

Evaluating Food Hygiene Awareness and Practices of Food Handlers in the Kumasi Metropolis

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Abstract

An Increase in Food borne diseases in the country has necessitated the need to investigate the level of hygiene awareness and practices among food handlers in five major communities of the Kumasi metropolis. Questionnaires were administered to 500 conveniently sampled respondents. About 89% of respondents had heard of food borne diseases and could mention a control measure to prevent occurrence although their practices were substandard. Of the respondents, 30% prepared food in the open while another 32% prepared in wooden structures, 67% of food preparation areas had no process flow in mind, temperature control was non standard, pest control and cleaning practices were poor although waste disposal was highly regularised. Personal hygiene practices were good although about 57% wore unacceptable jewelry during food preparation and service. Formal education and training on good hygiene practices are necessary and should be enforced to ensure safer customers.

Key words: Fast foods, Food vendors, Food hygiene, Food borne diseases, High risk foods

Introduction

Food safety is a corporate social responsibility as food is a product where consumption is not just a matter of choice, but is ultimately a matter of life and death (Peattie, 2006) It is the number one non negotiable priority to the food industry (Leech, 2005) and is equally a priority for governments worldwide as food borne diseases with related deaths and economic losses occur in countries worldwide (Thurston, 2006). Consumers likewise have growing concerns over how the food on their table was grown and processed with the rising food related issues like *Salmonella* in contaminated peanut, *E. coli* in contaminated beef and pork, contaminated vegetables and melanin in milk among others. Governments, law makers, food manufacturers, caterers, food vendors, farmers and all consumers have roles to play in making food safe. Food can be said to be safe when it contains no hazardous substance that could be injurious to health (Wallace, 2006 and Codex Alimentarius, 2009). This can only be assured when stringent and careful measures are put in place to prevent, reduce and or remove possible hazards to acceptable levels, through effective training on methods and technologies available.

Food borne and water diarrhea diseases are said to be leading causes of illness globally, killing 2.1 million people annually (WHO, 2001). Ghanaians have our own share of food borne diseases and their related cost to individuals and the nation as a whole. Highlighted in the news in recent

times are food and water borne diseases including the swine flu, bird flu, food borne infections in some schools where students had to be hospitalised, food labeling misinformation and recently the cholera epidemic that has already taken over 60 lives out of over 4000 reported cases. According to the Ghana News Agency, (2010) a total number of outpatient cases reported with food borne disease in Ghana is reported to be 420,000 per year with an annual death rate estimated at 65,000, costing a total of 69 million US dollars to the economy. This is a problem that needs to be tackled head on.

A survey conducted in the Regional Capital of Ghana by Tomlins, Johnson, Aseidu, Myhara and Greenhalgh, (2002) reported that most consumers did not associate poor hygiene with illness. This shows the low level of awareness among consumers on possible diseases that one could get when hygiene is not practiced. According to Addo, Mensah, Bonsu and Akyeh (2007) most food vendors have barely any formal education. According to Osei and Duker, (2008) Africa alone accounts for 90% of cholera cases worldwide. They reiterated that while Ghana accounted for 27000 of these cases, Kumasi in the Ashanti region was one of the most affected.

Food handlers are very important people when considering food safety. Their hygiene practices affect a larger part of the population who depend on them for their meals. Food vendors who sell ready to eat meals on the streets also

known as ‘street foods’ (Addo, et al, 2007) are also important factors contributing to food borne related diseases as they are considered to be of very little or no educational background and hence have low understanding of food safety issues (Mensah et al, 1999). For a community to reach a state of awareness in hygiene such that they do not suffer from food borne disease epidemics, loads of awareness campaign must be received by food handlers, the people must also get some direct or indirect education on good hygiene practices with effective monitoring and surveillance in place. Other important factors are good source of drinking water, availability of toilet facilities that prevents individuals defecating in waters which could end up in the food chain directly through drinking or through the use of agricultural produce that have come in contact with this filth. Good personal hygiene can also be a factor where individuals make special effort to make regular hand washing regime a practice, proper washing of uniforms and cleaning practices. Cooking to the right temperature, avoiding the abuse of temperatures of food during storage and after cooking and proper handling and control of high risk foods are also recommended. Temperature control of High risk foods which are foods with high moisture and nutrient value, ready to eat and can encourage the growth of food poisoning micro organisms (Wallace, 2006) should be a major concern for all food handlers. Good waste management, pest and insects control are all factors that go into making a community safe from food hazards. It is the interest of the researchers to investigate good hygiene practices among food handlers in the Kumasi metropolis. Good hygiene practice involves a holistic approach towards keeping food safe. According to Codex Alimentarius (2009) Food hygiene involves all conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain. These include sourcing of raw materials from a right supplier, good storage systems, temperature control, maintenance, proper waste management and pest control systems, available cleaning regimes, personnel training and good personal hygiene, transporting and distribution under safe conditions and currently HACCP (Hazard analysis and critical control point) With these measures food hazards (physical, chemical and biological) could be controlled and thus lead to safe food and safe consumers. According to the Food and Drugs Board of Ghana’s Standard Operating Procedures Manual and the Food Standard Agency of UK’s ‘Guide to food hygiene’ the following minimum requirements should be applicable in all food preparation premises. Standard premises, good purchasing control, effective temperature control, maintenance, pest and waste management, personnel training and personal hygiene. These will hence be the major indicators of the hygiene status of the respondents.

Material and Methods

Population and sampling. The population in Kumasi in the year 2000 was around 3.5 million (Osei, et al, 2008) For effective and reflective results 5 major communities in Kumasi with high population of food vendors and restaurants due to the socioeconomic activities pertaining in these areas were purposively sampled.

Table 1. Distribution of Respondents

| Location | Frequency | Percentage (%) |
|-------------------|-----------|----------------|
| KNUST | 77 | 15.4 |
| Stadium | 99 | 19.8 |
| Kumasi Central | 104 | 20.8 |
| Bantama | 104 | 20.8 |
| UEWK-Surroundings | 116 | 23.2 |
| Total | 500 | 100.0 |

The areas selected were Kwame Nkrumah University of Science and Technology, Baba Yara Stadium and its surroundings, Adum in Kumasi and surroundings, Komfo Anokye Teaching Hospital and surrounding areas and University of Education Winneba, Kumasi campus and surroundings. A total of 500 respondents were randomly sampled from all the 5 communities

Statistical Instruments and tools for analysis. 44 structured questions were prepared in a form of questionnaire for respondents to answer with options given for further responses if desired. Statistical Package for the Social Sciences (SPSS) will be used to determine simple percentages and frequencies of responses and the correlation of indicators for further discussion.

Results

Demographic information of respondents: A total of 500 respondents were sampled from 5 different localities in the Kumasi metropolis. The distribution of respondents used is shown in Table 1. From Table 2, the results show that most of the food handlers were females representing approximately 83% of the sample size. This goes to confirm Tomllin et al’s (2002) work on gender of food handlers in the Greater Accra Region of Ghana, which concluded that food is mostly handled by women. The females also featured highest in restaurant operations. Whiles restaurants were the least food operation recorded for the males. Most males (55.4%) were in fast food businesses. A large percentage of the food handlers were between the ages of 20 to 40 year thus the active work group. The few respondents under 20 years were food vendors while those in and above 60 years operated in chop bars and this could be attributed to lack of capital to set up a business of good standing. The highest operated food

Table 2. Demographic information of respondents

| Characteristics | Category of food service | | | | | Total | Chi-square |
|---------------------------|--------------------------|-----------|---------|----------|-------------|-------|-------------------|
| | Restaurant | Fast food | Canteen | Chop bar | Food vendor | | |
| Gender | | | | | | | |
| Male | 7.1 | 55.4 | 6.3 | 16.7 | 9.7 | 16.8 | 95.185 (0.001) |
| Female | 92.9 | 44.6 | 93.7 | 88.3 | 90.3 | 83.2 | |
| Age groups | | | | | | | |
| Under 20 | 0.0 | 0.0 | 0.0 | 0.0 | 4.7 | 2.7 | 84.028 (0.001) |
| 20-29 | 21.4 | 63.0 | 18.3 | 16.7 | 31.8 | 32.5 | |
| 30-39 | 35.7 | 30.1 | 31.7 | 31.5 | 31.8 | 31.7 | |
| 40-49 | 35.7 | 5.5 | 36.7 | 29.6 | 26.3 | 25.4 | |
| 50-59 | 7.1 | 1.4 | 13.3 | 20.4 | 5.5 | 7.6 | |
| 60 and above | 0.0 | 0.0 | 0.0 | 1.9 | 0.0 | 0.2 | |
| Educational status | | | | | | | |
| Uneducated | | | | | | | 238.6 (0.001) |
| Basic | 3.6 | 6.8 | 31.7 | 20.4 | 34.4 | 26.6 | |
| Secondary | 3.6 | 31.1 | 36.5 | 53.7 | 53.3 | 45.0 | |
| Tertiary | 46.4 | 59.5 | 27.0 | 25.9 | 11.5 | 24.3 | |
| | 46.4 | 2.7 | 4.8 | 0.0 | 0.7 | 4.1 | |

service was fast food and was operated by youngsters within the ages of 20 and 29. The highest educational level for most of the respondents was basic education (45%) followed by 26% of those with no formal education. This result is however in contrast with the findings of Addo et al (2007) on their work on food and its preparation in hotels in Accra. Addo indicated that most food vendors had barely any formal education. However the study is in line with Tonder et al (2007) which reported that 74% of food handlers sampled had some basic education. This could mean that most Junior Secondary School graduates unable to further their education find chop bar operation and 'food vending' suitable livelihood. No tertiary educated food handler operated in a chop bar and only one person of this

group was a food vendor.

Types of food and sources of water used by categories of food operations. Foods prepared by respondents were grouped into high risk and low risk foods. The high risk foods included soups, sauces with meat, chicken and fish, salads and milk products with fufu, banku, rice and waakye and plantain and tubers serving as accompaniments. Low risk foods were roasted yam and plantain, groundnuts and banana, beverage and snacks. From Table 3, 86.4% of the respondents handled high risk foods this implying that most foods were ready to eat requiring no further heating and could be a source of food poisoning if not handled hygienically.

Table 3. Food types and sources of water used by respondents

| Characteristics | Category of food service | | | | | Total | Chi-square |
|------------------------|--------------------------|-----------|---------|----------|-------------|-------|------------------|
| | Restaurant | Fast food | Canteen | Chop bar | Food vendor | | |
| Food Risk Level | | | | | | | |
| High Risk | 100.0 | 97.4 | 93.7 | 100.0 | 77.5 | 86.4 | 41.538 (0.00) |
| Low Risk | 0.0 | 2.6 | 6.3 | 0.0 | 22.5 | 13.6 | |
| Source of water | | | | | | | |
| Pipe borne | 89.7 | 84.4 | 81.2 | 76.5 | 77.5 | 79.6 | 18.730 (0.54) |
| Well | 3.4 | 5.2 | 7.8 | 5.5 | 11.1 | 8.7 | |
| Borehole | 6.9 | 10.4 | 6.2 | 16.4 | 10.0 | 10.1 | |
| Pipe+borehole | 0.0 | 0.0 | 4.7 | 1.8 | 1.8 | 0.2 | |
| Other | 0.0 | 0.0 | 0.0 | 0 | 0.4 | 1.2 | |
| None | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.2 | |

Table 4. Respondents suggested control measures to prevent food borne diseases

| Characteristics | Category of food service | | | | | Total | Chi-square |
|---|--------------------------|-----------|---------|----------|-------------|-------|-------------------|
| | Restaurant | Fast food | Canteen | Chop bar | Food vendor | | |
| Suggested Control measures | | | | | | | 89.299 (0.001) |
| Serving hot food | 21.4 | 12 | 17.5 | 25.9 | 14.3 | 16.1 | |
| Preventing crosscontamination | 7.1 | 2.7 | 3.2 | 0 | 0 | 1.3 | |
| Washing hands and equipment regularly | 0 | 0 | 7.9 | 1.9 | 4.7 | 3.8 | |
| Cook meat and other food items properly | 0 | 0 | 0 | 0 | 0.8 | 0.4. | |
| Wash hands with soap and water | 7.1 | 10.7 | 0 | 3.7 | 10.9 | 8.4 | |
| Maintaining a clean environment | 32.1 | 34.7 | 33.3 | 29.6 | 22.1 | 27.0 | |
| Quality raw materials | 7.1 | 0 | 9.5 | 0 | 3.1 | 3.3 | |
| Keep food from insects | 10.7 | 10.7 | 4.8 | 7.4 | 12.8 | 10.7 | |
| Clean and safe water | 3.6 | 0 | 1.6 | 0 | 0 | 0.4 | |
| Cover food well | 3.6 | 4 | 3.2 | 3.7 | 7.8 | 5.9 | |
| Washing of food items | 0 | 2.7 | 1.6 | 3.7 | 1.2 | 1.7 | |
| Don't know | 0 | 9.3 | 11.1 | 11.1 | 15.1 | 12.3 | |
| Personal hygiene | 7.1 | 13.3 | 6.3 | 13.0 | 7.4 | 8.8 | |

There was a good report on sources of water used for food preparation as about 79.6% of the respondents used pipe borne water, 8.7% used wells and 10% were using boreholes. The rest used a combination of any two. Thus there is potable water availability in the Kumasi metropolis for use by food handlers.

Respondent's awareness of food borne diseases and measures to prevent them. About 89% of the respondents had heard or suffered from food borne disease. Approximately 84% could mention a type of food borne disease. An indication that food handlers in Kumasi were aware of the existence of diseases that could be contracted from food. Only 12.3% had no idea about measures that could be used to prevent food borne diseases. Most of the respondents who had heard about food borne diseases had some idea of how food borne diseases could be prevented. This could be due to their exposure to both formal and informal education as shown from Table 1. The implication being that even though most of the food operators were offering high risk foods for sale, their knowledge in the prevention of food borne illness could control the exposure of their customers to food borne illnesses. From Table 4, the highest control measure practiced by all the food handlers was maintaining a clean environment (27%)

followed by serving food hot (16.1%). Prevention of cross contamination, cooking meat thoroughly and using clean and safe water were the least mentioned. This is in contrast with Tomlin's (2002) work which indicated that basic hygiene among food handlers in Accra and for that matter Ghana were generally poor.

Kitchen and conditions of preparation areas. About 32.8% of food handlers had wooden structures in which food was prepared, 30.3% prepared food in the open, these included kenkey sellers, roasted meat and chicken, wakye sellers. About 24.8% had concrete structures and 12% had metal structures (containers) Thus most of the respondents were not operating in approved facilities. The highest users of concrete block building were restaurant operators with 82.8% respondents. Open air as a preparation area was mostly used by food vendors. From Table 5, none of the restaurant operators used wooden structures for preparation of food. Fast food joints mostly used metallic structures (containers), however over all the most used material for kitchens were wooden structures which was highly used by chop bars and canteen operators. Thus confirming the variation in food hygiene standards among food handlers in different set ups (Tomlins et al 2002).

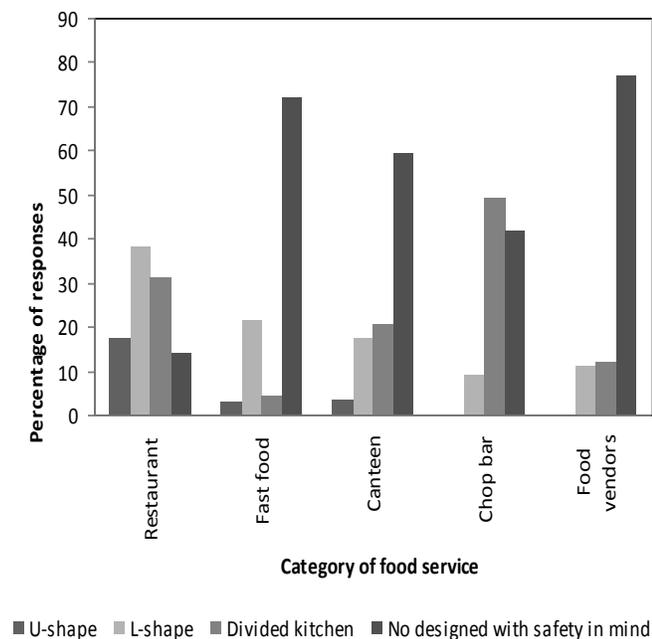
Table 5. Category of food service and kitchen in use

| Characteristics | Category of food service | | | | | Total | Chi-square |
|-------------------------|--------------------------|-----------|---------|----------|-------------|-------|-------------|
| | Restaurant | Fast food | Canteen | Chop bar | Food vendor | | |
| Types of Kitchen | | | | | | | |
| Open air | 6.9 | 22.4 | 12.5 | 12.7 | 43.1 | 30.3 | 210.9(0.00) |
| Wooden structures | 0.0 | 21.1 | 40.6 | 54.5 | 33.3 | 32.8 | |
| Metallic structures | 10.3 | 47.4 | 4.7 | 1.8 | 6.0 | 12.0 | |
| Concrete | 82.8 | 9.2 | 42.2 | 30.9 | 17.6 | 24.8 | |

Food preparation environments must be an enclosed and protected area with safety in mind. Most walls, paintings, floors and ceilings were not of the standard prescribed for food preparation areas. Only 31.4% had their kitchen roofs sealed. This allows insect, pest and dust to deposit on foods causing health hazards. Although most respondents had electrical sources of power, about 91% of respondents had no shatter proof bulbs covers to prevent the possible physical hazard caused by broken glasses.

Process flow in kitchen design and education of respondents. The design of processing in kitchens helps with keeping food safe by preventing cross contamination and also saves staff energy. This is done by the use of physical barriers from floor to ceiling or processing schedule segregation between raw and cooked food if separate facilities are not available (American Association of Meat Processors, 1999) About 67% of the respondents had no safety in the designing of their processing.

Fig 1. Category of food service and process flow availability in kitchens



Thus product safety and prevention of cross contamination were not known obviously to the food handlers. Only 14.6% had L- shaped kitchen while 1.8% had U-shaped kitchen and 16.8% had divided kitchen. Thus although respondents had some form of food borne disease awareness and mentioned some control measures, the technical knowledge and application was however lacking. This is typical of most food preparation areas and kitchens as most structures were built with no food preparation in mind coupled with lack of basic hygiene education. From Fig. 1, a higher percentage of restaurant operators who also have tertiary education as indicated from Table 2 had very high level of responses of availability of a design with safety in mind. Apart from restaurant operators who had a high level of L and U shaped kitchens all the rest had mostly not designed their process with safety in mind. Thus formal education to a higher level directly or indirectly creates conscious awareness on the part of the food handler in ensuring safer and hygienic practices.

Factors influencing respondents buying of ingredients. Most respondents (50%) combined the factors price and quality when buying raw materials. Quality as a factor was the second highest influencing factor with 35.8%. Price as a factor was chosen by only 8% of the respondents. The rest 6.2% had other factors other than price and quality and gave no response. Quality as a factor is important when considering food safety and hygiene and this was a key response among respondents. Price is equally important as it ensures the survival of the businesses however when it outruns quality then there is a concern as safety could be compromised (Wallace, 2006). According to Sung-Hee, Tong-Kyung, Hyte-Ja, (2010) and Koopmans (2004) factors that are mostly associated with food borne illness outbreaks include food purchases from unsafe sources and respondents had quality as a paramount criterion although there were no documented specifications to ensure standards and to disapprove out of specification materials.

Storage facilities in use by respondents and storage of perishable raw materials. Most of the respondents bought and used meat and poultry on daily bases. They also kept vegetables and fish in similar manner for a maximum of two days. Those who stored meat and fish on their premises had refrigeration systems to keep food safe. There

were however a few (11%) who had no cold storage facility and still kept raw meat and poultry in their kitchen. This is an unacceptable practice and very unhygienic. Perishable raw materials ought to be kept at good temperatures ≤ 8 OC for chilled storage and ≤ -18.0 OC for frozen storage (FSA, 2005)

Ready to eat food temperature control among respondents and some corrective actions in practice.

About 82.8% of the respondents said they served their food for sale hot. 11.4% sold food warm which is unacceptable while 3% sold cold foods. Those who sold food cold were mostly the ice kenkey sellers and the rest could not respond to the question. About 44% of the respondents kept food hot during service by keeping them in insulators, this included ice chest and the use of polythene bags to cover the food (Agboola, 2005). Some of these bags are sources of possible chemical contaminants due to chemical migration when used on hot food. Around 31.8% kept food on fire during service and 5.4% used microwaves ovens while 5.0% kept food on Gas cookers. Only 2% used hot plate to keep food warm.

With the action taken when food meant to stay hot goes cold for more than two hours, that is staying within the 'danger zone' beyond the allowable time (FSA, 2002 and 2005) most respondents (37.6%) said they sold it any way, another 36.8% said they reheated food on coal pots, 9.8% reheated food in microwaves ovens while 1.4% used other ovens.

Around 8.6% of respondents had other alternative means such as heating on local heating systems like firewood. Only 0.6% discarded food when it stayed within danger zone for more than 2 hours which is a requirement of some food safety standards (FSA, 2000, Wallace, 2005) Hot food sold cold to customers carries the risk of increased number of food poisoning bacteria that can cause serious illness to consumers. Ready to eat food or food for display that has gone cold for more than 2 hours is allowed to be reheated once to piping hot and then used. Such food could also be quickly chilled and stored or discarded. From the above analysis respondent's awareness of the importance of serving hot food to prevent possible food borne diseases through multiplication of disease causing micro organisms was found not to be supported by actual technical understanding and practices. This could be due to inadequate training and knowledge in temperature control as a means of keeping food safe.

Cleaning schedule and disinfection frequency of kitchens or food preparation areas. Cleaning practices among respondents as shown was mostly done with water and detergents (87.8%) Only 4.2% used only water while 2% did only sweeping. Only 26% of respondents disinfected their premises daily while 36.6% never did disinfection. The highest frequency among those who do not disinfect could be due to lack of awareness of the buildup of dirt and micro organisms in kitchen floors, doors, walls and outlets as food preparation activities go on a daily

basis. The absence of written Standard Operation Procedures and training coupled with infrequent surveillance seems to be the reason for this inadequacy.

Most respondents cleaned their utensils before and after use (78.2%) and 12% cleaned after use while 1.8% cleaned before use. Around 4.4 % cleaned utensils when changing from one food to another and 3.6% could not respond. The latter were mostly those who sold roasted plantain, banana and groundnuts. Some roasted meat/poultry sellers for instant consumption did not also have a cleaning regime and could not respond to the question. This is rather unhygienic and requires some attention. A proper schedule for cleaning with documented procedure is necessary for all food establishments (Wallace, 2006)

Cutting surfaces, colour coding and cleanliness.

Surprisingly around 8 % of respondents did not use cutting/chopping boards and used their hands for chopping presenting the risk of hand cutting accidents and blood contamination. The other 88% had non colour coded chopping boards which were mostly wood and only 4% had colour coded boards. Colour coded non wood material has been recommended for the food industry as the colour coding helps with effective segregation thus reducing the incidence of using same board for different food materials, raw and cooked causing cross contamination. Plastics unlike wood are also easy to clean.

About 64.2% of respondents washed their cutting surfaces before and after use, 9.2% washed when changing from one food item to another while 8.8% cleaned after use and 0.8% said before use. This shows the level of unplanned cleaning practices and use of same cutting material for several uses. Effective cleaning regime should have a well cleaned and sanitised working tools and equipment for food preparation before and after use and frequency should be planned and documented to serve as a guide for all. Special segregation of cutting surfaces for raw and cooked or ready to eat foods should be on top of the food poisoning prevention list as most cases arise from here (FSA, 2006)

Management of waste and pest control. Approximately 72% of respondents used community dumping grounds for disposing their waste while 27% used contracted service. Only 1% had other means of disposal but not mentioned. Restaurants were the only food services that practiced a higher level of contracted waste disposal service.

The rest practiced self disposal at community dumping grounds. Frequency of waste disposal was very good as 88.6% disposed of waste on daily basis, 5.6% did twice a week, 2.2% did thrice a week and 1.4% did four times a week. Waste disposal at a predetermined frequency based on ones processes is very essential to control pest ingress, smelly waste bins, insects and contamination. It was realized although not part of the targeted indicators, that respondents did not practice waste segregation.

Pest control was mainly self applied methods (71.9%) as seen from Table 6.

Table 6. Waste and pest management practices by categories of food service

| Characteristics | Category of food service | | | | | Total | Chi-square |
|-------------------------|--------------------------|-----------|---------|----------|-------------|-------|---------------|
| | Restaurant | Fast food | Canteen | Chop bar | Food vendor | | |
| Waste Management | | | | | | | |
| Contracted service | 58.6 | 34.2 | 32.8 | 25.5 | 21.2 | 27.4 | 23.368(0.003) |
| Community grounds | 41.4 | 64.5 | 67.2 | 72.7 | 77.7 | 71.6 | |
| Other | 0.0 | 1.3 | 0.0 | 1.8 | 1.1 | 1.0 | |
| Pest Control | | | | | | | |
| Contracted service | 27.6 | 2.6 | 7.8 | 3.7 | 3.7 | 4.9 | 52.029(0.001) |
| Self applied | 62.1 | 75.3 | 81.2 | 83.3 | 83.3 | 71.9 | |
| No Control | 10.3 | 22.1 | 10.9 | 10.9 | 13.0 | 23.2 | |

Table 7. Personal hygiene and category of food service

| Characteristics | Category of food service | | | | | Total | Chi-square |
|---|--------------------------|-----------|---------|----------|-------------|-------|-------------------|
| | Restaurant | Fast food | Canteen | Chop bar | Food vendor | | |
| Usage of protective clothing | | | | | | | |
| Hair net/scarf only | 3.4 | 19.5 | 32.8 | 36.4 | 30.9 | 28.4 | 79.566 (0.001) |
| Apron only | 17.2 | 24.7 | 6.2 | 10.9 | 18.8 | 17.1 | |
| Hand gloves only | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.2 | |
| Hairnet + Apron | 65.5 | 37.7 | 46.9 | 27.3 | 27.9 | 34.0 | |
| Hairnet + Gloves | 0.0 | 1.3 | 0.0 | 0.0 | 0.0 | 0.2 | |
| Apron + Gloves | 0.0 | 1.3 | 0.0 | 0.0 | 0.4 | 0.4 | |
| Apron + Gloves + Hairnet | 10.3 | 1.3 | 4.7 | 0.0 | 0.0 | 1.4 | |
| None | 3.4 | 14.3 | 9.4 | 25.5 | 21.7 | 18.3 | |
| Hand washing frequency | | | | | | | |
| Once a while | 0.0 | 5.3 | 1.6 | 7.4 | 17.2 | 11.2 | 48.005 (0.001) |
| Quite often | 31.0 | 53.3 | 54.0 | 74.1 | 53.4 | 54.4 | |
| Very often | 69.0 | 41.3 | 44.4 | 18.5 | 28.7 | 33.9 | |
| Not at all | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 0.4 | |
| Usage of jewelry in food preparation | | | | | | | |
| Yes | 34.5 | 33.3 | 67.7 | 63.0 | 51.3 | 50.9 | 22.587 (0.001) |
| No | 65.5 | 66.7 | 32.3 | 37.0 | 48.7 | 49.1 | |

Only 4.9% practiced contracted service and 23.2% had no control. Self application although could be a step in the positive direction might not be a sufficiently safe measure due to lack of education and understanding of how the chemicals sold on the open market operates, how to prevent accidental chemical contamination of food and also lack of a routine monitoring and alertness. Their inability to choose contracted service for pest control could be due to limited availability of pest control services in the country and the related cost involved with the few available.

Food handlers' certification and categories of food service.

From Fig. 2 only 8.8% said they did not have certificates, among this group some respondents had expired certificates that required renewal. This is a very good indication of the work of the enforcement agencies. However there is the need for monitoring to ensure that those with expired certificates are renewed. Most of the food handlers without certificates were food vendors. Only 1 person out of the tertiary educated group did not have food handlers certificate. Comparatively, from the analysis all the

categories of respondent's certification were high. However 9% of the sampled population not having certificates still indicates the need of surveillance and enforcement of legal and food hygiene practices. This will be a means to ensure renewal after expiration.

Fig. 2 Food hygiene certificate availability among categories of establishments

Personal hygiene among food handlers. The protective clothing used mostly by all food services was the combination of Hair net and aprons (34%) followed by hairnet/scarf only (28.4%) then aprons only (17.1%) The highest percentage of restaurant operators used hair net and apron combination while chop bar and food vendors mostly used hairnet/scarf only while fast food operators used hair net and apron combination mostly. Canteens used hairnet and apron combinations mostly. Hand gloves only, hair only and hairnet and gloves combinations were not a practice for almost all the food services providers. Apron and gloves combination and a combination of all were also not practiced. With the absence of hand gloves in food preparation and service, hand washing should be a regularized practice among food handlers. From Table 7 below, only restaurants operators had a higher number of respondents washing hands very often. The rest did quite often. Only 0.7% of food vendors did not wash at all. This good hand washing procedure with useful detergents, running warm water and sanitizers with training will be helpful in the Ghanaian food handlers situation.

Cleaning of protective clothing was daily among most of the respondents (88.0%) About 7.8% said they washed when the uniform looked dirty and 1.4% did once a week, these are not acceptable. Washing uniforms on a daily basis is highly recommended among food handlers to avoid contamination from dirty ones.

About half of the respondents (50.9%) wore jewelry while preparing and or serving food. These are not acceptable due to the possible physical hazards they could pose if they fell accidentally into food and the biological contamination due to their ability to harbor dirt and bacterial in their crevices.

Conclusion and recommendation. Food handlers in the Kumasi Metropolis had some level of awareness of food hygiene and what could be done to prevent food borne diseases. The practical aspect however was not fully understood by the food handlers and they had no technical understanding of the practices that could be done to ensure food safety. The kitchen and preparation area for food among most food handlers were not up to standard. Temperature control among most food handlers especially for cooked and ready to eat food was also non scientific but based on the respondents own discretion. Some food handlers used their hands for cutting and chopping meat and vegetables and those who had cutting boards used no colour coding and could easily cross contaminate cooked and other ready to eat foods. Cleaning practices, disinfection and pest control practices were also not based on any planned regime. Although hand washing was practiced by a higher percentage of food handlers, the frequency varied among common food categories which requires training. The availability of trained personnel in food safety and hygiene to play supervisory role in food preparation establishments is highly recommended while well designed training based

on food handlers training needs will go a long way to ensure a safer community in the Kumasi Metropolis.

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