

ORIGINAL ARTICLES**Assessment of household food security and food safety knowledge and practice in Motta town, East Gojjam Zone, Ethiopia**

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¹Corresponding author: mogessie.ashenafi@aau.edu.et**ABSTRACT**

The ultimate goal of food security is to live an active and healthy life. Accessing safe food is, therefore, an integral component of food security. This study was, thus, initiated to assess knowledge and practice of food safety among food insecure household in Motta town, East Gojjam Zone. in terms of household food handling, personal hygiene and water sanitation. Kebele 01 was selected purposively as people of different incomes lived in it. The study households were selected randomly. The study was cross-sectional and information was collected from 366 households using structured questionnaires. Data was analyzed using STATA for windows version 14. Descriptive and inferential statistical tools were used to analyze and interpret data. Based on their experiences of food insecurity as measured by household food insecurity access (HFIA) prevalence, about 83% of the respondents were found to be food insecure at different levels, mildly (40%), moderately (41%) or severely (2%). To cope up with food insecurity, households either reduced the quality (88%) or the quantity of food provided to household members. Knowledge, attitude and practice (KAP) in food handling among the respondents were low (28.5%, 50%, and 32.3%, respectively). Similarly, poor level of knowledge (14%, 12%) and practice (49%, 20%) was observed in water sanitation and personal hygiene, respectively. Thus, household members are at risk of contracting foodborne illnesses. In general, most of the study households suffered from food insecurity and lack of appropriate practices in food safety.

Keywords: Food handling, food insecurity, KAP, personal hygiene, water sanitation,

INTRODUCTION

Food security, as defined by FAO (2002), exists 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. This concept, when applied to the household level, focuses on individuals within households as the focus of concern (FAO 2003). Although food security aims to assure access, by all people, to sufficient food for an active and healthy life, the food must be safe from various contaminants, particularly the biological ones (Hanning et al., 2017). One of the sustainable development goals, SDG 2, aims at, among others achieving food security, which is possible if available food is free from disease-causing agents (Ene, 2020). At household level, food safety refers to all measures taken to ensure that food is safe for human consumption.

Food is a product that is rich in nutrients required by all living organisms, including micro-organisms, and may be exposed to contaminations either by water, air, dust, sewage and many other sources (Adams et al., 2016). At household level, the major factors that determine food safety are appropriate food handling, water sanitation and personal hygiene. These factors avoid contamination with disease-causing microbes and prevent illness. Food handlers may carry some foodborne microbes on their hands, mouth, skin and hairs and play a major role in transmitting pathogens from contaminated sources to ready to eat foods (Akabanda et al., 2017). Improper and unhygienic food handling and preparation techniques can contaminate food by microorganisms that can cause illness (Abdi et al., 2020).

Each year, as many as 600 million people in the world fall ill, among which 420,000 die after consuming contaminated food (WHO 2021). Globally 844 million people do not have safe water supplies for drinking purpose and a large proportion of people suffer from unsafe drinking water at home (WHO 2018).

The food safety system in developing countries, especially in Africa, is weak making it difficult to protect human health (Grace 2015). In Ethiopia, all forms of diarrheal diseases and intestinal parasites are directly or indirectly related to food (Fenta and Nigussie, 2021),

Appropriate knowledge and practice in food handling, water sanitation and personal hygiene in food insecure households is crucial to prevent contamination of food by disease-causing organisms or their toxins (Sharma et al., 2020). Several studies indicated that poor knowledge and practice in food safety was prevalent in food insecure households in different parts of Ethiopia, namely South Wollo Zone (Endris et al., 2020), Awi Zone (Tarekegn and Ashenafi, 2021), Eastern Tigray Zone (Negash et al., 2022), East Shewa Zone (Alemu and Ashenafi, 2022) and Addis Ababa (Alemayehu et al., 2023). The aim of this study was, therefore, to assess the food

insecurity status and evaluate the food safety knowledge, attitude and practice among households in Motta town, East Gojjam Zone.

MATERIALS AND METHODS

Description of the study area

Motta is a town in East Gojjam Zone of Amhara Regional State. The town is located at 37° 52' E 15° 5' N with an elevation of 2,487 meters above sea level. During the study period (2020), Motta town consisted of four kebeles and had a population of 46,916.

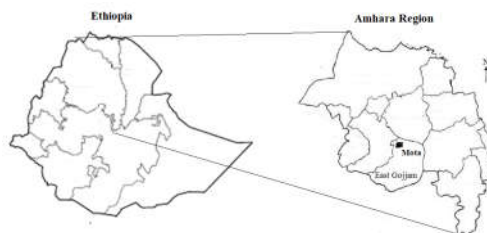


Fig. 1. Map showing the location of Motta town in East Gojjam, Amhara Region

Sampling and sample size determination

The study was a cross-sectional study. One kebele, inhabited by a mix of households with varying incomes was purposively selected. The size of sampled households was calculated as in Yamane (1967). With 5% non-respondent rate, the total size of sampled households was 366. Study households were selected randomly.

Data collection

Structured questionnaires were used to collect data from respondents. The questionnaires were translated into Amharic for simplicity of communication between enumerator and respondent. They were pre-tested to check for validity and reliability. In addition, field observation was carried out to validate collected data. All questionnaires were checked for completeness before releasing respondents at the end of the interview.

Experience-based assessment method as in Coates et al. (2007) was used to determine household food insecurity status. Thus, the household food insecurity access (HFIA) prevalence, which is also validated for Ethiopia (Gebreyesus et al., 2015) was calculated. The HFIA assessment consisted of nine questions (Coates et al., 2007). Each of the nine questions was asked with a recall period of four weeks to address the occurrence and frequency of occurrence. Occurrence parameters ranged from never having experienced conditions related to food insecurity to experiencing hunger rarely (one to three times), sometimes (three to ten times) or often (more than ten times). Food insecurity experiences were expressed as anxiety or uncertainty about having enough food, or reduction of quality or quantity of food or experiencing hunger.

Households that experienced none of the food insecurity conditions or experienced uncertainty only rarely were considered as food secure. Mildly food insecure households worried about not having enough food sometimes or often, and/or had to reduce quality of foods they ate but only rarely. Moderately food insecure households reduced quality of food more frequently and/or quantity of food rarely or sometimes. Severely food insecure households cut back on meal size or number of meals often, and/or experienced hunger (Coates *et al.* 2007).

Household Food Insecurity Access was determined by using the formula:

$$\frac{\text{Number of households with HFIA category}}{\text{Total number of households with a HFIA category}} \times 100$$

Household food safety knowledge, attitude and practice (KAP) were assessed with respect to food handling, personal hygiene and water sanitation according to Macías and Glasauer, (2014).

Total KAP percentage among respondents was calculated as

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

Total positive attitude among respondents was calculated as

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

Similarly, appropriate practice was calculated as

$$\text{Percent of practice} = \frac{\text{Sum of appropriate responses given by all respondents}}{\text{Sum of all responses given by all respondents}} \times 100$$

Data analysis

Data was analyzed using STATA for windows version 14. Descriptive and inferential statistical tools were used to analyze the data on food insecurity access and on KAP of the households on food safety water sanitation and personal hygiene. Values of food safety KAP of respondents were classified as good ($\geq 80\%$), moderate (60%-79%) and poor (<60%), using Bloom's cut-off points for KAP studies (Destaw *et al.*, 2021).

Ethical Consideration

The nature and aim of the survey were explained to respondents and verbal consent to participate was obtained. Confidentiality of the information obtained from respondents and anonymity of respondents were maintained.

RESULTS AND DISCUSSION

Characteristics of the respondents

The majorities (68%) of the participants were female (Table 1). Unmarried male respondents worked as daily laborers and prepared food for themselves whenever possible. The female respondents worked, prepared food, and cared for children. Most of them were considered as poor because they were either widowed or divorced, had children and did not have jobs. Women in poor households, in Ethiopia, are exposed to several economic, social and environmental risks and vulnerabilities (Naqvi *et al.* 2019). Among the respondents, over 43% of the participants were older than 51 years, and those in the productive age (20-40 years old) made up 37% of respondents. The majority of the households (77.3%) had a family size of one to four. About 58% were married and about 71% had no job or worked as daily laborers. About 18% could not read or write but about 46% had tertiary level education. About 35% of respondents had no income at all or earned less than ETB 1000 per month (USD 1=ETB 35, at time of study). Only 21.6% earned more than ETB 3,500 monthly.

Table 1. Socio economic and demographic status of the study population (n=366)

Variables	Category	No.	%
Sex of household head	Male	121	33.1
	Female	245	67.9
Age of household head	20-40	134	36.6
	41-50	74	20.2
	Above 51	158	43.2
Family size	1-4	283	77.3
	5-6	72	19.7
	Above 7	11	3.0
Marital status	Single	66	18.0
	Married	165	45.1
	Divorced	81	22.1
	Widowed	54	14.8
Occupation	Government	45	12.3
	Private	61	16.7
	Daily labor/ No job	260	71.0
Educational status	Illiterate	65	17.8
	Read and write	133	36.3
	Diploma	125	34.2
	Degree and above	43	11.7
Income	500-1,000	60	16.4
	1,001-2,000	50	13.7
	2,001-3,500	107	29.2
	Above 3,500	79	21.6
	No income	70	19.1

Household Food Insecurity Experiences

Our study households experienced food insecurity at varying levels and frequencies during the previous four weeks prior to the study period (Table 2). About 62% of the households felt anxiety or

uncertainty about the sufficiency of food for the household during the previous four weeks at various frequencies. Such feelings, if they occur only rarely, may not be considered as signs of food insecurity. More frequent anxiety and uncertainty due to food insecurity severely affect subjective well-being which measures life satisfaction as well as positive and negative feelings (Kornher and Gutu, 2021). Dissatisfied groups or societies are more likely to become involved in civil conflict and political protest (Kim, 2018). About 88% compromised the quality of food they ate either by not being able to eat the preferred food, or by eating a limited variety of food, or foods they did not like to eat. This is a coping strategy to provide usual

meals to household members. However, lack of diversity in meals is an underlying cause of undernutrition, mainly due to lack of micronutrients. About 78% had to reduce the quantity of food they ate either by eating smaller meals than they needed or eating fewer meals in a day because there was not enough food in the household. This would result in energy deficiency in household members. Hunger was experienced by 7% of the households because there was ever no food to eat of any kind in the household, or a member went to sleep at night hungry, or went a whole day and night without eating anything because there was not enough food in the household.

Table 2. Food insecurity experiences in study households (n=336)

Household food insecurity experience	Occurrence	Frequency		
		Rarely	Sometimes	Often
Feeling of anxiety and uncertainty	61.5%	63.6%	25.3%	11.1%
Reducing quality of food HH member eats	88.1%	51.1%	22.1%	15%
Reduced quantity of food	78.1%	44%	20.2%	13.9%
Experience of hunger by HH member	7.1%	16.1%	2.45%	0.27%

Rarely (1 or 2 times), sometimes (3 to 10 times), often (more than 10 times)

Based on HFIAS classification, the households in our study were classified into four categories of food security status (Table 3). Food secure households consisted of 16.8% of the study households. About 40% were mildly food insecure and about 41% were moderately food insecure. Severely food insecure households made up only 2.3% of the respondents (Table 3). The level of food insecurity in our study was much higher than that observed in Bahir Dar (Husein et al, 2018) and Southwestern Ethiopia (Usman and Callo-Concha, 2021), and Asayita, Afar (Abdu et al., 2018). However, it is much lower than observations from Adigrat, Tigray (Negash and Ashenafi, 2021) and Sidama and Hadya (Dejene and Cochrane, 2021)

Table 3. Frequency of HFIA categories in study households.

Category	Frequency
Food secure	16.8%
Mildly food insecure	40%
Moderately food insecure	40.9%
Severely food insecure	2.3%

Food safety KAP

Food safety was assessed in terms of knowledge, attitude and practice in food handling, personal hygiene and household water sanitation.

Food handling knowledge

Less than half of the respondents did not know the importance of separating cooked food from raw food and could not identify signs of thorough cooking. Average knowledge in food handling, in general, was poor (25%) (Table 4). Knowledge with respect to washing raw fruits and vegetables before cooking

was, particularly poor (12%). Similar studies reported poor knowledge in food handling from different parts of Ethiopia (Endris et al., 2020; Tarekegn and Ashenafi, 2021; Negash et al., 2022; Alemayehu et al., 2023). Traditionally, preparation of sauces requires heating to boiling for over 30 minutes, and this temperature and time combination is high enough to eliminate any possible contaminating microorganism that may arise from sauce components (Ashenafi, 1997).

Food handling attitude

Respondents' attitude towards proper food handling was moderate (60%). Between 70% and 80% of respondents believed that contaminated food could cause illness and the illness could be serious (Table 4). Less than half of respondents did not think that it was good to keep perishable foods in cold places or to re-heat leftover foods. They had their own beliefs regarding cold storing of foods or handling leftovers. Some were unscientific and others were practical issues. The following were some of the perceptions as given by different respondents.

- "Unless foreign materials, such as chemicals, enter into food, it is not contaminated by itself. Illness from contaminated food is not serious; if it occurs, drinking some local liquor can cure it".
- "If food is kept in the refrigerator, it forms some bacteria by itself that may cause illness".
- "It is difficult to keep perishable foods in cold places because we do not own refrigerator".
- "Reheating left-over food is not good because it causes heartburn".

- "Reheating leftover foods is not practical for us because we do not afford firewood for re-heating. We do not use electric power for cooking. Firewood is our only source of heating. It is even difficult to get firewood for cooking."

- "Fruits and vegetables are clean by themselves. Washing them with water speeds up their spoilage. So we just shake off any small particles by hand before eating them".

Table 4. Household Food handling KAP among respondents (n=366)

Food handling knowledge	%
Reason for separation of raw and cooked foods	49%
Signs of thorough cooking of soups and stews for safety and readiness to be served	40%
Kinds of perishable foods to be stored in refrigerator or in a cool place	12%
Reasons for avoiding eating leftovers that were not kept in a cool place	20%
Washing raw fruits and vegetables before eating	5%
<i>Average Knowledge</i>	25%
Food handling attitude	
Likelihood of getting sick from eating contaminated food	82%
Seriousness of sickness from eating contaminated food	72%
Goodness of cold keeping perishable foods; re-heating left-overs; washing fruits and vegetables with clean water	49%
Not difficult to keep cool perishable foods; re-heat leftovers; wash fruits and vegetables with clean water	34%
<i>Average attitude</i>	60%
Food handling practice	
Appropriate cleaning of kitchen surfaces and utensils	33%
Storing perishable fresh foods	33%
<i>Average practice</i>	40%

Food handling practice

Average practice in food handling was assessed among respondents in terms of cleaning of kitchen surfaces and utensils using detergent and clean water; and storing perishable fresh foods. Corresponding to the poor knowledge in food handling, appropriate practice was also low (40%). (Table 4). Only a small proportion of respondents (20%) washed kitchen surface and utensils with detergent. Most respondents (58%) covered perishable foods to protect them from insects, rodents, pests and dust. Although this practice might protect foods from further contamination, initial bacterial contaminants might multiply in the stored food at ambient temperatures to reach a high level, which can spoil the food or cause disease when the food is consumed (Hoel, 2017).

Personal hygiene knowledge

Assessment of personal hygiene focused on actions taken to prevent food poisoning from germs that come from feces and hands. Proper handwashing technique and handwashing with soap at appropriate times can reduce fecal contamination of hands (Otsuka et al., 2019). Respondents were not aware of the actions that were required to prevent foodborne infections that came from germs in feces (23.9%) (Table 5).

Table 5. Household personal hygiene KAP among respondents (n=366)

Personal hygiene knowledge	%
Action for preventing food poisoning from germs from feces	19%
Key moments for hand washing	28.7%
<i>Average Total Knowledge</i>	23.9%
Personal hygiene attitude	
Likelihood of oneself or child having stomachache or diarrhea, from not washing your hands	61.7%
Seriousness of oneself or child getting diarrhea from oneself not washing one's hands.	69.1%
Goodness of washing ones hands before preparing food or before feeding a child/eating	85.5%
Not difficult to wash ones hands before preparing food or before feeding a child/eating	86.6%
<i>Average total attitude</i>	75.7%
Personal hygiene practice	
Step-by-step description of hand washing	20.4%
<i>Average total practice</i>	20.4%

Knowledge of respondents in identifying the six key moments of handwashing was poor (3% - 31%) Among the actions for preventing food poisoning from germs that come from feces, 23% of the respondents knew about hand washing after toilet use or before preparing food (18%). Average knowledge of personal hygiene among the respondents was only 20%. Those, who did not know about appropriate hygienic practices gave the following reasons for not following the rules.

- "We believe in God and God's will always protects us. So we do not get sick. We get sick only when God gets angry with us.

- Habesha (aka an Ethiopian) does not die from foodborne diseases".

- "We Wash our hands when we wake up in the morning and after food".

Creation of awareness in personal hygiene to food handlers could be a big step to fight against foodborne infections. A campaign against dirty hands had resulted into good knowledge of hand washing in Lagos, Nigeria (Ogwezzy-Ndisika and Solomon 2019).

Personal Hygiene Attitude

A good proportion (62%-85%) believed that not washing hand could result in diarrhea or other symptoms; the illness would be serious; or it was good to wash hands before preparing food or feeding a child (Table 5). Average positive attitude of personal hygiene among the respondents was moderate (76%). However, over 96% believed that it was not important, or it was difficult to wash hands. The following were the perceptions as given by various respondents.

- *"We do not think that handwashing and diarrhea are connected".*
- *"Whether I wash my hand or not, my child will not be ill".*
- *"No one got sick or died from not washing hands.*
- *"My handwashing practice does not protect my child from getting sick; God always protects my child from getting sick"*
- *"If we wash our hands or not, nothing different happens. We have lived for many years without caring much about hand washing".*
- *"We always touch the mud or soil and eat food without washing our hand and we are still alive".*
- *"Habesha does not die from germs".*

Personal Hygiene Practice

Personal hygiene practice was assessed in terms of step by step description of hand washing. (Table 5). Average appropriate handwashing among respondents was very poor (20%). Most washed hands by dipping in a bowl containing water. Some washed their hands using soap or ashes (about 20%). Mothers' practices related to hygiene was low as reported by Dad and Habib (2017).

Water and sanitation KAP

Water and sanitation knowledge

Knowledge in water sanitation was assessed in terms of ways of treating unsafe water. Only about 14% of the respondents knew about treating unsafe water by boiling, by using bleach (chlorine) or by discarding unsafe water (Table 6). Although most respondents allowed water to stand and settle, this practice would not avoid disease-causing microbes that remained suspended in the water. In our case, respondents commonly distinguished safe water from unsafe one, by pouring some into a transparent glass and observing if small particles were suspended in it. Waterborne germs cannot be seen by the naked eye unless the number is high enough to reach detectable level of turbidity. Lower level of knowledge on water sanitation was also reported by other workers (De1 and Taraphdar, 2016). Low knowledge of water and sanitation contributed to waterborne diseases (Chaulagain and Parajuli. 2018)

Table 6. Household water and sanitation KAP among respondents (n=366)

Water and sanitation knowledge	%
Treating unsafe water	13.7%
<i>Average Knowledge</i>	13.7%
Water and sanitation attitude	
Likelihood of oneself or child having stomachache or diarrhea, from unsafe water	68.3%
Seriousness of oneself or child getting diarrhea from oneself not washing one's hands.	79.5%
Goodness of boiling water before drinking or using it	20.5%
Not difficult to boil water before drinking or using it	32%
<i>Average attitude</i>	50.1%
Water and sanitation practice	
Safe source of water for household for drinking, cooking and hand washing	48%
Treating collection item to make it clean	96.4%
Correct description of how water is stored	39.9%
Treatment of water to make it safe to drink	41%
Appropriate actions usually done to the water to make it safer to drink	21.2%
<i>Average practice</i>	49%

Water and Sanitation Attitude

Attitude in household water sanitation was evaluated in terms of likelihood and seriousness of illness caused by drinking unsafe water; goodness of boiling water to make it safe for drinking and difficulty in boiling water to make it safe. Although a good proportion of respondents (69% - 80%) believed that unsafe water could likely lead to a serious illness, about 80% did not think that boiling water was good and about 70% thought that boiling water was difficult (Table 6) for the following perceptions as given by various respondents.

- *"God always protects us from anything. Water couldn't cause diarrhea".*
- *"Diarrhea from water is not serious because we have been drinking water for a long time and it has not been the cause of any diarrhea or illness since the source of water was piped into yard".*
- *"Boiling water is not good because it changes the taste of the water".*
- *"Since we use firewood for cooking, we cannot afford to buy firewood for boiling water".*
- *"We do not boil the water because water is naturally clean; and wood smoke and ash particles would contaminate the water and make it worse".*

Average positive attitude in water sanitation was poor (50%).

Water and Sanitation Practice

About 48% of the respondents collected water from safe sources. And over 96% treated water collection items to make them clean (Table 6). About 40% of the respondents appropriately stored water in a clean and covered container or jar. As drinking water obtained from 'safe sources may become contaminated during storage in the house (Jensen et al. 2002), our respondents had a good practice in that they cleaned water storing items by washing them using *Vernonia* leaves (locally known as 'grawa') which have antimicrobial property (Olusola-Makinde et al., 2021). For this purpose, cleaning of storage containers matters most. Another study showed that even the collected safe water was subjected to frequent and extensive fecal contamination in households (Clasen and Bastable 2003). Due to improper practice of treating water to make it safe for drinking and other issues, average good practice among the respondents was, in general, poor (49%).

CONCLUSION

Since over 43% of the respondents were moderately or severely food insecure, assistance in the form of safety-net programs is required. Although slightly more than half of respondents had relatively moderate attitude in food safety and personal hygiene, knowledge and practice in food safety issues were very limited. Training programs targeted at knowledge and practices regarding general household food safety issues are recommended.

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