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FOOD SAFETY PRACTICES AMONG HOMEMAKERS IN THE SAGNARIGU MUNICIPAL OF NORTHERN GHANA

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ABSTRACT: *This study investigated household food safety practices (HFSPs) employed by homemakers in Sagnarigu Municipality of Northern Ghana. It explored their practices related to food hygiene, food storage, food preparation, handling and cooking, serving, and disposal of food. The study employed a stratified random sampling technique to survey 300 participants across six communities in the study area. Questionnaires were the primary data collection tool, supplemented by observations and unstructured interviews. The study revealed that, on household food safety practices, the majority (68%) of homemakers store cooked food at room temperature, store raw vegetables/fruits at room temperature (71.9%) and 36.3% store raw meat/poultry/fish by freezing. Food safety measures employed by homemakers showed that most of the homemakers wash utensils before and after cooking (72.9%) and serve meals when hot (87.2%). Homemakers had a moderate knowledge of food safety and observed good personal hygiene. However, some bad food safety practices were reported such as cooking or handling food when ill.*

KEYWORDS: Food safety, homemakers, food hygiene, food, cooking.

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INTRODUCTION

Food safety is now acknowledged on a global scale as one of the main obstacles to development in both industrialized and developing nations (King *et al*., 2017). The World Health Organization, for example, estimates that food safety problems, particularly foodborne illnesses, cost the United States more than $5 billion annually (Amaami *et al*., 2017). In terms of diseases, food safety is allegedly in competition with other deadly illnesses including malaria, HIV/AIDS, and tuberculosis. According to the WHO, developing countries bear 98% of the burden for food safety. Furthermore, there are reports of higher illnesses and deaths related to food safety issues throughout Africa generally (WHO, 2015).

Around the world, one in ten people get food-borne illnesses, according to the WHO (Addo-Tham *et al*., 2020). Every year, over 91 million people worldwide, including those in Africa, contract food-borne illnesses, which lead to approximately 37 thousand fatalities. Every year in Ghana, a food-borne illness affects one in every 40 persons (Ababio, and Lovatt, 2015) and causes over 60,000 fatalities (Amaami *et al*., 2017). Additionally, the government is thought to spend roughly sixty-nine million United States dollars on food-borne illnesses. Food poisoning caused by pathogens is a major global public health concern that many countries are investing substantial resources to address. Foodborne infections caused by microorganisms are a concern in both developed and developing countries (Myintzaw *et al*., 2020).

Reducing the number of foodborne illnesses linked to home food preparation is crucial because these activities are often the cause of foodborne illnesses. To do this, people who prepare meals for friends and family at home can consider altering their attitudes, beliefs, and behaviours (Parra *et al*., 2014). When it came to foodborne illnesses in 2009–2010, the Centers for Disease Control and Prevention in the United States reported that 21% of cases could be traced back to food consumed in private residences (Parra *et al*., 2014). The U.S. Food and Drug Administration (FDA) conducted a nationwide study of consumers, and one-third of respondents reported using improper food hygiene methods. This finding highlights the need for consumer education regarding the connection between proper food preparation and cleanliness and foodborne illnesses. (Duff *et al*., 2003). Food handling errors that can be avoided at home may be the cause of a large number of foodborne illness episodes and the related financial implications (Nesbitt, et al., 2009). In Europe, the house was implicated in half or more of all Salmonella outbreaks and about one-third of cases of foodborne illness (Byrd-Bredbenner *et al*., 2013). According to experts, the number of incidents of foodborne illness that truly result from mistakes made when handling food at home is substantially higher, some estimates reach 95% because the majority of illnesses are thought to be intermittent, mild, unverified, and unreported (Byrd-Bredbenner *et al*., 2013). In the home environment, poor food preparation and storage practices may be the main source of foodborne infections, but at least one-third of these cases have involved cross-contamination. (Duff *et al*., 2003). If two or more people experience a similar disease after consuming the same contaminated food or drink, it is considered an outbreak of food poisoning. Raw or undercooked chicken, dairy products, expired eggs, and vegetables are commonly contaminated during outbreaks, mostly by *Salmonella typhi*, *Staphylococcus aureus*, *Escherichia coli*, and *Clostridium perfringens* (Hassan *et al*., 2023). The public health danger presented by foodborne illnesses is enormous in Ghana. According to research released by the World Bank and the nation's Ministry of Food and Agriculture, almost one (1) in every forty (40) people (or 420,000 people) have foodborne illnesses each year, with about 65,000 of those people dying as a result (Ahiabor *et al*., 2024).

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Although there are food regulatory authorities in Ghana and Nigeria, it appears that there are issues with the application of food standards in the food businesses. It is impossible to guarantee anything from the choice of seeds to planting in accordance with customary cultural practices to harvesting and selling. This is the only thing that can cause heavy metal toxicity, bug infestation, parasite infection, microbiological, chemical, and faecal pollution, as well as other physical and chemical contaminants (Christiana Cudjoe *et al*., 2022). In recent years, Ghana has also witnessed instances of cholera outbreaks in its major cities and towns such as Accra, Kumasi, and Koforidua. Numerous studies undertaken in Ghana covering various areas of food hygiene over the past decade have found that most food vendors have low food hygiene knowledge and attitudes that affect the personal cleanliness of the vendors (Arthur *et al*., 2021). The government and other stakeholders in Ghana have acknowledged food safety as a critical concern. In order to guarantee safe food for all consumers and increase the competitiveness of Ghanaian food products in both domestic and foreign markets, the country enacted a food safety policy in 2015. However, there are still issues with food safety in Ghana, particularly at the home level, even with the policy and other pertinent laws and regulations in place (Mensah *et al*., 2014). Therefore, this study this study investigated household food safety practices (HFSPs) employed by homemakers in Sagnarigu Municipality of Northern Ghana.

METHODOLOGY

Study Area

The research area chosen for this study is the Sagnarigu Municipal in the Northern Region of Ghana. There are six communities under the municipal assembly namely; Sagnarigu, Kpalsi, Sanarigu Kukuo, Gurugu, Katariga, and Malishegu with Sagnarigu being the capital of the municipal.

Sample Size and Sampling Method

An estimated sample size of three hundred (300) respondents was selected. The study targeted 300 homemakers from six different communities within the estimated population of 59,000 households. Existing research by Cohen and Manion (2018) suggests a sample size of at least 217 is sufficient for surveys involving populations of around 60,000. The breakdown of the sample size selected from each community is presented in Table 1.

Table 1: Description of community and sample size chosen from every community

Community Name	Sample selected
Sagnarigu	50
Kpalsi	50
Sagnarigu kukuo	50
Gurugu	50
Malishegu	50
Katariga	50
Total	**300**

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Data Gathering Instruments

Structured questionnaires were the primary tool utilized in this study to collect data. This was however supported by an observation with the use of an observational guide and unstructured interviews.

Data Analysis

Data was analyzed using SPSS software (21) and Microsoft Excel (2019) for descriptive and inferential statistics. Means, standard deviation, and frequencies of the food safety practices were.

RESULTS AND DISCUSSIONS

Demography of Respondents

The results showed that most 233 (77.7%) of the respondents were females with the remaining 67 (22.3%) being males. This suggests that most of the homemakers were females confirming the long-standing tradition that women are the main caretakers of the home and better managers of the affairs concerning households. With reference to the ages of the respondents, participants were more or less evenly distributed over the various age groupings. The category, 18 – 25 years recorded 79 respondents representing 26.3% and 26 – 30 years received 49(16.3%) of the respondents. The majority of those surveyed 103(34.3%) were found between the age bracket of 31 – 39 years old. The age range of 40 – 49 recorded 42(13.9%) of respondents while 18(5.9%) respondents were in the age group of 50 – 59. The last age group of 60 years and above recorded the lowest number of respondents which was 9 (2.9%). This presupposes that the majority of the homemakers in the study area were young adults considered to be in their primes and hence are expected to be mindful of food safety and health practices.

When it comes to the educational qualification of respondents, about 28 (9.3%) respondents had no formal education whilst 113 (37.7%) had at least basic school education. Also, 89 (29.6%) respondents had senior high school level education with 41 (13.6%) respondents had either a certificate, a diploma or a higher national diploma (HND). There were 27 (8.9%) respondents having a first degree and 2 (0.7%) having post-graduate degrees. The data on educational background indicate that the majority of respondents had basic education with only 9.3% having no formal education. This can be interpreted as respondents being literate at the very least and a combined percentage of 52.8% are well educated having at least senior high school qualification. We can surmise from this data that the educational level of respondents is generally higher than average and as such respondents should generally be aware of food safety practices.

Regarding the occupation of respondents, 54 (18%) were students whilst 49 (16.3%) said they were self-employed or running their own businesses. Again, 42 (13.95) respondents were housewives meaning their only job was taking care of their various households. The majority 80 (26.6%) of respondents however were farmers indicating that farming is a predominant occupation in the study area. A small percentage of 12 (3.9%) were retired and thus were living on their pensions.

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The social status of respondents revealed that the majority of respondents 202 (67.3%) were married in their households whilst 20.3% were single. The results show that 8.7% and 3.7% of respondents were divorced and widowed respectively. The majority of respondents were Muslim with a raw figure of 164 (54.7%) whereas 109(36.3%) were with the remaining 27 (9%) being traditionalists.

Table 2: Demographic data of homemakers

Variables	**Frequency (*f*)**	**Percentage (%)**
Gender		
Female	233	77.7
Male	67	22.3
Total	300	100.0
Age		
18 – 25 years	79	26.3
26 – 30 years	49	16.3
31 – 39 years	103	34.3
40 – 49 years	42	13.9
50 – 59 years	18	5.9
60 years and above	9	2.9
Total	300	100.0
Educational Level		
No formal education	28	9.3
Basic school	113	37.7
Senior high school	89	29.6
Certificate/Diploma/HND	41	13.6
1st Degree	27	8.9
Post Graduate	2	0.7
Total	300	100.0
Occupation		
Student	54	18.0
Civil servant	49	16.3
Business/(self-employed)	63	21.0
Housewife	42	13.9
Farmer	80	26.6
Retired	12	3.9
Total	300	100.0
Social Status		
Single	61	20.3
Married	202	67.3
Divorced	26	8.7
Widowed	11	3.7
Total	300	100.0

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Religious Background		
Christian	109	36.3
Traditionalist	27	9.0
Muslim	164	54.7
Other	0	0.0
Total	300	100.0

Household Food Safety Practices among Homemakers

According to Mensah *et al*., (2014), foodborne illness constitutes a substantial financial and social strain on society and its health systems. As such, food safety is an important concern to health experts and dieticians alike. A substantial amount of foodborne infections are caused by activities that take place in the home kitchen (Young *et al*., 2018; Abdul-Mutalib *et al*., 2012; Amoah *et al*., 2017). In the past, foodborne infections were thought to be mostly caused by contaminated food that is consumed outside of the home. Nonetheless, an analysis of studies conducted in North America and Europe showed that foodborne infections typically happen in the home, with a significant amount brought on by incorrect food handling and cross-contamination (Duff *et al*., 2003). According to Medeiros *et al.,* (2004), As long as food safety regulations are adhered to from manufacturing to consumption, the majority of food-borne illness incidents can be avoided. With this, the various food handling and safety practices of homemakers in the study area were assessed with results presented in Table 3.

Respondents were asked how they stored their freshly prepared or leftover meals. Out of a total of 300 participants, 6.3% responded that they freeze their leftover cooked meals whilst 25.3% refrigerate their cooked food. Most of the respondents, 205 (68.4%) said they stored their cooked foods at room temperature whilst 25.3% refrigerated their cooked food. From the responses given, it can be inferred that most people in the study area rarely store their cooked food in fridges and/or refrigerators. This can be attributed to the fact that respondents in the study area do not usually cook large meals that may last them over one meal period. Another factor responsible for this is the fact that even though over 85% of households in the study area are connected to the national electricity grid, a significant number of households have no access to refrigerators or freezers. As a result, they mostly resort to storing their cooked meals at room temperature which makes them susceptible to the growth of food pathogens. The primary cause of foodborne diseases like those reported in the United Kingdom (2005) and Australia (2010) is improper temperature management during heat treatment and food storage (Ricci *et al*., 2020). Microorganisms associated with food, including pathogens, can grow in temperatures ranging from 5 to 57 degrees Celsius (Ricci *et al.,* 2020), hence the storage conditions practised in the households can be a source of food contamination.

The next questionnaire item or variable sought to know how fruits and vegetables were stored by respondents in the study area. From the data presented in Table 3, 71.9% of respondents representing a majority of the study participants kept their fruits and vegetables at room temperature whilst 17.6% refrigerated them. A small percentage of 7.0% said they stored their fruits and vegetables by drying them. The remaining 3.3% of respondents resorted to freezing their fruits and vegetables and converting them to jams and marmalades. When it comes to food production, there are several ways that improper handling can lead to the presence of harmful substances. These include the release of foreign substances from acidic-pH storage

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containers, cooked food left at high temperatures for extended periods, applying the wrong cooking times for a particular food, and contamination from unwell people or poor hygiene (Gallo *et al*., 2020). Leafy greens, bean sprouts, leftover rice, unpasteurized milk, soft cheeses, deli meats, raw eggs, chicken, pork, and shellfish are among the foods that have the highest risk of bacterial contamination (Hassan *et al*., 2020: Ragab *et al*., 2022). For instance, contaminating other items in a fresh salad with unwashed, tainted lettuce might spread the infection. Homemakers be encouraged to adhere to good storage practices to reduce the risk of contamination during storage.

Further, respondents were asked how they stored their animal food products such as raw meat, poultry and fish. From the responses obtained, the most popular method of meat/fish/poultry preservation was freezing 108 (36.3%). The next popular method of preservation for meat was roasting with 92 (30.1%) of respondents favoring this method. A significant proportion of respondents 59 (19.6%) used smoking as a method of preservation or storing their animal food items. The least favoured methods were drying, brining, and refrigerating receiving respective responses of 24 (7.9%), 14 (4.6%), and 3 (0.9%).

When asked whether they separate the different food products such as raw meat, poultry and seafood from others during storage, most respondents 282 (94%) out of 300 representing 94% said they did not. Only a small percentage of 6.0%, representing 18 out of 300 respondents, said they separate their fresh meat, poultry, and seafood from other food items during storage.

The follow-up questionnaire item sought to find out how respondents made their stored food safe for consumption after being kept in storage. To this, 180 (60%) of respondents answered by saying they re-heated their stored food on stoves or open fires whilst 72 (24%) revealed that they microwaved their stored food to make it edible again after storage. The remaining 48(16%) of respondents said they consumed their stored food at room temperature.

Respondents were asked to indicate their places of meal preparation within the survey items seeking to establish the food safety measures that they observed. The responses to this question showed that 19% or 57 respondents out of 300 prepared their meals in a properly designated and well-fitted kitchen. About 120 (40%) respondents said they prepared their meals using a makeshift kitchen while the remaining 123 (41%) prepared their meals in the open space.

In furtherance to ascertaining the procedures for food safety of homemakers in the study area, the researcher sought to know whether respondents had access to running or pipe-borne water in their kitchens or places of meal preparation. In response to this, only 21 (7.0%) of respondents responded in the affirmative with the overwhelming majority of 279 (93.0%) responding in the negative. The vast disparity in the reported figures is an indication that even though the number of households with access to pipe-borne or running water may be higher than reported, only a select few have this running water available in their kitchens or places of cooking.

When asked about the cleaning of cooking surfaces, the majority of respondents 178 (59.3%) revealed that they only clean their cooking surfaces after meal preparation whilst 61 (20.3%) said they cleaned their cooking surfaces before meal preparation. On the same issue, 38 (12.7%) indicated that they rather clean their cooking surfaces before, during and after each meal preparation. A smaller percentage 23 (7.7%) of respondents said they only cleaned their cooking surfaces once in a day or occasionally. Microorganisms causing cross-contamination

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pose a health risk to human populations through the food chain. In addition to causing illnesses in people, cross-contamination of food can result in large yield losses, and changes in food quality (Edris *et al*., 2013; Shaltout *et al*., 2017). Food-to-food cross-contamination occurs when contaminated foods are added to uncontaminated foods. This makes it possible for dangerous, drug-resistant germs to proliferate. Large numbers of drug-resistant bacteria, including Salmonella, Clostridium perfringens, Campylobacter, Staphylococcus aureus, E. coli, and Listeria monocytogenes, can be found in raw, undercooked, or inadequately cleaned food. If we consume any of these germs, it could be harmful to our health (Shaltout, 2024). Good food safety practices such as cleaning surfaces should be encouraged to reduce cross-contamination.

When respondents were asked if they divided their utensils between raw meat and other foods, 65% responded in the affirmative and 35% responded in the negative. Again, 58.9% of respondents indicated that they checked packaged food items for expiration before consumption whilst 41% did not.

On the issue of whether respondents followed safe cooking temperatures for different types of food items, about 70% said they did whilst 30% indicated that they did not. Respondents were further asked whether they used a microwave or refrigerator to thaw their frozen foods to which 54(17.9%) participants responded in the affirmative. The remaining 246 (82.1%) of respondents reported that they did not.

Last but not least, respondents were asked what hand hygiene practices they observed before handling food. In response to this, 56% said they washed their hands with water at room temperature whilst 21.7% used warm, soapy water to wash their hands before handling food. However, 22.3% indicated that before touching food during meal preparation, they don't wash their hands.

Table 3: Household food safety practices of homemakers

Variables	**Frequency (*f*)**	**Percentage (%)**
Freezing	19	.3
Refrigerating	76	25.3
Room temperature	205	68.4
Total	300	100.0
How do you store raw vegetables/fruits?		
Brining	0	0.0
Refrigerating	53	17.6
Freezing	7	2.3
Room temperature	216	71.9
Drying	21	7.0
Jams/marmalades	3	1
Total	300	100
Storage of raw meat/poultry/fish		
Brining	14	.6
Refrigerating	3	0.9

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Freezing	108	36.3
Smoking	59	19.6
Roasting	92	30.1
Drying	24	7
Total	300	100
Separation of raw meat, poultry and seafood from others during storage		
Yes	18	6.0
No	282	94.0
Total	300	100
How do you make your stored food edible again?		
Microwaving Heating on stove/fire Eat at room temperature **Total**	72 180 48 300	24.0 60.0 16.0 100.0
Where do you prepare your meals		
Proper kitchen	57	19.0
In the open space	123	41.0
Makeshift kitchen	120	40.0
Total	300	100.0
Do you have running water at your place of cooking? Yes No **Total**	 21 279 300	 7.0 93.0 100
How often cooking surfaces are cleaned		
Once a day	23	7.7
Before meal preparation	61	20.3
After meal preparation	178	59.3
Before, during and after meal preparation	38	12.7
Total	300	100.0
Do you separate utensils for raw meats and other food items?		
Yes	195	65.0
No	105	35.0
Total	300	100.0
Do you check expiry dates on packaged foods before consumption?		
Yes	177	58.9
No	123	41.1
Total	300	100.0
Do you follow safe cooking temperatures for different types of food?		
Yes	208	69.9
No	92	30.1
Total	300	100.0
Do you ever use a microwave or refrigerator to thaw frozen foods?		
Yes	54	17.9
No	246	82.1

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Total	300	100.0
What hand hygiene steps do you take before touching food?		
Wash hands with warm soapy water	65	21.7
Wash hands with water at room temperature	168	56.0
I do not wash my hands before handling food	67	22.3
Total	300	100.0

Food safety measures employed by homemakers in Sagnarigu District

On food safety measures, the majority 218 (72.9%) of respondents answered that they wash their utensils and equipment before and after use in cooking. In further support, this item recorded a mean rating of 3.90. A conflicting finding is reported by Priyadarshini (2015), as in her study it was found that washed and stored utensils were not rewashed before use and that only 21.8% of respondents rewashed utensils before use.

The next food safety practice of homemakers as presented in the table was serving meals when they were hot. This variable received an overwhelming agreement percentage of 87.2% and a disagreement percentage of 10% with a mean value of 4.41. This is an indication that most of the participants in this study served their meals when they were hot which is a good practice. This is because it reduces the risk of ingesting food containing active disease-causing microbes.

With regards to the storage of leftover foods, it is seen that a combined percentage of 91.4% of respondents agreed that they stored their leftover foods in covered containers whilst 8.6% were unsure. This is supported by research evidence from Priyadarshini, (2015) that 97.2% of homemakers stored foods in covered containers. Also, it was revealed that 81.4% of respondents stored food in refrigerators. As a follow-up, 71.4% of respondents indicated that they separated cooked food from raw food during storage. This is corroborated by research findings from the National Assessment Institute, (1998) which reported that the majority of consumers 66.7% prepared and ready-to-eat food should always be kept apart from raw food whilst 16.7% of consumers did not.

When the researcher asked whether participants prepared meals left out for longer than four hours at room temperature, a majority of 219 (72.8%) responded in the affirmative whilst only 42 (14.2%) did not. This practice by homemakers is worrying since it can potentially expedite the multiplication of pathogens quickly enough to cause food-borne diseases. Evidence from the literature supports this finding as most consumers (79%) in a study by Byrd-Bredbenner *et al.,* (2013) reported keeping perishable food that has been prepared at room temperature for longer than the suggested two hours. This may be related to the widespread misperception that items that have been cooked ought to cool to room temperature before being stored in the refrigerator (Bruhn & Schultz, 1999).

The next item which sought to find out whether stored food is consumed in the next meal period found that a majority of 75.7% of respondents consumed the stored food with the next meal. This practice is encouraged because cooked ready-to-eat foods are readily perishable and have a short life span. In a similar study by Medeiros *et al.*, (2001) 66.36% of a portion of the participants stated that they ate the leftovers with their next meal, and 22.72 per cent stored it till the following day. Similar results were found by Sudershan *et al.*, (2009). According to their research, 86% of participants kept leftover food, and 99% of them did so in closed

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containers. The majority of them (89%) eat stored food with their subsequent meal (67.8%) and leave it at room temperature. Sudershan et al. (2009), further found that twenty-one per cent consume stored food the next day.

Another questionnaire item sought to find out whether respondents handled food when they were ill. Results from this item were worrying since it revealed that most respondents, 77.1%, reported that they handled and cooked food when they were ill whereas only 20% did not. The remaining 2.9% were unsure. This is most likely because the homemakers in this study are the only ones who prepare meals exclusively for their families. As such when suffering from an illness that is not considered 'serious' enough, they must handle and prepare food for the household, increasing the risk of cross-contamination. Medeiros *et al.,* (2001) reported varying findings where a significant number of homemakers recognized that diseased persons are highly likely to contaminate food with poisoning from micro-organisms, however, just 10% of respondents said they never handle food when sick. The data from the table further shows that, after handling raw meat, poultry, fish, eggs, and unwashed vegetables, only 44.3% of respondents said they washed their hands. The American Dietetic Association (2011) also reports that only 37% of respondents claimed to wash their hands after touching raw food. This is worrying because it is established that raw food contains pathogens and harmful organisms that can be transferred to cooked food. As stated by Green and Selman (2005), People are the most frequent cause of contamination, meaning they are the source of food. In this sense, food might get contaminated if a food handler is not clean (McSwane, Rue & Linton, 2003). Domestic food workers have the potential to transfer diseases from their gastrointestinal system onto food by using hands contaminated with these organisms. So, one potentially significant way that infections could infiltrate the food supply is through hand contact with ready-to-eat (RTE) food (Guzewich & Ross, 1999).

On the issue of reheating food thoroughly before serving, 68.6% of respondents, yielding a mean value of 3.63 responded affirmatively whilst 17.1% responded in the negative. One issue of concern is the use of food that has fallen to the floor. To this, 54.3% responded that they do not use food that has fallen to the floor whilst 45.7% responded in the negative. The issue of using food that falls to the ground is of course dependent on the kind of food involved. Food like vegetables, fruits, and raw fish/meat that can be washed thoroughly after picking from the floor do not pose significant health risks, however, it is not encouraged.

On the other hand, 84.3% of respondents said they used the same chopping board for raw and cooked food without adequate washing whilst 8.6% did not. With mean values of 3.73 and 3.90 respectively, respondents affirmed that they clean working surfaces before and after cooking and boil food to the right temperatures before serving. These constitute good food handling and safety practices which reduce the risk of food contamination or poisoning.

Homemakers engaged in several unsafe food handling practices such as storing cooked food at room temperature for more than 4 hours, cooking or handling food when ill, not washing hands after handling raw food like vegetables, meat, fish, and poultry using food that has fallen to the floor. All these contribute to the risk of making food unsafe during preparation.

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Table 4: Food safety measures employed by homemakers in Sagnarigu District

Variables	SD		D		N		A		SA		Mean
	f	%	*f*	%	*f*	%	*f*	%	*f*	%	($\underline{x}$)
I wash utensils before and after cooking	9	2.9%	30	10%	43	14.3%	120	40%	98	32.9%	3.90
I serve my meals when they are hot	0	0%	30	10%	9	2.9%	68	22.9%	193	64.3%	4.41
I store leftover foods in covered containers	0	0%	0	0%	26	8.6%	175	58.6%	99	32.9%	4.24
I store raw and cooked food in the refrigerator	47	15.7%	39	12.9%	0	0%	73	24.3%	141	47.1%	3.74
I separate cooked and raw food during storage	30	10%	17	5.7%	38	12.9%	95	31.4%	120	40%	3.86
I store cooked food at room temperature for more than 4 hours	21	7.1%	21	7.1%	39	12.9	95	31.4%	124	41.4%	3.93
I consume stored food with the next meal	17	5.7%	26	8.6%	30	10%	124	41.4%	103	34.3%	3.90
I cook and handle food when I am ill	39	12.9%	21	7.1%	9	2.9%	154	51.4%	77	25.7%	3.70
I wash my hands after touching raw meat, poultry, fish, eggs and unwashed vegetables	43	14.3%	64	21.4%	60	20%	107	35.7%	26	8.6%	3.03
I wash my hands after sneezing, visiting the toilet, coughing, or touching other parts of my body	21	7.1%	21	7.1%	70	22.9%	137	45.7%	51	17.1%	3.59
I reheat food thoroughly before serving	21	7.1%	30	10%	43	14.3%	150	50%	56	18.6%	3.63
I do not use food that has fallen to the floor	77	25.7%	60	20%	0	0%	94	31.4%	69	22.9%	3.06
I use the same cutting board for raw and cooked food	13	4.3%	13	4.3%	21	7.1%	184	61.4%	69	22.9%	3.94

Knowledge Level, Attitude, and Perception of Food Safety among Homemakers

The initial aspect within this category aimed to determine if participants had previously undergone any sort of health education related to food hygiene and food safety. Based on the data provided in Table 5, the majority of the participants, 223 (74%) indicated that they had not received any form of education regarding food safety and hygiene. Conversely, only 26% responded affirmatively.

Similarly, the researcher aimed to ascertain whether the respondents possessed knowledge regarding the factors indicating the safety of raw meat when making a purchase. The responses

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revealed that 72% of the participants displayed a reasonable understanding of these indicators, while 28% answered negatively.

To gauge the extent of knowledge and perception about food safety, participants were inquired about their views regarding the appropriate storage and handling of fruits and vegetables. The answers collected from this query demonstrated that 138 (45.8%) of the respondents, advocated for washing fruits and vegetables using cold running water. Additionally, 41.5% endorsed the method of soaking these items in brine followed by rinsing under running water. Similarly, a minor percentage of 11% of participants suggested washing with warm water, while an even smaller group, comprising 5 individuals (1.7%), proposed the use of soapy water for cleaning fruits.

The researcher further aimed to assess participants' understanding of whether food contamination could result in food poisoning. In reply to this question, a significant majority of 83.7% provided a positive response, whereas 16.3% answered negatively.

When respondents were asked about the diseases, they knew it could result from eating contaminated foods, the majority of them 97 (32.3%) said stomachache or tummy upsets with 72 (24.0%) saying diarrhoea was likely to result from eating contaminated food. Also, 23% chose cholera and 16% indicated that fever was more likely to be a side effect of eating contaminated food. A smaller percentage of 1.7% selected Hepatitis 'A' whilst 3% reported that they had no idea of diseases that could result from eating contaminated food.

The responses to the kind of food that can potentially cause food poisoning after consumption showed that the majority of respondents believed eating raw or undercooked meat/eggs was highly dangerous. This received 60.1% of responses which corresponds to 182 respondents out of a total of 300 whilst 25.2% agreed that consuming unheated leftover foods could also lead to sickness. Similarly, 11% of respondents opined that the consumption of reheated leftover foods could also cause food poisoning with 2% going for cold canned foods and the remaining 1.7% pointing that eating fruits taken straight out of the refrigerator could potentially be harmful.

Table 5: Responses on the knowledge level and perception of food safety among homemakers in Sagnarigu Municipal

Variables	Frequency (f)	Percentage (%)
Have you received any health education on food hygiene?		
Yes	77	26.0
No	223	74.0
Total	300	100.0
Do you have any knowledge of the indicators of safe meat?		
Yes	215	72.0
No	85	28.0
Total	300	100.0
In your view, how should fruits and vegetables be washed?		
Soaked in soapy water	5	1.7
Wash with warm water	32	11.0
Soak in brine then wash with running water	125	41.5

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Wash with running cold water	138	45.8
Total	300	100.0
Do you know that contamination of food can lead to food poisoning?		
Yes	251	83.7
No	49	16.3
Total	300	100.0
Knowledge of diseases that can result from eating contaminated food		
Diarrhoea	72	24.0
Cholera	69	23.0
Fever	48	16.0
Stomachaches	97	32.3
Hepatitis A	5	1.7
No idea	9	3.0
Total	300	100.0
In your opinion, which is the correct way to heat leftover food?		
Heat to your preferred temperature	120	40.0
Heat until boiling	87	28.9
Reheat is not necessary if food has not gone bad	76	25.4
No idea	17	5.7
Total	300	100.0
You can become sick after eating which of the following?		
Fruits taken from the refrigerator	5	1.7
cold canned foods	6	2.0
Raw or undercooked meat/eggs	182	60.1
Reheated leftover foods	33	11.0
Unheated leftover foods	74	25.2
Total	300	100.0

Socio-Cultural Factors that Influence Household Food Safety Practices

Many rural African communities have deep-rooted traditional practices related to food preparation, preservation, and consumption. These practices can significantly impact food safety (WHO, 2015). The food culture in Northern Ghana, where Sagnarigu district is located is rich and diverse reflecting the region's unique history and ecology. The preparation of food in northern Ghana is impacted by several variables, including the availability of ingredients, climate and cultural beliefs. For instance, in the dry season when water is scarce, foods are often cooked using dry heat methods such as roasting or grilling whilst in the wet season, water is more plentiful and as such foods are often cooked using wet heat methods such as boiling or stewing. The perception of food safety among homemakers in rural Africa is also influenced by cultural factors. For example, some cultures believe that certain foods are inherently safe, even if they are not handled or stored properly. Other cultures may have taboos against certain food safety practices, such as washing raw meat before cooking (Muchiri, Nyaga & Kariuki, 2019). Table 6 presents data on how social factors influence household food safety practices in the Sagnarigu Municipal District. From the table, it is seen that 70.7% of respondents

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maintained that there are no generational differences in knowledge and adherence to food safety practices. The remaining 29.3% are however of the differing opinion that there are generational differences in knowledge and adherence to food safety practices. This is at variance with findings by Okoye, Okoli, and Eze (2018) who posit that older adults may be less likely to know about the latest food safety practices. They may also have difficulty following safe food-handling practices due to physical or cognitive limitations. On the issue of whether there were specific challenges or limitations in practising food safety due to economic conditions, a majority of 66.7% of respondents which correspond to 200 out of 300 participants concurred whilst 33.3% of respondents disagreed.

The third item presented in Table 6 sought to find the resources and facilities that are available to homemakers in the study area for maintaining food safety. The responses indicated that 113 (37.5%) respondents had access to clean water whilst 89 (30%) had access to electricity. Similarly, 26.3% of respondents indicated that they had access to proper sanitation facilities which enhanced their food safety practices. Finally, the last but not least facility that respondents reported as available to influence their food safety practices was a refrigerator and/or freezer. This received a percentage of 6.2 signifying 19 respondents out of 300.

Table 6: How social factors influence household food safety practices

Variables	Frequency (f)	Percentage (%)
In your household, are there any generational differences in knowledge and adherence to food safety practices?		
Yes	88	29.3
No	212	70.7
Total	300	100.0
Are there specific challenges or limitations in practising food safety due to economic conditions?		
Yes	200	66.7
No	100	33.3
Total	300	100.0
What resources and facilities are available to you for maintaining food safety?		
Clean water	113	37.5
Electricity	89	30.0
Proper sanitation facilities	79	26.3
Fridge/freezer	19	6.2
Total	300	100.0

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CONCLUSION

Homemakers had a moderate knowledge of food safety and hygiene and practised good personal hygiene. However, some bad food safety practices were reported. Homemakers had satisfactory food handling practices. There were several sociocultural factors such as finances, access to facilities and cultural practices that affected the adherence to safe food practices.

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Conflict of interest

The authors declare no conflict of interest

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