Internet Journal of Food Safety, Vol.16, 2014, p.36-44

Prevailing Food Safety Practices and Barriers to the Adoption of the WHO 5-Keys to Safer Food Messages in Rural Cocoa-Producing Communities in Ghana

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Abstract

In most developing countries, food safety studies and interventions such as education have focused on urban centres with little attention to rural communities. This study therefore focused on members of the Cocoa Farmers' Cooperatives in eighteen rural cocoa-producing communities in Ghana. The objective was to assess their current food safety practices, educate them on the WHO five-keys to safer food messages, and identify barriers that may inhibit the adoption of the messages. Data was collected through focus group discussions in each community. Prevailing food safety practices include (1) washing hands at various instances but not following the recommended hand-washing procedures that can adequately remove microbes from their hands; (2) engaging in practices that can promote cross-contamination; (3) mostly cooking foods thoroughly but reheating food improperly to effectively destroy microbes that might have contaminated the food; (4) mostly keeping cooked food and leftovers at room temperatures and repeatedly reheating them to prevent spoilage; (5) inadequate protection of boreholes, streams, rivers, and wells from microbial and chemical contamination; (6) misuse of agrochemicals and food additives and food adulteration. Barriers that may limit the adoption of the five-keys to safer food messages include lack of knowledge on various food safety issues, lack of amenities such as potable water and electricity that facilitate appropriate food safety practices, inadequate food safety extension and advisory services, lack of enforcement of food safety and environmental laws, illiteracy, and misplaced priorities among community members. Findings imply that people in rural communities have the tendency to engage in practices that can potentially affect food safety and their health. Therefore, interventions should focus on intensive and continuous food safety education and develop and implement strategies for eliminating barriers that can possibly limit the adoption of recommended messages.

Key words: rural communities, five-keys to safer food, food safety practices, barriers, Ghana

Introduction

Food safety is an essential component of sustainable development and contributes to improved public health, poverty reduction, increased food security and environmental protection. Ghana currently faces numerous food safety challenges such as microbial contamination; aflatoxin contamination; polycyclic aromatic hydrocarbons (PAH) in smoked fish and meats; mercury in fish; pesticide residues in grains, legumes, vegetable, and fruits; food adulteration; and misuse of food additives all of which impact public health and international trade (RASFF 2004-2007; Ministry of Health 2013). The annual out-patient reported cases of food-borne illnesses such as diarrhoea, typhoid, and cholera in Ghana is about 420,000 with annual death rate not less than 65,000 (Food and Drug Authority 2006). In 2006 alone, a total of 90,692 people died from food- and personal hygiene-related illnesses in the country (Food and Drug Authority 2006). Food-borne illnesses are in fact one of the most important underlying factors for malnutrition with a serious impact on the growth and immune systems of infants in developing countries (FAO 2005).

In Ghana, several food safety studies (e.g. Ackah et al. 2011; Mensah et al. 2002; Mensah et al. 2001; Rheinlander

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et al. 2008; Addo et al. 2007; Feglo et al. 2004) and interventions such as education and training have mostly focused on street foods and their vendors in urban centres with little attention to rural communities and households. Besides, food inspection and regulatory services are often located in major cities, with little or no control exercised in small towns and rural areas (FAO 2005). Consequently, the vulnerability of rural communities to food safety problems can potentially become exacerbated.

The WHO (2006) has acknowledged that although interventions such as increased education and awareness about safe food handling practices are necessary, they are insufficient bases for personal action to get us the behavioural impact we desire as our end-goals. Essentially, achieving behaviour change in relation to food safety implies encouraging individuals to assess their prevailing knowledge and practices, supporting safe and hygienic practices and, when necessary, providing incentives to facilitate the adoption of new, hygienic and healthy practices (WHO 2006; Ehiri and Morris 1996; Foster and Kaferstein 1985).

In view of the gaps between urban and rural communities and referring to the above discussions, this study focuses on members of the Cocoa Farmers' Cooperatives in rural cocoa-producing communities with the objective of assessing their current food safety practices, educating them on the WHO five-keys to safer food messages and identifying barriers that may inhibit the adoption and practice of the recommended messages. The WHO developed the global food hygiene message with five key steps that explains safe food handling and preparation practices to facilitate an understanding of foodborne illness prevention to promote health. Medeiros et al. (2001) have shown that the organisms that predominantly cause foodborne illnesses and the factors contributing to actual outbreaks are directly related to these five steps, namely, (1) keep clean; (2) separate raw and cooked; (3) cook thoroughly; (4) keep food at safe temperatures; and (5) use safe water and ingredients. These steps are further elaborated in Table 1.

It is expected that findings from this study may provide some recommendations that may be useful for implementing interventions to improve food safety and reduce incidences of food-borne illnesses in rural cocoa-producing communities in Ghana. This study is particularly relevant because these communities are rural and do not have access to adequate medical facilities and hence the need to reduce or prevent incidence of foodborne illnesses. Furthermore, these communities are the main producers of cocoa, one of Ghana's main export commodities, as well as other food and cash crops hence it is important to ensure that members of these communities maintain good health for increased productivity. Most cases of foodborne illnesses are preventable if food protection principles are followed throughout the food chain, from production to consumption. Therefore, these cocoa farmers who are also producers of food crops and are involved in food preparation and consumption are essential in the food chain to prevent foodborne illnesses.

Table 1. elaboration on the 5-keysto safer food messages

Key Messages	Core information
Key One: Keep clean	• Wash your hands before handling food and often during food preparation • Wash your hands after going to the toilet • Wash and sanitize all surfaces and equipment used for food preparation • Protect kitchen areas and food from insects, pests, and other animals
Key two: Separate raw and cooked	• Separate raw meat, poultry and seafood from other foods. • Use separate equipment and utensils such as knives and cutting boards for handling raw foods. • Store food in containers to avoid contact between raw and prepared foods
Key three: Cook thoroughly	• Cook food thoroughly, especially meat, poultry, eggs, and seafood • Bring foods like soups and stews to boiling to make sure that they have reached 70℃. • Reheat cooked food thoroughly
Key four: Keep food at safe temperatures	• Do not leave cooked food at room temperature for more than 2 hours • Refrigerate promptly all cooked and perishable food (preferably below 5℃) • Keep cooked food piping hot (more than 60℃) prior to serving • Do not store food too long even in the refrigerator • Do not thaw frozen food at room temperature
Key five: Use safe water and raw materials	• Use safe water or treat it to make it safe • Select fresh and wholesome foods • Choose foods processed for safety, such as pasteurized milk • Wash fruits and vegetables, especially if eaten raw • Do not use food beyond its expiry date

Source: WHO (2006)

Materials and methods

Data were collected from cocoa farmers in rural communities on their food safety practices and possible barriers to the adoption of the WHO five-keys to safer food messages. Focus groups were used to collect the data because they supply descriptive, qualitative data that can be difficult to acquire through other research methods.

Eighteen focus groups (one per community) were conducted with members of the Cocoa Farmers' Cooperatives in eight cocoa-producing communities in the Amansie West District in the Ashanti Region and ten in the Asunafo North District in the Brong Ahafo Region of Ghana. The focus groups were conducted during a nutrition and food safety education programme for members of these communities including the Cocoa Farmers' Cooperatives. The programme was part of the nutrition and food safety education programme, which was sponsored by the Cadbury Cocoa Partnership (CCP) programme. To obtain

participants in each community, the CCP facilitators gave the co-operative executives prior notice of the educational programme through letters followed by constant reminders by telephone. The co-operative executives in turn informed all the Co-operative and community members to participate. After the nutrition segment of the training programme, 12 cooperative members (both male and female) were randomly selected in each of the 18 communities to participate in the food safety study. Each focus group lasted for a maximum of two hours and the entire study was conducted for 15 days.

The participants assembled at locations of their choice such as community centres, chapels, and classrooms. The participants in each of the focus groups responded to questions posed by the group moderator. First of all, participants discussed their current food safety practices in relation to the WHO recommended five-keys to safer food messages. The moderator (a food safety educator) then explained the messages to the participants with the aid of the 5-keys to safety training manual and poster, and demonstrations. After this, participants were asked to discuss what would make it easier or more difficult for them to adopt and practice the WHO recommended messages.

The use of the 5-keys to safer food poster was crucial in bringing to life what seemingly are abstract facts. This not only facilitated the education process and the explanation of how to ensure food safety and prevent foodborne diseases but it also enabled participants to better understand processes that are relevant in reducing food contamination. The poster was adapted to the needs of the communities and the educators used examples that participants could easily identify with. The whole programme was conducted in Twi, a local Ghanaian language predominantly spoken in the communities involved. Each focus group discussion was tape-recorded and transcribed. The transcripts were systematically reviewed and common themes among the responses were identified and categorized.

Results and discussion

Described in this section are the characteristics of the participants and the themes identified in the participants' discussions of their current food safety practices and barriers that can potentially limit the adoption of the five-keys to safer food messages. The findings for all the eighteen groups are discussed together because the content of the discussions were found to be similar in both districts.

Description of participants. In total, 216 participants (118 males and 98 females), who were mainly cocoa farmers but also grow food crops for commercial purposes and home consumption, took part in the study. The participants mostly had low level of education with majority unable to read or write. However, they were lively, very active, freely responded to questions, shared their problems and concerns, and contributed ideas, which went a long way in clarifying issues. Both male and female participants freely shared their opinions– there was no obvious intimidation on the basis of gender.

Prevailing food safety practices in relation to "keep clean". In relation to hand washing, findings as presented in Table 2 showed thatit is only in few communities that participants wash hands with water and soap or wood ash, under running water, and before handling, preparing and cooking food, or after using agrochemicals.

Table 2 Prevailing food safety practices in relation to the "keep clean" message

"Keep clean" message	Practices	Number of focus groups (N=18)*
Hand-washing	Wash hands with only water	18
	Wash hands with water and soap	8
	Wash hands with water and wood ash	5
	Wipe dry unwashed hands on clothes being worn	12
	Wash hands under running water	6
	Wash hands in stagnant water in a basin, which has already been used by one or more people	18
	Wash hands before handling, preparing and cooking food	4
	Wash hands before eating usually excluding fruits	18
	Wash hands after using the washroom	14
	Wash hands after using agrochemicals	4
Cleaning utensils, equipment, kitchen	Wash knives before use	6
	Wash knives after use	2
	Wipe knives with a dry cloth before and after use	12
	Wash utensils with only water before cooking	18
	Wash utensils with water and soap before cooking	2
	Wash utensils after cooking	18
	Protect kitchen area from animals	14

The use of running water here implies water being poured on hands from a container but not from the tap since none of the communities had even an improvised tap. In most communities, participants often washed hands in a basin of standing water, which sometimes might have already been used and contaminated by one or more people. Most participants also just wipe dry unwashed hands on clothes they happen to be wearing. It was also found that most participants wash hands before eating (but usually excluding fruits and snacks) and after using the washroom. However, in most cases hands are not washed with soap before eating because of the perception that the soap fragrance left on the hand can make food flavour unacceptable – they would rather wash hands with soap after eating. Some participants demonstrated their hand washing procedure where it was observed they just sprinkle water on their hands without scrubbing all surfaces of hands, including palms, back, between the fingers and especially under the finger nails, for at least 20 seconds as recommended (Jensen 2012; Burton et al. 2011; Todd et al. 2010).

These findings are particularly risky for these farmers who often use their bare hands even when working in the soil that harbours lots of microbes – it is estimated that a teaspoon of soil contains about 1 billion bacteria (WHO 2006). While working on their farms, they are likely to pick up soil, viable bacteria, bacterial spores and worms and their eggs, some of which may also be held firmly by the body oils on their hands. Therefore, it is important for them to use the most effective way of preventing the hands from spreading bacteria by using warm, soapy water to remove the oily soils and the bacteria that they hold (Burton et al. 2011; Todd et al. 2010).

In terms of keeping equipment and kitchens clean, it was found that these communities do not use most of the modern equipment such as blenders in food preparation. Nonetheless, findings showed that it is only in a few communities that participants said they wash knives before and after use. What is rather mostly done is to wipe the unwashed knives with a dry piece of cloth before and after use. A woman even ironically asked "do we also wash knives?" Obviously, this practice can promote cross-contamination (which is also discussed in the next section) especially when the knives are used to peel or cut fruits, vegetables, or ready-to-eat foods such as bread. In most communities, cooking utensils are mostly washed with only water before and after cooking. However, some households often leave used and dirty utensils including mortar and pestle overnight or even longer before washing them up. Most participants indicated that they mostly do their best to protect kitchen areas and food from insects, pests, and other animals by ensuring that their kitchens are fitted with doors and windows, which are often closed when the place is not in use. These findings are similar to those by Mensah et al. (2002) where proper handling of processing equipment, storage and dispensing of cooked food, hand-washing practices and environmental hygiene were identified as needing attention for improving the safety of street vended foods even in urban centres.

Prevailing food safety practices in relation to "separate raw and cooked". Some people in some communities travel over long distances to shop at market centres in other communities and in such cases the individual items are wrapped in paper, leaves or polythene after which they are all put into one basket or a sack. It was not a usual practice to separate raw, cooked, and ready-to-eat foods during transportation. We also found that purposely made chopping boards were not available in most households therefore they improvise various items for cutting meat and other foods. For example, the mortar, which is used for pounding many food products such as palm nut fruits and boiled cassava, is mostly used as a platform on which meat is cut. Some people also use tables, which are also used for several other purposes such as dining, as improvised chopping boards. These practices have the tendency to promote cross-contamination therefore it is important to ensure that whatever is being used for cutting food including meat be thoroughly cleaned after every use. These findings are consistent with Brown et al. (2013) who found that even some restaurants in the USA were not engaging in practices that could reduce the potential for pathogen cross-contamination from raw chicken to the environment or food.

Prevailing food safety practices in relation to "cook thoroughly". Foods in the communities are most likely to be thoroughly cooked because of the main cooking methods such as boiling, steaming, and frying being used. Although one cannot tell when food is well cooked or "done" simply by checking its colour and texture, these communities do not have thermometers or microwaves to ensure that foods are cooked to the right temperatures. However, generally, most typical Ghanaian foods have prolonged cooking times therefore it is likely that most pathogens will be destroyed during cooking. In relation to reheating of stored foods and left-overs, findings showed that most of the communities did not have electricity and refrigerators for keeping cooked and perishable foods. Hence, the practice was to reheat leftover food usually in the evening, keep it at room temperature, and reheat the next morning. This is done repeatedly until all the food is consumed. According to the participants, it is more cost-effective to prepare soups, for example, in bulk. Incidentally, the participants reported that they have frequent diarrhoeal episodes in most of the communities, which could be due to the presence of heat-stable bacterial toxins secreted during food storage. Nutritionally, repeated reheating can deplete the food of some of micronutrients.

Reheating is a critical control point, or a point at which reaching proper temperatures can help ensure that a food is safe to eat however findings showed that some participants thought that the purpose of reheating leftovers was only to make them palatable. Therefore, their usual practice was just to warm up the food rather than heat it to get steaming

hot as recommended in this third key message. Some participants even warm-up food by placing it in the sun– a practice mostly carried out at farms. These findings are a source of concern because the temperature at which the food is warmed might not be high enough to kill pathogens that might have contaminated the food during storage or handling. Experts even recommend that food should only be reheated once and any reheated leftovers should be discarded to prevent the production of bacterial toxin (National Food Service Management Institute 2009).

Prevailing food safety practices in relation to "keep food at safe temperatures". As indicated under the key message "cook thoroughly", most of the communities do not have electricity supply so they mostly keep cooked food at room temperature. It was also found that food flasks which can keep food hot for some hours were available in some communities and market centres but they were not being used by the farmers to keep food at home or send food to their farms. A few participants however indicated that they put food in the food flasks for their children to send to school.

In communities that had access to electricity, some participants have refrigerators in which they often store food beyond the recommended maximum period of two days. Another practice was that all the quantity of refrigerated food is reheated, then the required amount is taken and the rest is placed back in the refrigerator. They explained that they reheat all the food so as to extend the time it takes for the food to visibly start deteriorating. This practice of repeated heating as discussed earlier could pose food safety and nutrition challenges. It was also found that some participants used other food preservation methods such as drying and smoking to extend the storage lives of high risk foods such as meat and fish.

Prevailing food safety practices in relation to"use safe water and raw materials". In relation to the availability and use of safe water, findings showed that all the communities had boreholes, streams, rivers, and wells. However, most of the boreholes and their immediate surroundings were not regularly cleaned while wells were usually left uncovered. These practices clearly can reduce the quality and safety of water. Also, containers (jerrycans, gallons etc.) used to fetch and store water were not properly cleaned. Some participants said they seldom washed the containers with parazone (a type of chlorine-based sanitizer/bleaching agent), which may kill bacterial. However, if the containers were not thoroughly rinsed then traces of the parazone can contaminate the water.

The only source of potable water in Nipankyeremia community is a borehole that was constructed in the 1970s. Some members of the community believed that the borehole was not constructed properly thus making the water unwholesome. In some communities, participants did not trust the safety of water from rivers and streams because they were being contaminated through illegal mining and other human activities such as washing-off agrochemicals into the water bodies. Although some communities suspect their water to be unwholesome, they do not use any form of treatment such as boiling to reduce contamination as recommended in this key to safer food message.

In terms of raw material and their safety, findings showed that vegetables were usually not washed properly before use. Some participants demonstrated how they wash vegetables such as tomatoes and garden eggs at home– the practice is to put them in a bowl of water and remove them without taking the trouble to rub or scrub them. These practices did not conform to the recommended method of washing fruits and vegetables, which entails washing (rubbing or scrubbing with hands or sponge) plus peeling (where applicable) to effectively reduce bacterial load as well as chemical residues.

Participants in all the communities raised concerns about contamination of some food with agrochemicals indicating that it was one major reason for which they avoid eating most fruits and vegetables. These findings support Amoah et al. (2006) and Horna et al. (2008) who found that typical microbiological and pesticide contamination levels of vegetables in Ghanaian markets pose a threat to human health with pesticide residues often exceeding the acceptable levels. This is an issue of extreme importance in view of the fact that in recent times, Ghanaian agricultural produce has been rejected in some Europe Union countries on account of high residue levels (Ministry of Health 2013 2009). Participants indicated that most farmers misuse agrochemicals in several ways as follows:

- Use of wrong or banned chemicals such as DDT;
- Application of agrochemicals such as pesticides at the wrong time (e.g. close to harvest time)
- Application of agrochemicals at unusually high concentrations with the perception that the higher the concentration the more effective the chemical;
- Farmers not consulting experts (e.g. agricultural extension officers) for advice.

In addition to agrochemicals, other substances including food additives were being misused. For example, monosodium glutamate (MSG) was being excessively used in food preparation – even a type of MSG (popularly called A1), which was banned by the Food and Drug Authority (FDA) of Ghana in the 1990s, was still available and being used in some communities. Food adulteration was also found to be prevalent in the communities. For example, items such as cassava flour, maize flour, cooking oil, and water were added to groundnut paste to increase its weight. Sudan IV dye was also being added to palm oil while food and even non-food colours were added to red fish to conceal its spoilage and give an idea of freshness to the buyer or consumer. A survey conducted by the Food Research Institute also found that various substances were added to various foods where for example, even alum and chalk were added to bread to whiten it while sawdust and

Plaster of Paris were also added to increase its weight (Food and Drug Authority 2008).

Barriers to the adoption and practice of the 5-keys to safer food messages. This section discusses the findings after participants have been educated on the 5-keys to safer food messages. In most communities, participants indicated their willingness to carry out some of the recommended practices, which they described as easy-to-practise. These include washing hands with soap and water, washing and peeling fruits before eating, advising food vendors to observe hygienic food handling practices and specifically advising fruit sellers to wash fruits before peeling and to protect them from houseflies and pathogen, sharing the knowledge and skills they have acquired with children and neighbours, and making extra effort to practise what they have learnt until they become their habit.

These notwithstanding, some barriers were identified that could limit the adoption of the 5-keys to safer food messages in the communities. These barriers are summarised in Table 3. These rural communities are disadvantaged in the sense that they lacked knowledge on several food safety issues including proper hand washing procedures, importance of reheating food before eating, proper use of agrochemicals, and cross contamination. Akonor and Akonor (2013) also found that domestic food handlers even in the city of Accra had limited knowledge on cross-contamination. The problems in these communities are further compounded by the inability of most of them to read and the absence of food safety extension, advisory, and regulatory services that can contribute to ensure the safety of farm produce, cooked and processed foods and water.

The findings have shown that it may be possible to address some of these barriers at the individual level if rural communities are educated to understand food safety and hygiene issues. Furthermore, the communities need to be encouraged and motivated to practise the recommended food safety behaviours as indicated in the 5-keys to safer food messages. It also became evident that certain basic facilities such as safe food storage equipments are lacking in some communities but it is possible to educate people on alternative ways of ensuring food safety even in the absence of state-of-the-art facilities. There is therefore the need for interventions to develop specific programmes that suit the needs of these communities. Some of the prevailing food safety practices such as hand-washing did not meet the recommended standard but it is worthy of note that hand-washing with water alone or even with non-potable water has also been found to reduce the presence of bacteria on hands substantially (Luby et al. 2005 2011; Curtis et al. 2005; Scott et al. 2008), implying that food safety can be improved, even in an imperfect world. Also, in the absence of thermometers, for example, people can be educated to test if food has been properly cooked by inserting a small knife into the food to check that it is steaming hot in the middle.

The presence of banned chemicals and food additives and the practice of food adulteration in these communities necessitate the need for regulatory authorities such as the FDA and the Environmental Protection Agency to follow-up such product bans with withdrawal of the products from shops and markets. This is important in rural farming communities in particular where most people cannot read and understand product labels but still have limited access to food safety, environmental and agricultural extension services.

Conclusion

This study sought to examine the prevailing food safety practices and possible barriers to the adoption of the 5-keys to safer food messages in rural cocoa producing communities in Ghana. Findings showed food safety practices in all the communities leave much to be desired. Hand-washing in particular is not effectively practised, agrochemicals and food additives are being misused, and food adulteration is prevalent thus compounding food safety problems in the communities.The major barriers to the adoption of the 5-keys to safer food messages include lack of knowledge on a number of food safety issues, lack of amenities such as potable water and electricity that facilitate appropriate food safety practices, lack of enforcement of food and environmental laws, inadequate food safety extension and advisory services, illiteracy, and misplaced priorities among community members whereby food safety issues are not given the needed attention and urgency.

These findings have policy implications for Ghana since food safety and hygiene-related illnesses are real and alarming throughout the country. The study has shown that in rural communities where most food safety facilities are lacking, people have the tendency to indulge in practices that can potentially compromise food safety and affect public health. Therefore, interventions should focus on intensive food safety education and develop and implement strategies that will eliminate barriers that may limit the adoption of the 5-keys to safer food messages. While some of these interventions such as carrying soap to farms for hand-washing can be implemented at the individual levels, other interventions need community and government's actions. It is therefore recommended that food safety interventions should target rural communities, most of which are the breadbasket and producers of most food and cash crops for the nation, and focus on (1) food safety education, (2) enforcement of food and environmental laws and bye-laws, (3) training of Agricultural Extension Agents and equipping them with resources to train farmers on the safe application of agrochemicals, (4) regular food inspection and testing services and withdrawal of the non-compliant ones, (5) creating awareness on banned agro-chemicals and other food-related substances and

withdrawing them from the communities (6) regulating mining activities.

Table 3. Possible barriers to the adoption of the WHO 5-keys to safer food messages

Five-keys message	Barriers	Number of focus groups*
Keep clean	Inadequate understanding of the importance of hand washing	18
	Lack of knowledge on proper hand washing procedure	18
	Hand washing habit not cultivated right from childhood	16
	Laziness about hand washing	14
	Haste to attend to 'more important businesses or chores'	8
	Lack of water especially at the farms or when out-of-home	12
	Failure to directly link poor hand washing behaviour to any health problems.	5
	Distant farms make it difficult for farmers to carry adequate amount of water to the farm for cooking, drinking, and hand washing.	16
	Tiredness, cooking at late hours due to longer hours spent on farms, and leaving for farms too early makes it difficult to clean used utensils soon after use.	9
Separate raw and cooked	Lack of knowledge about cross contamination	18
	Distant market centres	9
	Lack of adequate or appropriate equipment for food transportation, preparation, and storage	13
	Poverty	8
	Misplaced priorities	10
Cook thoroughly	Lack of knowledge on the importance of reheating food	15
	Lack of facilities for reheating food at farms	10
	Lack of knowledge about alternative ways of keeping cooked food hot	9
Keep food at safe temperatures	Lack of knowledge on effects of keeping food at wrong temperatures	18
	Lack of appropriate storage facilities	12
	The need to always cook food in bulk to save cost	10
	Distant farms and market centres	10
	Most refrigerators too old and possibly not functioning properly to provide the right temperatures	5
	Inadequate knowledge on other appropriate food storage and preservation methods especially in the absence of electricity and refrigerators	8
Use safe water and raw materials	Inadequate knowledge about safe ways of storing water	7
	Uncontrolled and illegal mining activities	9
	Lack of knowledge about ways of treating water at home to reduce contamination	14
	Inadequate knowledge and skill about proper way of cleaning and disinfecting water storage containers	11
	Inadequate knowledge on proper use of agro-chemicals	18
	Lack of access to extension, advisory, and regulatory services	15
	Low awareness of banned agro-chemicals	18
	Continuous availability of banned agrochemicals	6
	Illiteracy and inability to read and understand product labels	16
	Lack of enforcement of food safety and environmental laws	13
	Greediness of food producers and sellers leading to adulteration	9
	Lack of knowledge about the harmful effects of misusing chemicals and other substances	15

This study was conducted among adults but it is expected that the participants as part of their interventions at their individual level will impart the knowledge they have acquired to their children and the youth who are agents of change. Future studies and interventions should focuson children and the youth since they need to maintain healthy lifestyles so that they can live long to contribute to the development of their communities and the country as a whole.

Acknowledgement

This work was made possible by Cadbury Cocoa Partnership Programme, which provided funds, Care International (Ghana, Kumasi), which facilitated the work and EatSafe Ghana, which conducted the nutrition education.

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