Food Safety and Hygiene Practices of Kitchen Staff of Boarding Senior High Schools in Amenfi West Municipality, Ghana

ABSTRACT

Food safety and hygiene practices have emerged as an important global issue with international trade and public health implication. Over the years, there have been a lot of reports on several degrees of food poisoning outbreaks in Senior High Boarding institutions in Ghana. Based on this, the study aimed at assessing food safety and hygiene practices of kitchen staff of boarding Senior High Schools in Amenfi West Municipality. The objectives of the study are to; determine the perception of kitchen staff on food safety and hygiene practices, investigate food safety and hygiene practice of kitchen staff, and ascertain whether food safety and hygiene practices of kitchen staff differ with respect to their demographic characteristics. Survey research design was employed. Purposive sampling technique was used in sampling 64 kitchen staff from the boarding Senior High Schools in Amenfi West Municipality.The study found that, the kitchen staff have high perception on food safety and hygiene. The study further revealed that the practices towards cooking/preparing food in the kitchen (3.10±1.249), personal hygiene (3.34±1.235), storage of food (3.21±1.269), and food handling (Separate/ Cross-contamination) (3.45±1.213) were good. The study found a statistical significant difference between food safety and hygiene practices and educational level of kitchen staff. The study recommends regular refresher courses for kitchen staff to ensure updated food safety practices.

Keywords: food safety practices, public health, hygiene practices, food-borne diseases

1.1 Introduction

"Food safety and hygiene practices is becoming a global problem due to increase in food borne illnesses" (Bigson, Essuman & Lotse, 2020). "Prominent among the causes is food contamination by microorganism" (Appietu, 2018; Bigson,Essuman & Lotse, 2020). "Millions of people worldwide suffer from food-borne diseases each year" (WHO, 2016; WHO, 2018). "Globally,the prevalence of food-borne illnesses is unknown since most cases are not reported"(WHO, 2016). However, in a study conducted by Mullan & Wong (2015), 2.2 million people in Canada and 5.4 millionin Australia record food-borne illnesses every year. Also according to the Center for Disease, Control, and Prevention (2011), 48 million foodborne illnesses are recorded annually out of which 128,000 result in hospitalization and 3,000 results in death. Again, a study byDah (2016) indicates that,Ministry of Health of Turkey reported 23,901 Salmonella typhoid infection, 429 Salmonella paratyphoid infection, 21,068 Dysentery infections and 8,824 Hepatitis occurred in Turkey in 2004.

"In Ghana,about 420,000 cases are reported yearlywith an annual death rate of 65,000 costing US$69 million to the Ghanaian economy" (Mahami & Odonkor, 2012). "It is evidence that 10 and 20 percent of food-borne diseases is as a result of consumer behavior" (Mullan & Wong, 2015).

Among established institutions, incidence of foodborne illness are consistently reported in schools.(Dora-Liyana, Mahyudin, Ismail-Fitry, Ahmad-Zaki & Rasiyuddin (2018);Leslie, Bitrus, Abaribe., Okwuikpo & Maitanmi, 2021). Records from the Ministry of Health Malaysia (MOH) indicates 50% of food poisoning cases were from schools (Sharifa, Netty & Sangaran, 2013). According to Dora-Liyana, Mahyudin, Ismail-Fitry, Ahmad-Zaki

&Rasiyuddin (2018) high incidence of food poisoning recorded in schools are as a results of students exposure to risk of foodborne illnesses.

In Ghana, a report by Mohammed (2019) revealed 60 Archbishop Porter girls hospitalized over food poisoning, consequently leading to the closure of the schools and other food establishments. To avert or decrease the occurrences of food poisoning in schools, both kitchen and non-kitchen staff should observe satisfactory food safety standards in the procurement, preparation, processing, cooking, storing or serving of food (Dora-Liyana et al., 2018;8-11).

With the persist research conducted on the causes and prevention of food poisoning in Ghanaian schools, there is still an incident of food poisoning in Senior High Schools in Ghana (Kunadu et al., 2016; Ababio et al., 2016). For instance, in 2019, 60 Archbishop Porter girls were hospitalized over food poisoning.

This researchtherefore sought toevaluate knowledge, attitude and practice towards food safety and hygiene among kitchen staff in boarding school

Materials and method

The study employed a survey designed in collecting data from the study participants

Population

The target population of the study included all the kitchen staff of the thirty one (31) boarding Senior High Schools in the Western Region of Ghana. The study estimated about 620 kitchen staff at the various 31 boarding Senior High Schools.

Sampling Technique and Sample Size

Cluster sampling technique was used to select 11 Public Senior High Schools in the Western Region of Ghana. In determining the sample size for the kitchen staffs (Matron, cooks and cleaners), a table developed by Krejcie and Morgan (1970) was employed. Based on this table, a sample size of 240 kitchen staff of the eleven (11) boarding Senior High Schools in

the Western Region of Ghana were selected. Purposive sampling technique was adopted in selecting the kitchen staff.

2.4 Data Collection Instrument

Questionnaire was used for collecting the necessary information. The questionnaire was designed for the selected kitchen staff; the items were related to the research questions raised in the study. The questionnaire was divided into two (2) sections A and B. The section A consisted of bio data of respondents, while, B reflected the constituents of the Likert scale of which kitchen staff were expected to respond to statements raised. Respondents were expected to tick (√) the created boxes of columns where they strongly agree; agree; disagree and strongly disagree to the given statements.

Data Analysis

In this study, Statistical Product for Scientific Solutions (SPSS-23.0) was used in analysing the data. Descriptive analysis was employedin the form of frequencies, percentages and mean score and presented in tabular form.In order to ascertain the relationship between the variables, regression analysis and Pearson correlation analysis were used.

RESULTS AND DISCUSSIONS

Demographic Characteristics of Respondents

Background characteristics of the respondents were determined. Out of 185 participants, 174 were females. 33% and 30.8% of the study participants were within the age range of 21-25 and 36-40 respectively and only 4 of the participants has no formal education with 7 having master's degree as detailed in Table 1

Table 1: Summary of demographic characteristics of respondents

Characteristics	Responses	Frequency (%)	Percentage (%)
Gender	Male	11	5.9
	Female	174	94.1
Age group	Below 21years	25	13.5
	21-25years	61	33.0
	26-30years	21	11.4
	36-40years	57	30.8
	40years and above	21	11.4
Position	Cook	123	66.4
	Matron	41	22.2
	Cleaner	21	11.4
Educational level	No formal education	4	2.2
	Junior high	9	4.9
	Senior high	55	29.7
	Diploma/HND	56	30.3
	First degree	54	29.2
	Masters degree	7	3.8

As depicted in Table 2, 94.1% of the kitchen staff were females, whereas the smaller portion representing 5.9% were males. This constituted a proportion of 1:15, which indicated that for every male, there were 15 more females who work in the kitchen at the selected boarding schools in the Western Region. The proportion of the females as a kitchen staff concur with Dah (2016) study who found out that 63.1% of kitchen staff in training colleges in Hohoe were females and 36.9% were men. Also, Lestantyo, Husodo, Iravati, and Shaluhiyah (2017) showed that majority (96.7) of kitchen staff in some selected hospitals in Indonesia were female and 3.3% were males. This could also be in line with findings from Human et al. (2015) who found womendominates the catering industries in developing countries.

It was also found that the highest proportion (33.0%) of the respondents were those in their late 30s (36-40 years) In addition, 11.4% of the respondents were above 40years. In similar studies, Dah (2016), found the majority of the kitchen staffs (34.4%) were 31–40 years of age while 12.5% were more than 50 years. Monney et al. (2014) also found that the least represented in their sample of food handlers in Sunyani were teenagers, whereas the majority were those within the age brackets of 31-35 years. The results of the current study therefore bear similarities to earlier studies, in terms of the age of food handlers.

As depicted in Table 1, 66.4% of the respondents were cooks, 22.2% of the kitchen staff were matrons. Also, 11.4% of the respondents were cleaners. This is obvious that cooks dominate the matrons since they carry out the greater part of the kitchen job and the matrons perform the supervisory role. The finding coincides with the study by Dah (2016) who found that majority (53.8%) of kitchen staff in senior High Schools in Kumasi Metropolis are cooks.

On the educational level of the kitchen staff, 2.2% had no formal education. Also, it is can be seen that 4.9% and 29.7% of the respondents had junior high and senior high education respectively. However, 30.3% of the respondents had Diploma/HND qualification, whereas 29.2% had first degree, and only a few 3.8% had master's degree education. The finding agrees with Asamoah (2017) who found majority (42.0%) of kitchen staff in second cycle institution in Kumasi had primary education, followed by secondary education (30.0%), 20.0% had tertiary education, and (8.0%) had no formal education.

Perception of kitchen staff on food safety and Hygiene

The perception of the respondents regarding food safety and hygiene used a scale of 1 to 5, where 1 = strongly disagree, to 5 = strongly agree. Presented in Table .6 were the responses gathered. The responses which were gathered with the aid of questionnaire administration are presented in Table 2.

Table 2.Responses on Perception of kitchen staff on food safety and hygiene

S/N	Perception	Mean	Std. Dev.	Skewnes s	$\bar{X}$ ± SD
	Personal hygiene				
Kph1	There is the need to wash hands before using gloves	3.86	.419	-.883	
Kph2	Hair contains various types of bacteria and can be a main source of food contamination	3.62	1.141	-1.702	3.11±.96
Kph3	Bacteria are normally found on the surfaces of human skin	3.20	1.975	-.213	9
Kph4	There are steps in hand washing procedures	2.52	1.348	.202	
Kph5	Dishcloths cannot replace hand towels for wiping hands	2.35	1.161	.461	
	Temperature control				
Ktc1	Frozen beef is defrosted by soaking in water	4.25	.592	-.925	
Ktc2	Freezing process of foods does not kill bacteria but prevent their growth	4.15	.765	-1.294	
Ktc3	Food can be stored at room temperature after cooking it for 2 hours before storing it in the refrigerator	3.68	1.143	-.520	3.62±.24 1
Ktc4	The correct temperature for refrigerator is 1-	2.41	1.013	.341	

	40C and freezer is below -180C				
	Cross contamination				
Kcc1	Staff/students should no eat and drink in food preparation area	3.76	1.107	-.197	
Kcc2	Fresh vegetables should be washed by soaking it in vinegar water	3.32	1.079	.202	2.72±.243
Kcc3	Bacteria can enter smashed canned food	2.21	.723	.103	
Kcc4	Vegetables should be chopped and then washed	1.59	.492	-.388	
	Food storage				
Kfs1	Raw food should be stored in lower shelves within cold storage	3.94	.901	-.774	
Kfs2	Preparation of food in advance is likely to contribute to food-borne illnesses	3.66	1.370	-.262	3.33±.411
Kfs3	Frozen food cannot be frozen again after being defrosted in the chiller	3.49	.956	-.071	
Kfs4	Samples are taken from each meal for quality controls, and these samples are stored in refrigerator for 48 hours	2.23	1.070	.478	
	Equipment hygiene				
Keh1	The action of a detergent is not enough to	4.17	.554	-.913	3.45±.50

	ensure effectiveness of cleaning equipment			2
Keh2	Bacteria cannot grow on broken or cracked dishes	3.70	1.196	-1.556
Keh3	Cold storages should not be opened and ventilated frequently	3.65	.995	-.184
Keh4	Rinsed containers and equipment should not be wiped with a dish towel	3.57	1.031	-.048
Keh5	Sinks used for washing raw materials cannot be allowed to wash hands in the production area	2.16	1.154	.279

On the personal hygiene perception of the kitchen staff, majority of the respondents (3.86 and a standard deviation of 0.419) agreed that there is the needs to wash hands before using. On the other hand, the respondents (mean of 3.62 and a standard deviation of 1.41). agreed that hair contains various types of bacteria and can be a main source of food contamination. The respondent's agreement aligns with Hernández-herrera (2016) that the human hair contains microorganisms that can be transferred to the food during processing, packaging, and preparation. With a mean score of 3.20 and a standard deviation of 1.975, the respondents agreed that bacteria are normally found on the surface of human skin. On the contrary, majority the respondents disagreed that there are steps in hand washing procedures (x=2.52), and dishcloths cannot replace hand towels for wiping hands (x=2.35). These statements failed to meet the predetermined cut-off point of 3.0.

An average mean of 3.11 and a standard deviation of 0.969 shows that the kitchen staff are knowledgeable about personal hygiene. Amelia et al. (2017) in their studies affirmed that

food handlers need to be knowledgeable about personal hygiene. This aspect of knowledge is crucial because many diseases can be spread through poor personal hygiene. Liyana et al. (2018) on the other hand mentioned that having a good knowledge in food hygiene and safety lead to proper food handling practices.

On the issue that frozen beef is defrosted by soaking in water, majority of the respondents agreed with a mean score of 4.25 and a standard deviation of 0.592. Also, the respondents agreed that freezing process of foods does not kill bacteria but prevent their growth. Again, the respondents agreed that food can be stored at room temperature after cooking it for 2 hours before storing it in the refrigerator.. The view of the respondents concurs with the study by Schulz (2021) that cooked food should be stored at room temperature before storing it in the refrigerator. On the other hand, majority of the respondents disagreed that the correct temperature for refrigerator is 1-40C and freezer is below -180C.

With an average mean score of 3.62, it appeared that the kitchen staff have knowledge about temperature control. The kitchen staff high perception on refrigerator and freezer temperature is very important in reducing the risk of food spoilage and effects on food safety. A study by Abdul-Mutalib et al. (2012) showed that majority of kitchen staff have knowledge about acceptable refrigerator temperature ranges and temperature danger zones for food.

From Table 2, the respondents agreed that staff/students should not eat and drink in food preparation area with a mean score of 3.76 and a standard deviation of 1.107. Moreover, the respondents agreed that fresh vegetables should be washed by soaking it in vinegar water. This statement had a mean score of 3.32 and a standard deviation of 1.079. This clarifies that unwashed vegetables can lead to food poisoning and death of the consumer. According to World Health Organisation (WHO), prevention of contaminating food with pathogens spreading vegetables should be washed with safe water thoroughly to kill pathogens. On the

contrary, the respondents disagreed to the statement that bacteria can enter smashed canned food (x=2.21), and vegetables should be chopped and then washed(x=2.21).

The average mean of 2.72 and a standard deviation of 0.243 shows that perception of the kitchen staff is low. Food handlers knowledge about food contamination is important to prevent food poisoning. Lestantyo et al. (2017) indicated that occurrence of food poisoning may be due to improper handling of equipment that contributes to food contamination. Food contamination is not just limited to foods that may consider risky, such as chicken or fish. Prepared fruits, vegetables, and salads can also be potentially dangerous. Contaminated food will usually look, smell and taste normal.

As depicted in Table 2, the kitchen staff agreed to the fact that raw food should be stored in lower shelves within cold storage. The respondents agreed that preparation of food in advance is likely to contribute to food-borne illnesses. Asamoah et al. (2017) indicted that food frequently cooked well in advance of consumption is prone to contamination from exposure to dust, flies, bacteria and their spores. The statement that frozen food cannot be frozen again after being defrosted in the chiller was agreed by the respondents. This statement attained a mean score of 3.49 and a standard deviation of 0.957. Conversely, majority of the respondents disagreed that samples are taken from each meal for quality controls, and these samples are stored in refrigerator for 48 hours. This statement had a mean of 2.23 and a standard deviation of 1.070.

An average mean score of 3.33 and a standard deviation of 0.411 shows that the kitchen staff have knowledge about food storage. The result concurs with Liyana et al. (2018) study that the kitchen staff are knowledgeable about the process of food preparation and storage. This is because the food handlers were acknowledging that cooked food can be stored for at least three hours at room temperature.

As displayed in Table 2, the respondents agreed that the action of a detergent is not sufficient

to ensure effectiveness of cleaning equipment, with a mean score of 4.17 and a standard deviation of .554. Again, with a mean of 3.70 and a standard deviation of 1.196, the respondents agreed that bacteria cannot grow on broken or cracked dishes. On the issue that cold storages should not be opened and ventilated frequently had a mean score of 3.65 and a standard deviation of 0.995. This implies that the kitchen staff have knowledge about frequently not opening cold storage areas. Moreover, the respondents agreed that rinsed containers and equipment should not be wiped with a dish towel. This statement had a mean score of 3.57 and a standard deviation of 1.031. This clarifies that the kitchen staff are knowledgeable about wiping rinsed containers with dish towel. On the contrary, with a mean score of 2.16 and a standard deviation of 0.279, the respondents disagreed that sinks used for washing raw materials cannot also be allowed to wash hands in the production area.

The average mean score of 3.45indicates that the kitchen staff are knowledgeable about equipment hygiene. This is because most of the kitchen staff answered correctly to effective cleaning of equipment. Sun and Ockerman (2005) affirmed that knowledge on equipment cleaning is important to avoid any cross-contamination to the prepared food. Presented in Figure 1 described the average mean score and standard deviation of each category of the perception of kitchen staff on food safety and hygiene

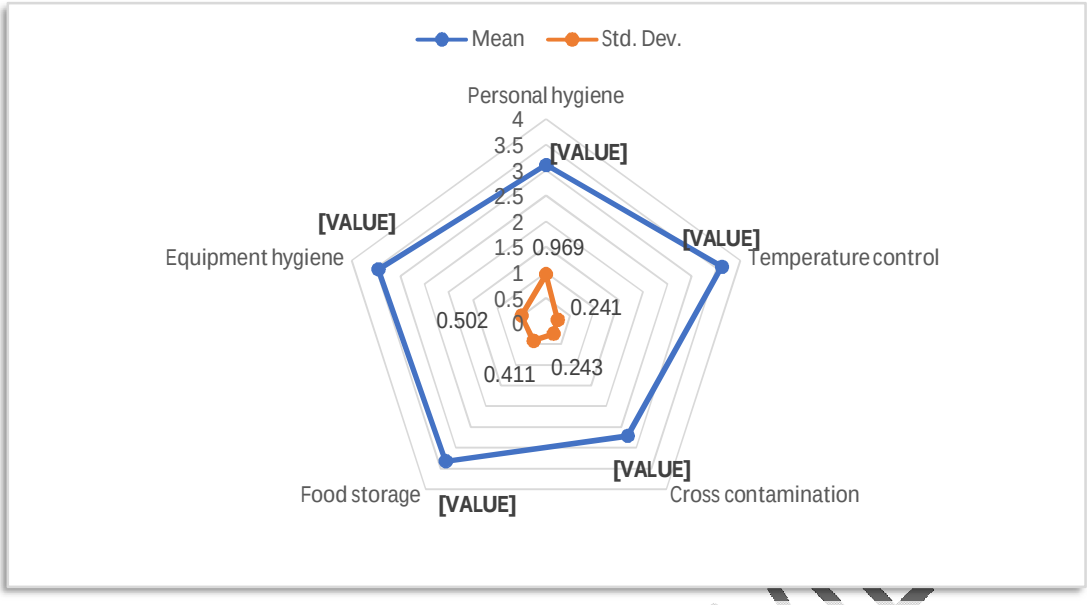

Figure 1.Average Mean scores for each Perception

Source: Field Data, 2023

From Figure .1 the average mean score for personal hygiene is 3.11±.969. On the other hand, perception of kitchen staff on temperature control had a mean score of 3.62±.241. Again, cross contamination had a mean score of 2.72±.243. Moreover, food storage had a mean score of 3.33±.411, whereas the mean score of equipment hygiene perception is 3.45±.502. This indicates that the kitchen staff at the various sample boarding senior high schools have good knowledge on food safety and hygiene, although the knowledge on cross contamination is low. The findings is in lines with studies (Baş, Ersun & Kivanç, 2006, Abdul-Mutalib et al., 2012; Stenger et al., 2014) who found good food handlers' knowledge score (>50%) among food handlers in school food operations and catering. Tan et al. (2013) (79.71 ± 13.36) and Yardimici et al. (2015) (76.5%) study found that 50% of food handlers in schools have knowledge about food safety and hygiene practices. Appietu (2018)study revealed good food safety knowledge among kitchen staff. However, Leslie et al. (2021) determines the pattern of food safety and hygiene practices among food vendors in public primary schools in Ikenne Local Government Area, Ogun State, Nigeria. The analysis revealed that 8.3% of the

respondents had low knowledge of food safety and hygiene, 18.8% had moderate knowledge and 72.9% of them had high knowledge of food safety and hygiene.

Food safety and hygiene practice of kitchen staff

The section intends to answer the question on the food safety and hygiene practices of kitchen staff. The practices regarding food safety and hygiene used a scale of 1 to 5, where 1 = strongly disagree, to 5 = strongly agree. Presented in Table 3 were the responses gathered.

Table 3.Response of food safety and hygiene practices of kitchen staff

S/N	Food safety and hygiene practice	Mean	Std. Dev.	Skewness	$\bar{X} \pm SD$
	Cook/Prepare				
Pcp1	Recipes used in the kitchen specify both oven temperature and cooking time to ensure that the food is fully and safely cooked	4.15	.359	1.962	
Pcp2	Soup or other foods, that have been fully cooked, cooled and kept in the refrigerator but are being served hot are reheated to at least 65°F	4.03	.526	.033	**2.97±0.869**
Pcp3	We use color to determine whether a meat is completely cooked	2.75	1.292	-1.305	
Pcp4	Hot foods that are not served immediately are held at 130°F	2.46	.872	.598	

Pcp5	Chicken is cooked until the temperature in the middle is a least 165°F	2.23	.796	-.431	
Pcp6	If cooked food is accidentally left out on the counter overnight, we reheat to 165°F and serve	2.21	1.370	.262	
	Chill/Cool and Cold Storage				
Pccs1	In the kitchen, very hot food is allowed to completely cool (room temperature) and then refrigerated	4.15	.672	-2.354	
Pccs2	Cold foods that are not served immediately are held at 41°F or below	3.53	.676	-1.123	
Pccs3	Meats are kept in the refrigerator until they are all gone or for no more than 3 or 4 days	2.58	1.011	-.302	**2.92±0.988**
Pccs4	Foods, like rice, is held at room temperature for 2 hours if students/teachers do not eat at the same time	2.26	1.160	.103	
Pccs5	The temperature at the facility refrigerator is 41°F or below	2.08	1.424	.343	
	Clean/hygiene				
Pch1	Washing hands with water and soap after preparing foods	4.60	.753	-3.045	**3.40±0.829**

Pch2	Washing hands with water and soap before preparing foods	4.60	.753	-3.045	
Pch3	Wash Vegetables before slicing	4.30	.732	-2.209	
Pch4	Wear hair restraint (cap) when working	2.45	.758	-2.472	
Pch5	Wear fully equipped Personal Protective Equipment when on duty	2.27	.724	-2.198	
Pch6	Wearing Gloves when handle ready -to-eat food	2.20	1.259	1.467	
	Receiving/General Storage				
Prs1	Foods are date marked when received and after opened	3.45	.846	-1.279	
Prs2	Dry ingredients are stored in properly closed and labeled intact containers	2.98	1.300	-.180	
Prs3	There is a system in place to insure that a food item received first is used first	2.91	1.365	.340	
Prs4	Plastic or glass containers that originally did not hold food, but have been properly cleaned, are reused to store food	2.91	1.110	-.623	**2.81±1.122**
Prs5	Food, used in this kitchen, is purchased from an approved vendor	2.82	1.135	-.274	
Prs6	Before any food is prepared, the safety of the food is assessed by the way the food	2.58	1.168	.191	

	looks and smells				
Prs7	Cleaning chemicals are stored with dry food ingredients, as long as they are in their original containers	2.01	.935	.392	
	Food Handling (Separate/Cross-contamination)				
Pfh1	After cutting up raw meat or chicken, the cutting board is wiped with a wet dishcloth or sponge before using the board to cut produce	4.23	.420	1.314	
Pfh2	Fresh produce is stored in the refrigerator above or below raw meat or poultry – wherever there is room	3.60	1.049	-.597	**3.02±0.572**
Pfh3	In the refrigerators, lunchmeats and raw meats are kept separated	2.15	.359	1.962	
Pfh4	Kitchen staff use the different spoon to taste and then stir the food	2.10	.461	.866	
	Allergens				
Pa1	Food allergies of students/teachers are taken into consideration when planning meals	3.84	1.217	-.629	3.45±1.257
Pa2	We adjust recipes and food handling	3.07	1.298	-.343	

practices for students/teachers with food allergies	

Good: > 3.0, Bad: < 3.0

Cook/Prepare Practice

It can be observed from the cook/prepare practices category in Table 3 that the recipes used in the kitchen specify both oven temperature and cooking time to ensure that the food is fully and safely cooked had a mean of 4.15 and a standard deviation of 0.359. On average, the respondents also agreed that foods that have been fully cooked, cooled and kept in the refrigerator are reheated and served hot. This is supported by a mean of 4.03 and a standard deviation of 0.526. Conversely, the respondents disagreed that they use color to determine whether a meat is completely cooked. This statement reflected a mean of 2.75 and a standard deviation of 1.292. In addition, the respondents disagreed that hot foods that are not served immediately are held at 130°F with a mean of 2.46 and a standard deviation of 0.872. However, with a mean score of 2.23 and a standard deviation of 0.796, the respondents disagreed that chicken or any other meat products are cooked until the temperature in the middle is a least 165°F. On the other hand, the respondents disagreed that if cooked food is accidentally left out on the counter overnight, we reheat to 165°F and serve with a mean score of 2.21 and a standard deviation of 1.370.

The average mean scores of 2.97±0.869 showed thatthe kitchen staff practices towards cooking/preparing food in the kitchen were bad. This indicates seriousness should be attached to personal hygiene by food preparation and cooks. The finding contradicts with the work done by Dah (2016) that the kitchen staff at the training colleges of education adhered to good practices in cooking/preparing food. Monney et al. (2013) reported similar studies

that food handlers in educational institutions in Konogo adhered to good practice in preparing food.

Chill/Cool and Cold Storage

From Table 3 the respondents agreed that in the kitchen, very hot food can completely cool (room temperature) and then refrigerated. This statement attained a mean of 4.15 and a standard deviation of 0.672. However, with a mean score of 3.53 and a standard deviation of 0.676, the respondents revealed that Cold foods that are not served immediately are held at 41°F or below. On the contrary, most of the respondents disagreed that Meats are kept in the refrigerator until they are all gone or for no more than 3 or 4 days with a mean score of 2.58 and a standard deviation of 1.011. In addition, the respondents disagreed that Foods, like rice, is held at room temperature for 2 hours if students/teachers do not eat at the same time. This statement reflected a mean of 2.26 and a standard deviation of 1.160. Furthermore, the respondents disagreed that he temperature at the facility refrigerator is 41°F or below. This statement had a mean of 2.0 and a standard deviation of 1.424.

The average mean score (2.92±0.988) indicates that the kitchen staff had bad practices on chilling/cooling of food storage. This indicates that the kitchen staff answered majority of the questions incorrectly.

Clean/hygiene

The findings revealed under clean/hygiene practices that kitchen staff wash their hands with water and soap after preparing foods. This is supported by a mean of 4.60 and a standard deviation of 0.753. Washing hands with water and soap before preparing foods had a mean of 4.60 and a standard deviation of 0.753. In addition, wash vegetables before slicing had a mean of 4.30 and standard deviation of 0.758. On the other hand, the kitchen staff's response on wearing hair restraint (cap) when working had a mean of 2.45 and a standard deviation of 0.758. This confirms that most of the respondents disagreed on wearing hair restraint (cap)

when cooking. This finding contradicts with Dah (2016) who asserted that majority (75.4%) of the kitchen staffs in the selected Senior High Schools in Hohoe Municipality wear hair restraint (cap) when working. Also, the kitchen staff disagreed that they wear fully equipped Personal Protective Equipment when on duty. This reflected a mean of 2.27 and a standard deviation of 0.724. Meanwhile, the respondents emphasized that they do not wear gloves when handling ready to eat food. This statement had a mean score of 2.20 and a standard deviation of 1.259.

The average mean score (3.40±0.829) affirmed that kitchen staff have good practice in food hygiene. The finding is in line with the study Scott (1996) also suggested the seriousness that should be attached to personal hygiene by food processors and cooks. In a study by Dah (2016), 56.9% of the respondents always make use of gloves to handle food that is ready to be eaten. Previous studies proved that it is vital to practice personal hygiene particularly hand washing since the hand is the major agent that transfers microorganisms to foods (Sneed *et al.,* 2004: Aarnisalo *et al.* 2006

Receiving/General Storage

On receiving/storage practices category, it was observed from that foods are date marked when received and after opened. It has the highest mean score of 3.45 and a standard deviation of 0.846. On the contrary, the respondents disagreed to the statement that dry ingredients are stored in properly closed and labeled intact containers with a mean score of 2.98 and a standard deviation of 1.300. This shows that the kitchen staffs do not pay attention to expiring dates on foods always. The issue that there is a system in place to ensure that a food item received first is used first had a mean score of 2.91 and a standard deviation of 1.365.

Moreover, on plastic or glass containers that originally did not hold food, but have been properly cleaned, are reused to store food had a mean of 2.91 and a standard deviation of

1.110. However, the respondents disagreed that before any food is prepared, the safety of the food is assessed by the way the food looks and smells. This statement had a mean of 2.58 and a standard deviation of 1.168. With reference to the statement that cleaning chemicals are stored with dry food ingredients, as long as they are in their original containers, the majority of the respondents disagreed with a mean score of 2.01 and a standard deviation of 0.935.

An average mean of 2.81±1.122 indicates that the kitchen staffs have bad practices in receiving and storing of food. The finding is also in line with a study conducted by Mohd. Firdaus Siau et al. (2015), who stated that food handlers had bad practices for storage of food. Siau further asserted that although hospital food handlers were reported to exhibit good storage practices, however they were negligence to compliance with adequate hygiene practices. The finding contradicts with the work of Dah (2016) who indicated that the kitchen staff in the selected Senior High Schools in Hohoe Municipality had good practices towards storing of food. As per Dah, 93.8% and 96.9% of the respondents pay attention to expiring dates on food received and assessed the safety of food by the way the food looks and smells respectively. Research in Turkey by Tokuç (2009), found that the food handlers have good practices on food storage and believe that food safety is an important part of their job.

Food Handling (Separate/Cross-contamination)

Table 3 shows the result of the five food handling practices investigated. It is evident from the result that the highest mean of 4.23 and a standard deviation of 0.420 claimed that after cutting up raw meat or chicken, the cutting board is wiped with a wet dishcloth or sponge before using the board to cut produce. The statement that fresh produces is stored in the refrigerator above or below raw meat or poultry – wherever there is room had a mean score of 3.60 and a standard deviation of 1.049. Again, the statement that refrigerators, lunchmeats

and raw meats are kept separated had a mean score of 2.15 and a standard deviation of 0.359. Kitchen staffs using different spoon to taste and then stir the food had a mean of 2.10 and a standard deviation of 0.461. Lestantyo et al. (2017) revealed that safe food handling is an important part of in food safety. Lestantyo et al. believed that wiping cutting board with dishcloth or sponge before using the board to cut produce after cutting up raw meat or chicken could prevent food borne microbes contaminations.

The result on Table 3 suggests that the kitchen staff have good food handling practices with an average mean of 3.02±0.572. According to the study by Nurul-Huda (2008), food handlers might not practice food safety when handling foods although most of the food handlers in this survey gave positive answers. Hence, motivation, initiative, and training, should be provided to encourage food handlers practicing appropriate attitudes and procedures during food preparation and handling (Nurul-Huda, 2008). Mohd et al (2015) pinpoint that non-Malaysian have a higher level of practices compared to Malaysian. The mean of the practices for non-Malaysian was 10.88±1.5 compared to Malaysian was 10.01±2.6. Mohd et al (2015) indicated that the food handlers have good practices towards food handling practices, but the non-Malaysian food handlers have poor handling compared to the local food handlers.

Allergens

From Table 3 the respondents indicated that they consider food allergies of students/teachers when planning meals. This statement had a mean of 3.84 and a standard deviation of 1.217. In addition, the respondents emphasized that they adjust recipes and food handling practices for students/teachers with food allergies. This statement reflected a mean of 3.07 and a standard deviation of 1.298. With an average mean score of 3.45±1.257 affirmed that the kitchen staff to the large extent takes into consideration and adjust recipes and food handling when planning meals for the students/teachers with allergy.

Presented in Figure 2 shows the average mean score and standard deviation of each category of food safety and handling practice.

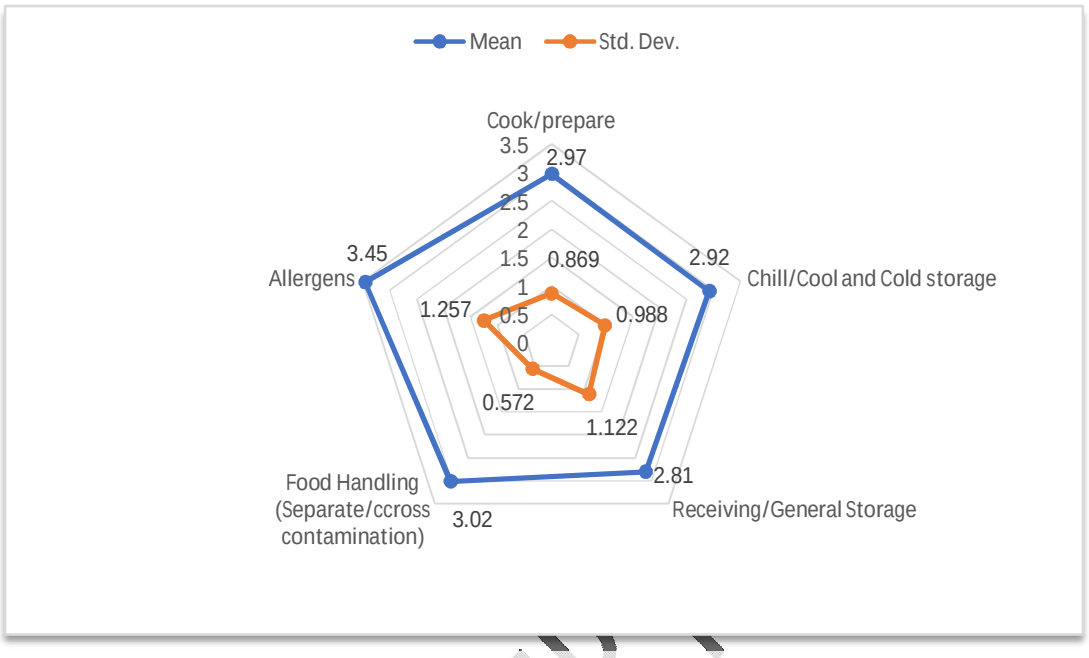

Figure 2.Average Mean scores for each practice category

Source: Field Data, 2023

From Figure 2, the average mean score for cook/prepare practice had a mean score of 2.97±0.869. However, Chill/Cool and Cold Storage practices had a mean score of 2.92±0.988. On the other hand, clean/hygiene practices had a mean score of 3.40±0.829. Again, receiving/storage practices had a mean score of 2.81±1.122. Moreover, food handling (separate/cross-contamination) had a mean score of 3.02±0.572. In addition, the allergens practice of the kitchen staff had mean score of 3.45±1.257. This shows that food safety and handling practices among kitchen staffs are not convincing as they only have good practice in clean/hygiene, food handling, and allergens. Food handlers with poor personal hygiene, handling practices and storage practices can be sources in spreading the food-borne diseases directly, or due to cross-contamination. Studies suggested that good hygiene practices,

storage practices and handling may result in good food safety and hygiene practices among food handlers (Cakiroglu & Ucar, 2008).

Factors hindering food safety practices of kitchen staff

The section intends to address the factors hindering food safety practices of kitchen staff in the selected boarding schools. The factors hindering food safety practices of kitchen staff used a scale of 1 to 5, where 1 = strongly disagree, to 5 = strongly agree. Presented in Table .4 were the responses gathered.

Table 4: Response of factors hindering food safety practices of kitchen staff

S/N	Factors	Mean	Std. Dev.	Skewness	Decision
Fac1	Lack of education and training on food safety practices	4.38	.714	-.716	Agreed
Fac2	Poor monitoring and evaluation	4.23	.420	1.314	Agreed
Fac3	Busy work schedules	4.23	.420	1.314	Agreed
Fac4	Lack of motivation to ensure food safety practice	4.15	.359	1.962	Agreed
Fac5	Improper treatment of sewage	4.01	.542	.009	Agreed
Fac6	Irregular water supply	3.22	.954	.086	Agreed
Fac7	Inadequate provision of equipment and resources	3.14	.842	-.272	Agreed
Fac8	Lack of funds	2.85	.658	.171	Disagreed

Fac9	Inadequate space and unenclosed nature of the kitchen	2.73	1.080	-.046	Disagreed
Fac10	Time pressure/high volume of students/staffing	2.69	1.382	.394	Disagreed

From Table 4, the respondents agreed that lack of education and training hinder food and safety practices. This statement had a mean score of 4.38 and a standard deviation of 0.714. Education and training are important element in the responsibility of enhancing food and safety practices. The finding agrees with the study by Engdaw, Tesfaye and Worede (2023) that education and training have a significant influence on the ability of food handler to prepare food hygienically.

Moreover, the respondents agreed that poor monitoring and evaluation hinder food safety practice of kitchen staff. This statement had a mean of 4.23 and a standard deviation of 0.420. Effective monitoring and evaluation in place enable food handlers to make an effort to regularly ensure good practice. A study by Nguyen et al. (2014) revealed that ineffective approaches in monitoring and evaluation hampers good safety and hygienic practices which at the long run can lead to a lack of accurate information and inaccurate results. Without proper monitoring and evaluation, institutions can lack the necessary information to properly assess their safety practices and progress.

In addition, the respondents affirmed that busy work schedules hinder food safety practices at the kitchen. This statement attained a mean of 4.23 and a standard deviation of 0.420. On the other hand, with a mean score of 4.15 and a standard deviation of 0.359, the respondents agreed that lack of motivation to ensure food safety practice hinders food safety practices at the kitchen. The finding concurs with Arendt and Sneed (2008) study that lack of motivation

influence food handlers practice of safe food handling behaviors, or the food safety culture. Etter et al. (2019) advocated the important role of motivation on influencing employees' safe food handling practices.

Conversely, the respondents indicated that improper treatment of sewage hinders food safety practice at the kitchen. This statement had a mean score of 4.01 and a standard deviation of 0.542. This indicates that untreated sewage can contain pathogens that which might affects food safety practices. The finding buttresses with Santacruz (2016) study who opines that improper treatment of sewage affects proper food safety practice. Santacruz emphasized that privies and septic tanks should be sufficiently separated from wells, streams, and other bodies of water in order to prevent this contamination.

Furthermore, the respondents agreed to irregular water supply as a factor hindering food and safety practice at the kitchen with a mean score of 3.22 and a standard deviation of 0.954. This indicates that irregular water supply allows food handlers rely on different water supply which might serve as a source of contamination. On the other hand, the respondents agreed to inadequate provision of equipment and resources as a factor hindering food and safety practice at the kitchen with a mean score of 3.14 and a standard deviation of 0.842. The finding aligns with the study by Appietu (2018)study that inadequate provision of equipment and irregular water supply accounted for the major barriers that obstructed food safety practices in Boarding Senior High Schools in Ghana.

On the contrary, the respondents disagreed to lack of funds (x=2.85, SD=0.658), inadequate space and unenclosed nature of the kitchen (x=2.73, SD=1.080), and time pressure/high volume of students/staffing (x=2.69, SD=1.382) as factors affecting proper food and safety practices in the boarding Senior high schools in the Western Region of Ghana.

The result reveals that lack of education and training on food safety practices, poor monitoring and evaluation, busy work schedules, lack of motivation to ensure food safety

practice, improper treatment of sewage, irregular water supply, and inadequate provision of equipment and resources are the major factors that obstructed food safety practices in Boarding Senior High Schools in the Western Region of Ghana. This indicates that food safety practices continues to be a critical problem in boarding senior high schools. The study by Leslie et al. (2021) identified adequate water for washing, assess to protective equipment while serving food, refrigeration system to preserve food, inadequate waste disposal system and conducive environment for food preparation as the factors that influence food safety and hygiene practices among food vendors in public primary schools. The finding concurs with Zenebe et al. (2018) who found that inadequate provision of equipment and resources, lack of training and education on food safety practices, and inadequate space and the unenclosed nature of the kitchen as factors that influence kitchen staff food safety practices.

A report by Mohammed (2019) revealed 60 Archbishop Porter girls hospitalized over food poisoning, consequently leading to the closure of the schools and other food establishments. This has been attributed to illiteracy of the kitchen and non-kitchen staff and ignorance of safety rules, leading to poor personal hygiene by food handlers, the abuse of temperature for the service of food, the improper storage conditions and the poor ways of disposing of both solid and liquid waste at the Senior High Boarding Schools.

Association between demographic variables and food safety knowledge and hygienic practices

Pearson correlation was used to measure the extent to which the demographic variables and food safety knowledge and practice of kitchen staff fluctuate together. Table 5 presents correlation matrix of demographic variables and food safety knowledge and hygienic practice.

Table 5: Correlation matrix

Construct	1	2	3	4	5	6

Gender	1	.013	.118	-.206[a]	-.443[a]	-.418[a]
Age		1	-.201[a]	.018	-.028	-.266[b]
Position			1	.041	.043	.053
Educational level				1	.336[a]	.004
Food safety and hygiene perception					1	.649[a]
Food safety and hygiene practices						1

[a] $p<0.05$, [b] $p<0.01$,

Gender: male = 1 (Negative coefficient), female = 2(Positive coefficient)

Age: Young kitchen=1(Negative coefficient), Older kitchen staff=2(Positive coefficient)

Position: Higher position (Negative coefficient), Lower position (Positive coefficient)

Education: low educational level=1 (Negative coefficient), High educational background=2(Positive coefficient)

Gender has a negative significant influence on food safety and hygiene knowledge (r= -0.443, P<0.01), and food safety and hygiene practices (r= -0.418, P<0.01). However, the negative sign indicates that the male kitchen staff had good knowledge and better practice on food safety and hygiene as compared to their female counterparts. The finding contradicts with past studies who found that female possessed considerably higher food safety knowledge and practices level compared to their male counterparts (Abdullah Sani & Siow, 2014; Sharif et al., 2013).

Also, age has a negative but insignificant influence on food safety and hygiene knowledge (r=-0.028, P>0.05), and a significant influence on food safety and hygiene practices (r=-0.266, P<0.05). This indicates that younger kitchen staff exhibit good knowledge and better practice on food safety and hygiene. On the position of the kitchen staff (i.e cleaner, cook and matron) an insignificant positive correlation was attained on the food safety and hygiene knowledge (r=0.043, P>0.05), and a significant influence on food safety and hygiene

practices (r=0.053, P>0.05). The positive correlation indicates that kitchen staff with higher position have good knowledge and exhibit proper food safety and hygiene practices.

Education level also significantly correlate positively with food safety and hygiene knowledge (r=0.336, P<0.01) but positively insignificant with food safety and hygiene practices (r=0.004, P>0.05). This is an indication that kitchen staff with higher education have good knowledge and better food safety and hygiene practices. The finding concurs with previous studies (Chukuezi, 2010; Dun- Dery, 2012; Mensah et al. 2002; Monney et al., 2013) that the educational level of food handlers is a significant determinant of the hygienic practices among food handlers. Dah (2016) on the other hand bared that; there is an evidence of significance difference (p = 0.000) from the chi-square test establishing the relationship between respondents' educational level and food safety and hygiene practices. This, therefore, endorses the importance of formal education in promoting people to supervise cooks in preparation of food for students in educational institutions with regard to food hygiene and safety.

5.3 Conclusions

The issue of food safety and hygiene practices covers a broad area including the cooking/preparing foods, chill/cold storage of foods, personal hygiene, and receiving/general of storage as well as allergies. The increasing outbreak of food contamination and food poisoning depicts that most kitchen staff employed in the food services areas in the boarding schools have inadequate knowledge about the hygiene practiced and safety involved in food service. This study assesses the food safety and hygiene practices of kitchen staff at Senior High Boarding schools in the Western Region of Ghana. According to the study, kitchen staff at the various boarding senior high schools have high perception on food safety and hygiene.

Food hygiene practices are public health concern especially the food served to students and pupils at school. The study discovered that at the boarding senior high schools' food safety and handling practices among kitchen staffs are not convincing as they only have good

practice in clean/hygiene, food handling, and allergens. It was found that lack of education and training on food safety practices, poor monitoring and evaluation, busy work schedules, and lack of motivation to ensure food safety practiceare the major factors that obstructed food safety practices in Boarding Senior High Schools in the Western Region.

According to the study, male kitchen staff had good knowledge, and better practice on food safety and hygiene as compared to their female counterparts since the coefficient was negatively related. Also, the younger kitchen staff exhibit good knowledge and better practice on food safety and hygiene. It was evident that that kitchen staff with higher position have good knowledge and exhibit proper food safety and hygiene practices. On the other hand, kitchen staff with higher education have good knowledge and better food safety and hygiene practices.

Ethical Approval and consent

The researcher obtained formal permission from the head teachers of the various sample boarding senior high schools. The objectives of the study were explained to each study participant and those who consented took part in the study. Confidentiality of the information given by the respondents was highly upheld. This was done by coding the identification of the participants.

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Details of the AI usage are given below:

1.

2.

3.

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