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Food handling/serving and hygiene practices: The perception of food vendors operating in Obubra local government area of Cross river state, Nigeria

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Abstract
The way and manner food is handled especially during preparation and serving to consumers can determine the level to which the ready-to-eat food is free from contaminants. Poor food handling and poor hygiene can create room for food contamination and cause food poisoning upon consumption. This study sought to investigate food handling/serving and hygiene practice as well as the perceptions of food vendors operating in Obubra Local Government Area of Cross River State, Nigeria. The Health Action Model postulated by Tones in 1977 was used as a guide in the study. The study adopted a descriptive cross sectional design. One hundred and twenty (120) food vendors were sampled through convenience sampling. Self-administered questionnaire was used for data collection. Data were analyzed using SPSS version 20 and hypotheses were tested using Pearson's Product Moment Correlation analysis. Results and findings were represented using descriptive statistics. The finding of the study showed that there was a significant correlation between perception of proper food handling and hygiene practices among food vendors in Obubra Local Government Area; and there was a significant correlation between food serving and hygiene practices among food vendors in Obubra Local Government Area. Based on the findings of this study, the following recommendations are made among others: use of Personal Protective Equipments (like; nose/face mask, apron and head gear/chef cap) during food preparation and serving process; practice of regular hand washing for every 20-30 minutes; constantly sanitizing all surfaces, washing of plates and utensils with good quantity of clean water; bi-annual sensitization of food vendors by agencies and bodies saddled with the responsibility to ensure food safety. Furthermore, NAFDAC and other food agencies through government permission and authority should ensure food vendors are inspected for hygiene bi-annually including assessing their personal hygiene and screening of the food sold. This can be done through taking samples of the vended foods to Food Laboratory for analysis. Government should provide WASH facilities so that food vendors can conveniently practice good hygiene.

Keywords: Food handling, food serving, hygiene practice, perception, food vendors

1. Introduction
Food is an essential instrument for health promotion and disease prevention. Poorly prepared and recontamination of ready-to-eat street food may be the cause of outbreaks of food borne disease. Food safety issues are of major importance to world health. The term "Food" refers to the broad range of edible materials that comprise the essential body nutrients required for life and growth. Cooked ready-to-eat street food is the food that is ready for immediate consumption at points of sale. The Food and Agricultural Organization (FAO) defined street food as ready-to-eat foods and beverages prepared and/or sold by vendors and hawkers especially in streets and other similar public places (FAO/WHO, 2015) [10]. The sole aim and concern of better food handling and food hygiene practices of food vendors is to ensure that the food served to consumers is safe for consumption and to safeguard the health of the people. This is to say that food vendors play a critical food safety role in the 'farm to plate' continuum that is necessary for the prevention and control of food borne diseases and therefore, any lack of its understanding by the food vendors poses a serious challenge to food safety. To buttress this, it is worth knowing that, it is in view of the above statement the world health theme for 2015 was "Food Safety" and the slogan was "Farm to Plate, make Food Safe" (World Health Organization, 2015). This highlights the importance the World Health Organization places on the need to globally address, in a coordinated manner, the potential threats posed by unsafe food which is a consequence of the breakdown of food hygiene with the subsequent risk of the emergence of food borne illnesses along the pathway of the entire food supply chain, of which food vendors are critical components.

Food handling and hygiene is very essential in that, with rapidly increasing number of food vendors especially in the urban areas and their access to a rapidly growing consumer base, there is a need for increased vigilance and control of the food vendor's practices through the enforcement of regulations, proper hygienic practices and food safety control measures by local authorities that are empowered to perform their functions without constraints, with the aim of preventing

and controlling the potential risks and spread of disease. In the interest of public health, the management of food vendors, both mobile and stationary, should involve the development of coordinated, effective, integrated and preventive strategies that emphasize vendors' registration, formal training on hygienic practices, initial medical and periodic medical certification and regular personal and environmental hygiene checks (Iwu, Uwakwe, Duru, Diwe, Chineke, Merenu, Oluoha, Madubueze, Ndukwu & Ohale, 2017) [13].

However, with the booming street food industry in the developing world there is an urgent need to ensure food vendors adhere to hygienic practices to protect public health. Street foods are very well patronized in many developing countries since they are affordable, easily accessible and also serve as an important source of income (DeWaal & Rober, 2013; Feglo & Sakyi, 2012) [7, 9]. Studies have shown that these street foods largely do not meet proper hygienic standards and can therefore lead to morbidity and mortality due to food borne illnesses, and concomitant effects on trade and development (FAO/WHO, 2013; Feglo & Sakyi, 2012) [9]. Food-borne illnesses are a growing public health concern worldwide and results from food contaminated by pathogenic microorganisms, mycotoxins or chemical hazards (FAO/WHO, 2015) [10]. This concern is heightened by the fact that, worldwide, there seems to be a change in life-style and food consumption patterns as frequency of eating out is increasing and commitment to food preparation at home is decreasing. The number of reported outbreaks of food-borne illnesses has been high, both in developed and developing countries (Osaili, Jamous, Obeidat, Bawadi, Tayyem & Subih, 2013) [21]. However, the problem is exacerbated in developing countries due to economic reasons, poverty, the lack of adequate health care facilities, and the dearth of data regarding food-borne diseases. The safety of street or vended foods is therefore one of the most pressing health and safety issues facing most developing countries since it leads to both public health and social consequences.

Food safety is now a major public health concern. Diarrhoeal diseases due to contaminated and unhygienic food are among the leading causes of illness and deaths in low-income countries, and several outbreaks of disease have been attributed to consumption of street food (Elvis & Addo, 2016) [8]. Food poisoning and other food borne diseases could occur through poor hygiene practices, especially in areas where food and drinks are served. In most cities around the world, selling of whole meals on the streets is an important means to generating income. Unfortunately, the emergence of informal food businesses can cause health problems if the foods are not prepared and handled under hygienic conditions. Therefore, there is a need to look into the operations of food vendors to ascertain whether they are adhering to proper hygiene practices.

Food is said to be hygienic when it contains no hazardous substance that could be harmful to human or animal health (Ababio & Adi, 2012; Feglo & Sakyi, 2012) [1, 9]. Though this is the case, microbiological hazards in ready to eat food and chemical hazards, mostly pesticides from agricultural products including fresh vegetables and fruits have been highlighted (Foriwaa & Lovatt, 2015) [11]. According to Foriwaa and Lovatt (2015) [11], metals including lead, cadmium, arsenic, mercury and copper from utensils, raw materials or transport methods used can cause food poisoning. Other studies have taken a look at consumer behaviour for possible answers to questions such as: why, what, when, where and how vendors purchase raw materials for processing (Elvis & Addo, 2016) [8]. Ensuring food hygiene and safety practice among vendors is one challenge that has existed for decades, and therefore the need for vendors to adhere to high standard food safety regulations and hygiene practices cannot be overemphasized (Monney, Agyei, Ewoenam, Priscilla & Nyaw, 2014) [16]. However, a preventive strategy based on thorough analysis of prevailing conditions to ensure the achievement of quality assurance programme objectives is also recommended.

According to Okojie and Isah (2014) [18], there has been an inadequate supervision and monitoring by food safety officers, and the enforcement of food hygiene regulation has been weak. Poor sanitary conditions like open gutters, flies, improper waste disposal, and overcrowding are still persistent dangers to food hygiene (Onyeneho & Hedberg, 2013) [20]. Even vendors who exhibit knowledge about food hygiene still find it difficult associating dirty hands with the transmission of diarrheal pathogens. Just to say the least, the sources of food contamination are but few of the roots and sources of contamination that are known in the limelight. Very little is usually known and explored about how street food vendors themselves perceive food safety and how to practice it.

Food handler are anyone who works in a food and drink establishments and who handles food, or contact with any equipment or utensils that are likely to be in contact with food, such as cutlery, plates, bowls, or chopping boards (Ayehu, Kassahun & Daniel, 2014) [3]. In industrialized countries, infected food handlers are an important source of food borne disease. Ingestion of infected food can result in mild to severe illness, hospitalization or even death. Diseases with short incubation periods are more likely to be detected and attributed to poor food handling and food borne.

2. General objective of the study

The general broad objective of this study was to investigate food handling/serving and hygiene practice as well as the perceptions of food vendors operating in Obubra Local Government Area of Cross River State, Nigeria. Specifically, the study sought to:

1. Investigate the perception of food vendors as regards food handling, serving and hygiene practices to ensure food safety; and,
2. Determine the relationship between perceived food handling safety and hygiene practices of food vendors.

3. Statement of the Problem

Food borne diseases are major health problems in developed and developing countries including Nigeria and Obubra Local Government Area in particular. The problem is more noticeable in developing countries due to prevailing poor food handling and sanitation practices, inadequate food safety laws, weak regulatory systems, lack of financial resources to invest on safer equipments, lack of education for food handlers and inadequate WASH (Water Sanitation and Hygiene) facilities. The World Health Organization estimated that in developed countries, up to 30% of the populations suffer from food borne

diseases each year, whereas in developing countries up to 2 million deaths are estimated per year (WHO, 2015). Every day people all over the world get sick from the food they eat (FAO/WHO, 2015) [10] and Obubra is part of this proportion. According to Ayehu, Kassahun and Daniel (2014) [3], millions of people become sick each year and thousands die after eating contaminated or mishandled foods. Food handlers with poor personal hygiene working in food establishments could be potential sources of infections of many intestinal helminthes, protozoa, and pathogenic bacteria (Elvis & Addo, 2016) [8]. The case of Obubra is not different from what is reported by the authors reviewed. It is based on these problems highlighted that the researchers were interested in investigating how food is handled by food vendors and their hygiene practices towards ensuring food safety for the consumers in Obubra Local Government Area.

4. Literature Review

4.1 Perception of food handling and hygiene practices among food vendors

Safe food is a basic human right, despite this, many foods are frequently contaminated with naturally occurring pathogenic microorganisms. Such pathogens cannot be detected organoleptically (seen, or tasted), but can cause disease of varying severity, including death specially if the way they are conserved during exposition for sales provides conditions for those microorganisms to grow and reach considerable levels of contamination. It is no doubt that with the difficult, harsh economic environment especially in developing countries, food vending business is rapidly expanding in the urban areas and serving as a common, accessible and complementing source of family income and employment especially for women, which is probably due to the existing cultural orientation and gender bias (Henry, Edward, Ogbonna & Emmanuel, 2017) [12].

The study of Iwu *et al*. (2017) [13] assessed the knowledge, attitude and the level of practice of food hygiene among food vendors in Owerri town of Imo State, Nigeria; whose overall findings revealed that knowledge, attitude and training were significantly associated with the level of food hygienic practice of food vendors. Even vendors who exhibit knowledge about food hygiene still find it difficult associating dirty hands with the transmission of diarrheal pathogens. Just to say the least, the sources of food contamination are but few of the roots and sources of contamination that are known in the limelight. Very little is usually known and explored about how street food vendors themselves perceive food safety and how to practice it.

Iwu *et al.* (2017) [13] found out that the higher level of education observed among food vendors in their study may be attributed to the increasing lack of employment opportunities for the skilled and educated, thereby increasing the number of educated people engaging in self-employment activities like the food vending service as a source of livelihood. They observed that knowledge of the food vendors with regard to food hygiene was good for a majority of the respondents in their study. In addition, they added that the level of good knowledge among the majority of food vendors in their study could be related to the fact that a majority of the respondents had either a secondary or tertiary level of education which could have formed the basis for increased comprehension of food hygiene information and therefore improved knowledge. According to Kalua (2010) [14], knowledge positively influences attitude formation and in other words, attitude can be said to be a reflection of knowledge which is linked to personal beliefs and previous personal experiences.

According to Nigusse and Kumie (2012) [17], practice as a concept refers to the ways in which people demonstrate their knowledge and attitude through their actions but in the study of Iwu *et al*. (2017) [13], about one third of their respondents had a good level of food hygienic practice which appear not to be commensurate with the levels of knowledge and attitude observed in the majority of their respondents therefore appearing to have a disconnect between the levels of knowledge and attitude and the level of practice.

The enactment of safe food handling practices, learnt during food hygiene training, requires the food handler to use the resources available to them and implement the knowledge and skills into practical application. Unfortunately, in most cases, food hygiene training does not translate into positive food handling behaviours. Iwu *et al*. (2017) [13] observed that good level of hygienic practice among food vendors was less than 50% of the respondents which was also similarly observed in previous studies of Bamidele, Adebimpe, Oladele and Adeoye (2015) [4]; Rahman, Arif, Bakar and Tambi (2012) [24]; Cuprasittrut, Srisorrachatr and Malai (2011) [6] with a range of only between 15% - 32% of the respondents having a good level of food hygienic practice. This was not the case in a number of other studies, were more than 50% of the respondents had a good level of food hygienic practice (Afolaranmi, Hassan, Bello & Misari, 2015; Tessema, Gelaye & Chercos, 2014; Okojie & Isah, 2014) [2, 26, 18].

A general observation of our society shows a social pattern characterized by increased mobility due to urbanization, large number of itinerant workers and less family or home centered activities resulting in large percentage of the population depending on ready-to-eat. This situation however, has resulted that food sanitary measures and proper food handling have been transferred from individual and families to the food vendors who rarely enforce such practices (Bukar, Uba & Oyeyi, 2009) [5]. The food man purchase are not sterile in the sense that they normally contain germs (bacteria, viruses, yeast and moulds), some of which can lead to food intoxication and infections when present above the recommended reference level (Rath & Patra, 2012) [25]. More so, foods harbor a variety of microorganisms, bacteria and fungi which are ubiquitous in soil and around man (air) and could easily contaminate foods (Henry, Edward, Ogbonna & Emmanuel, 2017) [12].

4.2 Food serving and hygiene practices among food vendors

To serve a wholesome food to the public, it is expected that food is free from toxins to prevent food borne diseases. According to WHO's estimates of the global burden of food borne diseases in (2015), food borne diseases are an important cause of morbidity and mortality worldwide with significant public health impact. Similarly, WHO's report on food safety fact sheet shows that the global burden of food borne diseases in 2010 was 33 million healthy life years lost with about 600

million food borne illnesses and 420,000 deaths, of which food borne diarrhoeal diseases, the most frequent cause of food borne illnesses contributed about 230,000 deaths. This was attributed to food consumption and food serving been handled poorly. In past studies, seventy percent of the survey respondents reported that they always washed hands with soap before preparing foods, 20% most of the time and 10% some of the time (Onyeneho & Hedberg, 2013) [20].

The burden of food borne diseases is borne by individuals of all ages, particularly children under the age of 5 years who constitute about 40% of the global burden and also by individuals living in low-income regions. This is why food handling and hygiene practices among food vendors are very crucial. However, with considerable regional differences in the global burden of food borne diseases, Africa stands out, as having the highest burden per population of food borne diseases due to poor food serving (WHO, 2015). In Sub-Saharan Africa especially Nigeria, despite the efforts of Government through its National Agency for Food and Drug Administration and Control (NAFDAC), to improve the safety of food supply, food safety still remains a major issue that has been exacerbated by the peoples' ignorance of food hygiene, food vendors negligence to food handling in terms of serving, Government's uncoordinated approach to food safety control and the poor enforcement of food safety legislation and regulations (Omojokun, 2013) [19].

Iwu *et al*. (2017) [13] observed in their study that formal training on food hygiene practices appear to be low with only 32% of food vendors having received training, and this appears to be a problem across developing countries as studies from Nigeria, Ethiopia, Malaysia and Thailand have reported a range of only between 12% - 39% of food vendors having received training on food hygiene practices (Kibret & Abere, 2012) [15]. Formal training of food vendors is important in ensuring good personal and environmental hygiene and has been reported by Nigusse and Kumie (2012) [17] who showed that, food vendors trained on food hygiene and safety are more likely to keep their finger nails clean and adequately protect their food from flies and dust. Despite this, the observational check list on hygiene standard in Iwu *et al*. (2017) [13] showed that while close to three quarters of respondents were neatly dressed, only about half of the respondents had well- kept finger nails. Also while about 60% of respondents protected their food from flies and rodents, only about half had adequate sanitary conditions. This showed that the level of personal and environmental hygiene of some food vendors appeared to be fairly good. This is similar with some other studies of Okojie and Isah (2014) [18] and Otu (2014) [22] who argued that, due to the food vendor's necessity to depend on the customer's repeat patronage in order to maintain and sustain their livelihood, the vendors are more likely inclined to produce relatively safe food by maintaining the minimum required level of hygiene standards; even though a serious gap still exists for the improvement of proper hygienic conditions and access to basic sanitary facilities for the food vendors.

The study of Onyeneho and Hedberg (2013) [20] indicated that minority of vendors wash their hands at some point or the other, while the rest practice hand washing between each meal serving and 20 minutes. Since people who purchase and prepare food (food vendors) for larger populations assumes greater responsibilities for outbreaks, hygiene practices like hand washing, cross-contamination of raw foods and cooked foods, and observation of cooling temperatures for cooked food, are critical measures and important means to controlling food-borne illness.

In a study conducted by Henry, Edward, Ogbonna and Emmanuel (2017) [12], the microbiological assessment of six selected cooked ready-to-eat street foods (Moimoi, Afang Soup, Stew, Porridge Yam, Porridge Beans, and Jollof Rice) sold freely and openly in Calabar and its environs was assessed. A total of five hundred and forty (540) cooked ready-to-eat street food samples were collected from three types of food vendors; Stationary Vendors with Shade (SVWS), Stationary Vendors without Shade (SVWOS), and Mobile Vendors (MV) from different locations in Calabar and analyzed using standard techniques. Results obtained from their study showed that the level of contaminations observed was above the acceptable microbiological limits.

5. Theoretical Frame Work

5.1 Health Action Model by Tones (1977)

The Health Action Model was postulated by Tones in 1977. The theory states that people's actions may be affected by beliefs about what is normal and acceptable behaviour and by the extent to which they feel they can control their own health (locus of control). The model advocates for education of food vendors. The Tones' Health Action Model synthesizes two other widely tested models: the Health Belief Model and the Theory of Reasoned Action. The Theory of Reasoned Action provides a framework that links individual beliefs, attitudes, intentions and behaviour. Norms are considered to be fundamental to all behaviour and distinctions are made both between attitudes and beliefs, and between behavioural intentions and resultant actions. Beliefs and attitudes may interact to produce a behavioural intention. The intention then leads to an advocated action when appropriate social and environmental conditions prevail.

The application of Tones' Health Action Model to this study lies in the fact that most of the recognized influencing factors towards food handling and hygiene are incorporated. The knowledge about food hygiene obtained from a food hygiene course; the influence of norms, which could be altered by the provision of support for changes in food handling practices from management and colleagues in the food industry; some incentive to change behaviour, e.g., perhaps improved job satisfaction or financial inducements; the facilitating effects of a workplace that provides a suitable range of equipment and facilities; and the development of personal skills to apply the knowledge gained from a course are essential for proper handling of food by vendors. In light of the benefits gained from the synthesis of two widely tested models (i.e., HBM and TRA) and the inclusion of the recognized factors which affect food handling behaviours, the Health Action Model applied to food hygiene education is considered a worthy framework for this study.

The model explains Perceived Behavioural Control (PBC) which reflects personal beliefs as to how easy or difficult performing the behaviour is likely to be. PBC therefore acts as both a proxy measure of actual control and a measure of confidence in one's own ability. It is assumed to reflect

external factors (e.g., availability of time, money, or social support) as well as internal factors (e.g., ability, skill, information) towards food hygiene. The inclusion of PBC as a predictor of behaviour is based on the rationale that: holding intention constant, greater perceived control increases the likelihood that enactment of the behaviour will be successful. Further, to the extent that perceived control reflects actual control, PBC will directly influence behaviour. This theory guided the researchers is the whole study.

6. Methodology

The research design adopted for this study was a descriptive cross sectional design. The study area was Obubra in Cross River State of Nigeria. Obubra was established as a British colonial district in 1902 and has since undergone several metamorphoses in terms of geography and administrative nomenclature to the extent that from 1976 to date, it became known as "Obubra Local Government Area" following the Local Government Reforms of 1976 in Nigeria. Today, Obubra is one of the oldest Local Government Areas in Nigeria. It lies between latitude 4º 45' and 6º 15' North of Equator and longitude 8º 12' East of Greenwich Meridian. It is bounded in the North by Yala and Ikom Local Government Areas, in the South by Yakurr Local Government Area and in the West by Ebonyi State. The present day Obubra as a geo-political entity covers an area of 1,115 km^2 with a population of 172,543 people, as at 2006 census (National Population Commission of Nigeria, 2006). It is situated in the Central Senatorial District of Cross River State of Nigeria and has its headquarters at Obubra.

There are eleven political council wards in the Local Government Area, namely: Ababene, Ofat, Ofodua, Ovonum, Apiapum, Iyamoyong, Ochon, Obubra Urban, Ofumbongha/Yala, Osopong I, and Osopong II. The Mbembe speaking people constitute the majority of the following traditional clans: Adun, Okum, Osopong and Ofumbongha. In concrete terms, Obubra could be best described as having the characteristics of an ethnic plural society (Ovat, 2015) [23]. The main occupation of the inhabitants of the communities is subsistence farming and fishing. Some are civil servants and part-time worker, businessmen, while some engage in tourism activities in their area. There are about 320 food vendors in the study area as at the time of this study. The common language spoken by the people is Mbembe while the general language of communication is English.

One hundred and twenty (120) food vendors were sampled through convenience sampling. Self-administered questionnaire was used for data collection. Data were analyzed using SPSS version 20 and hypotheses were tested using Pearson's Product Moment Correlation analysis. Results and findings were represented using descriptive statistics.

7. Results and Findings

The first hypothesis was stated thus: H_{o1}: There is no significant correlation between perception of proper food handling and hygiene practices among food vendors in Obura Local Government Area. To test this hypothesis, Pearson Product Moment Correlation was used with perception of proper food handling as the independent variable and hygiene practices among food vendors as the dependent variable. The result of the analysis is presented in Table 1.

Table 1: Pearson's Product Moment Correlation analysis of perception of proper food handling on hygiene practices among food vendors (N=120)

Variables	$\sum X \sum Y$	$\sum X^2 \sum Y^2$	$\sum XY$	r-value
Perception of proper food handling (X)	210	148	114	.85*
Hygiene practices among food vendors (Y)	84	92		

*significant at 0.05; df=118; Critical r-Value =.138

The result of the analysis presented in Table 1 indicated that the calculated r-value of 0.85 was greater than the critical r-value of 0.138 at 0.05 level of significance with 118 degree of freedom. Since the test statistic was greater than the critical value, the researchers rejected the Null Hypothesis (H_o) and accepted the Alternative Hypothesis (H_a). This implied that, there was a significant correlation between perception of proper food handling and hygiene practices among food vendors in Obubra Local Government Area.

The second hypothesis was stated thus: H_{o2}: There is no significant correlation between food serving and hygiene practices among food vendors in Obubra Local Government Area. To provide answers to this hypothesis, Pearson's Product Moment Correlation analysis was used with food serving as the independent variable and hygiene practices among food vendors as the dependent variable. The result is presented in Table 2.

Table 2: Pearson's Product Moment Correlation analysis of food serving on hygiene practices among food vendors (N=120)

Variables	$\sum X \sum Y$	$\sum X^2 \sum Y^2$	$\sum XY$	r-value
Food serving (X)	150	140	200	.88*
Hygiene practices among food vendors (Y)	70	60		

*significant at 0.05; df=118; Critical r-Value =.138

The result of the analysis in Table 2 revealed that the calculated r-value was .88 and the critical r-value at 0.05 significant level is .138 at degree of freedom (df) of 118. Since the test statistic was greater than the critical value, the researchers rejected the Null Hypothesis (H_o) and accepted the Alternative Hypothesis (H_a). This implied that, there was a significant correlation between food serving and hygiene practices among food vendors in Obubra Local Government Area.

8. Discussion of Findings

8.1 Perception of proper food handling and hygiene practices among food vendors

The finding on hypothesis one revealed that there was a significant correlation between perception of food handling and hygiene practices among food vendors in Obubra Local Government Area. This is because if the perception of food vendors is positive especially as regards food safety, they will comply positively with ensuring that the food served to the populace is clean and free from contaminants. This finding is

supported by Iwu *et al.* (2017) [13] who assessed the knowledge, attitude and the level of practice of food hygiene among food vendors in Owerri town of Imo State, Nigeria; and found out that knowledge, attitude and training of food vendors were significantly associated with the level of food hygienic and handling practice of food vendors. Henry, Edward, Ogbonna and Emmanuel (2017) [12] also supported this findings in that, they emphasized that very little is usually known and explored about how street food vendors themselves perceive food safety and how to practice it and as such education and training of food vendors is very pertinent towards the sales of safe food to consumers. They added that there is a correlation between educational status of food vendors and the way and manner food is handled. They observed that knowledge of the food vendors with regard to food hygiene was good for a majority of the respondents in their study. In addition, they added that the level of good knowledge among the majority of food vendors in their study could be related to the fact that a majority of the respondents had either a secondary or tertiary level of education which could have formed the basis for increased comprehension of food hygiene information and therefore improved knowledge. Similarly, the findings of Kalua (2010) [14] corroborates with this finding in that they asserted that knowledge positively influences attitude formation and in other words, attitude can be said to be a reflection of knowledge which is linked to personal beliefs and previous personal experiences.

8.2 Food serving and hygiene practices among food vendors

The finding on hypothesis two revealed that there was a significant correlation between food serving and hygiene practices among food vendors in Obubra Local Government Area. This is because the safety of food does not end is food storage and processing. It goes a long way to serving it on the table for consumption. The study of Henry, Edward, Ogbonna and Emmanuel (2017) [12] supported this finding by observing that in the microbiological assessment of six selected cooked ready-to-eat street foods (Moimoi, Afang Soup, Stew, Porridge Yam, Porridge Beans, and Jollof Rice) sold freely and openly in Calabar and its environs assessed, the level of contaminations observed was above the acceptable microbiological limits. Similarly, the study of Onyeneho and Hedberg (2013) [20] is in support of this study by indicating that minority of vendors wash their hands at some point or the other, while the rest practice hand washing between each meal serving and 20 minutes. Since people who purchase and prepare food (food vendors) for larger populations assumes greater responsibilities for outbreaks, hygiene practices like hand washing, cross-contamination of raw foods and cooked foods, and observation of cooling temperatures for cooked food, are critical measures and important means to controlling food-borne illness. This study finding is in line with Nigusse and Kumie (2012) [17] who posited that about 60% of respondents protected their food from flies and rodents; only about half had adequate sanitary conditions. This showed that the level of personal and environmental hygiene of some food vendors appeared to be fairly good.

9. Summary, Conclusion and Recommendations

Perception can influence attitude and the benefits expected from carrying out a particular attitude can influence practice. The study showed that perception of proper food handling can influence hygiene practices. When food vendors perceive that poor food handling can cause food contamination they will practice better food handling and better hygiene. Furthermore, if food vendors understand the gravity of being traced to food poisoning of a consumer, they will tend to make effort to prevent it and guard against it. Based on the findings of this study, the following recommendations are made:

1. Food vendors should use Personal Protective Equipments (like; nose/face mask, apron and head gear/chef cap) during food preparation and serving process.
2. Food vendors should practice regular hand washing for every 20-30 minutes.
3. Food vendors should constantly sanitize all surfaces, wash plates and utensils with good quantity of clean water.
4. Sensitization of food vendors by agencies and bodies saddled with the responsibility to ensure food safety. This can be done at least bi-annually.
5. NAFDAC and other food agencies through government permission and authority should ensure food vendors are inspected for hygiene bi-annually including assessing their personal hygiene and screening of the food sold. This can be done through taking samples of the vended foods to Food Laboratory for analysis.
6. Government should provide WASH facilities so that food vendors can conveniently practice good hygiene.

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