Food safety, Hygiene and Sanitation Status of Micro and Small Food Service Enterprises Managed by Food-Insecure Households: The Case of Lideta Sub-City, Addis Ababa

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Abstract

Food processing and food service are among the sectors organized under micro and small enterprise (MSE). MSE beneficiaries are organized in groups and sell ready-to-eat foods to customers. This prompted the study to assess the food security status of beneficiary households and evaluate food safety practices in food handling and related issues. MSE food handlers in woredas 1, 3, 4, 5, and 10 of Lideta Sub-City, Addis Ababa were purposively considered for this study and respondents were randomly and proportionally selected from the woredas. Data was collected from 255 beneficiaries using questionnaires and analysed by descriptive statistics. Chi-square was used to test significance of association. The majority (76%) of MSE food handlers were female. About 74% of respondents had primary or secondary education, 64% had a monthly income of ETB 2000 or less, and 22% were considered food secure. Mildly, moderately or severely food insecure respondents made up 45%, 27%, or 6%, respectively. The total food handling knowledge, attitude, and practice (KAP) of MSE food handlers were about 78%, 95% and 21%, respectively. The total personal hygiene KAP were about 23%, 97%, 22%, respectively. Water sanitation KAP were about 1 4%, 100% and 75%, respectively. Solid waste was taken away from the neighbourhood twice a week (96%). Only less than half admitted that the toilets around the food service sheds were clean. A few (about 6%) said that there were no toilets at all or, if present, were not functional. About 51% of handwashing facilities had soap and water on them. Generally, the results showed poor knowledge and practice of food handling, personal hygiene and water sanitation, although positive attitude towards improved food safety practice was high. Poor hygiene and sanitary conditions of food handlers in MSE can contribute to outbreaks of foodborne illnesses that may contribute to loss of customers, which, in turn, might worsen the food insecurity status of MSE beneficiaries.

Keywords: Knowledge, Attitude, Practice, Food Safety, Food Security, WASH, Micro and Small Enterprise

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1. Introduction

'Food Security is achieved 'when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life' (FAO 2000). The ultimate goal of food security is to lead a healthy and active life. To achieve the goal, food must, thus, be sufficient, safe and nutritious. Food is anything that is edible and gives nutrients for body building, energy, growth and good health. However, unsafe food causes illness or death. Food safety refers to handling and preparation of food to make it free from toxic chemicals or disease-causing organisms. Safe food is important for health, productivity, growth and poverty reduction (WHO 2002). To this end, FAO (2019) declared that "there is no food security without food safety".

Food can be contaminated with disease-causing microbes due to inappropriate food handling practices, poor personal hygiene, inappropriate waste disposal, and cross-contamination (Grace 2015). About 600 million food-borne illnesses and 420,000 deaths occur each year worldwide due to inappropriate food handling (WHO 2015). Acute diarrhoea is the second leading cause of death in under-five children in developing countries (Yibeltal and Muchie 2021). Prevalence of diarrhoea, caused by contaminated food and water, in children in Ethiopia, is 12% CSA (2017).

The high prevalence of foodborne illnesses, mainly manifested in the form of diarrhoea, requires that every responsible organization and food handler in food service establishments and at home should give attention to food safety through appropriate food handling practices. Food safety is attained by practicing good hygiene during production, preparation, storage, and serving. Equally important are sanitary washing of dishes, and work surfaces, appropriate waste disposal and keeping an environment free from different pests (Wandolo 2016). Foodborne diseases are avoidable by correct food handling and appropriate practices and hygiene (Ramful 2017).

In Ethiopia, government-initiated micro and small enterprises (MSE) are means of financial improvement and business formation for individuals and groups. They are intended to reduce poverty and to ensure food security for

participating low-income groups or households suffering from poverty. Small-scale family food businesses are organized under MSE along with other developmental working sectors dealing with manufacturing, construction, urban agriculture, services, and trade. The food service sector consists of, among others, food processing and food serving establishments, cafés, and small-scale producers of traditional home-packaged food products, locally called '*Baltina* shops'. Previous studies on food safety knowledge, attitude and practice (KAP) of public food establishments and restaurants indicated unsatisfactory KAP in food safety issues (Fasikaw *et al.* 2019; Dejene *et al.* 2017; Mekasha *et al.* 2016). The aim of this study was, thus, to assess the food serving establishments of MSE focusing on food security status of business owners and their practices of food safety, sanitation and hygiene in and around the establishments in selected woredas of Lideta Sub-city.

2. Methods

2.1. Description of the Study Area

Lideta is one of the eleven sub-cities of Addis Ababa with an area of 9.18 km^2. It has nine *woredas* - the smallest administration unit in the city (Fig. 1). The total population of this sub-city is around 271,339, of which 48% are male and 52% are female. MSE food handlers in the sub-city consisted of 149 males and 470 females. The number of food handlers in the selected woredas (1, 3, 4, 5 and 10) was 101, 113, 105, 82, and 82, respectively.

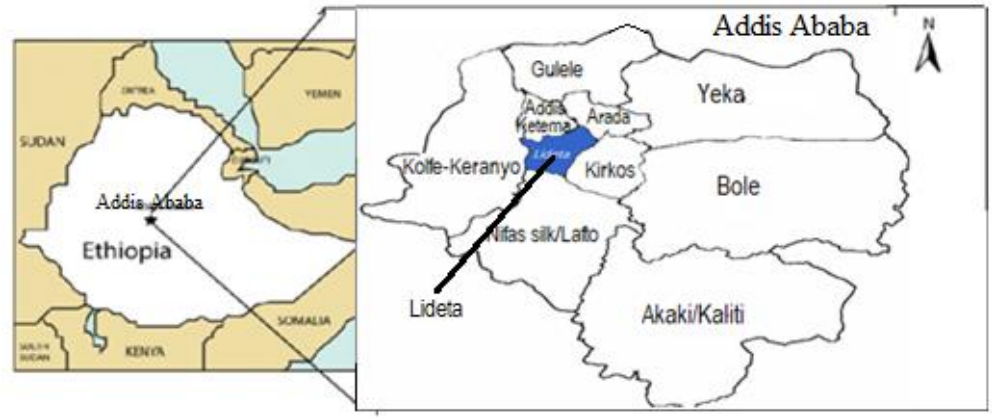

Figure 1. Map of Lideta Sub-city in Addis Ababa

2.2. Sampling

A cross-sectional study design was used to describe the food security status of SME-participating households and food safety, hygiene, and sanitation practices in and around food service sites. Purposive sampling was used to include *woredas* with a high number of food service MSEs. Consequently, five *woredas*, namely *Woredas* 1, 3, 4, 5 and 10 were selected for this study. There were 619 members in the sub-city which were organized under MSE in food service and processing. The sample population was determined with ±5% precision level and 95% confidence interval, as in Yamane (1967). The total sample size was distributed to each selected woreda based on the proportion of the total number of MSEs in food service and processing. A total of 255 food handlers were considered for the study. Pre-tested structured questionnaires and observational notes were used to collect data on food security status and food safety, hygiene and sanitation of food service sites. Questionnaires were used to collect quantitative data from respondents. Discussions with key informants yielded qualitative information.

2.3. Tools and Techniques of Data Collection

Household food security status was assessed using Household Food Insecurity Access Scale (HFIAS) as in Coates *et al.* (2007). MSE's food safety status was evaluated using questionnaires adapted from the FAO guideline (Macías and Glasauer 2014). Questionnaires adapted from UNICEF (2016) were used to assess sanitation and hygiene practices in and around food service sites. Total knowledge, positive attitude and appropriate practices of respondents were calculated as:

Total knowledge, positive attitude and appropriate practice of respondents were calculated as:

$$\text{Percent knowledge} = \frac{\text{Sum of correct responses given by all respondents}}{\text{Total number of responses given by all respondents}} \text{ x } 100$$

$$\text{Percent positive attitude} = \frac{\text{Sum of positive responses given by all respondents}}{\text{Total number of responses given by all respondents}} \text{ x } 100$$

$$\text{Percent appropriate practice} = \frac{\text{Sum of appropriate responses given by all respondents}}{\text{Total number of responses given by all respondents}} \text{ x100}$$

The food safety KAP of food handlers was classified using Bloom's cut-off points for KAP studies, as good (≥80%), moderate (60%-79%) and poor (<60%) (Zelalem *et al*. 2021). The percentage and frequency of household food insecurity, food safety, hygiene, and sanitation practices in and around food service sites were analysed by descriptive statistics. Chi square test was applied at 0.05 level of significance to assess association between multiple variables.

2.4. Ethical Consideration

Verbal informed consent was obtained from MSE respondents. Interview was carried out only with full consent of the person being interviewed. Each respondent was assured that the information provided by her/him would be kept confidential. Accordingly, respondents' details and information obtained therefrom were kept confidential and were used only for the purpose of this study.

3. Results and Discussion

3.1. Description of Food Service MSEs in the Study Area

Discussions with respondents and observations made by the investigator showed the following. MSE beneficiaries who prepared cooked food for on-site consumption were mostly organized in groups of ten; each group worked as a team and members shared profits. They prepared and sold various traditional legume-based sauces (such as *shiro* sauce and *missir* sauce – both legume based sauces), *firfir* (small pieces of traditional leavened bread mixed into sauce), *ambasha* (traditional leavened bread type) with tea, cooked vegetables, spaghetti, macaroni, *ful* (a stew made of cooked fava bean flavoured with various herbs and spices), etc. Customers of these establishments were mostly those who recently came from rural areas and were working as labourers, street vendors, as well as employed or unemployed youth living in the neighbourhood. Prices were relatively lower than those in privately-owned food establishments. Traditional bread (*injera*) with legume-based sauces and cooked vegetables were sold for ETB

25.00, and spaghetti/macaroni, for ETB 28.00 (USD 1 = ETB 34.00, at the time of this study). Meat stew (*qiqil)* and meat sauces were made available only on religious holidays and were priced at ETB 35.00.

A few similar food service establishments served customers who had relatively higher income, including those who work in offices, wood-, steel- or auto-maintenance- workshops in the surrounding. Such food establishments regularly prepared meat sauces, fried mixed visceral organs of slaughtered cattle/sheep and goat (*dulet)* and scrambled egg. They also sold various beverages such as lager and draft beer, soft drinks and bottled water. *Enjera* with legume-based sauces and cooked vegetables was priced at ETB 35.00, spaghetti/macaroni at ETB 30.00, and *dulet* or *qiqil* at ETB 50.00.

Food processing and food service were provided in sheds constructed for the purpose by the sub-city administration. A shed with an area of 120 m^2 was allocated for a team of ten MSE beneficiaries. Monthly rent per shed was rated at ETB 8.50/m^2. Toilets were also constructed and provided for common use. In some areas, there were no toilets at all. In such cases, customers used other toilets in the surrounding for pay. In some areas, food service sheds shared the surrounding with other MSEs for wood and metal works. Food service customers complained of suspended wood dust and varnish/paint odour that originated from those workshops.

Only very few of the food processing and food service sheds had hand washing facilities with a tap, water, and soap. In some, the taps had no water. In others, customers had to use water from jug for hand washing. Some fixed a valve on the bottom portion of a Jerry can as water outlet for hand washing or used metal nails to open and close a hole on it. Some food service providers complained that they did not keep soap at hand washing facilities because customers took the soap away.

Solid waste was kept in plastic bags within the shed was taken away by waste collectors twice a week. In some areas, there was daily collection of solid waste. Liquid waste disposal was through open ditches, or, if covered, manholes were open. People put solid waste in manholes which blocked the

smooth flow of liquid waste. This made the waste flow freely onto the surrounding, forming a breeding site for various insects, such as houseflies which frequently visited food preparation and eating areas. Moreover, the foul odour that comes therefrom made eating in the food service establishments undesirable. Some food handlers threw away wash water through the doors, thereby creating breeding sites for insects just in front of the sheds. In limited areas, underground passages were constructed to remove liquid wastes.

Some MSE beneficiaries complained of certain hurdles in doing their business: shortage of raw materials (such as flour for bread making), frequent power disruptions, disruption of water supply, weak business, disagreement among MSE team members (because some members did not meet their responsibilities during their turn such as cleaning toilets, cleaning and properly using liquid waste ditches) and other similar problems.

3.2. Socio-demographic Information

There were a total of 255 respondents in this study, of which about 76% were female (Table 1). About 59% of the respondents were between 31 and 50 years old and 64% were married. About 68% of the households were female-headed and 66% of the households had four to nine members.

Table 1. Demographic and socio-economic data of respondents

Characteristics		No.	%
Sex	female	193	75.7
	male	62	24.3
Age Group	20-30	62	24.3
	31-40	76	29.8
	41-50	74	29.0
	above 51	43	16.9
House hold size	1-3	75	29.4
	4-6	113	44.3
	7-9	55	21.6
	10 and above	12	4.7
Religion	Orthodox	200	78.4
	Muslim	29	11.4
	Protestant	25	9.8
	Others (Catholic)	1	0.4
Marital status	single	44	17.3
	married	164	64.3
	divorced	31	12.2
	Widowed	16	6.3

Characteristics		No.	%
Occupation	Individual MSE	4	1.6
	MSE team	251	98.4
Educational status	degree	7	2.7
	diploma	15	5.9
	secondary school	70	27.5
	primary school	118	46.3
	illiterate	45	17.6
Monthly income (Birr)	500-1000	66	25.9
	1001-1500	45	17.6
	1501-2000	52	20.4
	2001-2500	12	4.7
	above 2500	80	31.4

3.3. Household Food Security Status

Analysis of HFIAS data showed that about 22% of the respondents were food secure. Food secure households in this study were those who either did not worry at all or worried rarely (one or two times) about not having enough food in the past four weeks (Tables 2 and 3). This was lower than the 28.4% reported from southern Ethiopia (Adimasu *et al*. 2019) but higher than the 9.4% reported from central Ethiopia (Getachew *et al*. 2018). Most respondent households (about 45%) were considered as mildly food-insecure in that they either worried sometimes (three to ten times) or often (for more than 10 times) about not having enough food; or could not eat the food they preferred; or rarely reduced the quality of food they ate in the past four weeks. This was much higher than the 27.2% reported from central Ethiopia (Getachew *et al*. 2018) and the 11.5% reported from Accra, Ghana (Tuholske 2020). In general, statistical tests of socio-demographic parameters showed that monthly income ($p<0.01$), family size ($p<0.01$) and educational status ($p<0.05$) were significantly associated with food security status of households. But age group ($p>0.05$) was not associated with food security status (Table 2).

Table 2. Mean values of food insecurity experience among respondents (255) in the past four weeks

Household food insecurity experience	Occurrence	Frequency		
		Rarely	Sometimes	Often
Anxiety and uncertainty	135 (52.9%)	62 (45.9%)	43 (31.9%)	30 (22.2%)
Reduced quality of food	153 (60%)	65 (42.5%)	46 (30.1%)	24 (15.7%)
Reduced quantity of food	60 (23.5%)	34 (56.7%)	22 (36.7%)	5 (8.3%)
Hunger	14 (5.5%)	10 (71.4%)	4 (28.6%)	0

Note: Rarely (1 or 2 times), Sometimes (3 to 10 times), Often (more than 10 times). Detailed data is given in Appendix 1.

Over a quarter (27%) of the households were moderately food-insecure in that they sometimes or often had to reduce the quality of food they ate; or rarely or sometimes reduced quantity of food they ate in the past four weeks. This status was much higher than the 13% reported from West Abaya, Southern Ethiopia (Shone *et al*. 2017), but lower than the 36% observed in Western Ethiopia (Ermias and Bezatu 2017). A few households (6%) were considered severely food-insecure because they reduced the quantity of food they ate often or experienced hunger rarely or sometimes. This was lower than the 24% reported from Western Ethiopia (Ermias and Bezatu 2017) but comparable with the report from Central Ethiopia (Getachew *et al*. 2018) (Table 3).

Table 3. Level of household food insecurity among respondents

HFIA CATEGORY	Frequency (in %)
Food secure	22.1
Mildly food insecure	44.8
Moderately food insecure	27.0
Severely food insecure	6.1

3.4. Food Safety Knowledge

3.4.1. Food handling knowledge

Knowledge in food handling was measured with respect to separation of raw and cooked foods; signs of thorough cooking; identification of perishable foods to be stored in a cool place; reasons for not eating leftovers not kept in a cool place; and washing raw fruits and vegetables before eating. Over 90%

of the respondents had good knowledge regarding separation of cooked and raw foods, signs of thorough cooking and washing of raw fruits and vegetables before eating (Table 4). The higher knowledge in food handling among the respondents might be due to a prior short training given to MSE members by TVET institutions on food catering and cleanliness (TVET agency, 2010). A study by Lee *et al*. (2017) showed that training in safe food handling had different degrees of impact on food safety knowledge and attitudes of food handlers. However, our respondents said they could not tell which perishable foods required cold storage. Total knowledge in food handling among respondents was moderate (77.7%). This was higher than the 50% reported from Egypt (Allah *et al* (2017), and Brazil (Auad *et al*. 2019).

Table 4. Summary of food safety knowledge among the study population

Knowledge	
Food handling	**Frequency of correct answers**
Reason for Separation of raw and cooked foods	241 (94.5)
Signs of thorough cooking	248 (97.3)
Kinds of perishable foods to be stored in a cool place	203 (79.6)
Reasons to avoid leftovers not kept in a cool place	50 (19.6)
Washing raw fruits and vegetables before eating	249 (97.6)
Total food handling knowledge	*77.7*
Personal Hygiene	
Action for preventing food poisoning from germs that come from faces	82 (32.1)
Key moments for hand washing	35 (13.7)
Total personal hygiene knowledge	*22.9*
Water Sanitation	
Treating unsafe water	35 (13.8)
Total Food Safety Knowledge	**38.1%**

Detailed data is given in Appendix 2a, b and c.

Although cooking stews to the point of boiling for several minutes eliminates disease-causing or spoilage microbes in sauces (Mogessie 1996; 1997), only less than half of the respondents said that they did not consider

boiling as a sign of thorough cooking. Some respondents stated that they determined whether food is well cooked or not by feeling such signs as smell or odour or by the time taken to cook. Fortunately, these sensory properties, though subjective, appear only after sauces are cooked beyond boiling for longer period. Foods such as soup, gravies and sauces should be thoroughly cooked to a complete boil to be safe (NES 2016). Cooking food requires a combination of the required time and temperature for safety; and cooking to boiling eliminates disease-causing microbes from the food. (Brandt 2018). Thus, sauces and stews prepared by our respondents could be considered as safe unless post-cooking contamination occurs.

3.4.2. Personal hygiene knowledge

Knowledge on personal hygiene was assessed in terms of identifying appropriate actions to prevent faecal germs from coming into food and distinguishing key moments of handwashing (Table 4). Only 30-40% of the respondents had knowledge about washing hands after using the toilet or washing baby's bottom or removing faces from home environment. When asked to list the key moments for washing hands, a very small proportion of food handlers (3%) gave one or more of the following answers: before and after eating or preparing food; before serving food; after waking up in the morning and after putting on clothes. Total knowledge in personal hygiene among the respondents was poor (23%). This low level of knowledge is not acceptable, particularly among our respondents, who were given some basic training in catering before they started the food service business. Perhaps, the training stressed more on food preparation than the hygiene part of it. They were given only a short introduction on personal hygiene. Training to food handlers should focus on maintaining good personal hygiene to avoid kitchen contamination.

Food handlers in food-serving establishments have a previous hand contact with disease-causing germs from faces or objects contaminated with faces, they can spread foodborne illnesses in the kitchen environment and subsequently to food (Paulson 2000). Thus, for food handlers, frequent handwashing is the single most important step to protect their clients from contracting disease-causing germs from the food they serve (Mathur 2011).

3.4.3. Water sanitation knowledge

Knowledge in water sanitation among respondents was measured basically on how they treat unsafe water. Water sanitation is guaranteed by taking steps that kill disease-causing microbes found in water. Although boiling and adding disinfectants in the right concentration are the methods of choice to make water safe for drinking (CDC 2020), only 32% of our respondents reported that they boiled water or added disinfectants to it (Table 4). Short of these steps, the water must be discarded as practiced by many respondents (61%). In general, respondents showed poor knowledge in methods of treating water to make it safe (13.8%). This was lower than that 42.2% reported from Tigray, Ethiopia (Abera *et al*. 2020)**.**

3.5. Food Safety Attitude

3.5.1. Food handling attitude

The study considered respondents' attitude in terms of perception on susceptibility to and severity of disease from contaminated food; benefits or difficulties of keeping perishable foods in cool places; reheating leftover foods before eating; and thoroughly washing fruits and vegetables with clean water (Table 5). Positive attitude towards appropriate food handling techniques was quite high (95-100%) among respondents. This was similar to the 92.3% food safety attitude observed in Malaysia by Liyana *et al*. (2018). Very good positive attitude (>90%) was noted among respondents towards the benefit or difficulty of keeping perishable food in cool places despite lack of refrigerators in the food service establishments.

Table 5. Food safety attitude among the study households

ATTITUDE	
Food handling	**Frequency of positive attitude**
Likely to get sick from eating contaminated food?	253 (99.2)
Seriousness illness from eating contaminated food.	241 (94.5)
Good to cold store perishable foods, re-heat left-overs, clean wash fruits and vegetables	241 (94.6)
Not difficult to re-heating left-overs or clean wash fruits and vegetables	234 (91.8)
Average attitude towards food handling	*95*
Personal Hygiene	
Likely to get stomach ache or diarrhea from not washing hands	243(95.3)
Serious to get diarrhea from oneself not washing hands.	244(95.7)
Good to wash hands before preparing food or before feeding a child/eating	254(99.6)
Difficult to wash hands before preparing food or before feeding a child/eating	253 (99.2)
Confidence in washing hands properly?	239 (93.7)
Average attitude towards personal hygiene	*96.7*
Water Sanitation	
Likely that oneself or one's child to get diarrhoea from using unsafe water	254 (99.6)
Serious to get sick from using unsafe water	253 (99.2)
Good to boil water before drinking or using it	247 (96.9)
Difficult to boil water before drinking or using it	220 (86.3)
Average attitude towards water sanitation	*95.5*
Total Positive Attitude	**95.8**

Detailed data is given in Appendix 3a, b and c.

3.5.2. Personal hygiene attitude

Attitude towards appropriate personal hygiene was assessed in terms of likelihood of getting sick from not washing hands, seriousness of sickness therefrom, benefit of washing hands before preparing food or eating, and difficulty to wash hands before preparing food or eating (Table 5). The average positive attitude among respondents towards handwashing was quite good (96.7%). The high level of positive attitude to personal hygiene was comparable to the 94% reported from Malaysia (Mustaff 2017) but much higher than the 76% reported from Asosa town, Ethiopia (Mulugeta and Wogari 2018). Although diarrhoea or stomach ache are caused by

contaminated food or unsafe water, some respondents thought that handwashing had no relation to the illness.

3.5.3. Water sanitation attitude

Attitude towards water sanitation was assessed in terms of likelihood to get diarrhoea from drinking unsafe water, seriousness of the illness therefrom, benefit of boiling water to avoid the illness and difficulty in boiling water. In general, average positive attitude towards safe water was quite good among respondents (95.5%) (Table 5). This was much higher than the 48.5% reported from Tigray, Ethiopia (Abera *et al*. 2020)**.** Nevertheless, there were respondents who believed that diarrhoea came from infected food but not from water; others said that they did not boil water because they did not like the taste of boiled water or it did not quench thirst. Some said boiling water was time consuming and had never thought of this action.

3.6. Food Safety Practice

3.6.1. Food handling practices

Food handling practices were evaluated in terms of cleaning of kitchen surfaces and utensils after preparing meal and appropriate storing of perishable foods. In a kitchen, cleaning means removing dirt from food preparation surfaces such as cutting boards, dishes, knives, utensils, pots and pans by washing surface with soap and hot water and rinsing with clean water (Buffer *et al* 2010). Only 24% of the respondents in this study reported that they washed utensils with hot water and 53% said that they used detergents to wash kitchen utensils (Table 6).

Only about 17% of respondents said that they stored perishable fresh foods in the refrigerator (Table 6). Some respondents stated that they purchased perishable foods just enough for one-time consumption, thereby avoiding the need for storage. About 13% of the respondents admitted that they used storing methods such as keeping cooking pot with sauce in it on the floor for cooling; or cutting raw meat into thinner strips and suspending them on a horizontally stretched rope to dry (jerky). With the understanding that flies and other insects are sources of contamination, some smoked dried lemon skin as indoor insect repellent. Although a good majority (93%) of the

respondents stated that they thoroughly cleaned water storage items, relatively few (57%) treated water to make it safe for drinking.

Table 6. Food safety practice among the study households

Food Handling practice	Frequency of appropriate practice
Appropriate cleaning of kitchen surfaces and utensils after preparing dinner	64 (25.1%)
Appropriate storing of perishable fresh foods	42 (16.5%)
Average practice in food handling	*20.8%*
Personal Hygiene	
Appropriate hand washing	56 (22,2 %)
Water Sanitation	
Appropriate cleaning of water storage item	238 (93.3%)
Appropriate actions to make water safe to drink	145 (56.9%)
Average practice in water sanitation	*75.1%*
TOTAL APPROPRIATE PRACTICE	39.4%

Detailed data is given in Appendices 4a,b and c.

In general, appropriate practice of food handling among the respondents was poor (21%). This was much lower than that reported from North West (Ayehu *et al*. 2014) and Southern Ethiopia (Dejene *et al*. 2017). Practices to protect fresh or perishable foods from various pests and to separate raw foods from cooked foods were markedly poor. It was unfortunate that the very good positive attitude they exhibited was not translated into practice.

3.6.2. Personal hygiene practice

Personal hygiene practice was assessed in terms of step-by-step description of handwashing. Although positive attitude towards handwashing was very high, as noted earlier, it was, unfortunately, not translated into practice as only about 22% of respondents followed appropriate handwashing steps (Table 6). A few admitted that they kept their hands clean by putting on gloves while cooking or removing garbage. Although gloves are believed to protect hands from contamination, they are themselves prone to contamination and are important sources of cross-contamination to ready-to-eat foods. Others admitted that they used soap for handwashing only when the hand was soiled with oil or fat. Handwashing practice among our respondents was lower than the 55% reported for mothers of under-five

children in Debark town (Henok *et al*. 2019) and the 53% reported for cafeteria food handlers in Gonder (Ketseladingle *et al*. 2020) both in Northwest Ethiopia.

3.6.3. Water sanitation practice

About 89% of respondents had water piped in their workplace or yard (Appendix 4c). All respondents collected water for domestic use. Most (62%) said that they used either buckets, barrels or Jerry cans for collecting water. The majority (68%) asserted that they stored water in clean and covered container or jar; 59% treated water to make it safe; and only a few (35%) said that they boiled water or added chlorine to it. About 40% of the respondents claimed that they kept water in the refrigerator to make it safe, while others said that they collected water daily to keep maintain a fresh supply. However, the latter two practices do not help in making water safe because cooling, although it may delay multiplication of microbes, it will not destroy them. Some stated that they used bottled water for drinking or added lemon juice to make water safe. Drinking water obtained from safe sources may become contaminated during storage in the house (Jensen *et al*. 2002). For this purpose, cleaning of storage containers matters most. Significant contamination was reported after water collection from source (Wright *et al*. 2004). Another study showed that even the collected safe water was subjected to frequent and extensive contamination in the household by faecal germs (Clasen and Bastable 2003).

Total acceptable practice of water sanitation among respondents was moderate (75%). This was much higher than the 49% reported from Tigray, Ethiopia (Abera *et al*. 2020)**.** About 88% of respondents did not get any refreshment training in food safety support from health extension workers in a month.

3.6.4. Other sanitary and hygiene practices in SME premises

About 83% of the respondents stated that they took bath once or more than once per week, and 54% did it inside their house. Kulkarni *et al*. (2017) showed that 66.8% of the food handler poor urban women in India were taking bath once in two days. About 96% of the respondents asserted that

they were not happy with the shower provided in their plot and almost all (96%) stated that there was no shower in the workplace (Appendix 5a).

3.6.5. Waste management practices of respondents

About 77% of the respondents said that they collected garbage in plastic bags within the house and all respondents reported emptying them in communal garbage collection bins. This practice was better than what was reported from India where households disposed solid wastes by throwing away outside the house (Kulkarni *et al*. 2017)). Respondents noted that there were not enough communal bins in the neighbourhood (Appendix 5b). About 96% of the respondents said that solid waste was taken away from the neighbourhood twice a week. Almost all respondents felt bad when someone littered waste from containers, and some (48%) believed that such person should be reprimanded or reported to concerned officials. They considered such action as bad habit; lack of respect for the community; or ignorance. They also said that such action would block the drainage systems. About 64% of the respondents expressed dissatisfaction with the drainage system because surface flooding occurred during the rainy season, and there was overflowing of cesspools to the surrounding. Overflowing sewage carries disease-causing germs close to residences and may result in some kind of epidemics. Over 60% said they were willing to pay for garbage collectors. Inappropriate solid waste management was also reported from Asella town, Ethiopia (Gorfnesh *et al*. 2019).

3.6.5. Toilets usage among respondents

About 46% of the respondents stated that they had observed people practicing open defecation in the surrounding and 34% noted that adults usually practiced open defecation (Appendix 5c). About 69% and 71% of the respondents expressed satisfaction with the privacy and safety of the toilet, respectively. Although above 80% of the respondents reported that their latrine was easy to clean, only less than half admitted that the toilet was clean. A few (about 6%) said that there was no toilet at all, or, if present, was not functional. About 51% of the handwashing facilities had soap and water on them. Toilets should provide safety and privacy with lockable doors for shared or public toilets. Studies from Jimma Town, Ethiopia, showed that latrine facility, solid and liquid waste disposal system,

sanitary and physical condition of the kitchen and dining room were poor (Kumera *et al*. 2017). In general, it had been reported that poor WASH was responsible for 60% of the country's disease burden and 70% of the diarrheal diseases (FMoH, 2005).

4. Conclusion and Recommendation

This study showed that being organized as MSE helped most households to curb food insecurity to a mild level at which they only faced anxiety about possible food shortage or sometimes had to compromise quality of food they ate. The low level of food safety knowledge and poor practice and poor hygiene in food service premises could result in foodborne disease outbreaks among consumers and that suggests the need for appropriate training to food handlers. Due consideration should also be given by governmental stakeholders to environmental conditions, such as drainage system, public toilets, and general environmental hygiene of working and food serving sites as these are critical to food safety in MSE food establishments.

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Appendix 1. Household food insecurity access measurement of respondents

		Occurrence		Frequency		
	Experience	Yes	No	Rarely[1]	Sometimes[2]	Often[3]
1	In the past four weeks, did you worry that your household would not have enough food?	135	120	62	43	30
2	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	185	70	86	64	35
3	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	178	77	85	62	31
4	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	43	212	25	12	6
5	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	66	189	33	29	4
6	In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	54	201	35	14	5
7	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	22	233	16	6	0
8	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	19	236	14	5	0
9	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	0	255	0	0	0

[1] Rarely (once or twice in the past four weeks); [2] Sometimes (three to ten times in the past four weeks); [3]Often (more than ten times in the past four weeks)

Appendix 2a: A) Food handling knowledge of respondents

Knowledge	Frequency of correct answers
1: Reason for Separation of raw and cooked foods	
Raw animal foods often contain germs	241 (94.5%)
Other	
Don't know	14 (5.5%)
2: Signs of thorough cooking of soups and stews for safety and readiness to be served	
They are boiling/ well cooked	119 (46.7%)
Other	129 (51%)[1]
Don't know	7 (2.7%)
3: Kinds of perishable foods to be stored in refrigerator or in a cool place	
Meat, offal	30 (11.8%)
Poultry	3 (1.2%)
Fish	
Milk/dairy products	8 (3.1%)
Cooked foods	11 (4.3%)
All	203(79.6%)
Other	
Don't know	
4: Reasons for avoiding eating leftovers that were not kept in a cool place	
Because food is not safe anymore	121 (47.5%)
Germs multiply very quickly and can cause illness or spoilage	57 (22.4%)
Higher temperatures make germs grow faster	12 (4.7%)
Any of the three first response options is correct	10 (3.9%)
Other	54 (21.2%)[2]
Don't know	1 (0.4%)
5: Washing raw fruits and vegetables before eating	
Wash them with clean water	249 (97.6%)
Other	6 (2.4%)[3]
Don't know	
Total knowledge:	77.7%

[1] "By taste, odour, sight, duration of cooking".

[2] "The food will change its aroma or flavour; it will have toxin; it will have unpleasant odour".

[3] "Soak with lemon, vinegar and salt; putting separately until used".

Appendix 2b: Personal hygiene knowledge of respondents

1. Action for preventing food poisoning from germs from faces	Frequency of correct answers
Wash hands (after going to the toilet and cleaning baby's bottom)	99 (38.8%)
Remove faces from the home and surroundings	85 (33.3%)
Any of the two first response options is correct	47 (18.4%)
Other	22 (8.6%)
No answer; don't know	2 (0.8%)
2. Key moments for hand washing	
After going to the toilet/latrine	78 (30.6%)
After cleaning the baby's bottom/ changing a baby's nappy	2 (0.8%)
Before preparing/handling food	77 (30,2%)
Before feeding a child/eating	48 (18.8%)
After handling raw food	4 (1.6%)
After handling garbage	25 (9.8%)
All	13 (5.1%)
Other	8 (3.1%)[1]
No answer	0
Total personal hygiene knowledge:	**22.9**

[1]"I wash hands before and after eating or preparing foods", "before serving food", "when I wake up in the morning" and after putting on my clothes". "Washing hands always or at any time is important".

Appendix 2c: Water sanitation knowledge of respondents

Treating unsafe water	**Frequency of correct answers**
If you know that the water you are going to use for cooking or drinking is not safe or does not come from a safe source, what should you do?	
¨ Boil it	69 (27.1%)
¨ Add bleach/chlorine(none of)	13 (5.1%)
¨ Strain it through a cloth	
¨ Use a water filter (ceramic, sand, composite, etc.)	7 (2.7%)
¨ Use solar disinfection	
¨ Let it stand and settle	1 (0.4)
¨ Discard it and get water from a safe source13/255	156 (61.2%)
- Other	21 (8.2%)[1]
- Do not know	1 (0.4)
Total Knowledge	13.8%

[1] "I will drink it because it does not cause any problem"; "I will inform the responsible organizations or people"; "I will ask for laboratory checking"; "I use it for washing clothes, cooking utensils and equipment"; "use for watering plants, cleaning floor and toilet".

Appendix 3a: Food handling attitude of respondents

Food handling Attitude	It is	It is not	Not sure
Perceived susceptibility:			
Likelihood of getting sick from eating spoiled food?	253(99.2%)	0	2(0.8%)
Perceived severity:			
Seriousness of getting sick from eating spoiled food.	241(94.5%)	4(1.6%)[1]	10(3.9%)
Perceived benefits:			
Goodness of keeping meat, poultry, fish, or cooked food in a cool place.	219(85.9%)	30(11.8%)[2]	6(2.4%)
Goodness of re-heating left-overs before eating or serving them	250(98%)	5(2%)[3]	0
Goodness of washing fruits and vegetables with clean water	255(100%)	0	0
Perceived barriers:			
Difficulty of keeping these foods in a cool box or in the refrigerator	48(18.8%)[4]	206(80.8%)	1(0.4%)
Difficulty of re-heating leftovers before eating or serving them	4(1.6%)[5]	245(96.1%)	6(2.4%)
Difficulty of washing fruits and vegetables with clean water	2 (0.8%)[6]	251(98.4%)	2(0.8%)
Total positive Attitude: 95%			

[1] "Sickness from eating spoiled food is not serious because it is easily curable". [2"] When putting foods for a long time in cool place, nutrient content and flavour will be lost, it is not like the fresh one. In addition, frozen food is not good for health because it will be contaminated while putting it in and out from refrigerator". [3"] Nutrient, aroma or taste of food will be lost". [4"] I cannot do this because I have no refrigerator". [5"] It raises electric bill; it causes loss of food nutrient". [6"] It takes longer time to wash because vegetables need thorough washing".

Appendix 3b. Personal hygiene attitude of respondents

Personal Hygiene Attitude	It is	It is not	Not sure
Perceived susceptibility: Likelihood of oneself or child having stomach ache or diarrhoea, from not washing your hands?	243(95.3%)[1]	5(2%)[1]	7(2.7%)
Perceived severity: Seriousness if oneself or child gets diarrhoea from oneself not washing one's hands	244(95.7%)[2]	2(0.8%)[2]	9(3.5%)
Perceived benefits: Goodness of washing ones hands before preparing food or before feeding a child/eating?	254(99.6%)		1(0.4%)
Perceived barriers: Difficulty to wash ones hands before preparing food or before feeding a child/eating?	0	253(99.2%)	2(0.8%)
Perceived self-efficacy: Confidence in washing ones hands properly?	239(93.7%)	0	16(6.3)
Total positive attitude: 96.7%			

[1]"In my opinion, diarrhoea or stomach ache comes from different things like food poisoning and unsafe water but not related with washing hands". [2]," Diarrhoea or stomach ache is not the symptoms of hand washing"

Appendix 3c: Water sanitation attitude of respondents

Water sanitation Attitude	It is	It is not	Not sure
Perceived susceptibility			
Likelihood of oneself or one's child to get diarrhoea from using unsafe water?	254 (99.6%)	1 (0.4%)[1]	
Perceived severity			
Seriousness of getting sick from using unsafe water?	253 (99.2%)	1 (0.4%)[2]	1 (0.4%)
Perceived benefits			
Goodness of boiling water before drinking or using it?	247 (96.9%)	7 (2.7%)[3]	1 (0.4%)
Perceived barriers			
Difficulty of boiling water before drinking or using it	33 (12.9%)[4]	220 (86.3%)	2 (0.8%)
Total Water sanitation Attitude: 99.6%			

[1]" Diarrhoea comes from poisoned food not from water"; [2]," There is no sickness or diarrhoea from water"; [3]"Boiling water changes the taste of water and when I drink boiled water I'm not satisfied"; [4]" Boiling takes time"; "I do not give attention to it"; "I do not like the taste/flavour of boiled water"; "I have no experience of boiling water".

Appendix 4a: Food handling practice of respondents

Practice	Frequency of appropriate practice
Usual cleaning of kitchen surfaces and utensils after preparing dinner	
• Scrape excess food into rubbish bin	25 (9.8%)
• Wash with hot water	60 (23.5%)
• Wash with detergent	135 (52.9%)
• All the above	35
• In the refrigerator (below 5 °C)/cool box	76 (29.8%)
Appropriate storing of perishable fresh foods	
• In the refrigerator (below 5 °C)/cool box	76 (29.8%)
• Covered (protected from insects, rodents, pests and dust)	-
• Separated from cooked or ready-to-eat foods	18 (7.1%)
• Other	33 (12.9%)[1]
Total Food handling practice:	**20.8%**

[1] "Put on floor (cement)"; "I do not put /store/ such kinds of foods for a long time"; "soaking with lemon, salt, vinegar and use it immediately", "store meat for a short time by cutting into thin strips and drying"; "blanching or cooking by boiling". "smoke dried lemon skin indoors to avoid flies or insects".

Appendix 4b Personal hygiene practice of respondents

Personal Hygiene Practice	Frequency of appropriate practice
Step by step description of handwashing	
a. Washes hands in a bowl of water (sharing with other people) — poor practice	
b. With someone pouring a little clean water from a jug onto one's hands - appropriate practice	11 (4.3%)
c. Under running water — appropriate practice	13(5.1%)
d. Washes hands with soap or ashes— appropriate practice	195 (76.5%)
All except a	7 (2.7%)
Other	
Don't know/no answer	
Total Personal hygiene Practice : 22.2%	

[1]"Use gloves when cooking and remove garbage";

[2] "wash hands only with water or without soap or ashes,but use soap when I touch oil or fat"

Appendix 4c: Water sanitation Practice of respondents

Practice	Frequency of appropriate practice
1. Main source of water for drinking, cooking and hand washing	
Piped water	25 (9.8%)
Piped into dwelling	147 (57.6%)
Public tap/standpipe	4 (1.6%)
Piped into yard or plot	79 (31.0%)
2: Collection of water for domestic use	255 (100%)
3. Collection item	
Bucket	14 (5.5%)
Jeri can	59 (23.1)
Barrel	20 (7.8%)
All (Bucket, Jerry can, Barrel)	158 (62.0%)
Water tank and Jerry can	4 (1.6%)
4. Treating collection item to make it clean	
Yes	255 (100%)
Use of water and soap (clean container)	238 (93.3%)
Other	17 (6.7%)1
5. Description of how water is stored	
Clean container or jar	45 (17.6%)
Covered container or jar	36 (14.1%)
Clean and covered container or jar	174 (68.2%)
6. Treatment of water to make it safe to drink	
Yes	169 (66.3%)
No	86 (33.7%)
7. Practices usually done to the water to make it safer to drink	
¨ Boil it	36 (14.1%)
¨ Add bleach/chlorine	52 (20.4%)
¨ Use a water filter (ceramic, sand, composite, etc.)	57 (22.4%)
- Other	103(40.4%)2
¨ Don't know/no answer	7 (2.7%)
8. Training about food safety from health extension	
None in this month	224 (87.8%)
1-2 times in month	29 (11.4%)
Above 3 times in month	2 (0.8%)
Total Water sanitation Practice:75.1%	

[1]"Wash with warm water"; "ajax (hard soap)"; "ash", "Vernonia' leaves";" brush", "bleach", "smoke with 'olive' splinters"; 2." Use bottled water for drinking"; "add lemon juice to treat water"; "put in refrigerator"; "fetch water daily or change the previous water every day".

Appendix 5a: Bathing practices of respondents

Practice	No. (%)
How often do you have a bath?	
More than once per day	1 (0.4%)
Once per day	24 (9.4%)
More than once per week	179 (70.2%)
Once per week	34 (13.3%)
Less than once per week	15 (5.9%)
Other	2 (0.8%)[1]
Where do you take your showers?	
Inside the house	138 (54.1%)
Inside the private showers	91 (35.7%)
Inside the toilet	6 (2.4%)
Other	11 (4.3%)[2]
Inside work place shower	9 (3.6%)
Are you happy with the shower provided on your plot?	
Yes	9 (3.6%)
No	246 (96.4%)
No shower in work place	246 (96.4%)

[1] "I take shower when water is available"; [2] "I take shower for pay".

Appendix 5b. Waste management practices of respondents

Activities	No. (%)
Where do you dispose your garbage?	
In a plastic bag in the house	196 (76.9%)
in a bin inside the house	59 (23.1%)
Where do you empty them?	
in the communal waste collectors	255 (100%)
Do you think there are enough communal bin in the neighbourhood?	
No	255 (100%)
How frequently is solid waste taken away from the neighbourhood?	
Two times per week	245 (96.1%)
every day	10 (3.9%)
How do you feel when you see someone littering out of the containers?	
It is normal	2 (0.8%)
It is a bad habit	66 (25.9%)
It will block the drainage system	2 (0.8%)
It is a lack of respect for the community	15 (5.9%)
It is because people are ignorant	45 (17.6%)
Other	123 (48.2%)[1]
I don't know	2 (0.8%)
Happiness with the drainage system	
No	164 (64.3%)
Yes	91(35.7%)
Flooding during rainy season	36(14.1%)
Overflowing of cesspools	49(19.2%)
Iron protection is not good	10(3.9%)
Other	69(27.1%)[2]
Willingness to pay for the garbage collection?	
Yes	154 (60.4%)
No	17(6.7%)
It depends on…	71(27.8%)
No answer	13(5.1%)

[1] "I tell him not to do it again"; "This practice causes a problem for all"; "I report to the concerned persons/office"

[2] "It is far from work place"; "has unpleasant odour"; "flies and insects are around"; "no good hygiene"; "The drainage system does not properly operate and it causes overflowing of solid waste".

Appendix 5c. Toilets usage among respondents

Observation	No. (%)
Have you observed people practicing Open Defecation?	
Yes	117 (45.9%)
No	107 (42.0%)
I don't know	31 (12.2%)
Category of the population practicing open defection	
Adult	87 (34.1%)
Teenager	5 (2.0%)
Children	6 (2.4%)
both adult and teenager	24 (9.4%)
Satisfaction with the privacy of the toilet	
Yes	177 (69.4%)
No	64 (25.1%)
toilet is not functional	4 (1.6%)
No toilet	10 (3.9%)
Satisfaction with the safety of the toilet	
Yes	180 (70.6%)
No	58 (22.8%)
There is no answer	3 (1.2%)
toilet is not functional	4 (1.6%)
No toilet	10 (3.9%)
Is the latrine on your plot easy to clean?	
Yes	217 (85.1%)
No	22 (8.6%)
There is no answer	2 (0.8%)
toilet is not functional	4 (1.6%)
No toilet	10 (3.9%)
Is the toilet clean?	
Yes	124 (48.6%)
No	117 (45.9%)
toilet is not functional	4 (1.6%)
No toilet but use by payment	10 (3.9%)
Hand washing facilities situation.	
Washing facility more than 5m far from latrine	
Availability of soap and water	131 (51.4%)
Availability only of water	85 (33.3%)
none	39 (15.3%)