Original Research Article

The Sanitary Conditions of Bakery and Food Safety Practices Assessment of Bakers in Tamale Metropolis, Ghana

ABSTRACT

There is a lack of research that provides information on the safety of bread for consumers in Ghana although it is one of the popular food items consumed by most Ghanaians daily. The study, therefore, assessed the sanitary conditions of bakeries in the Tamale Metropolis and further evaluated the food safety practices of bakers in these bakeries. The study employed the use of a questionnaire to assess the sanitary conditions of 24 carefully selected bakeries in the Metropolis and then investigated the food safety practices of bakers in these bakeries. At the end of the survey, it was revealed that most (91.7%) of the bakeries had bakers wearing protective gears such as gowns and aprons and all (100%) of the bakeries were free of domestic animals and the visible presence of insects, rodents and vectors. However, 6(25%) bakeries did not place their solid waste containers at an appropriate site far away from the bakery premises. Also, most (89.5%) of the bakers indicated they always wash their hands with soap and water before working and handling bakery ingredients and materials while the rest indicated they do that sometimes. All (100%) bakers indicated that they make sure ingredients are before their expiry dates before they use them. 29.8% (17) of the bakers however did not make it a practice of refrigerating bakery ingredients that require to be stored in the fridge when not in use. The study, therefore, concludes that most bakeries had good sanitary conditions and were managed in a manner that ensure food safety. Bakers also exhibited a good level of food safety adherence. It is recommended that managers should continue to ensure good sanitary standards are followed and food risk analysis concepts like HACCP are implemented in the bakery to check new and complex food safety threats.

Keywords: [Bread; Bakery; Food safety; Ghana; Hygiene; Practices; Sanitary.

1. INTRODUCTION

According to a report by the Center for Disease Control and Prevention, around 9.4 million foodborne illnesses occur annually leading to 55,961 hospitalizations and 1,351 deaths (1). This places food safety as one of the major issues of public concern since the provision of safe food is crucial for the good health and well-being of the public. The challenges of achieving food safety include contamination of food by biological and chemical agents like bacteria, fungi and pesticides as well as bad food safety practices and poor personal hygiene by food handlers (2).

Food establishments such as bakeries are charged with providing safe food by regulatory authorities because they make food in large quantities to serve a wide range of customers

and consumers (3). Failure to meet this mandate has the potential of leading to disastrous effects on human health in the form of illnesses, loss of productivity, serious health complications or death. Although there are several legislations to boost food safety in Ghana, certain studies have revealed low enforcement of these laws and standards, bad handling practices by food handlers and microbial contamination of ready-to-eat foods in Ghana (4,5,6,7). It is hence acknowledged that factors such as the bad condition of certain food establishments, poor personal hygiene and low food safety practice among food service providers majorly threaten food safety in Ghana and place consumers at risk.

Bread is widely consumed in all parts of Ghana and is mostly included in the breakfast of a lot of Ghanaian families. Bread is therefore very popular so bakeries are one of the busiest and most active foodservice establishments in the country. According to Meleko et al., (3), food prepared in large quantities is vulnerable to contamination and often may cause foodborne outbreaks unless good sanitary standards and practices are maintained. Bakeries and the activities of bakers in Ghana have the potential of causing a disease outbreak due to the high patronage however there is a lack of research that provides information on sanitary conditions of these bakeries and food handling activities of the bakers to assure the safety of their establishments and operations. This study, therefore, is conducted to assess the sanitary conditions of bakeries situated in Tamale Metropolis in the Northern Region of Ghana and the food safety practices of bakers in these bakeries.

2. METHODOLOGY

The study was conducted in the Tamale Metropolis in the Northern Region of Ghana with coordinates 9.4N and 0.8W. Tamale is the capital city of the region and is mainly an urban community with areas and locations that have moderate and high population density.

The method employed for this study was the methodology used by Birmaet al. (8) in their study on safety culture evaluation of laboratories. A total number of 24 bakeries were carefully identified and selected for this study. A questionnaire was administered to at least 2 bakers randomly selected in each bakery for food safety practices assessment. In the end, 57 bakers were successfully recruited and interviewed for the study.

The questionnaire was constructed based on information from a recognized Ghanaian food safety standard document which is the Accra Metropolitan Assembly Bakery Bye-Laws, 2017 and other studies that assessed sanitary conditions of food establishments around the world. The questionnaire consisted of three sections. Section I captured the sanitary conditions of bakeries. Section II focused on the demographic characteristics of bakers and section III investigated the food safety practices. Data was collected via a google form link by trained data collectors. The questionnaire was pretested in 2 bakeries to ensure the quality and validity of the data. The data generated at the end of the survey were analyzed using Microsoft Excel 2019. Frequencies and percentages of variables were counted and calculated.

Both verbal and informed consent of bakers were sought at the start of the survey. The participants were educated on their right to withdraw at any stage of the process and were also assured that information gathered will be protected and were also assured of anonymity during the publication or presentation of the research findings.

3. RESULTS AND DISCUSSION

3.1 Sanitary Conditions of Bakery

The survey results on the sanitary conditions of bakeries are shown in Table 1.

Table 1: Sanitary Conditions of Sampled Bakeries in the Tamale Metropolis

Variables	Responses

	Yes N(%)	No N(%)
Bakers wear protective gear like gowns, caps etc.	22(91.7)	2(8.3)
Floors, ceiling and walls of the bakery are visibly clean	19(79.2)	5(20.8)
Tables and bakery utensils are in good condition and visibly clean	24(100)	0
Bakers neatly dressed	24(100)	0
Fingernails of the bakers are well-kept and clean	24(100)	0
There is an adequate source of water in the bakery	22(91.6)	2(8.3)
There are handwashing stands available in the bakery	18(75)	6(25)
The bakery has a separate room for flour and ingredients storage	24(100)	0
The bakery has a separate room for keeping bread and other finished pastries	21(87.5)	3(12.5)
The rooms of the bakeries are infested with insects, rodents/vectors	0	24(100)
The rooms of the bakeries are well ventilated	24(100)	0
There is a toilet facility in the bakery	13(54.2)	11(45.8)
If yes, the toilet facility is properly managed	13(100)	0
If yes, there is a handwashing stand for use after using the toilet	13(100)	0
There is a properly managed liquid waste disposal system	19(79.2)	5(20.8)
There is a solid waste storage container with a fitting lid	19(79.2)	5(20.8)
The solid waste container is at an appropriate site away from the bakery site	18(75)	6(25)
There are domestic animals on the bakery premises	0	24(100)
There is good and adequate lighting on the bakery premises	24(100)	0
Bakers in the bakery have a health certificate	21(87.5)	3(12.5)
Bakers have received any food safety training	17(70.8)	7(29.2)
Bakers are aware of HACCP (Hazard Analysis and Critical Control Points) and its component	15(62.5)	9(37.5)

The study reveals a fairly good sanitary level of bakeries in the Tamale Metropolis. The sampled bakeries were mainly into bread baking and just a few were making other pastry products as well. From strict observation during the visit to the bakeries to collect data, it was identified that most of the bakeries were tidy and in good condition. All the bakeries (100%) visited in this study had separate rooms for storing ingredients as required by the food safety and hygiene bye-laws in the metropolis. The majority of the bakeries (79.2%) had visibly clean walls, ceilings and floors. Bakers are required to wear protective gear such as caps, aprons and gowns to boost food safety. The level of compliance in these bakeries was high as 92% of them had bakers in these protective wears. This is positive and in the right direction towards ensuring the safety of the bread and other pastry products meant for public consumption.

Unlike the findings of Mulugeta and Bayeh (9), this study revealed that 79.2% had liquid and solid disposal systems in place which promotes the sanitary condition of the location making such bakeries conducive for producing food to feed the public. Bread baked in unsanitary conditions are susceptible to contamination by biological, chemical and physical agents and can lead to foodborne diseases outbreak. It was therefore disturbing that 25% of the bakeries did not place their solid waste containers at an appropriate site far away from the baking premises.

Another finding which contributed to the good sanitary condition of the bakeries was the fact that domestic animals were absent in all the bakeries at the time of collecting data in the bakeries. Also, there was so visible infestation of all the bakeries by insects, rodents and vectors. All these animals are one of the main factors causing food contamination as there is an established link between animals and diarrhoeal diseases (10). According to Bentancor et al. (11) and Lefebvre et al. (12) animals such as cats and dogs are known carriers of

pathogens like *Salmonella* and *E. coli* which are among the leading causes of foodborne illnesses and complications around the world.

Consistent with the finding of Meleko et al. (3), not all foodservice establishments had lavatory facilities for food handlers in their premises. In this study, 45.8% of the bakeries lacked a lavatory facility. Fortunately, all the bakeries that had a toilet facility managed it properly with handwashing stands made available for users after using the toilet.

Although just 37.5% of bakeries had bakers who were not aware of food risk analysis concepts like HACCP, it is alarming since food risk analysis mechanisms are put in place to ensure food safety in food production. Concepts like HACCP identify both existing and new food safety hazards and further identify preventive controls for hazards that require a preventive control. The lack of awareness of bakers in these bakeries suggests the absence of food risk analysis components in the bakeries. This hence makes bread and pastry products from the said bakeries vulnerable to contamination.

3.2 Demographic Characteristics of Bakers

The results of the demographic variables as shown in Table 2 revealed that 70.2% of the bakers were Males and most of the bakers were between the ages of 31 to 40. Also, the bakers were experienced as 57.9% had been in the profession for 6 or more years.

Table 2: Socio-Demographic Characteristics of Bakers in the Sampled Bakeries

Demographic Characteristics	Number	Percentage
Sex		
Male	40	70.2
Female	17	29.8
Age		
Less than 20	0	0
20 – 30	16	28
31 – 40	23	40
41 – 50	18	31
51 and above	0	0
Religion		
Islam	39	68
Christianity	18	32
Traditional	0	0
Ethnicity		
Dagomba	22	38.6
Frafra	6	10.5
Gonja	1	1.8
Bulsa	8	14
Akan	7	12.3
Bono	5	8.8
Krobo	1	1.8
Moshie	5	8.8
Waala	2	3.5
Marital Status		
Married	29	50.8
Single	26	45.6
Divorced	0	0
Widowed	2	3.5
Education		
Tertiary	19	33.3
High school	18	31.6

Basic	15	26.3
None	5	3.5
Experience		
Less than 3 years	15	26.1
3 – 5 years	9	15.8
6 and above years	33	57.9

3.3 Food Safety Practices of Bakers

The food safety practices of bakers are shown in Table 3.

Table 3: Food Safety Practices of Bakers

Food safety practices	**Responses**			
	Always N(%)	**Sometimes N(%)**	**Rarely N(%)**	**Never N(%)**
Do you wash your hands with soap and water before working and handling bakery materials?	51(89.5)	6(10.5)	0	0
Do you wash your hands with soap and water after handling money?	43(75.4)	11(19.3)	3(5.3)	0
Do you wash your hands after using the restroom or going to dispose of waste?	52(91.2)	5(8.8)	0	0
How often do you clean/disinfect the oven?	41(71.9)	16(28)	0	0
How often do you wash the utensils used in baking?	54(94.7)	3(5.3)	0	0
How often do you wash or disinfect the tables/pans used on the premises?	52(91.2)	5(8.8)	0	0
Do you wear a gown or apron and cap whiles working?	47(82.5)	10(17.5)	0	0
Do you make sure the ingredients used are before their best before or expiry dates?	57(100)	0(0)	0	0
Do you cover your solid waste bins?	52(91.2)	3(5.3)	2(3.5)	0
Do you store materials that are meant to be refrigerated in the fridge?	17(29.8)	23(40.4)	9(15.8)	8(14)

The food safety practices assessment of bakers assessed practices surrounding food handling practices involving cross-contamination as well as bakery and personal hygiene of bakers in the bakeries. According to Azanaw et al. (13), improper handling of food is a major risk factor to food contamination hence a leading cause of foodborne illnesses. The majority of the bakers (89.5%) indicated that they always wash their hands with soap and water before handling bakery ingredients and materials. Most importantly, no baker indicated that they never or rarely washed their hands before working. It is therefore believed that bakers in the sampled bakeries find hand washing and clean hands crucial to achieving the safety of bread for consumption which is a good practice. It is hence not surprising that most of the bakeries employed a different individual as a cashier who was in charge of handling and receiving money from customers.

To prevent cross-contamination, 71.9% of bakers indicated that they always clean or disinfect the oven while the remaining 16% showed that they clean or disinfect sometimes and not always. The majority of the bakeries used clay ovens for baking and per interaction revealed that they prioritize cleaning immediately after use.

Protective gears such as caps, apron and gowns during food preparation aid to prevent food contamination since dirty clothing may be a source of microorganisms and other physical contaminants (13). It was shown via the results of this study that 82.5% of bakers wear these protective wears in their bread handling and preparation activities. This finding is consistent

with several other studies which also reported more than 50% of food handlers to wear protective wears. For instance, Meleko et al. (3) recorded 69.5% of food handlers wore gowns, aprons and hairnets or caps in their study and Mulugetah and Bayeh (9) reported a 92.6% rate in their study conducted in Bahir Dar. Also, due to the high indication response (70.8%) in bakeries that bakers had undergone food safety training before, bakers were alert to some basic threats to food safety hence all bakers reported that they make sure to check the expiry dates of ingredients used in their activities before they use them. This finding is in slight contrast with Meleko et al. (3) who revealed that only 50.3% of food handlers check ingredients' expiry dates before they use them in their study.

The study further revealed that only 29% and 40.4% of the bakers use refrigerators to always and sometimes respectively store raw materials that require to be in the cold chain during storage. A previous study carried out by Orekyeh et al. (14) however reported that 53.2% of bakeries use refrigerators for raw material storage. In this study, it was observed that not all bakeries had refrigerators. This was because some bakeries were just small and served few areas hence did not often purchase ingredients in large quantities. Some bakeries also only purchase ingredients enough to bake their required number of products so there is no surplus to store in refrigerators. Overall, the bakers reported good food safety practices just as reported by Orekyeh et al. (14) who also assessed the hygiene practices of bakers in Amuwo Odofin, Lagos. Most of the bakers in this study are educated and have six or more years of experience in the bakery service. These contribute to their good hygiene practices as they are equipped with crucial information on how to safely handle bakery ingredients and products. It is believed that they pass vital information to young workers around them hence the good sanitary condition of bakeries and food safety practices generally observed in the Tamale Metropolis.

4. CONCLUSION

In general, the study showed that most bakeries had good sanitary conditions. The floors, ceiling and walls of the bakeries were visibly clean and most bakers were frequently seen in protective wears like gloves, apron, gowns and caps. Also, the bakeries were free from domestic animals, insects, rodents and vectors infestation. These factors help to prevent cross-contamination and boost the safety of products produced in these bakeries. The bakers also showed good food safety practices and were aware of the need to adhere to proper handling practices as well as good personal hygiene. It is recommended that owners and managers of bakeries should continue to ensure bakeries meet good sanitary conditions set by authorities in charge of food safety and frequently organize food safety education for workers in their establishments. Also, food risk analysis components like HACCP should be implemented in all bakeries to help guard against existing and novel food safety threats.

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COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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