and reach the small intestine [3]. Then it penetrates the mucous layer of the gut and travels to intestinal layer through phagocytic micro fold cells and phagocytized. Then, salmonellae disseminate through the body in macrophages via lymphatic and colonize reticulo endothelial tissues like liver, spleen, lymph nodes, and bone marrow where it resides during the incubation period [4]. The onset of sign and symptoms vary after eight to fourteen days dependent on some factors. Widal test helps to detect the presence of salmonella antibodies in a patient's serum [28]. While the occurrence of food borne disease remains a significant health issue in both developed and developing

countries, governments all over the world are investing their maximum efforts to advance the safety of food supply [7].

Worldwide around 21.5 million people have been infected in each year, particularly in Asia, Africa and South America. In the United States, most cases of typhoid fever arise in international travelers, and the usual yearly incidence per a million travelers were 2.2 [33]. In Europe in 2014 the highest incidence rate of typhoid fever was reported by France zero point sixty-five cases per hundred thousand populations). The United Kingdom zero point fifty-five cases per hundred thousand populations), and Denmark (0.48 case per hundred thousand populations). There are seven countries (Cyprus, Hungary, Iceland, Latvia, Malta, Romania and Slovakia) were did not report any case of typhoid fever [34].

In South East Asia reported number of cases is more than 100 per hundred thousand persons per year. In Africa it is estimated about a total of 400,000 cases occur annually with an incidence of 50 per hundred thousand persons per year [38]. In the democratic Republic of Congo between 2004 and 2005 more than 42,500 cases and 214 deaths due to multi-resistant strains of *S. typhi* are becoming increasing worldwide [8]. In Ethiopia the prevalence of typhoid fever was 29% with the incidence rate of 46 cases per 10,000 residents per year [32]. Other study conducted in Addis Ababa, Ethiopia indicated that fifty-five point six percent of the patients were with clinical impression of typhoid fever [13].

In conclusion, typhoid fever has become a major problem with an estimated annual incidence of five hundred forty individuals per hundred thousand populations. Information in the Sub Saharan African region is very serious and requires urgent and rapid action mainly in east Africa Including Ethiopia, which appears to have a high burden of the disease [12]. To sum up, many of the previous study in Ethiopia indicate that typhoid fever was still a common problem in the communities. Thus, this study was intended to identify the gap of knowledge, attitude and food handling practice between food handlers in the prevention and transmission of typhoid fever in in the study area. The result of this research was providing important information and enables them to plan prevention program on typhoid fever infections.

## 2. Methods

### 2.1. Study Setting

This study was employed in Mettu University student's cafeteria. It is one of the higher governmental educational institutions established in 2012. The University located at about 603KMs away from Ethiopia. The university has eight Colleges and forty- two departments and currently about seven thousand seven hundred fifty nine regular undergraduate and about seven hundred twenty one postgraduate students by the year 2020/2021. About 7,326 students are cafe users and 446 students are non-cafe users.

### 2.2. Study Design and Population

An institutional based cross-sectional study design

supplemented by in depth interview was done. While all food handlers employing in the study area were a source population for the study, all food handlers who were selected for the study using simple random sampling method are study population.

### 2.3. Eligibility Criteria

Those volunteer to participate, food handlers who are routinely direct contact with food in the course of preparation and food handlers working in the cafeteria at the time of study regardless of their employment status were included in the study. The sick, mentally ill and unable to hear were excluded during data collection.

### 2.4. Sample Size and Sampling Technique

The sample size was determined using the proportion for poor knowledge, attitude and poor practice of 68% which taken from a study conducted in Assosa Town, Northwest Ethiopia, 2018 [42]. 95% CI, ( $p=68\%$ ), 5% margin of error and 10% non-response rate. Where  $n$ =minimum desired sample size, Proportion (0.68%),  $z$ =significance level at the confidence interval of 95%,  $d$ =margin of error, 0.05. Considering finite formula the total sample size was 189 subjects were selected using simple random sampling technique.

### 2.5. Data Collection Tools and Analysis

Validated a structured questionnaire translated by two local languages experts were administered. The questionnaire were contains socio-demographic characteristics, Knowledge, attitude and practice items supplemented by in-depth. The collected data were checked for completeness and clarity and analyzed using SPSS version 25, and tables, figures, and charts were used to summarize the data. A minimum of eight key informants were interviewed based on data saturation, and the finding is triangulated with the quantitative results.

### 2.6. Ethical Consideration

Ethical clearance with reference number res/28/3/14 was obtained from the college of health sciences, Mettu University, and submitted to the concerned bodies. Formal informed consent was obtained from study participants before actual data collection. Purpose of the study, anonymity and confidentiality of the questionnaire were secured before data collection and participants are set free to exclude themselves at any time from the study. The interview data was kept confidential in the password protected computers. The result was presented and submitted to the study area.

## 3. Results

The current study was conducted to assess knowledge, attitude and practice towards typhoid fever prevention among food handlers in the study area. Out of 189 subjects, about 180 were responded correctly which gives a response rate of

95%. For the qualitative part, a minimum of eight key informants were participated.

### 3.1. Socio-Demographic Characteristics

Out of 180 respondents 64 (35.6%) were males and 116 (64.4%) females. Majority (88.9%) were age group 15-30 years followed by (11.1%) 31-50 years. About 120 (66.7%),

60 (33.3%) of the respondents were married and single respectively. Regarding educational status, 33.9%, (25.6%), had completed secondary school, read and write respectively. The majority of the respondents 90 (50%), and 40 (22.2%), were protestant, and orthodox religion followers respectively. In addition, 173 (96.1%) were an Oromo ethnic group (Table 1).

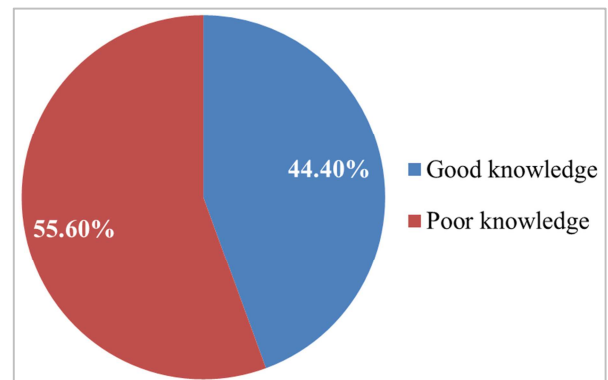
**Table 1.** Socio-demographic characteristics of food handlers in Mettu University Students' Cafeteria, Southwest, Ethiopia, (2022).

Variables	Category	Number (180)	%
Sex	Male	64	35.6
	Female	116	64.4
Age	15-30	160	88.9
	31-50	20	11.1
	51-70	0	0
	Orthodox	40	22.2
Religion	Catholic	41	22.8
	Muslim	9	5
	Protestant	90	50
Level of education	Illiterate	8	4.4
	Read & Write	46	25.6
	Primary	30	16.7
	Secondary	61	33.9
	Preparatory	28	15.6
Ethnic group	Higher educations	7	3.9
	Oromo	173	96.1
	Amhara	4	2.2
	Gurage	0	0
	Tigre	3	1.7
Marital status	Single	60	33.3
	Married	120	66.7

### 3.2. Knowledge of Food Hygiene and Sanitation to Prevent Typhoid Fever

The current study Showed that, out of the total 180 (100%) respondents about 80 (44.4%) had good knowledge and 100 (55.6%) had poor knowledge towards food handling. The Knowledge about typhoid fever transmission and prevention were 47.2% and 50.6% respectively. In addition (83.3%) heard about the means of typhoid fever prevention before the outbreak. According to the respondents, health information was the most common source for typhoid fever prevention methods followed by mass media (55.6%), (40%) receptively. The most commonly mentioned methods of preventing typhoid fever were washing hands with soap before food handling, washing hands after toilet with soap, wearing proper clothing/gowning during food preparation, using soap/detergent while they wash the utensils and wash their cloth frequently, (94.4%), (88.9%), (95%), (58.1%) and (83.3%) respectively. In addition 52.2% and 44.4% of the respondents agreed about the importance of medical checkup for food handlers to minimize typhoid fever transmission and individuals with typhoid fever did not have to work in food and drinking establishments receptively. Furthermore, 55.6%

of the respondents did not believe in that, typhoid carrier person could transmit the disease to the others through improper food handling. However, a majority (83.3% and 61.1%) believe in that typhoid fever is a curable and preventable disease respectively (table 2). These results were also supported by interview findings in that “most food handlers did not work based on the expected standards like improper hand washing technique, cleaning utensils” (participant 1-4).



**Figure 1.** Knowledge status of food handlers, in Mettu University Students' Cafeteria, Southwest, Ethiopia, (2022).

**Table 2.** Knowledge and attitude of food handlers in Mettu University Students' Cafeteria, Southwest, Ethiopia (2022), (N=180).

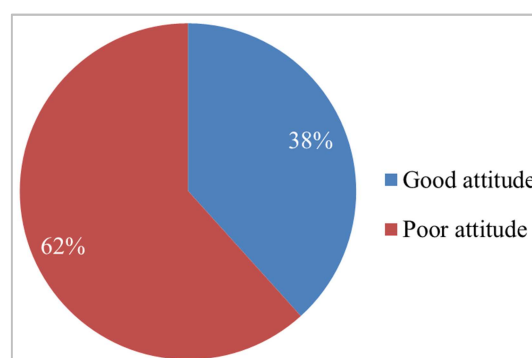
Variables	Response	Number (180)	%
Knowledge about typhoid fever as it is transmitted by poor food handling	Yes	85	47.2
	No	95	52.8
Knowledge about the advantage of personal hygiene of food handling and proper use of handling equipment to prevent typhoid fever	Yes	91	50.6
	No	89	49.4
Certified in food training	Yes	110	61.1
	No	70	38.9
Heard about food borne diseases	Yes	150	83.3
	No	30	16.7
Knowledge about proper use of latrine is important to prevent typhoid fever	Yes	80	44.4
	No	100	55.6
Acquire knowledge about typhoid fever	Yes	145	80.6
	No	35	19.4
If yes through what	Mass idea	72	40
	Health information	100	55.6
	Community meeting	8	4.4
Can mention food borne illness and their treatment	Yes	150	83.3
	No	30	16.7
Could you believe typhoid fever is curable?	Believe	150	83.3
	Don't believe	30	16.7
Are you agree with medical checkup of food handlers to minimize transmission of typhoid fever	Agree	94	52.2
	Strongly agree	80	44.4
	Disagree	6	3.3
Could you believe hand washing with soap and water are helps to prevent typhoid fever?	Believe	170	94.4
	Don't believe	10	5.6
Dis you believe about treating typhoid patient helps as to prevent typhoid fever	Believe	139	77.2
	Don't believe	21	11.7
	Don't know	20	11.1
Could you believe about typhoid carrier person could transmit the disease to others through improper food handling	Believe	60	33.3
	Don't believe	100	55.6
	Don't know	20	11.1
Did you agree about person with typhoid fever don't have to work in food and drinking establishment	Agree	80	44.4
	Strongly agree	40	22.2
	Disagree	60	33.3
	Strongly disagree	0	0
Could you believe about typhoid fever be a preventable disease	Believe	110	61.1
	Don't believe	70	38.9
	Don't know	0	0

### 3.3. Attitude of Food Hygiene and Sanitation

The current study reveals that out of 180 subjects 69 (38%), and 111 (62%) had positive attitude and negative attitude towards food handling to typhoid fever prevention. These results were in-line with the interview results in that, “many of the participants could not follow the proper hygienic requirements i.e. A 25 years old female interview participant shows that, “many of the food handlers did not give attention to the hygiene of their hands and utensils due to work overload” (participant 6). Other a 30 years old female were also explained that, “there is poor supervision, scarce utensils for foods, in adequate training for food handlers, interruption of tap water and overcrowding are explored as variables that facilitate for disease transmission” (participant 5).

The study revealed that, only 16.7% were had a medical checkup certificate. The significant numbers 33.3%, and 22.2% were reported that there are no latrine, and shower at food establishment site, respectively. In addition, a

significant numbers were reported that they did not clean the kitchen daily. The current study also revealed that 5.6% were did not washed their hands before preparing meal, and 77.8% were continued their work while they are sick. Majority 61.1% reported that they haven't a medical checkup in the last six months (Table 3).



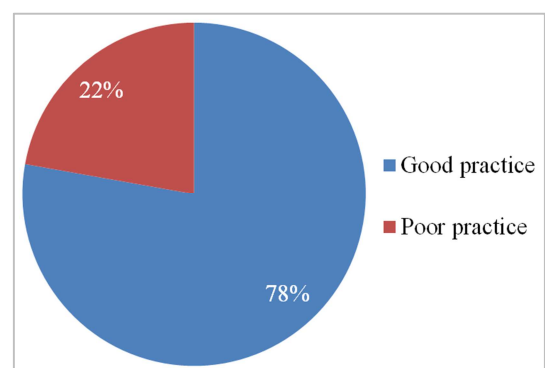
**Figure 2.** Attitude of food handlers on prevention and control measures of typhoid fever in Southwest, Ethiopia, (2022).

**Table 3.** Practice and hygiene level of food handlers on prevention and control measures of typhoid fever, Southwest, Ethiopia, (2022).

Variables	Response	Number	%
Medical check-up certificate for typhoid fever	Yes	30	16.7
	No	150	83.3
Availability of latrine in the establishment	Yes	120	66.7
	No	60	33.3
Availability of shower service in the establishment for food handlers	Yes	140	77.8
	No	40	22.2
Clean the kitchen every day	Yes	118	65.6
	No	62	34.4
Washing hands before preparing food	Yes	170	94.4
	No	10	5.6
Continue working when sick	Yes	40	22.2
	No	140	77.8
Washing hands after toilet	Yes	160	88.9
	No	20	11.1
If yes what do you use	Water only	40	22.2
	Soap	140	77.8
Washing cloth frequently	Yes	150	83.3
	No	30	16.7
Wear proper cloth during food preparation	Yes	171	95
	No	9	5
Cut nail frequently	Yes	160	88.9
	No	20	11.1
Use soap or detergent while washing the dishes	Yes	110	61.1
	No	70	38.9
Medical check-up within six month	Yes	70	38.9
	No	110	61.1
If yes, have check-up certificate	Yes	90	50
	No	90	50
Use of separate handmade (fabric) towel for dish drying	Yes	130	72.2
	No	50	27.8
Contamination risk of dish drying towel	Yes	50	27.8
	No	130	72.2
Three compartments dish washing system	Yes	160	88.9
	No	20	11.1

### 3.4. Practice of Food Hygiene and Sanitation

Out of 180 subjects about 140 (78%) had good practice towards food handling for typhoid fever prevention. The interview data was also supported this result in that, “a 30 years old female participant stated many food handlers are not providing adequate attention to the hygiene of utensils and foods processing” (participant 5). A majority (66.7%) were using pit latrines for feces disposal. In addition 94.4%, 88.9%, 65.6%, 83.3%, and 88.9% reported that they wash their hands before preparing foods, after using the toilet, clean their kitchen every day, wash their clothes frequently and shorten their nail frequently respectively. Furthermore, majority (22.2% and 61.1%) was continuously working when they were sick and did not seek medical checkup within six months respectively. This result was also supported by the interview findings in that, “almost, all of the interview participants explored that food handlers were negligent for the cleanliness of utensils, foods and their clothes and hands (participant 1-7).

**Figure 3.** Practice status of food handlers on prevention and control measures of typhoid fever in Mettu University Students' Cafeteria, Southwest, Ethiopia, (2022).

This study identified level of knowledge, attitude and practice of food handlers in the study area. The result showed that 44.4% of respondents had good knowledge about typhoid fever prevention. This result was lower than a cross-sectional Study conducted in Kaduna state, Nigeria 64.9%

[15]. Similarly, it was lower than study conducted in Assosa Town, northwest Ethiopia 75.8% [42]. However, extremely higher than Study conducted in Nigeria was 7.6%. In this study the level of knowledge about how typhoid fever it transmitted and prevented was low among study participants, 47.2% and 50.6% respectively. But this finding is higher than cross-sectional study conducted in India respondents had poor knowledge in the mode of transmission 33.33% and mode of prevention 36.67% [14]. This result is in line with the qualitative finding in that 30 years old male respondents said that "there were inadequate knowledge and poor practices among food handlers in the study area (*participant 5*).

Out of 180 respondents 150 (83.3%) heard about typhoid fever; this finding is higher than a cross-sectional study conducted in Saudi Arabia 27.9% heard about food borne diseases [16]. This result is supported by in-depth interview in that "30 years old male respondent said that, food can be source of infection if not handled properly. This result is supported by in-depth interview in that, "a 30 years old male respondent said that, food can be main source of infection if not handled properly. This study reveals that 69 (38.3%) of the respondents have good attitudes on typhoid fever prevention. This finding was somewhat higher than descriptive study conducted in Southwestern Nigeria 28.1%. The majority of the respondent believed that, typhoid fever is a treatable and preventable disease 83.3% and 61.1% respectively. This finding was in line with study conducted in tertiary care hospital in India was 86.67% and 66.7% respectively [13]. This result was also similar with a qualitative finding in that, a 27 years old male patient was said that typhoid fever is mainly caused by high exposure of food to bacteria due to inappropriate hygiene, but it is also curable in early detection and management approach (*participants 5*). The present study revealed that 77.8% of the respondents have a good practice about typhoid fever prevention. This finding was higher than study done in Gondar Town reported that 30.3% of the respondents had good practice [44]. This result also higher than a study conducted in Dire Dawa shows 52.4% of food handlers have good practice [45]. It is higher than a study had done in Arba Minch town Ethiopia (32.4%) of food handlers have good practice [46]. The majorities of respondents were had hand washing with soap after toilet use, and before food handling (88.9% and 94.4%) respectively. This finding is supported by in-depth interview findings in that "a 30 years old female respondents' said that, eating and handling food with the unhygienic hand is the main disease causing mechanism due to this we should be alert on precaution mechanism, including hand washing before and after toilet (*participant 4*).

Generally, a significant number of food handlers have a poor practice towards typhoid fever prevention in Mettu University students' cafeteria. In addition, poor hand hygiene, work overload, scarce utensils and poor training are explored by the qualitative findings.

#### *Limitation of the Study*

This study was it doesn't address factors associated with

KAP towards typhoid fever prevention.

## 4. Conclusion

To sum up even though majority of study participants' had poor knowledge and attitude regarding typhoid fever prevention in the study area, the significant number had a good practice for the prevention and control of typhoid fever in the students' cafeteria. However, practice methods of key hygiene activities, such as correct hand washing, practice as prescribed by WHO were observed to be inadequate, which may be a plausible reason for the prolonged transmission of Salmonella Typhi in the University. These findings highlight the fact that outbreak response interventions in the study population, particularly the study area community mobilization and hygiene training were ineffective. Thus, further study will be important by incorporating factors associated with KAP towards typhoid fever prevention in the study area.

## 5. Recommendations

The Environmental health professionals should arrange regular training, supervision and monitoring to the food handlers and additional food handlers required to reduce work overload. Student clinic should provide health information and hygiene promotion activities for food handlers. People with low level of education should be targeted to receive appropriate hygiene, sanitation and health information. Food handlers in the study area could properly wash their hands. The study area students' café should avail all important utensils, facilities like hygiene facilities for food handlers. The federal ministry of health should conduct awareness raising activities like, training for food handlers through collaborating with stakeholders. Researchers who want to conduct further study could include factors affecting typhoid fever prevention.

## Conflict of Interests

The authors declare that they have no competing interests.

## References

- [1] Weyesa JB. Sero-prevalence of Typhoid Fever among Subjects with Acute Febrile Manifestations at Tertiary Care Center, Addis Ababa, Ethiopia. *Int J Sci Res* 2014; 3 (10): 47-55.
- [2] K. Richard, A. Carl, B. Pradip. D. Pates, Food Microbiology encyclopedia, food poisoning outbreaks Publication date 01 Dec 2014.
- [3] Crump J A., Youssef F G., Luby S P., Wasfy M O., Rangel J M., Taalat M., Oun S A., and Mahoney F Estimating the Incidence of Typhoid Fever and Other Febrile Illnesses in Developing Countries. *Emerging Infectious Diseases* may 2012; 9 (5).

- [4] Jaunne M., Willey Linda M, Sherwood Christopher J, Wodverton, Proscott's Prevalence of Salmonella typhi Microbiology 6<sup>th</sup> edition, 2011, P 964-973.
- [5] World Health Organization, a report prepared from World Health Day, Pang Chang J., He H., Kwang J, *Walsh AL, Phiri AJ, Graham S, Gordon MA*, Infection of mice by salmonella enterica, 2010.
- [6] AO. Udeze, F Abdurrahman, IO. Okonko and II. Anibijuwon, Middle-East Journal of scientific Research 2010, 6 (3): 257-262.
- [7] World Health Organization. "Five Keys to Safer Food Manual"; 2006. Available from [http://www.who.int/foodsafety/publications/consumer/manual\\_keys.pdf](http://www.who.int/foodsafety/publications/consumer/manual_keys.pdf). [Last accessed on 2013 Jul 24.
- [8] M. Cheesbrough, District Laboratory Practice for Tropical Countries Part 2" 2nd edition Cambridge University Press, 2006.
- [9] Molbak, JE. Olsen and HC. Wegner, Salmonella Infections" in Medical bacteriology.
- [10] Whitaker, J. A., Franco---Paredes, C., Del Rio, C., & Edupuganti, S. (2009). Rethinking typhoid fever vaccines: implications for travelers and people living in highly endemic areas. *Journal of travel medicine*, 16 (1), 46-52.
- [11] CDC, Typhoid fever, General Information, National center for Emergency and Zoonotic, Infectious diseases, 2010.
- [12] WHO, Typhoid fever, Initiative for vaccine Research Diarrheal Diseases, 2009.
- [13] World health organization (2007) food safety and food borne illness and value chain management for food safety. "Forging links between agriculture and health" cgiar on agriculture and health meeting in who/hq Geneva.
- [14] M. Anuradha and Dandekar RH. Knowledge, Attitude and Practice among food handlers on food borne diseases, India. December 2013, DOI: 10.7439/ijbar.
- [15] Saurabh R. Kubde, Jayashree Pattankar, Prashant R. Koki war. Knowledge and food hygiene practices among food handlers in food establishments. November 2015, DOI: <http://dx.doi.org/10.18203/2394-6040.ijcmph20151572>.
- [16] Hafsat ali Grema, Jacob KwaGa, Mohammed bell, Hassan UmarU onimisi. Assessment of Food Hygiene Knowledge, Attitudes and Practices of Food Handlers in Kaduna State, Nigeria, 2018.
- [17] Ayehu Gashe Tessema, Kassahun Alemu Gelaye and Daniel Haile Chercos, Factors affecting food handling Practices among food handlers of Dangila town food and drink establishments, North West Ethiopia, 7 June 2014.
- [18] Abdul-Mutalib, N.-A., Abdul-Rashid, M.-F., Mustafa, S., Amin-Nordin, S., Hamat, R. A. and Osman, M. (2012). Knowledge, attitude and practices regarding food hygiene and sanitation of food handlers in Kuala Pilah, Malaysia. *Food Control*, 27 (2): 289-293.
- [19] Kasturwar NB, Mohd. Shafee. Knowledge, practices and prevalence of mrsa among food handlers. *Int J Biol Med Res*. 2011; 2 (4): 889 -89.
- [20] Marie-Rosette Nahimana, OlushayoOlu. Knowledge, attitude and practice of hygiene and sanitation in a Burundian refugee camp: implications for control of a Salmonella typhi outbreak. 2016.
- [21] Derek Anamaale Tuoyire. "A Study on Typhoid Fever in Elmina in the Central Region of Ghana. June, 2015.
- [22] Wasiu Olalekan Adebimpe, Ayodeji Oluwaseun Faremi, Abd Wasiu Oladele Hassan. Prevalence and knowledge of Salmonella infections among food handlers: Implications for community in Southwestern Nigeria. March 28, 2019, IP: 10.140.255.113.
- [23] Hui Key Lee, Hishamuddin Abdul Halim wai Lin Thong and Lay Ching Chai. Assessment of Food Safety Knowledge, Attitude, Self-Reported Practices and Microbiological Hand Hygiene of Food Handlers North West Ethiopia. Published: 10 January 2017.
- [24] Ethiop j health Dev. 2010; 24 (1) typhi carrier food handlers may be apotential source of s.typhi transmission.
- [25] Sridhar Rao, P. N. (2009) Widal Test [online] Available at: <http://www.nucrokao.com/nucronotes/widal.pdf> [Accessed 4 January, 2011].
- [26] House D., Chinh N. T., Diep T. S., parry C. M., Wain J., Dougan G., White N. J., Hien T. T., Farrar J. J. Use of paired serum samples for serodiagnosis of typhiod fever. *J. Clin Microbiol*. 2010.
- [27] Oloponenia L. A., King A. L. Widal agglutination test-100 years later: still plagued by controversy. *postgrad Med. J*. 2011., 76: 84.
- [28] Kulkarmi, M. L. and Rego, S. J. (1994) Value of single widal Test in the Diagnosis of Typhiod Fever. [online] available at: <http://indianpediatrics.net/nov1994/1337.pdf> [Accessed 4 January, 2011].
- [29] Zeru K Kumie A Sanitary condition of food establishments in Mekelle town, Tigray, north Ethiopia. *Ethiop J Health Dev* 2007., 21 (1): 3-11.
- [30] Andargie G, Kassu A Moges F, Tiruneh M, Henry K. Prevalence of Bacteria and Intestinal parasite among food-handlers in Gondar town, North West Ethiopia. *J Health popul Nutr* 2008., 26 (4): 451-455. 50 *Ethiop J Health Dev. Ethiop J Health Dev*. 2010; 24 (1).
- [31] Birhanu Areda. "prevalence of typhoid fever in Oromia Region, West Arsi Zone from July 2007 to June 2012". *Tropical Medicine and information health* (2012).
- [32] LJ Brusch. 'Typhoid Fever'. *Medscape* (2017).
- [33] Control ECFDpa. Typhoid and paratyphoid fever (2016).
- [34] Zulfiqar Bhutta., et al. "current concepts in the diagnosis and treatment of typhoid fever". *British Medical Journal* 333.7558 (2006): 78-82.
- [35] EO Ajayi., et al. "Prevalence of Typhoid Fever among different Socio-demographic Groups in Ondo State, Nigeria". *Journal of Applied Life Sciences International* 3.2 (2015): 89-95.
- [36] MJ Vinetx. "Typhoid fever and Its Association with Environmental Factors in the Dhaka Metropolitan Area of Bangladesh". *PLOS Neglected Tropical diseases* 7.1 (2013): e1998.
- [37] Soomro S., et al. seasonal variation and recent status of typhoid fever in tertiary care hospital". *International Journal of Endorsing Health Science Research* 2.2 (2014): 100-103.



- [38] JO O., et al. "Prevalence of salmonellosis among Food Handlers and the Health Implications on the Food Consumers in Lagos State Nigeria". *Journal Medical Microbiology and Diagnosis* 4.2 (2015): 187.
- [39] Sory E. *The health sector in Ghana. Facts and figures.* Accra (Ghana): Ghana health service: 2009. P. 31.
- [40] Allen, M., & Honest, N. (2010). prevalence and constraints of typhoid fever and its control in an endemic area of singida region of Tanzania: Lesson for effective control of the disease. *Journal of Public Health and Epidemiology*, 2 (5), 93-99.
- [41] de Law W, Li VSW, Barker N, Clevers H, kujala p, peters PJ, et al. peyer's patch M cell derived from stem cells require spiB and are induced by Rankl in cultured miniguts. *Mol cell Biol.* (2012) 32: 3639-47.
- [42] Temeche ME, satheesh NE, Dibaba KU. Food safety knowledge, practice and attitude of food handlers in Traditional Hotels of Jimma Town, Southern Ethiopia. 2016.
- [43] Admasu M and Kelbessa W. food safety knowledge, Handling practice and associated factors among food handlers of hotels/restaurants in Assosa Town, Northwestren Ethiopia, *SMJ public health epidemiol.* 2018; 4 (2): 1051.
- [44] Oladoyinbo CA, Akinbule O and Awosika IA. Knowledge of food borne infection and food safety practices among local food handlers in Ijebu-Ode Local Government Area of Ogun State. *Journal of public health and Epidemiology.* 2015; 7: 268-273.
- [45] Gizaw Z, Gebrehiwot M, Teka Z. Food safety practice and Associated factors among of food handlers working in substandard food establishments gondar Town, Northwest Ethiopia. *International Journal of food Science Nutrition Diet.* 2014; 3: 138-146.
- [46] Mihret Getachew. Food safety practice and associated practices among food handlers in selected type of food establishments of Dire dawa, Ethiopia. MPH thesis, Haramaya University. 2016.
- [47] Legesse DE, Tilahun MA, Agedew ES. Food handling practices Associated factors among food handlers in Arba Minch Town public food Establishments in Gamo Gofa Zone, Southern Ethiopia. 2017; 7: 30.