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RESEARCH ARTICLE

FOOD SAFETY KNOWLEDGE AND PRACTICE AND FOOD INSECURITY EXPERIENCE AMONG HOUSEHOLDS WITH UNDER-FIVE CHILDREN IN URBAN INJIBARA AND RURAL KESSA CHEWESA, AWI ZONE, ETHIOPIA

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ABSTRACT: Unsafe food and drinking water mostly affect under-five children in food insecure households. This study assesses the food safety and water and sanitation knowledge, attitude and practice (KAP) of mothers along with household food security status in an urban and rural setting in Awi zone, Ethiopia. Questionnaire-based data was collected on socio-demographics, food handling, personal hygiene, water and other sanitation issues from randomly selected 238 mothers in both settings. Household food security status was also assessed. Data was analyzed by using SPSS and results were analyzed using descriptive and inferential statistics and multiple regression analysis was applied to determine the influence of certain socio-economic variables on household food security status, food safety, water sanitation and hygiene KAPs. Food insecurity among urban and rural households was 64% and 89%, respectively. Knowledge, positive attitude and appropriate practice in food handling was poor (<60%) in urban as well as rural households considered in this study. Similarly average KAP in personal hygiene was also poor (<60%). About 82% of urban respondents had good practice of washing hands with appropriate detergents, though they did not perform this during the key moments of washing hands. Average KAP in water sanitation was also generally poor (60%) although a large proportion of urban respondents treated water for safety using different methods (96%) and did not practice open defaecation (86%). This study showed that respondents' KAP on food and water safety was unsatisfactory. Thus, under-five children who were fed with home-prepared complementary foods were particularly predisposed to food and water-borne diseases.

Key words/phrases: Food insecurity, Household food safety, KAP, Water and sanitation.

INTRODUCTION

According to WHO (2002), the term food safety indicates the assurance that when food is consumed in the usual manner, it does not affect human health and wellbeing. However, WHO (2015) indicates that 600 million people

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globally fall ill and 420,000 die after consuming unsafe food each year. Poor knowledge, attitude, and practices (KAP) of hygiene, lack of basic sanitary facilities, and negligence in safe food handling are major causes of poor sanitary conditions of food and drinking water at the household level (WHO, 2003). A considerable proportion of food-borne diseases are caused by contamination from food handlers (Mudey *et al*., 2010). In developing countries, mothers are usually the food handlers in homes and are responsible to ensure food safety at the household level. It is, thus, important to evaluate the status of their food handling knowledge and practices. Food-borne diseases are causes for diarrhoeal deaths among under-five children and since many food-borne illnesses arise from home kitchens, the responsibility to avoid food-borne child death rests upon mothers (Sudershan *et al*., 2008).

Unsafe food containing harmful bacteria, viruses, parasites, or chemical substances is responsible for more than 200 diseases ranging from diarrhoea to cancer (WHO, 2015). Various epidemiological data indicate that a substantial proportion of food-borne diseases are attributable to improper food preparation practices at consumers' homes (WHO, 2003). Solid waste disposal, sanitary conditions and hand washing facilities, lack of knowledge of food safety, traditional beliefs, inadequate food safety laws, weak health extension service, and lack of health education about food safety and hygiene affect the utilization component of food security.

Improving access to safe drinking water and adequate sanitation, as well as promoting good hygiene, are key components in the prevention of diarrhoea. It was also indicated that access to adequate sanitation reduced the incidence of disease and brought relative comfort and ease to the daily routine of toilet use, thereby enhancing the quality of life (Sibiya and Gumbo, 2013). Faecal transmitted disease-causing organisms of microbial or parasitic nature result in poor water, sanitation, and hygiene (WASH) which is the main cause of intestinal diseases, including cholera and diarrhoea (Walker *et al*., 2013). These diseases are the second leading cause of morbidity and mortality among children under the age of five and the leading cause of death in sub-Saharan Africa (Getu Debalkie *et al*., 2021). Among the major causes of morbidity and mortality in Ethiopia, water-borne diseases, associated with unsafe water, are foremost (Bayeh Abera *et al*., 2018). This study was, thus, aimed to assess household food security status and evaluate KAP of food safety and WASH among mothers of under-five children in urban Injibara and rural Kessa Chewesa, Awi zone, Ethiopia in 2020.

MATERIALS AND METHODS

Description of the study area

The study was carried out in Injibara, Awi zone, Amhara region, Ethiopia, which is located at 342 km north-west of Addis Ababa, the capital city of Ethiopia. It is the administrative centre of the Awi zone in the Amhara region. Injibara consists of 11 rural kebeles and an urban centre (also named Injibara) consisting of six kebeles. Kebele is the smallest administrative unit in the country. Kessa Chewesa kebele is located adjacent to the urban centre towards the south east. The town has a total population of 35,846 and 7,169 households (Bayeh Abera *et al*., 2018). The study was conducted in March and April 2020.

Sample size and sampling

The study was cross-sectional and questionnaires were used to collect qualitative and quantitative data. For this study, Kebele 02 was randomly selected from Injibara town to represent an urban setting. Of the neighbouring rural kebeles surrounding Injibara town, Kessa Chewesa was randomly selected. There were a total of 612 households with under-five children in the selected two kebeles. Sample size was determined as in Yamane (1967).

$$n = \frac{N}{1 + N(e)^2}$$

$$\text{Sample size} = \frac{612}{1 + 630\ (0.05)^2} = 238$$

A total of 238 sample households were randomly selected from among 630 households with under-five children and proportionally allocated to the study kebeles. Data was, thus, collected from 130 households from Kebele 02 of urban Injibara and 108 from rural Kessa Chewesa.

Tools and techniques of data collection

Data from respondents were collected using questionnaires by interview. Household food security status was assessed using Household Food Insecurity Access Scale (HFIAS) as in Coates *et al*. (2007). Household food safety status was evaluated using questionnaires adapted from the FAO guideline (Macías and Glasauer, 2014). WASH questionnaires (UNICEF/WHO, 2016) were translated to and administered in the local

vernacular for easy communication with respondents.

Total KAP percentage among respondents was calculated as in Macías and Glasauer (2014):

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

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

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

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 Destaw *et al*., 2021).

Data was analyzed using SPSS for Windows version 22. Descriptive statistics was used to analyze the data.

Ethical considerations

Verbal informed consent was obtained from respondents, researcher and enumerators promised to keep confidentiality regarding respondents' details. Interview was carried out only with the full consent of the person being interviewed. Each respondent was assured that the information provided by her/his would be kept confidential and used only for this study.

RESULTS AND DISCUSSION

Socioeconomic and sociodemographic characteristics

About 99% of the respondents consisted of females in both urban and rural households. Mothers, aged 20–40 years made up about 70% of the rural and urban households (Table 1).

Table 1. Socio, economic, and demographic status of the study households.

		Residence	
	Total (238)	**Urban (130)**	**Rural (108)**
Characteristics	**%**		
Sex (Mothers/ caregivers)			
Female	98.7	98.5	99.1
Mothers/caregivers age group			
20–40	70.2	69.3	71.3
40 and above	29.8	30.7	28.7
Marital status			
Married	87.8	82.3	94.4
Divorced	11.8	17.7	.6
Religion			
Christian	97.1	94.6	100
Muslim	2.5	4.6	0
Family size			
2–5	83.6	93.8	71.3
>5	16.4	6.2	28.7
Education			
Illiterate	13.9	2.3	27.8
Read and write	54.2	43.1	67.6
Diploma and above	31.9	54.6	4.6
Occupation			
Governmental	32.4	53.1	4
Private	8.8	15.4	9
Daily labour	25.6	23.8	27.8
Farming	33.2	7.7	63.9
Monthly household income (ETB*)			
500–2,000	46.6	23.8	74.1
2,001 and above	53.4	76.2	25.9

*ETB, Ethiopian Birr (1 USD=ETB 36 at time of study)

Most respondents in both settings were married, followers of Christianity and families consisted of two to five members, although about 29% of rural families had greater than five members. About 98% of urban respondents could either read and write or had diploma level education or higher, whereas 28% of rural households were illiterate. About 69% of urban households worked in government offices or private businesses, whereas 92% of rural households were mainly farmers or, to a lesser extent, daily labourers. About 76% of urban households had a monthly income of ETB 2,000 or above. The monthly income for 74% of rural households was less than ETB 2,000.

Household food insecurity access (HFIAS)

Around 45% of urban and 55% of rural households experienced food insecurity at varying extents during the four weeks prior to the study period

(Table 2). A much higher proportion of rural households (89%) and, to a lesser extent, urban households (35%), 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. Similarly, 78% of rural households and only 19% of urban households compromised the quantity of food they ate in the last four weeks either by eating smaller meals than they needed or eating fewer meals in a day because there was not enough food in the household. Hunger was experienced by 26% rural and 5% of urban households during the previous four weeks prior to this study. Similar to the observations in Nigeria (Abu and Soom, 2016) and Yemen (WFP, 2012), and Ethiopia (Ahmed Edris *et al*., 2020), our study also showed that more rural households experienced different levels of food insecurity than did rural households.

Table 2. Mean values of household food insecurity experience among urban and rural respondents in the past four weeks.

			Frequency*		
Household food insecurity experience	**Locality**	**Occurrence**	**Rarely**	**Sometimes**	**Often**
Anxiety and uncertainty	Urban (130)	44.6%	38.5%	6.2%	0
	Rural (108)	55.6%	63.9%	31.5%	0
Reduced quality of food	Urban (130)	34.6%	29.7%	4.6%	0
	Rural (108	88.9%	72.2%	17%	0
Reduced quantity of food	Urban (130)	19.2%	15.4%	3.1%	0
	Rural (108	77.8%	71.3%	7.4%	0
Hunger	Urban (130)	5.4%	5.4%	0	0
	Rural (108	25.9%	24.1	0	0

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

Food safety KAP of respondents

Food safety knowledge among respondents was assessed in terms of food handling, personal hygiene, and household water sanitation (Table 3).

Knowledge

Assessment of knowledge in the basic principles of food handling showed that the knowledge level of respondents from both urban and rural settings was generally very poor (24% and 22%, respectively) (Table 3). Poor level of knowledge was observed in reasons for separating raw foods from cooked foods (43% and 25%, respectively). Raw foods, particularly those of animal origin, and the juices that drip from them may contain disease-causing microbes, which can be transferred to other foods during preparation and storage (WHO, 2006). For this reason, it is important to separate raw foods from cooked foods during preparation or storage.

Knowledge level in identifying signs of thorough cooking was also poor (<35% in both cases). Thorough cooking of foods ensures microbial safety because of its effectiveness to kill almost all disease-causing microbes. Therefore, cooking sauces should go to the point of boiling (Mogessie Ashenafi, 2012), which is the only direct sign of thorough cooking. Poor level of knowledge was also noted among urban and rural respondents in storing perishable and left-over foods at cool places and washing raw vegetables and fruits before eating (below 40%). Keeping perishable foods at ambient temperatures in the tropics will allow disease-causing or spoilage microbes to grow in them. Storing perishable and left-over foods by holding them at cooler temperatures slows down the multiplication of microbes in them (WHO, 2006).

Knowledge of personal hygiene principles among the respondents was assessed based on appropriate hand washing and ways to avoid germs coming from faeces. Knowledge of personal hygiene was also very low among urban (25%) and rural households (21%). Disease-causing microbes are widely found in soil, water, animals, and people. Hands, wiping cloths, and utensils may carry these microbes and can easily transfer to food and cause diseases (Table 3).

Knowledge of the importance of treating unsafe water for drinking was also considered under household food safety and was also found to be low (25%) among urban and rural households. To prevent illness from contaminated water or fluids, water, particularly that collected from unsafe sources, should be disinfected before use by boiling or adding disinfectants in the right concentration (CDC, 2020a). Treating drinking water and maintaining sanitation have been among the efforts to reduce diarrhoeal disease in developing countries (Zwane and Kremer, 2007). Average knowledge in food safety components was less than 25%.

Knowledge of the respondents in this study in general food safety was much lower than that observed in Malaysia (Dora-Liyana *et al*., 2018) but comparable to a similar observation from Dangla, Ethiopia (Ayehu Gashe *et al*., 2014).

Table 3. Knowledge of respondents in food safety components.

Food handling knowledge	**Urban (130)**	**Rural (108)**
Reason for separation of raw and cooked foods	56 (43.1%)	27 (25%)
Signs of thorough cooking	43 (33.1%)	30 (27.8%)
Perishable foods to be stored in a cool place	10 (7.7%)	2 (1.9%)
Reasons to avoid leftovers not kept in a cool place	40 (30.8%)	20 (18.5%)
Washing raw fruits and vegetables before eating	7 (5.4%)	39 (36.1%)
Average knowledge of food handling	***24%***	***21.9%***

Personal hygiene knowledge		
Appropriate hand washing	39 (30%)	22 (20.4%)
Ways to avoid sickness from germs from feces	26 (20%)	24 (22.2%)
Average knowledge of personal hygiene	***25%***	***21.3%***
Water sanitation knowledge		
Treating unsafe water	33 (25%)	27 (24.8%)
Average total knowledge	**25%**	**24.8%**
Average knowledge	**24.7%**	**22.7%**

Attitude

Attitudes are emotional, motivational, perceptive, and cognitive beliefs that positively or negatively influence the behaviour or practice of an individual (Macías and Glasauer, 2014). Thus, the practice of food safety by respondents is influenced by their attitude towards food safety. Attitude in this study was assessed in terms of respondents' perceived susceptibility to food borne diseases, perceived severity of such diseases, perceived benefits of implementing food safety measures, and perceived difficulty in implementing such measures.

Table 4. Attitude of respondents in food safety components.

Food handling attitude	**Urban (130)**	**Rural (108)**
Perceived susceptibility: Likely to get sick from eating contaminated food	4 (3%)	35 (32.4%)
Perceived severity: Serious to get sick from eating contaminated food.	52 (40%)	42 (38.9%)
Perceived benefits: Good to cold store perishable foods, re-heat left-overs, clean wash fruits and vegetables	39 (30%)	34 (31.5%)
Perceived barriers: Not difficult to re-heating left-overs or clean wash fruits and vegetables	43 (33.1%)	25 (23.1%)
Average positive attitude to food handling	***26.5%***	***31.5%***
Personal hygiene attitude		
Perceived susceptibility: Likely to get stomach ache or diarrhoea, from not washing hands.	24 (43.1%)	38 (35.2%)
Serious to get diarrhoea from not washing hands.	55 (42.3%)	41 (38%)
Perceived severity: Good to wash hands before preparing food or before feeding a child/eating.	57 (43.8%)	43 (39.8%)
Perceived barriers: Not difficulty to wash hands before preparing food or before feeding a child/eating	59 (45.4%)	45 (41.7%)
Have confidence in washing hands properly	57 (43.1%)	41 (38%)
Average positive attitude to personal hygiene	***43.5%***	***38.5%***
Water sanitation attitude		
Perceived susceptibility: Likely to get sick from using unsafe water	49 (37.7%)	43 (39.8%)
Perceived severity: Serious to get sick from using unsafe water	54 (41.5%)	20 (18.5%)
Perceived benefits: Good to boil water before drinking or using it	36 (27.7%)	5 (4.6%)
Perceived barriers: Not difficult to boil water before drinking or using it	28 (21.5%)*	(8.3%)*
Have confidence in boiling water before drinking or using it	51 (39.2%)	9 (28.7%)
Average positive attitude to water sanitation	***33.5%***	***20%***

* For most respondents, boiling water before drinking was difficult for the following reasons: "Water is already clean/safe"; "Fuel to boil water is expensive"; "Boiled water does not taste good".

Rate of average positive attitude towards food handling was low (<40%) both in urban and rural households (Table 4). Similarly, average positive attitude towards implementing personal hygiene measures was also low (around 40%) among urban and rural respondents. The positive attitude rate for water sanitation was also <35% in both settings.

Generally poor attitude in treating water to make it safe for drinking was observed among respondents from both settings (<40%). The major reasons for not treating drinking water by boiling were the belief that the water was already clean/safe or that boiled water did not taste well or fuel wood for boiling water is expensive. Positive attitude towards implementing food safety measures among respondents was comparable to an observation from Egypt (Allah *et al*., 2017), but lower than that from Debarq, Ethiopia (Henok Dagne *et al*., 2019) and Saudi Arabia (Ahmed *et al*., 2018).

Practice

Practice of food handling was measured in terms of cleaning utensils and kitchen surfaces and storing perishable foods at cooler temperatures. Less than 20% of urban and rural respondents had appropriate practice in cleaning kitchen surfaces and utensils. Similarly, personal hygiene practice regarding ways of washing hands using water and soap or ash was good among urban respondents (82%). Washing hands frequently with soap and water prevents microbes from spreading around the kitchen and, consequently, to foods (Paulson, 2000). Hand washing with soap is one of the most effective steps taken to prevent diarrhoea (Curtis and Cairncross, 2003). Coverage of basic hand washing facilities in sub-Saharan Africa in 2015 was less than 50%. Of these, about 60% were in urban areas (Nguyen and Campbell, 2017). Hand washing practice observed in our study is comparable to the findings from Viet Nam (Takanashi *et al*., 2009) but lower than the observation from India (Hothur *et al*., 2019). Microbes are mainly transmitted by hand and hand washing is, therefore, the most important step to prevent food poisoning during food preparation (CDC, 2020b).

Average practice in cleaning water collection and storage items was poor (<10%) among urban and rural respondents. Water storage container is as important as the primary source of water with respect to water safety. A report showed that even if poor rural communities obtained drinking water from a 'safe' source, it could become contaminated during storage in the house (Jensen *et al*., 2002). Thus, thorough cleaning of storage containers is important to keep the water safe. A study identified significant

contamination after water was collection from the source (Wright *et al*., 2004). Even if water from improved sources was free from faecal contamination, it was found in a district of Sierra Leone, that collected safe water was subjected to frequent and extensive faecal contamination in the house (Clasen and Bastable, 2003).

About 96% of urban respondents treated water to make it safe for drinking using various methods. Water treatment practice was poor among rural respondents (35%). According to CDC (2020a), the two dependable ways of treating water are boiling and treating with the right concentration of chlorine. Water from municipal sources is believed to be already treated with chlorine before distribution. Point-of-use (household) water treatment is one of the major effective measures to make water safe (Jones, 2015). Average appropriate practice of our respondents in treating water to make it safe was higher than that observed in Andra Pradesh, India (Hothur *et al*., 2019). Use of water disinfecting tablets, which are available for purchase in many parts of the country, is a dependable way of making water safe to drink (Clasen *et al*., 2006).

Table 5. Practices of respondents in food safety components.

Food handling practice	**Urban (130)**	**Rural (108)**
Cleaning of kitchen surfaces and utensils after preparing dinner	21 (16.2%)	17 (15.7%)
Storing perishable fresh foods	20 (15.4%)	15 (13.9%)
Average practice of food handling	**15.8%**	**14.8%**
Personal hygiene practice		
Correct way of washing hands	34 (26.2%)	29 (26.9%)
Material used for hand wash?		
Water and soap or ash	106 (81.8%)	54 (50%)
Reasons for washing hands?		
To prevent infection	85 (65.2%)	50 (46.2%)
To maintain hygiene	41 (31.5%)	48 (44.2%)
Average appropriate practice of personal hygiene	**51.2%**	**41.8%**
Water sanitation practice		
Collect water from safe source	87 (67%)	0
Clean storage item every day	8 (7.6%)	2 (1.9%)
Store water in clean and covered container	14 (10.6%)	6 (5.6%)
Take appropriate action to make water safer to drink	124 (95.5%)	37 (34.3%)
Do not dispose waste within premises	18 (13.8%)	86 (79.6%)
Do not practice open defaecation	112 (86.2%)	21 (19.4%)
Average total water sanitation appropriate practice	**46.9%**	**23.5%**

Urban households (86%) disposed waste within premises. Poor management of waste leads to contamination of surface water and has an impact on public health (Singh and Priya, 2018). Moreover, blocked drainage lines can lead to flooding that may damage water supply infrastructure and contaminate domestic water sources (Kvitsjøen *et al*., 2021).

Rural households, on the other hand, mainly practiced open defaecation (81%). In Ethiopia, an estimated 35 million people defaecated in the open because they did not have access to any form of toilet (Jones, 2015). Practice of open defaecation would result in a heavy disease burden caused by food and water-borne disease-causing organisms (Jones, 2015).

CONCLUSION

Poor knowledge, negative attitudes, and poor practices on food safety and WASH were common amongst the residents in the study kebeles. These negative attributes predispose urban and rural residents, in general, and under-five children, in particular, who are fed with home-prepared complementary foods, to food and water-borne diseases. The study indicated a need for a family-centred extension education in food and water safety.

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CONFLICT OF INTEREST

We declare that there is no conflict of interest.

FT collected data and was involved in the research design and analysis of data. MA was involved in research design, analysis of data and wrote the manuscript.

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