ASSESSMENT OF SANITARY CONDITIONS OF FOOD ESTABLISHMENTS AND THEIR PATRONAGE IN SELECTED COMMUNITIES IN IBADAN NORTH-WEST LOCAL GOVERNMENT AREA OF OYO STATE

BY

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DEDICATION

This dissertation is dedicated to Almighty GOD, the creator of the universe for being there for me at all times.

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ABSTRACT

The current trend to eat outside the home in Nigeria has contributed to increasing number of food establishments where prepared food is sold and consumed. Poor sanitary conditions in such establishments can predispose consumers to food-borne diseases. Although, numerous food establishments exist in Ibadan, an appraisal of their sanitary status has not yet been well documented. This study determined the sanitary status of food establishments and assessed the determinants of their patronage in selected communities in Ibadan North-West Local Government Area (LGA), Oyo State, Nigeria.

The study design was cross-sectional. A four-stage random sampling technique was used in selecting 54 out of 108 food establishments in the LGA. Data were collected using four Focus Group Discussions (FGDs) with food handlers, two Key Informant Interviews (KIIs) with staff responsible for food safety at State and LGA levels and an observation of each establishment using a checklist. A semi-structured questionnaire was used to obtain data from 593 consumers selected by systematic random sampling technique. Thematic approach was used for analysing the qualitative data while descriptive and Chi-square statistics were used to analyze the quantitative data.

About one-quarter (25.9%) of cooks, 24.1% servers, and 24.1% dish- washers wore apron. Food stains and dirt were observed on clothes of 40.7% cooks, 35.2% servers and 31.4% washers. Sixty-one percent of the establishments had no appropriate refuse bins. The disposal of liquid wastes into partially blocked open drains was observed in 79.6% establishments while 78.4% lacked toilet facilities. Overall 83.3% food establishments had doors without screening nets while the windows of 72.2% had no screening nets. Flies were observed in 81.5% establishments. Separate rooms for storing unprepared foods and dish washing existed in 32.1% and 1.1% of food establishments respectively. A separate hand washing bowl was provided for each customer in 11.1% establishments. Forty-two percent of establishments had napkins but only 28.6% of these were found clean. Food Handlers safety practices were perceived by 67.9% customers to be tolerable. Customer's patronage choice of food establishments was influenced by cleanliness of food handlers going by the response of 45.5% of the respondents. Availability of electricity was cited as a factor by another 61.9% of the respondents. Respondents' concerns about eating places include location of sanitary facilities (76.9%) and food preparation from eating area (76.6%) which are significantly associated with education ($p<0.05$) and gender

($p<0.05$). The view of most FGD discussants was that financial constraints were the major reason for the inadequate facilities in food establishments. Regular training, routine supervision and imposition of appropriate sanctions were considered necessary by key informants for promoting compliance with safety practices among food handlers.

The sanitary status of food establishments in the study area could facilitate the occurrence of food-borne diseases. Yet, sanitary consideration was not a determinant of patronage of the food establishments. Educational intervention aimed at promoting standards of food safety and environmental sanitation is recommended for eliminating the situation.

Keywords: Food establishments, sanitary condition, environmental, sanitation, patronage.
Word Count: 477

CERTIFICATION

I certify that this study was carried out by Omolara Mobolanle FATUNMBI in the Department of Health Promotion and Education, Faculty of Public Health, University of Ibadan, Nigeria, under my supervision.

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OPERATIONAL DEFINITION OF TERMS

Street Foods: Street Foods are foods and beverages sold by vendors in streets and other public places for immediate consumption or consumption at a later time without further processing or preparation. Street food enterprises are characterized by the small scale of the operation, use of traditional food processing technologies, and low capital costs that allow ease of entry into the sector. Street foods show great variation in terms of ingredients, methods of retail and processing, and consumption.

Street Food Vendors: A street food vendor is a person who offers food or services for sale to the public without having any permanent built up structure on a street

Food-borne Disease: A food-borne disease is any illness resulting from the consumption of contaminated foods.

Food Hygiene: Food hygiene refers to conditions and measures necessary for the production, processing, storage and distribution of food designed to ensure a safe, sound, wholesome product fit for human consumption.

Knowledge: Knowledge refers to food consumers' understanding of the susceptibility, causes, signs and symptoms, prevention and consequences of food and water-borne diseases.

ABBREVIATIONS

CDC:	Centre for Disease Control
FAO:	Food and Agriculture Organization
FMOH:	Federal Ministry of Health
HACCP:	Hazard Analysis Critical Control point
LGA:	Local Government Area
PHC:	Primary Health Care
MDG	Millennium Development Goals
UN:	United Nations
USAID:	United States Agency for International Development
WHA:	World Health Assembly
WHO:	World Health Organization.

CHAPTER ONE

1.0. INTRODUCTION

1.1. Background Information

Street Foods has been defined as foods and beverages sold by vendors in streets and other public places for immediate consumption or consumption at a later time without further processing or preparation (Mensah, Yeboah-Manu, Onwusu-Dako and Ablordey, 2006). Street foods include a range of complete meals, snacks and beverages which are prepared and sold in traditional eating places, refreshment parlours, permanent and semi-permanent structures, by the roadside, in the streets, markets, bus stops, motor parks, outside schools, hospitals, offices as well as mobile stalls (Barro, Bello, Itsiembou, Savadogo, Ouattara, Nikiema, De Souza and Traore; 2007).

Street foods are prepared in a variety of ways including frying, roasting, boiling, baking or steaming and may be quickly served on the spot or prepared by invisible vendors and packaged for idle men to hawk on the streets (Ohiokpehai, 2003). Some of the foods sold on the street are noodle-or rice-based meals, fried snacks, cakes and pastries, soups, porridges, drinks, fruits, vegetables, meat, poultry, seafood, eggs, cereal and soy products (Mwangi, 2002).

Regional differences exist in the patterns and consumption of street foods. In some countries, street foods are an integral or substantial part of the whole diet, while in others they serve as supplemental foods (Ohiokpehai, 2003). Some populations, such as students and the homeless, are almost totally reliant on street foods, whereas other population groups buy them occasionally (Iyenda, 2001). Another factor that makes street foods a potentially cost-effective food is time. Mancino and Newman (2006) reported that many traditional foods involved lengthy preparation and the purchase of street food allowed women to substitute time spent in food preparation for income generating activities.

Apart from serving as an essential supplier of cheap, ready-to-eat food for the community, workers and travellers, it also serves as a source of employment and income for some women (Tinker 2000). In some countries such as Bangladesh, the majority of street food vendors are men, while women - primarily the vendors' wives and female children - are involved in food preparation (Haque, Faruqoe, Shekhar and Begum, 2010).

In other countries (e.g. Nigeria, Ghana, Uganda Botswana and Kenya) the opposite occurs, and the majority of vendors are women who balance the income-generating opportunities of street vending with traditional household and child care duties (Mwangi, 2003).

Street food contributes significantly to the total daily nutrient intake of consumers, even when consumption is inadequate to meet recommended daily allowance (Ziegler, Jonnalagada, Nelson, Lawrence and Baciak, 2002). The Food and Agriculture Organization (2007) reported that street food are consumed by an estimated 2.5 billion people daily because of several attributes that included affordability, convenience (especially for households with limited time and facilities for food preparation); availability, accessibility and cultural acceptability (Food and Agriculture Organization, 2007).

Street food vendors offer a range of traditional foods as well as imported snacks and drinks allowing consumers the choice of certain foods which are usually not eaten at home e.g. trotters (cow feet), cow skin, goat head. The trade reduces unemployment by creating self employment for a large proportion of urban dwellers especially those in the low socio-economic groups most of whom are unskilled ((Rheinländer, Olsen, Bakang, Takyi, Konradsen and Samuelsen, 2008).

The practice of street foods trading is promoted mostly in urban settings where working outside the home by many does not allow families to prepare meals for family members (Onyuga-Ogubi, Waudo, Afullo and Oiye 2010). It is a common practice among wage earners, schooling children, youths, and market men and women especially among the low socio-economic class (Benny-Ollivierra and Badrien 2006; FAO, 2007).

In addition, as a result of the socioeconomic changes in many countries which brought urbanization and population growth, especially in the developing countries, street food vending has experienced significant growth during the past few decades (Olutayo and Akande 2009; Sudershan, Rao and Polasa, 2009). Street-vended foods which are largely, but not exclusively, an urban phenomenon has the following benefits. It provides a source of inexpensive, convenient and often nutritious food for urban rural poor. It is also a source of attractive and varied food for tourists and economically advantaged; a major source of income for a large number of persons particularly women and a chance for self-employment and the opportunity to develop business skills with low capital investment (Haque et al., 2010).

The role of this sector in the urbanisation process and the urban economy reflects the way of life and the survival and coping strategies adopted in most African cities (Lues, Rasephei, Venter and Theron; 2006). Rapid urbanisation is breaking down traditional family ties throughout the world and the street food sector is widely understood as an inevitable phenomenon tied to urban growth (Lues et al., 2006). This urbanisation and the associated social and structural changes have caused the demand for street food to increase. Longer travelling times between living and working places are likely to lead to further increase in demand.

The benefits of street food vending notwithstanding, it is recognized that street food vendors are often poor, uneducated and lack appreciation for safe food handling (Mensah et al., 2006). Street-vended foods are perceived to be a major public health risk especially in developing countries. For example, it is a common insanitary marketing practice for buyers to customarily touch and even taste food items offered for sale to evaluate quality and determine weight and in the process contaminate the food (Lues et al., 2006).

Moreover, concerns have been raised over the safety and quality of street-vended foods, because the vendors lack appreciation of basic food safety issues (Rheinländer, et al., 2008). They often use stands and carts of crude and inefficient construction, running water is not easily accessible, and hand and dish washing is done in the same bucket, sometimes without soap (Mosupye and von Holy, 2000). Waste water is usually discarded in streets and garbage is discarded nearby providing attraction, food and harbourage for insects and rodents (Lues et al., 2006).

In many cases toilets are not available, thus forcing the vendors to eliminate their body wastes in nearby areas and return to their vending sites without washing their hands (Zeru and Kumie, 2007). Such conditions and practices are likely to lead to cross-contamination of cooked foods. Furthermore, safe food storage temperatures are difficult to maintain since foods are often displayed over long periods and may not be reheated before serving (Mosupye and von Holy, 2000). In other cases vendors buy raw materials from dubious sources which may either already be contaminated with food-borne pathogens or be unfit for consumption due to other reasons (Lues et al., 2006).

Mobile food vendors who lack sanitary facilities are a common cause of unsafe food in the urbanizing third world (Baht and Waghray, 2000; Mensah et al., 2006). According to the Centers for Disease Control and Prevention (CDC), food-borne illnesses are responsible for approximately 5,000 deaths and about $5 billion in medical expenditures

every year (CDC, 2005). A majority of the reported cases of food-borne illness can be traced to the public eating establishments (Martins, 2006). Recent increases in the consumption of restaurant foods have been accompanied by an increased risk of illnesses being transmitted by food handlers (Rheinlander, Olsen, Bakang, Takyi, Konradsen and Samuelson 2008).

The World Health Organization Experts Committee on the role of the health sector in food and nutrition concluded that the main determining factors in the high incidence of malnutrition in a given place or area was not only lack of food at the family level but also an insanitary environment in the household, lack of personal hygiene and the consumption of contaminated unsafe food leading to food-borne diseases such as salmonellosis, cholera and typhoid (WHO, 2002). Riet, Hartog and van Steveren (2010) added that if food poisoning, dysentery and other allied food-borne diseases appear to contribute maximally to the incidence of malnutrition, a reduction in the frequency, intensity and duration of these would not only save millions of lives but will also contribute significantly to the reduction of malnutrition in developing nations. A high level of food safety is one important method to check this. The environment in which street foods are prepared and sold are critical to the health and nutrition of the consumers, as well as to the growth of street food vending as an important economic activity.

1.2. Statement of the Problem

In spite of the rationale of street foods to the socio-economic development of a nation and the array of public health problems associated with it, which are injurious to the health of man, street foods have tended to be overlooked by many policy makers (Mensah et al., 2006). Very few researchers and scholars are interested in its operations. This informal sector has always been viewed with disdain and an assumption made that with modernization it would disappear. Many governments have resulted to driving away the operators of street foods on the major streets, but with the resultant re-emergence after sometime because of the widely held view by the common woman that street food must stay, it shall not go!

Food-borne illness and food hazards pose serious health threats to everyone (Satcher 2000; Gauci and Gauci, 2005). WHO reports that 90% of annual deaths from diarrhoea are among children particularly from developing countries. A significant number of deaths could be attributed to shigellae, which causes dysentery or bloody

diarrhoea (WHO 2001). Researchers maintained that the prevalence of food-borne illnesses may be under-reported because many people do not seek medical help for food-borne illnesses and so those episodes of illness are not included in the official records (Vogt, 2005). Food-borne illness may be under reported because many believed that food-borne illnesses are not common (Yarrow, 2006).

In Nigeria, the incidences of food-borne diseases have been well documented with recommendations made for improvement in access to potable water and hygienic food. For example, Olawoyin, Ogunbodede, Olumide and Onadeko (1999) reported a prevalence of 1384 cases of cholera at the cholera unit, Infectious Disease Hospital, Ministry of Health, (a referral centre for all clinics and hospitals) in Ibadan between January and December 1996. Diarrhoea and vomiting were the most common combination of symptoms present in 97.3% of all cases, followed by diarrhoea, vomiting and dehydration (84.3%). Similarly, a UN humanitarian unit (2008) reported a total of 340 deaths out of 5,600 cholera cases ever reported in Nigeria. Of these deaths, 102 cases were attributed to street food vendors (Isere and Osemwenkhae, 2010).

Therefore, the challenge of the local and state governments will be to reduce the negative problems on health and educate the people on the advantages of food safety. This should be based on the assessment of the problem and examination of existing traditional beliefs, customs, knowledge, attitude and behaviour related to food safety and the determination of areas of weakness and the most appropriate means of solving them. These are the areas that need much study.

These considerations formed the basis for the study of street food vendor state. The study was designed to identify the knowledge, attitude and practice of food vendors in relation to safety and hygiene of food in Ibadan North-West Local Government area of Ibadan. This focus was important because whether food prepared for public consumption would give rise to a disease or not is a function of what happens to it in the kitchen during preparation, storage and serving. This, in effect, implies that specific practices in the vendors' workshop can result into food contamination. Therefore the simple fact that most people now eat outside the home due to working condition or social pressure indicates the need to safeguard the safety of food by the vendors.

1.3. Justification for the Study

This study which focused on the food handlers and consumers in public food establishments in an inner-core region has the following potential benefits:

Data generated, well analysed and interpreted, will add to the available studies focusing on public food establishments and will provide current information necessary for reviewing activities of food handlers in areas with similar developmental profile with the study area. In addition, the result can also be used by consumers of local restaurants to advocate for improve standard of sanitary conditions and hygiene-related practices in restaurants in the study area.

The results of this study are therefore crucial in designing health education strategies for preventing food-borne diseases associated with poor personal and environmental hygiene. If Nigerians are to have the full benefits of street-vended foods with minimal risk of food-borne diseases, Government intervention is required to ensure that the standard of safety for such foods is the best attainable in the context of prevailing local situation.

Finally, the need to strengthen food safety education programmes for the prevention of food-borne diseases is increasingly being recognized by countries (WHO 2003). The fifty-third session of the regional committee for Africa in September 2003 adopted a resolution on food safety urging the strengthening of food safety programmes. Priority interventions include, among others, food safety education and promotion. This can be effectively delivered if data to inform evidence-based communications are accessible to policy makers and managers on food and nutrition. The data obtained therefore can be useful in setting priorities, formulate interventions, and identify the needs of street food vendors and their customers for education and training.

1.4. Research Questions

This study was conducted to answer the following questions:

1. What are the available sanitary facilities in food establishments in inner-core areas of Ibadan North-West LGA?
2. What are the hygiene-related behaviours of food handlers in these facilities?
3. What is the knowledge of consumers about food-borne diseases?
4. What are the experiences of consumers with food-borne diseases?
5. What are the perceptions of consumers about sanitary provisions and hygiene-related practices in these establishments?

1.5. Broad Objective

The broad objective of the study was to evaluate the sanitary conditions of food establishments and factors influencing their patronage in an inner-core area of Ibadan North-West Local Government Area, Oyo State, Nigeria.

1.6. Specific Objectives

The specific objectives of the study were to:

1. Determine the extent of provision of sanitary facilities in public food establishments in an inner-core area of Ibadan North-West LGA.
2. Assess hygiene-related practices of food handlers in these facilities.
3. Determine knowledge of respondents who utilised these facilities about food-borne diseases.
4. Document respondents' experiences of food-borne diseases from public food establishments.
5. Document the perceptions of respondents on sanitary provisions and hygiene practices in the index establishments.

1.7. Hypotheses

This study tested the following null hypotheses. There is no significant association between:

1. Registration status of food establishments and availability of facilities for disposal of solid and liquid wastes.
2. Structural location of food establishments and availability of facilities for disposal of solid and liquid wastes.
3. Demographic characteristics of food consumers (sex, education and income level) and knowledge about food and water-borne diseases.
4. Demographic characteristics of respondents (sex, education and income level) and perceptions of quality of service provided in food establishments.
5. Demographic characteristics of respondents (sex, education and income level) and concerns about hygiene-related practices in food establishments.
6. Demographic characteristics of respondents (sex, education and income level) and experience with food/water-borne diseases.

CHAPTER TWO

2.0. LITERATURE REVIEW

The literature review covers seven topics that include: Nature of food; Food-borne Viral Diseases; Prevention of Transmission of Viral Infections via Food; Globalization and Spread of Food-borne Diseases; Street Food Trade; Street Foods and the Spread of Food-borne Diseases and; Knowledge, Attitude and Practices Relating to Food Safety and Hygiene

2.1. Nature of food

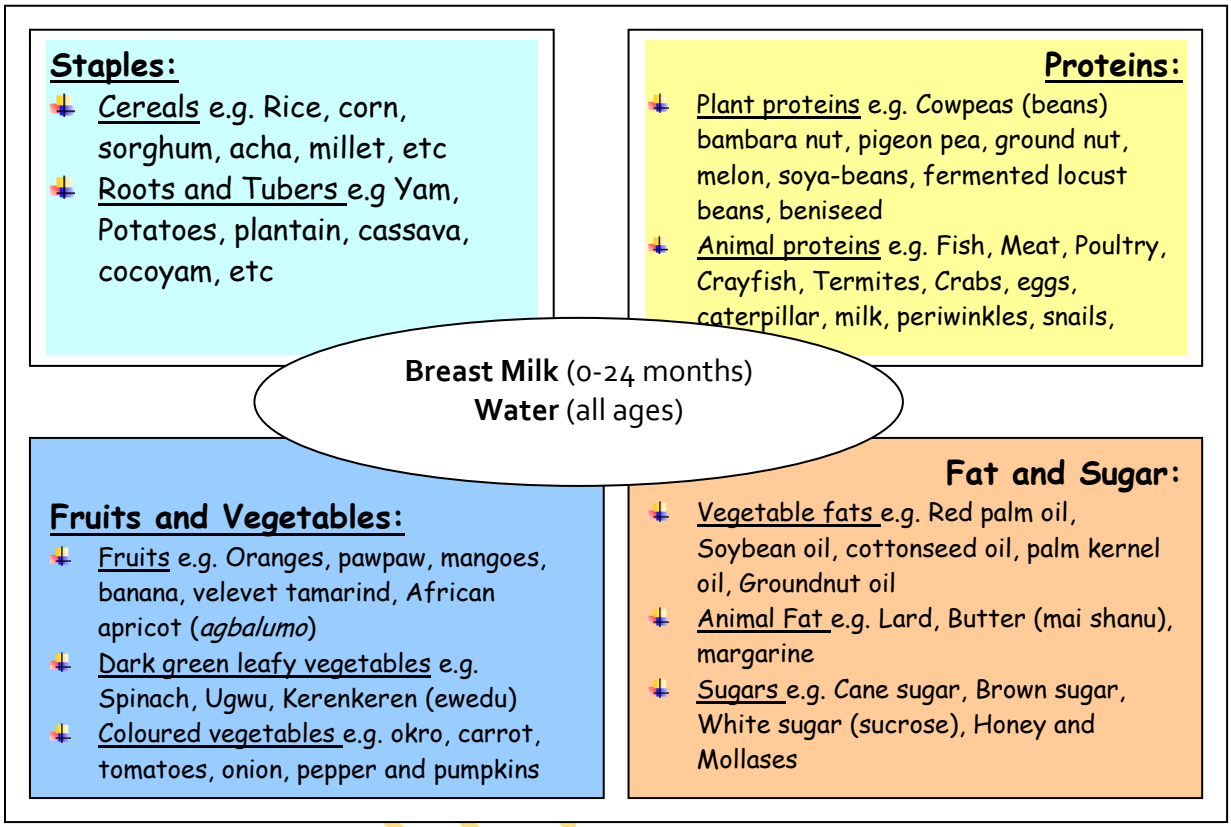
Food is one of the established three basic necessities of life. Others are shelter and clothing. A popular saying among the *Yoruba*, a major tribe in Nigeria, translates that '*if hunger is out of man's problems, the problem becomes insignificant'*. Food is any substance, liquid or solid which when ingested, supplies the much needed nutrients to the body (Hornsby, 2001). Foods, on ingestion and digestion, are broken down in the body into constituents which are absorbed and circulated by the blood to the various organs as nutrients. Nutrients, as components of food, are essential to life as nourishments to support growth (proteins), provide energy for daily activities (carbohydrates and fats) and regulate all body processes (vitamins, minerals and water). Lack of food in the correct quality and quantity may lead to clinical symptoms which could be disastrous if there is no prompt and appropriate intervention. Further review of the literature on food in terms of food groups, food square, food and culture, food habits, food consumption and food safety are shown below.

Food Groups: Three broad food groups have been recognized in relation to the functions performed in the body. These are body building, energy giving and protective foods. The World Health Organisation (1999) described a modified grouping on the basis of **s**imilarity in nutrient content including. The sub-classifications are milk and milk products; Meat, fish and poultry; Legumes and their derivatives; Cereals and grains; Roots, tubers and starchy fruits; Fruits and vegetables and; Oil seeds and nuts.

Food Square: An adequate diet contains a variety of foods from the food groups and provides the nutrients in the right amount that promotes growth, keep the body functioning maximally and protect the body against diseases as well as premature ageing.

The World Health Organisation (1999) recommended the use of *Food Square* as a practical guide to ensure consumption of adequate diet. Food items were categorised into four broad groups namely: staples; protein rich foods; vegetable and fruits (including water); and fats and sugars as shown in figure 2.1

Figure 2.1: Food Square



Source: WHO (1999):

Food and Culture: The consumption of certain food items and their products is influenced by many factors such as customs, culture, belief, socio-economic status, season and dietary habits (Nesbit, Majowicz, Finley, Pollari, Pintar, Marshall, Cook, Sergeant, Wilson, Ribble and Knowles, 2008). Some food items have been identified with particular nationalities, tribes and ethnic groups. In Africa, in Nigeria in particular, specific food items are characteristic of particular ethnic groups. A mere mention of the food item immediately reminds one of associated ethnic group (table 2.1)

Table 2.1: Specific Food Items associated with Ethnic Groups in Nigeria

Food items (Local name)	**Food items (English name)**	**Nationality/tribe**
Iyan	Pounded yam	The *Ekiti* (*Ekiti* State) and Benue people (Benue State)
Akara-Osu	Fried bean cake	The *Osu* people, Osun State of Nigeria
Dodo-Ikire	Chopped fried plantain	The *Ikire* people, Osun State of Nigeria
Ikokore	Mashed water yam with delicacies	The *Ijebu* of Ogun State, Nigeria
Abula	Mixed soup of beans and green leaves	The *Ibadan* of Oyo State, Nigeria
Fura da nunu	Paste of Millet and cow milk	The *Hausa* and the *Fulani* of Northern Nigeria
Lafun	Yam floor	The *Egba* of Ogun State, Nigeria

Food Habits: According to Aboud (2002), food habits vary from one cultural group to another because each group in its own evolution sets up a complex pattern of standardised behaviours. Individuals within a culture respond to the approved behaviour pressures by selecting, consuming and using those foods which are available to them.

The items identified as food, their mode of preparation, the conditions under which they are consumed all reflect basic cultural values. The food habits of a group are the product of the group's present environment and past history. These food habits and customs that have become meaningful to the group are carefully and tenaciously held, and not quickly changed.

Aboud (2002) further explained that each ethnic group carefully passed on its food pattern through the training of children so that each child knows what is considered to be food and what is not. Children are also taught socially acceptable behaviour in relation to food. In 1977, the World Health Assembly adopted "Health for All by the year 2000" as the official goal of all Member States of the Organization (World Health Assembly, 1977). The outcome of an international conference held in 1978 in Alma-Ata, USSR, sheds light on how this goal could be achieved through Primary Health care (PHC) (Alma-Ata Declaration, 1978). One of the essential elements of PHC is the qualitative and quantitative improvement of food supply. Improvements in food quality refer to nutritional aspects as well as the raising of personal hygiene standards geared towards the prevention of food-borne diseases.

Food Consumption: This takes into consideration consumer behaviour in demanding and eating of ready-to-eat food items (Bae, Chae and Ryu, 2010). Client's knowledge informs his/her attitude which, in turn, influences his/her practices. Factors influencing consumer behaviour include availability of product information, knowledge of consumers, cultural values, socio-economic status (Bae et al., 2010). Insufficient product information, and/or inadequate knowledge of general food hygiene can lead to products being mishandled at later stages in the food chain. Such mishandling can result in illness, or products becoming unsuitable for consumption, even where adequate hygiene control measures have been taken earlier in the food chain.

Food Safety: Food safety is the assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use (Raspor and Jevsnik, 2008). Food suitability assures that food is acceptable for human consumption according to its

intended use. Therefore, food hygiene comprises of all conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain (Raspor and Jevsnik, 2008).

Five Key Steps to Safety Foods

A five-key strategy was launched at the Second Global Forum of Food Safety Regulators, Bangkok, Thailand; 12th – 14th October 2004. A conference document with detailed information was presented at the conference. The conference believed that good food hygiene could contribute towards preventing the transmission of pathogens responsible for many food-borne diseases. Governments, industries and consumers have shared responsibility in ensuring the safety of food. The World Health Organisation has long been aware of the need to educate all food handlers, including professionals and ordinary consumers, about their responsibility for food safety. After nearly a year of consultations with food safety experts and risk communicators, WHO introduced the Five Keys to Safer Food poster in 2001 (WHO 2001).

Already translated into 25 languages, the WHO Five Keys to Safer Food are simple rules elaborated to promote safer food handling and preparation practices including keep clean; Separate raw and cooked; Cook thoroughly; Keep food at safe temperatures; and Use safe water and raw materials. However, this simple message is not enough and in October 2004 WHO produced a draft version of a basic training manual for food safety professionals, teachers and other interested organizations to use in training food handlers and consumers including, school children (WHO 2004).

The five-key manual, entitled "Bring Food Safety Home", has two objectives:

1. To provide generic food safety training material that can be used as a framework to produce food safety training materials for a variety of audiences at the national level; and
2. To provide recommendations on how this basic material can be adapted for different audiences based on the social, economic and cultural differences between countries.

2.2. Food-borne Viral Infections

Food-borne disease is a major public health problem. Deeply concerned by this, the Fifty-third World Health Assembly (WHA) in 2000 adopted a resolution calling upon the World Health Organization (WHO) and its Member States to recognize food safety as an essential public health function. As most cases of food-borne disease are not reported, the true dimension of the problem is unknown. The absence of reliable data on the burden

of food-borne disease impedes understanding about its public health importance and prevents the development of risk-based solutions to its management.

There are only limited data on the economic consequences of food contamination and food-borne disease. The World Health Organisation (2002) reported that the estimated annual cost of the 3.3 - 12 million cases of food-borne illnesses caused by seven pathogens in the US in 1995 was US $6.5 - 35 billion; the medical costs and the value of the lives lost during just five food-borne outbreaks in England and Wales in 1996 were estimated at UK£ 300 - 700 million; the cost of the estimated 11, 500 daily cases of food poisoning in Australia was calculated at AU$ 2.6 billion annually.

Cholera

Cholera has become a worldwide health problem. It is an acute infection caused by the colonization and multiplication of *V. cholerae* 01 or 0139 within human small intestine (Emch, 2008). It is a water-borne disease that causes severe diarrhoea and vomiting which leads to dehydration of the body and can prove fatal unless treated quickly. Outbreaks usually result from contaminated food, poor sanitation and dirty drinking water (Isere and Osemwenkhae, 2010).

Cholera was first mentioned in the India subcontinent in 1817. The disease spread through Asia continent in the 1960s, reaching Africa in 1970 and Latin America in 1991 (Codeco, 2001; Wearing, 2005). In Nigeria, outbreaks of the disease have been occurring with increasing frequency since the first outbreak in modern times in 1970 (Lawoyin, Ogunbode ,Olumide and Onadeko, 2004).

A United Nation (UN) humanitarian unit report (2008) reveals that out of a total of 5,600 cholera cases in Nigeria, 340 cholera deaths were reported. Of this number, 102 cases were known to have drunk street-vended water (Isere and Osemwenkhae, 2010). Cholera outbreak was reported in Benue State in April, 2005. More than 90 people died from this outbreak within two weeks (Isere and Osemwenkhae, 2010). Similar cases were also reported in Gwer West and Apa, LGA of Benue State. According to the UN humanitarian unit report (2005), a source attributed the outbreaks to the fact that many residents in Makurdi depend on the River Benue (which flows through the city) for drinking water (UN, 2005). In February, 2005, at least 46 people died of cholera in Kusa village in Oyo State (Lawoyin et al, 2004). In July 16, 2008, it was reported that cholera claimed six lives leaving 30 others hospitalized in Zaria LGA of Kaduna State (Hustin, 2008).

2.3. Prevention of Transmission of Viral Infections via Food

Most documented food-borne viral outbreaks can be traced to food that has been manually handled by an infected food handler, rather than to industrially processed foods (Koopmans and Duizer, 2004). The viral contamination of food can occur anywhere in the process "from farm to fork", but most food-borne viral infections can be traced back to infected persons who handle food that is not heated or otherwise treated afterwards. Therefore, emphasis should be on stringent personal hygiene during preparation. If viruses are present in food pre-processing, residual viral infectivity may be present after some industrial processes. Other methods of inactivating viruses except adequate heating within a food are relatively unreliable, but viruses in water and on exposed surfaces can be inactivated with ultraviolet light or with strong oxidizing agents (WHO, 2003).

Therefore, it is important that sufficient attention should be given to good agriculture practice (GAP) and good manufacturing practice (GMP) to avoid introduction of viruses onto the raw material and into the food-manufacturing environment, and to HACCP to assure adequate control over viruses present during the manufacturing process. If viruses are present in foods after processing, they remain infectious in most circumstances and in most foods for several days or weeks, especially if kept cooled (at 4°C). According to Koopmans and Duizer (2004), it is necessary for the control of food-borne viral infections to:

(i) Heighten awareness about the presence and spread of these viruses by food handlers

(ii) Optimise and standardise methods for the detection of food-borne viruses (develop laboratory-based surveillance to detect large, common-source outbreaks at an early stage

(iii) Emphasise consideration of viruses in setting up food safety quality control and management systems (GHP, GMP, HACCP)

More strict and frequent hygiene inspections of food manufacturers in all stages of production, processing and distribution according to the hygiene requirements defined in Regulation (EC) No 852/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs, should be made to ensure prevention of viral transmission via food, particularly in the post-communist, new member states of the European Union.

2.4. Globalization (transnational trade) and Spread of Food-borne Diseases

In the past two to three decades, public health authorities in industrialized countries have been faced with an increasing number of food safety problems. In 1983, a Joint Food and Agriculture Organization/World Health Organization Expert Committee on Food Safety concluded that illness due to contaminated food was perhaps the most widespread health problem in the contemporary world and an important cause of reduced economic productivity (Food and Agriculture Organization/WHO 1984). More recent data from industrialized countries indicate that annually up to 10% or more of the population may have a food-borne disease (Rocourt, Moy, Vierk and Schlundt, 2003). The situation is equally serious in developing countries, where infant diarrhea causes many illnesses and deaths (Isere and Osemwenkhae, 2010).

In addition to known food-borne diseases, public health communities are being challenged by the emergence of new or newly recognized types of food-borne illnesses, often with serious and chronic health consequences. Certain populations (e.g., pregnant women, the elderly, infants and children, immune-compromised persons, and the undernourished) are particularly vulnerable (Rocourt, Moy, Vierk and Schlundt, 2003). In economic terms, food borne illnesses are very costly for industry, health services, and society as a whole. Many factors have contributed to the increase in food-borne disease. These include:

Industrialization: Industrialization, leading to increased wealth and urbanization, has revolutionized the food supply system, resulting in mass production and an explosive increase in the number of food service establishments and food outlets (Riet et al., 2003). Mass production, environmental factors and inadequate knowledge on the part of food handlers have contributed to increased contamination of primary foodstuffs (Gaffga, Tauxe and Mintz (2007).

International Trade: The increase in international trade has increased the risk for cross-border transmission of infectious diseases. The globalization of food (and feed) trade, facilitated by the liberalization of world trade, while offering many benefits and opportunities, also presents new risks (Rocourt, Moy, Vierk and Schlundt, 2003). Food, a major trade commodity, is also an important vehicle for transmission of infectious diseases (Gaffga et al., 2007). Because food production, manufacturing, and marketing are now global, infectious agents can be disseminated from the original point of

processing and packaging to locations thousands of miles away in three ways including rapid transfer of microorganisms from one country to another; increase in the time between processing and consumption of food, leading to increased opportunity for contamination and time/temperature abuse of the products and hence the risk of food-borne illness; increase in the exposure of the population to a higher number of different strains/types of food-borne pathogens (Rocourt, Moy, Vierk and Schlundt, 2003). This multinational approach to food production and distribution; and the progressive opening up of world markets have allowed the international food trade to flourish.

Increased Travel: The globalization of food-borne diseases also results from increased travel. Five million international arrivals were reported worldwide in 1950 and this number is expected to increase to 937 million by 2010 (Gaffga et al., 2007). As a result, a person can be exposed to a food-borne illness in one country and expose others to the infection in a location thousands of miles from the original source of infection. Depending on their destination, travellers are estimated to run a 20% to 50% risk of contracting food-borne disease (Steinberg et al., 2001). For example, 90% of salmonellosis in Sweden, 71% of typhoid fever cases in France and 61% of cholera cases in the USA are attributed to international travel (Gaffga et al., 2007).

2.5. Food Safety Risk Perceptions and Behaviour of Consumers

Several surveys have been undertaken to obtain information on consumers' perceptions and attitudes towards food safety problems. Findings from these surveys indicated that the perception of consumers of the origin of most food-borne problems is at variance with those of food safety experts. Williamson et al., (1992) found that about one third of consumers thought food safety problems most likely occurred at food manufacturing facilities. Further, Fein et al., (1995) found that most consumers (over 65%) attributed food-borne illness to food prepared at a restaurant. Less than 18% considered mishandling of food at home a major source of food-borne illness. On the other hand, most food safety experts concur that more food-borne illness has origin in homes away from food sources (Adu-Nyako and Thompson 1999).

Consumers risk perception is influenced by a host of several factors, which can be grouped under three categories namely: personal influences, social and cultural influences, and or perceived locus of control (Grobe et al., 1996). Consumers' attitudes and behaviour towards food are influenced by the social and cultural context. For

example, researchers have found ethnicity to be a determinant of individual perception of and response to symptoms (Cleary, 1987). Food safety concerns, awareness, and knowledge levels are also conditioned by socio-economic and demographic factors. Demographic factors including age, gender, ethnicity, place of residence, household size as well as economic factors including income levels have been posited as important factors influencing consumer perceptions and knowledge of food safety issues (Basitio and Gutherie 1993).

The socioeconomic research on food safety issues indicates that individual characteristics associated with food safety concerns depend on the particular kind of food safety issue. Further, the characteristics associated with food safety concerns in general may differ from those associated with particular issues. Basiotis and Gutherie (1993) found that higher education and gender were more likely related to increased concern with regards to general food safety concerns. In a study of irradiation and food safety perceptions, Misra et al., (1993) also found female respondents with less than college education and lower income more likely to perceive irradiation to be a more serious problem than their counterparts. Regarding awareness, a higher level was evidenced for older men with higher levels of education.

Experience of food-borne illness or a perceived exposure is associated with increasing awareness, concern and knowledge of food safety issues. Derby and Fein (1995) assert that people with chronic dietary related diseases are more likely to be aware of the relationship between diet and chronic disease and are more likely to read food labels. Fein et al., (1995) using data compiled from a 1988 FDA food safety surveys confirm the association between experiencing food-borne illnesses and increased awareness about food safety issues.

Adu-Nyako and Thompson (1999) conducted a telephone survey among 317 consumers residing in the Atlantic South-Eastern states of the U.S (Virginia, North Carolina, South Carolina, Georgia, and Florida) to assess food safety perceptions and concerns, knowledge of food-borne pathogens, food safety behaviour and sources of food safety information. Findings revealed that there were no significant differences in the perceptions of blacks and whites about general food safety risk perceptions. Both races believe that more people are getting sick from food-borne illnesses in recent times. In general, awareness of the food-borne pathogens is low. While both races exhibit a low level of awareness of food-borne pathogens, comparatively, whites tended to have a relatively higher level of awareness of food pathogens.

2.6. Food Preparation Practices Associated with Bacterial Food-borne Disease

Food preparation, whether in a domestic or communal kitchen, includes the purchase and transport of ingredients to the kitchen and the storage of ingredients in frozen, chilled or dry storage areas. It further includes preparation actions such as measuring, cleaning, peeling and slicing, chopping, and mixing of ingredients in the creation of dishes. The final steps include the cooking and service of these dishes. Where food items are cooked in advance of consumption, or left over after consumption, actions such as the storage and, where applicable reheating before service are included (Griffith and Worsfold, 1994). According to Knabel (1995) each one of these actions can contribute to outbreaks of bacterial food-borne disease.

Purchasing food items are purchased from supermarkets, fast-food outlets and street vendors (Azanza, 2001; Nel and Steyn, 2001). Studies in developing countries, such as South Africa and Ghana, show that street vendors do not always follow bacterial food-borne disease prevention guidelines. Despite this, the microbial levels of most of the street foods investigated in the studies conducted in Johannesburg, South Africa (Mosupye and Von Holy, 2000; Kubheka et al., 2001) and Accra, Ghana, were within acceptable limits (Mensah et al., 2006). However, in a study conducted by the Department of Health in the Western Cape in 1995, food items obtained from street vendors in tourist areas carried high concentrations of *Escherichia Coli* and *Staphylococcus Aureus* (Sidley, 1995).

In addition to purchasing food items from reputable dealers, certain food items such as meat, poultry, eggs, fish, dairy products and combination-type chilled foods, such as tuna salad, should be chosen and handled with extra care. These food items, high in protein and water, are at risk of bacterial contamination and, due to their composition, ideal to support bacterial growth (Brown, 2000). Van Nierop et al., (2005) found that 60% of whole-chicken carcasses, sourced from various retailers in Gauteng, were contaminated with *Campylobacter* spp. (32.3%), *Salmonella* spp. (19.2%) or *Listeria Monocytogenes* (19.2%). Moore et al., (2002) found an even higher number of contaminated carcasses in a study conducted in Northern Ireland, where 94% of the fresh and 77% of the frozen chickens obtained were contaminated with *Campylobacter*spp. In addition, Harrison et al. (2001) found in a study conducted in South Wales, UK that 34% of whole-chicken packaging was contaminated with *Campylobacter* and 11% with *Salmonella*. Other high risk raw food items include minced meat and shellfish.

Although the carcass of a healthy animal usually has a low level of surface microbial contamination, the chopping or grinding of the meat allows for a high potential of bacterial contamination (Pelczar et al., 1993). Raw shellfish from polluted water may be contaminated with *Escherichia coli* (Roberts, 1990). In recent years, bacterial food-borne disease has also been associated with foods that do not fit into the high protein/high water risk category (Brown, 2000).

Fresh fruits and vegetables may be contaminated with *Listeria monocytogenes, Clostridium botulinium* and *Bacillus cereus*, which are present in the soil in which they are grown (Kubheka et al., 2001). Contamination with organisms, such as *Salmonella*, *Escherichia coli* 0157:h7, *Campylobacter jejeni* and *Vibrio cholerae*, can also occur owing to the use of contaminated wash-water used for partially prepared fresh vegetable products (Beuchat and Ryu, 1997).

Once purchased, food items need to be transported to the kitchen for further preparation. High-risk food items, such as raw meat and poultry, are usually purchased in a chilled or frozen state. If these low temperatures are to be maintained, transport time should be as brief as possible and the items transported in an insulated cool bag. In this way the growth of pathogenic, spoilage bacteria can be limited (Jay et al., 1999a).

Storage

On reaching the kitchen, food items should be stored and handled correctly to decrease the growth of the micro-organisms already present and to minimise the risk of contamination (Gorman *et al*, 2002). Results from studies conducted in the UK and Australia indicate that many consumers do not follow bacterial food-borne disease prevention guidelines, such as keeping high-risk food products at or below 4^{o}C, separating raw and ready-to-eat food products during storage, or applying the correct procedures when thawing frozen food items (Worsfold and Griffith, 1997b; Jay et al., 1999a). Most consumers are aware that a refrigerator extends the shelf life of food items and keeps food safe. However, in order to attain these beneficial effects and to prevent the growth of *Staphylococcus aureus, Clostridium perfringens, Listeria monocytogenes* and *Bacillus cereus*, a refrigerator must be operated correctly to maintain a temperature of below 5^{0}C (Medeiros et al., 2001a; Brown, 2000; Rosset, 2001). Storing raw meat, poultry or fish on the top shelf in the refrigerator increases the risk of cross-contamination due to the potential dripping of raw juices onto other foods stored beneath. The risk is especially high if the foods stored below are ready-to-eat items that will not be heated to

high enough temperatures to destroy pathogenic bacteria (Bennion and Scheule, 2004). Frozen meat and poultry should be thawed by putting it in the refrigerator, placing it in a sealed package in cold water or in a microwave oven. Defrosting frozen food items at room temperature or in warm water is a hazardous practice as temperatures between 5^0C and 60^0C can lead to the growth of food-borne pathogens.

Personal hygiene during preparation: When hands are not washed correctly and at appropriate times, pathogens such as *Escherichia coli* O157: H7 can be transmitted to prepared or ready-to-eat food items (Medeiros et al., 2001a), directly to the mouth, or to other household members (Jay et al., 1999b). Hunter (2000) found that drying of hands after washing is critical as bacteria are frequently recovered from hands that have not been dried effectively. The residual moisture remaining on hands, if not dried, contributes to the number of micro-organisms transferred from hands to solid surfaces. The choice of cloth for the drying of hands is important. Using a kitchen cloth to dry hands may lead to recontamination as such a cloth is normally used for actions such as wiping surfaces. Using a drying cloth is also not recommended as it is possible that following hand-washing and even more so if the hands are merely rinsed, bacteria will be transferred from the hands to the cloth. In addition, the damp state of many kitchen and drying cloths creates conditions for the survival of bacteria over a significant time period. If subsequently used for drying dishes or wiping hands, re-contamination would occur (Meredith et al., 2001; Bennion and Scheule, 2004).

General hygiene during preparation Bacterial contamination in the kitchen often occurs during processing of raw foods (Enriquez et al., 1997). Raw meat and poultry products may be contaminated with *Salmonella typhimurium DT105, Campylobacter, Listeria monocytogenes* and *Escherichia coli* 0157:H7 (Ralston *et al*, 2000; Zhao et al., 2001; Borch and Arinder, 2003). During food preparation, pathogenic organisms may be transferred to food items by the handler both directly or by cross-contamination through hands, surfaces, utensils and equipment that have been inadequately cleaned and disinfected between the preparations of different types of food (Scott and Bloomfield, 1990). In studies conducted by Gorman *et al* (2002), Mattick *et al.,* (2003) and Haysom and Sharp (2004) pathogenic micro-organisms were spread from raw chickens to hand and contact surfaces in kitchens during the domestic preparation of meals.

Cooking and serving the consumption of high risk food products, such as contaminated raw or undercooked protein foods, can contribute to outbreaks of bacterial food-borne disease (Adams and Moss, 1995). It is thus recommended that all high-risk

food items be cooked to a temperature of at least 74^{o}C (Brown, 2000; Bennion and Scheule, 2004). Food items should be served as soon as possible after preparation. If food items are kept for extended periods, they must be kept either above 60^{0}C or below 5^{0}C (Brown, 2000). Food items prepared in advance of consumption should be rapidly cooled, within 90 minutes, and stored or covered below 5 ^{0}C for less than three days (Griffith and Worsfold, 1994).

Handling Left-over Foods: The handling of left-over foods is a further high-risk action in a domestic kitchen (Beumer and Kusumaningrum, 2003). Brinkman *et al.*, (1999) found that 73% of the left-over food samples collected from domestic kitchens showed high bacterial counts (>106 cfu/g). Bacteria found in these samples included *Enterobacteriaceae* and *Bacillus cereus.* The microbiological guideline for ready-to-eat foods, such as cooked and sliced chicken, as indicated by the Airline Catering: Code of Good Catering practice in Britain is <103 cfu/g (Worsfold and Griffith, 1995). Beumer and Kusumaningrum (2003) concluded that leftovers should be handled hygienically, kept in clean containers and cooled as quickly as possible. Leaving food to cool at room temperature before refrigeration allows for an uncontrolled time period where food is left in the temperature danger zone of 5^{0}C to 60^{o}C (Brown, 2000). According to Brown (2000), improper cooling of prepared food items frequently contributes to outbreaks of food-borne disease. When reheating previously cooked foods, the same high temperatures should be reached as in the initial cooking as poor storage practices may have led to the proliferation of large numbers of bacteria in the cooked food (Worsfold, 1995).

2.7. Bacterial Food-borne Disease Awareness and its Effect on Bacterial Food-borne Disease Prevention Practices

In studies conducted in the USA by Meer and Misner (2000) and Lin et al. (2004), it was established that the self-reported awareness of guidelines to prevent bacterial food-borne disease had a positive effect on the self-reported food practices associated with a decreased risk of food-borne disease. Altekruse et al. (1996) found that respondents who were able to specify a food item associated with *Salmonella* spp. were more likely to report washing their hands and cutting boards after handling raw meat or poultry, than those respondents who were unaware of this association. Similarly, Lin et al. (2004) found that the self-reported awareness of *Salmonella* was associated with safer before-meal preparation handwashing practices and that the awareness of *Campylobacter* or *Escherichia coli* was associated with serving thoroughly cooked hamburgers.

However, in other studies where respondents reported their own home food preparation practices, awareness of the causes of microbial food-borne disease did not always correspond with practices associated with a decreased risk of food-borne disease. Williamson et al., (1992) reported that 51% of the respondents correctly identified *Salmonella* as a term associated with poultry and eggs and indicated that they would use the correct procedure of immediately refrigerating a chicken after cooking. In contrast, 15% of the respondents did not know the term, but indicated using the correct storage procedure, and 23% of the respondents although correctly identified the term, did not indicate following proper storage procedures for cooked chicken. Lack of awareness may thus contribute to food handling practices that increase the risk of bacterial food-borne disease, but ignorance may not be the only cause why consumers may fail to apply principles already known to them (Worsfold and Griffith, 1997a). Williamson et al., (1992) concluded that knowledge in itself did not guarantee that bacterial food-borne disease prevention practices would be implemented.

According to Jones (1992) and Pelczar et al., (1993) *Salmonella* is one of the major causes of food-borne disease and its incidence is increasing. In studies conducted in the USA (Altekruse et al., 1996) and Australia (Jay et al., 1999a) a larger number of consumers (80% to 96%) were aware of *Salmonella* compared to an awareness of other food-borne bacteria (3% to 74%). In addition, more than half of these consumers were also aware of the link between *Salmonella* and poultry.

2.8 The Street Food Trade

2.8.1 The Nature of the Street Food Trade and its Economic Importance

Street Foods is defined as foods and beverages sold by vendors in streets and other public places for immediate consumption or consumption at a later time without further processing or preparation (Mensah et al., 2006). The central characteristic of street foods in this definition is location, namely that they are sold on the street. Chakravarty and Chanet (2005) found three additional distinguishing characteristics of street foods in India. These are food prepared in small or cottage-scale factories and brought to the street food stall for sale; food prepared at the home of the vendor and brought to the street food stall for sale; and food prepared and sold at the street food stall.

Street food enterprises are characterized by the small scale of the operation, use of traditional food processing technologies, and low capital costs that allow ease of entry into the sector (Acho-chi, 2002). Those who participate in this sector are principally the

urban poor and this has been seen by some as an innovative response or coping strategy on their part when denied access to more formal employment structures (Johnson and Yawson, 2000). The street food industry offers a significant amount of employment, often to persons with little education and training (Muinde and Kuria, 2005; Chukwuezi, 2010). Food and Agriculture Organization (2007) reported that the street food trade generated a surprisingly large volume of business, which involves large amounts of money and also provides a competitive source of employment and income to millions of people (FAO, 2007). For instance, Mwangi (2003) asserts that street foods provides a substantial amount of income for most vendors, with most of them earning an income above the official minimum wage while some of them earn twice or more of this amount. Street food vendors benefit from positive cash flow, as they are able to establish their business with a minimum outlay of capital and are often free from taxes (Moy et al., 1997).

2.8.2 Street Food Enterprises

Most street food enterprises are single person- or household-based. A study in Pune, India, for instance, found that most vendors owned only one kiosk/stall or cart (only 12 per cent owned two and very few more than two), and most received assistance, either from family members (45 percent), paid workers (8 percent) or both (19 percent) (Bapat 1992). Similarly, in Jamaica, 90 percent of vendors were single person enterprises and the remaining 10 percent were joint ventures (Powell et al. 1990). A similar situation was found in the EPOC and other studies; the one exception being a study of street food vendors in Nigeria which found that, in addition to assistance from family members, most vendors employed one or two paid assistants (FAO and Food Basket Foundation International, 1991).

2.8.3 Street Food Vendors

According to Draper (2006), those who manufacture and/or sell street foods can be regarded as small-scale operators or micro-entrepreneurs who form part of the informal sector. This is distinct from the formal-sector food industry in a number of ways. Because many individuals in the rapidly increasing urban populations of developing countries have not been absorbed into the formal organised labour market, they have taken up a range of self-employed, small-scale, income-generating activities, both legitimate and illegitimate, which form the informal sector.

Many studies have examined the characteristics of vendors and have found that street food vendors do not form a homogenous group, but differ according to various socio-economic and demographic criteria and, in some locations, fall into identifiable groupings (Munde and Kuria, 2005; Chukwuezi, 2010). In terms of mode of selling, vendors can be broadly classified into three main categories of street food vendors namely 'mobile' vendors, 'semi-mobile' vendors, who may be stationary or move from one site to another, and 'stationary' vendors who sell their food at the same site each day (Escalante de Cruz, 2005).

Stationary vendors, who sold their wares from small stalls, kiosks, pushcarts, and so forth, were the predominant type in most countries. Most vendors operate from selected strategic locations, including bus and train stations, markets and shopping areas, commercial districts, outside schools and hospitals, residential suburbs, factories, and construction sites. In some places, food vendors have a regular clientele and charged lower prices to regular customers (Achi-Cho, 2002; Bae et al., 2010). A common perception is that street food vendors tend to concentrate in downtown commercial areas, In Nigeria, 23 percent of vendors were located in residential areas (FAO and Food Basket Foundation International 1991).

2.8.4 Street Foods and Participation of Women

The majority of food vendors are women who balance the income-generating opportunities of street vending with traditional household and child care (Mwangi, 2002). In Nigeria, Chukwuezi (2010) reported that women made up 66.67% of the vendors while males made up 33.33%. Other studies in Cameroun (Achi-Cho, 2002), Ghana (Mensa et al 2002) and South Africa (Martins, 2006) have also found a predominance of women vendors (over 60 percent in all countries). Although studies in Kenya (Muinde and Kuria, 2005) and Sudan (Abdalla, Suliman, Alian and Bakhiet, 2008) have shown more participation of men in street food trading. Most male vendors had assistance from either family members or paid workers of which majority were women and children, especially girls.

Studies have also found a high level of participation of women in some Asian countries; in Korea, 57.6 percent of vendors were women (Bae et al., 2010). A different picture is obtained in Bangladesh, an Islamic country, where women were less involved in processing and preparing foods prior to sale; most food vendors (96%) were male

(Haque et al., 2010). Bhat and Waghray, (2000) reported that 25% of the men received help in preparing foods for sale from their wives and 12% employed female helpers.

In Mexico City, Muòoz de Chávez, Villasana, Mu òoz, and Vuskovic, (2000) found that men and women divided their tasks and responsibilities. Women cooked the food to be sold later in the day, while the men were responsible for buying all that was necessary for preparation of the food. Women worked an early shift in the stall, until about noon, when the men took over and stayed late. Men were responsible for cleaning the stalls and the cooking equipment in the stall, while women washed the utensils and dishes at home (Muòoz de Chávez et al, 2000).

2.8.5 Street Food Safety

The safety of street foods is a major consideration, which deserves and has received considerable attention. The main health hazard associated with street foods is microbial contamination. The potential for the contamination of street foods with pathogenic micro-organisms has been well documented and several outbreaks of disease, including cholera outbreaks, have been traced to consumption of contaminated street foods (Lues et al., 2006). Food-borne bacterial pathogens commonly detected in street-vended foods were *B. cereus, C.perfringens, Staphylococcus aureus* and *Salmonella* spp (Idowu and Rowland, 2006).

The tremendous and unlimited growth of street foods in Africa has placed severe strain on city resources such as water, sewage system and interference with city plan through congestion and littering adversely affecting daily life (Nicholas et al., 2007). Vendors usually congregate in overcrowded areas where there are high numbers of potential customers. Such areas usually provide limited access to basic sanitary facilities such as running water, garbage disposal and clean toilets. In these areas large amounts of garbage accumulate and provide harbourage for insects and animal pests (Barro et al., 2002).

Several authors have raised concerns with respect to the potential of street foods as the cause of serious food poisoning outbreaks due to improper use of additives, presence of pathogen bacteria, environmental contaminants and improper food handling practices based on lack of respect for Good Manufacturing Practices (GMPs) and Good Hygiene Practices (GHPs) (King et al., 2000; Estrada-Garcia et al., 2002, 2004; Barro et al., 2002). Further, the washing of hands, utensils and dishes in most public food establishments is often done in buckets and bowls (Patients et al., 2002). Such conditions

have given rise to many concerns regarding the sanitary standards of street-vending operations, especially because consumers are concerned about the price of food rather than its safety and hygiene in many cases (Iyenda, 2001; FAO, 2007).

Microbiological studies carried out on street-food vending in several developing countries have reported high bacterial counts in foods. For instance, representative samples of street foods collected and analysed by Haque et al., (2010) in Dhaka city, Bangladesh, have medium to high risk potentiality in terms of total viable microbial load and medium to low risk potentiality in terms of total coli form count. In Nigeria, Idowu and Rowland (2006) in their study in Abeokuta reported that ninety-seven percent (97%) of food vendors were infected with one or more faecal-orally transmissible parasites. Moreover, parasites reported in food samples include *Entamoeba histolytica* with a prevalence of 72% *Ascaris lumbricoides* (54%), *Enterobius vermicularis* (27%), *Trichuris trichiura* (24%) and *Giardia duodenalis* (13%) (Idowu and Roland, 2006).

2.8.6 Street Food Regulation

Food legislation and regulatory control of street foods vary from country to country. In many countries, the street food trade is not officially recognized and vendors operate unlicensed and unregulated. For example, in Bangladesh, Haque et al., (2010) reported that street food vending was not regulated, lacked systematic monitoring system and vendors were frequently faced with harassment and restrictions. Similarly, Iyenda (2001) reported that regulatory situation in Congo DR was currently very confusing as government tolerated the sale of street foods without specific regulations but strict regulation applied to formal restaurants. As a result street food sellers were subjected to harassment and paid bribes to police and civil servants to allow them to continue their businesses (Iyenda 2001).

However, a small number of countries have recognized the street food trade. Singapore, for instance, incorporates the street food trade within city planning and tourist development schemes (Draper, 1996). Vendors were relocated in food centers and markets and the licensing requirements included certain health specifications, such as regular typhoid vaccination. There is a danger, however, of over-regulation; the street food trade and the informal sector, as a whole, provides livelihoods and means of income generation that many governments and the formal sector are unable to provide. A repressive licensing system would only further marginalize the street food trade and make those engaged in it less interested in participating in interventions.

2.9 Street Foods and the Spread of Food-borne Diseases

Food-borne diseases remain a major public health problem across the globe. The problem is severe in developing countries due to difficulties in securing optimal hygienic food handling practices. The World Health Organisation (2002) reported that an estimated 70% of cases of diarrheal disease were associated with the consumption of contaminated food. Reports of food-borne disease outbreaks in various countries have shown that such outbreaks had resulted from unhygienic food handling and preparation practices within food establishments (Zeru and Kumie, 2007).

In countries where street food vending is prevalent, there is commonly a lack of information on the incidence of food-borne diseases related to street-vended foods (Vogt, 2005; Yarrow, 2006). However, microbiological studies on street-vended foods in American, Asian and African countries have revealed high bacterial counts and a high incidence of food-borne bacterial pathogens in the food (FAO, 2007).

In some cases street-vended foods have been implicated in outbreaks of food-borne diseases (Nicholas et al., 2007). For instance, in the Malaysian state of Perak, 14 people died as a result of eating rice noodles bought from street vendors (Kubheka, Mosupye and von Holy, 2000). A cholera epidemic in Pune City, India, was related to street-vended sugar cane juice containing ice that was contaminated with *Vibrio* (*V.*) *cholerae* (Mosupye and von Holy, 2000). In Senegal, over 200 cases of food poisoning were traced to street foods made from dairy products (Parekh and Subhash, 2008). In the mountain region of Pakistan, tourists are reported to have complained of diarrhea during or following travel to this region where they reportedly bought snacks or prepared meals from vendors (Mosupye and von Holy, 2000). In Western Cuba, 14 people died and 49 were hospitalised due to food poisoning after eating fried food from a street-vendor who was among those that died (Nicholas et al., 2007).

2.10 Knowledge, Attitude and Practices of Street Food Hygiene and Safety

Azanza, Gatchalian and Ortega (2000) conducted a survey on food safety knowledge and practices of street food vendors from a representative urban university campus in Quezon City, Philippines using a standardized survey tool containing 70 questions, which included queries on demographics, health and personal hygiene, good manufacturing procedures, food contamination, waste management, and food legislation.

The study found that among the 54 street food vendors surveyed, knowledge on food safety concepts was established particularly on topics that dealt with health and personal hygiene; food contamination and good manufacturing procedures. However, vendors were shown to be not too knowledgeable in terms of food legislation and waste management. A significant gap between knowledge and practice on these topics was established and it was primarily attributed to the tendencies of street food vendors to compromise food safety for financial issues. Confusion in food legislation was established in this test microcosm because the purveyor of food safety regulations was not the local government health unit but the business concession office of the campus administration. The provision of continuous food safety education, some financial assistance through social services affiliations, and basic water and waste management utilities were recommended to diminish the gap between knowledge and practices of safe street food vending in school campuses.

In Nigeria, Idowu and Rowland (2006) conducted a study in the city of Abeokuta to assess the prevalence of parasites with direct transmission and the level of hygiene among food vendors. Formo-ether concentration method was used to examine ova and cysts of parasites in stools collected from randomly selected food vendors selling in schools and streets. Questionnaires, interviews, and field observation were also used to assess the activities of food vendors. Ninety-seven percent (97%) of the food vendors were infected with one or more faecal-orally transmissible parasites while 3% were free from such parasites. Parasites observed were *Entamoeba histolytica* with a prevalence of 72% *Ascaris lumbricoides* (54%), *Enterobius vermicularis* (27%), *Trichuris trichiura* (24%) and *Giardia duodenalis* (13%). School food vendors recorded lower prevalence of infection (92%) than the street food vendors (98.7%) ($P>0.05$). Fifty-two percent (52%) of the food vendors had dewormed in the last four years. Toilet facilities available to the vendors were mainly pit latrine and other related structure (75%) while 25% had access to water system closets. During hawking, dung hills were majorly used for defecation. Handwashing after defecation did not include the use of soap in the few vendors that were involved in handwashing. The authors concluded there was need to enact food handling policies and implementation of such policies ensured in order to reduce transmission of oral faecal parasites.

Gordon et al., (2007) conducted a national telephone survey involving 353 participants who were at least 65 years of age and who prepared a minimum 5 meals per week to assess perceived risk of contracting food-borne illness; attitudes toward food

safety; and knowledge of safe food handling among U.S. residents over the age of 65.

Their findings revealed that perceptions of risk, attitudes, knowledge and behaviours were consistent with safe food handling. Stepwise regression indicated attitude, knowledge and perception of risk accounted for 35% of explained variance in behaviours. Yet, three specific problem areas in which safe food handling behaviours were suspect were identified. It was revealed that those with higher educations were less likely to engage in safe food handling behaviours; knowledge about eating undercooked hamburger was uncertain; and certain safe food preparation recommendations, such as using thermometers, were ignored. They concluded that even though food safety educators had increased their efforts to promote safe food handling among the high-risk older adult population, areas of concern remained. Addressing these areas and proper consideration of the factors of perceived risk, attitudes, and knowledge can increase the effectiveness of future food safety promotion efforts.

Green et al. (2007) assessed the factors related to food worker hygiene practices using observations and interviews to document hygiene behaviour such as worker activity, restaurant characteristics, worker food safety training, and the physical and social environment on 321 food workers in the USA. Results indicated that handwashing and glove use were more likely to occur in conjunction with food preparation than with other activities (e.g. handling dirty equipment) and when workers were not busy. Handwashing was more likely to occur in the restaurants whose food workers received food safety training, with more than one hand sink, and with a hand sink in the observed worker's sight. Glove use was more likely to occur in chain restaurants and in restaurants with glove supplies in food preparation areas. Their findings indicate that a number of factors are related to hand hygiene practices and support suggestions that food worker hand-hygiene improvement requires more than food safety education.

In Southern Ethiopia, Kumie et al. (2002) assessed the sanitary-hygienic conditions of 147 food and drink establishments in the district of Zeway using a standardized questionnaire. A minimum of one food handler from the kitchen and one from those serving the dining per establishment was physically checked to assess their personal hygiene and presence of infection at the time of visit for data collection. Local informal catering establishments were considerably high with the ratio of 1:1 to that of formal sectors. A piped water supply was found in all establishments. About 59% of the establishments had some kind of human waste management means, dry pit latrine being the commonest. Liquid waste and refuse management were found to be grossly

inadequate in 73.5% and 81% of establishments, respectively. Food handlers in 14.8% of establishments had some form of active skin and respiratory infections. The personal hygiene of food handlers in most establishments was very poor and that only 21.65% of them had acceptable type of over coats used while working. They concluded that the poor sanitary conditions of food and drink establishments in the town favoured the transmission of food borne communicable diseases. They recommended a public intervention towards the improvement of the establishments.

In Ghana, Mensah et al., (2002) conducted a study to investigate the microbial quality of foods sold on streets of Accra and factors predisposing to their contamination. Structured questionnaire copies were used to collect data from 117 street vendors on their vital statistics, personal hygiene, food hygiene and knowledge of food-borne illness. Standard methods were used for the enumeration, isolation, and identification of bacteria. The authors reported that most vendors were educated and exhibited good hygiene behaviour. Also, they reported that Diarrhoea was defined as the passage of ≥3 stools per day by 110 vendors (94.0%), but none associated diarrhoea with bloody stools. Only 21 (17.9%) associated diarrhoea with germs. Their findings further show that the surroundings of the vending sites were clean, but four sites (3.4%) were classified as very dirty. The study shows that the cooking of food well in advance of consumption, exposure of food to flies, and working with food at ground level and by hand were likely risk factors for contamination.

Moreover, the authors made examinations of 511 menu items, classified as breakfast/snack foods, main dishes, soups and sauces, and cold dishes. They detected Mesophilic bacteria in 356 foods (69.7%): 28 contained Bacillus cereus (5.5%), 163 contained Staphylococcus aureus (31.9%) and 172 contained Enterobacteriaceae (33.7%). Although, the microbial quality of most of the foods was within the acceptable limits, the authors reported unacceptable levels of contamination in samples of salads, macaroni, *fufu*, *omo tuo* and red pepper. In conclusion, the authors concluded that street foods could be sources of entero-pathogens. They recommended that vendors should receive education in food hygiene with special attention given to the causes of diarrhoea, the transmission of diarrhoeal pathogens, the handling of equipment and cooked food, handwashing practices and environmental hygiene.

2.11 Summary of the Reviewed Studies

The published studies reviewed reveal that street foods are potential sources of food-borne diseases due to reports of presence of infections on food handlers, presence of parasites on food samples, knowledge-practice gap on food safety and hygiene issues and poor provision of sanitary facilities. A major underlying factor is financial considerations and profit motives (Azanza et al., 2000). These findings informed the need to adequately educate food vendors on the role of food in disease transmission as well as on rules of personal hygiene and approved practices in handling street food. Moreover, the legal implications of selling un-wholesome food should be made clear to street food vendors. Finally, there is need for the government to make available basic infrastructures for the society including supplies of portable water, electricity, waste disposal services. good drainage system and public toilets.

2.12 Conceptual Framework (PRECEDE FRAMEWORK)

Precede framework was used to highlight the context of this study. According to Lawrence Green (1980), the framework is used in Health Education to analyse and solve both behavioural and non-behavioural health-related problems. He identified seven phases of health education planning and implementation to explain the framework. These are:

Phase 1: Social Diagnosis – deals with quality of life

Phase 2: Epidemiological diagnosis – deals with specific health problems

Phase 3: Behavioural and Environmental diagnosis – deal with special health-related problems and the influence of environmental factors

Phase 4: Educational and organizational diagnosis deals with the predisposing, enabling and reinforcing factors that can influence the behavioural intentions.

Phase 5: Administrative and policy diagnosis - deals with health educational intervention by authority concerned

Phase 6: The implementation of the policy and intervention plans and

Phase 7: Evaluation which deals with evaluation processes of the implementation of health policy from one stage to another.

For the purpose of this study, only phases one to five were applied.

Application of PRECEDE Framework to Poor Sanitary Condition of Food Establishments

The application of the PRECEDE framework to poor sanitary condition of food establishments is shown in figure 2.

Phase 1: Considers the quality of life that would result from patronizing public food establishments with poor sanitary conditions and include consumption of contaminated food and water/drinks that could lead to malnutrition, hospitalization and death.

Phase 2: The epidemiological diagnosis includes increase in the incidence of infections which consumers in this study reported to have contracted diseases from contaminated food and water. This study includes typhoid, diarrhoea and cholera.

Phase 3: The behavioural diagnosis in the food establishments has to do with the extent of provision of sanitary facilities by the operators and the hygiene-related practices of food handlers. This study reveals poor availability of sanitary facilities such as toilet, dust bin, handwashing bowl, towel, cup/ladle over water container and dishwashing devices. Also, separate rooms were not available for changing clothes and for storage of food. Cabinets for cooked food were not found covered in most of the establishments. The environmental diagnosis refers to the environmental conditions identified during visits to these establishments as characterised by presence of children and animals (that roam freely and their faecal wastes), refuse, liquid wastes on open gutters and presence of flies in the eating area

Phase 4: Predisposing factors include food operators and handlers' knowledge, attitude, belief values and practices that facilitate or hinder ability to practise healthful behaviours and maintain proper sanitation, which will depend largely on the quality of food safety education received during continuous education and training. Within the context of this study, predisposing factors include limited knowledge about the wide array of food- and water-related diseases, lack of knowledge about the link between poor environmental sanitation and personal hygiene practices and the aetiology of these diseases, and attitude of food consumers to the internal and environmental conditions of the food establishments.

Enabling factors in this context refer to those factors responsible for the state of personal hygiene and environmental conditions of the food establishments. These include lack of availability of solid and liquid wastes disposal facilities, poor drainage network, poor access to government-owned refuse collecting vehicles, insufficient capital to provide sanitary conveniences by operators and poor development of the area.

Reinforcing factors include factors from significant others that may influence environmental sanitation and personal hygiene practices. The monitoring activities and food safety education by the local government health staff and the activities of the food vendors association constitute positive reinforcing factors. However, the gaps observed in the quality of education reported by food operators and high rating of the quality of hygiene-related practices by food consumers in this study constitute negative reinforcing factors.

CHAPTER THREE

3.0 METHODOLOGY

This chapter presents the description of the study area and describes the research design. The other components of the methodology include the study population, sample size and sampling technique, methods and instruments for data collection, validity and reliability, data collection process, data management and analysis, ethical consideration and limitations of the study.

3.1. Study Design

The study utilized a descriptive cross-sectional design involving the use of qualitative and quantitative methods to obtain information on the sanitary conditions of food establishments and factors influencing their patronage in an inner-core area of Ibadan.

3.2. Description of Study Area

Ibadan is the capital city of Oyo State, Nigeria. It was founded in the early 19th century by fleeing refugees from the old Oyo Empire, following Fulani invasion of Yoruba land (Mabogunje, 1968). Ibadan is designated as largest city in the West Africa and the most populous in Black Africa. It is mainly inhabited by the *Oyo* –a *Yoruba* sub-group with an estimated population of 1,829,187 (Information Division, Ibadan North-West Local Government Area). Ibadan North West Local Government Area, the study area, is one of the five (5) that were carved out of the former Ibadan Municipal Government (IMG) in 1991 by the then Federal Military Government.

Ibadan North-West Local Government is the smallest of the eleven (11) local government areas (LGAs) within the Ibadan region. It is bounded in the West by *Ido* LGA, in the North by *Akinyele* LGA, in the South and East by Ibadan North and *Ido* LGAs respectively. Within the Local Government Area are *Eleyele* Water Works, Army Barracks, Police Headquarter, and a Golf Course. The local government has both social and physical infrastructural facilities that include roads, water supply, health centers and housing.

National Population Commission census of 1996 put the total population of Ibadan North-West LGA at 171,793, accounting for 8% of the Ibadan metropolis. This comprised of 86,938 (50.6%) females, of which 37,794 were in the reproductive age group; and 84,854 (49.4%) males. Children less than one year are 6,872, and under-fives were 37,794.(EPI/NID 2005)

Three types of housing are identifiable within the Local Government Area. They are the highly, moderately and low (Government Reservation Areas) dense areas. The high density areas with poor quality housing are found around *Mokola, Ekotedo, Ayeye, Idikan, Nalende* and *Oke Oloro* areas. The housing in the moderate density area is of fair quality, as found in *Adamasingba* and part of *Sabo* areas. The low-density areas with high-quality housing are found in the Government Reservation Areas (GRA) of Onireke, Idi-Ishin and Jericho.

Residential Land use in Ibadan North-West LGA can be grouped into two. These are high and low density areas. A high density area is a densely populated residential area with as many as four or more dwelling units per plot of 620m^2. These areas include *Ekotedo, Ijokodo, Mokola, Adamasingba, Agbeni, Idikan, Oke-Parde, Eleyele, Arometa* and *Dugbe*. The low density area comprises of sparsely populated neighbourhood with as low as one dwelling unit per plot of land. Such areas include Jericho, *Idi-Ishin* and *Onireke* GRA. The former core areas and newly developed parts of the LGA that are not planned are otherwise known as low service areas, whereas the latter is well planned with infrastructural facilities and services.

Generally, the LGA can be divided into three zones, based on their location and industrial development. These are Traditional, Inner-Core, Transitional area and Sub-Urban periphery (Town Planning Department, Ibadan NWLGA, 1995)

The Traditional inner-core: This comprises of the oldest indigenous area of Ibadan where most indigene-inhabitants live in compounds made up of irregularly built houses, inadequate drainage systems indicative of lack of systematic town planning. The area is densely populated and most of the inhabitants are civil servants, peasant farmers, traders, etc. Also this area is usually or mostly inhabited by indigenes and low socio-economic class residents. The localities include *Dugbe, Onireke, Ekotedo, Ayeye, Sabo, Orita-merin, Olopo-mewa, Inalende, Ogunpa, Agbeni, Oke Are, Idikan, Abebi*, among others.

The Transitional Area: This is a mixture of inner-core and sub-urban periphery areas. It has changed from the traditional conditions and concepts of living to a modern way of living. The areas are fairly well- planned with fairly tolerable drainage system. It

consists of such places like *Idi-Ishin, Sabo, Ijokodo, Agbaje, Dugbe-Onireke, Ogunpa, Aro-meta, Adelokun, Eleyele,* etc. These areas are inhabited mainly by non-indigenes and by both low and high socio-economic status residents.

The Sub-Urban Periphery Area: This is a properly planned area, characterized by good roads, well laid pipe-borne water, spaced and well-built houses approved by Town Planning Division. The environment is relatively clean and quiet, usually inhabited by highly placed, educated white-collar job citizens, high level professionals and wealthy individuals (Adeniyi and Brieger, 1982). The areas include *Idi-Ishin*, Jericho, NIHORT and *Olopo-mewa.*

The residents of the study area relied on three sources of water supply namely: tap, deep well, and boreholes. Water Corporation of Oyo State (WCOS) provides potable water supply for the residents of such areas relied on the *Asejire* Water Dam for their water supply. Provision of water to residents by the WCOS has been unreliable; hence people depend on water from deep wells. More than 67% of the total residence have deep wells.

There are numerous public eating places which are spread across the LGA. However, the locations of these establishments determine the size, structure, type of service provided, facilities available and their patronage. For example, big eateries with concrete structures such as hotels and restaurants are spread all over the peripheral and transitional areas and are mostly patronized by middle and upper class individuals. Most of these outlets are equipped with facilities for the comfort of their clients including generators as alternative power supply in case of power failure, fans and air-conditioners etc.

However, a common feature of the inner-core areas are small eating establishments, mostly wooden structures, that are mostly patronized by the inhabitants and those who work within the areas. Most of these outlets are part of buildings while very few can be found standing alone. Due to their small size, the establishments in the inner-core areas lack so many facilities and depend a lot on the government for the food establishments must be registered with the local and state governments before they can start operation.

3.3. Study Variables

The independent variables included characteristics of food establishments such as type of structure; location and type of food service provided; and socio-demographic

characteristics of the respondents such as their age, sex, marital status, family living status, occupation, highest educational back ground, religion, ethnic back ground, distance of place of work and house from facility and estimated monthly income.

The dependent variables of interest in this study were grouped under food establishments (the environmental sanitation of the premises, available sanitary facilities and the food handlers hygiene practices including personal hygiene practices) and consumers (knowledge of food borne diseases, their concerns about food hygiene in eating places, experiences relating to food/water-borne diseases, consumers' perception of quality of services provided at food establishments).

3.4. Target Population

The target population comprised operators, handlers and consumers of food establishments in selected communities in Ibadan Northwest LGA.

3.5. Sample Size Calculation and Sampling procedure

Sample Size Calculation

Sample size was calculated using the sample size equation

$$n = \frac{(Z_{\alpha} + Z_2\beta)^2 \, pq}{d^2}$$

where n= minimum sample size

α = level of significance=5%

2_{α} =Standard Normal deviation=1.96

Prevalence =50 % = 0.5

p= 1- q = 0.5

d = absolute deviation = 6%

when $_{\alpha}$=5% and =20%, power=80%

$$(Z_{\alpha} + Z_2\beta)^2 = 7.8$$

$$n = \frac{(7.8) \times 0.5 \times 0.5}{(0.06)^2}$$

$$= \frac{1.95}{0.0036}$$

$$= 541$$

However, a prediction of 10% non- response rate was included. Therefore, the calculated sample size was ≈ **600**

Sampling procedure

Simple random sampling technique was used to select food establishments surveyed and consumers interviewed for the study that include the following stages.

Step 1: Ibadan North-West LGA was stratified into its developmental regions i.e. peripheral, transitional and inner-core regions.

Step 2: The inner-core region was purposively selected.

Step 3: This region was stratified into its constituent wards i.e. NWI, NW2, NW3 and NW5.

Step 4: Enumeration was done to know the number of food establishments in these Wards, which gave a total of 108 (see table 1).

Step 5: Probability proportion to size and systematic random sampling strategies were employed in selecting half (54) establishments that were surveyed.

Step 6: Interviewers visited each facility daily and stayed for a period that covered morning, afternoon and evening meals to interview 12 randomly selected consumers while the interviews lasted.

Table 3.1: Breakdown of Local Restaurants in Four Wards in Ibadan North-West LGA

Type of Facility	Wards					
	NW1	**NW2**	**NW3**	**NW5**	**Total**	**%**
Wooden	12	5	20	22	59	54.6
Block	3	1	15	6	25	23.1
Shed	5	3	4	-	12	11.1
Stall	8	4	-	-	12	11.1
Total	**28**	**13**	**39**	**28**	**108**	100
%	25.9	12.0	36.1	25.9		

3.6. Development of Instruments

The instruments for this study were developed using information available from extensive review of literature and instruments used in previous studies on street foods. The initial proposal for this dissertation along with the instruments was subjected to a series of review by lecturers and students of the Department of Health Promotion and Education. The instruments include the following.

1. **Observation Guide:** An observation checklist (appendix B) was developed to assess the sanitary provisions and hygiene-related practices of food establishments and handlers respectively. Areas assessed were location, type of structure, environmental sanitation behaviours, available storage facilities, sanitary facilities/conditions and employees' hygiene practices.

2. **Questionnaire:** A semi-structured questionnaire (Appendix C) was designed to obtain information on consumers' knowledge and experience of food-borne diseases as well as their perceptions of hygiene-related behaviour of food handlers and sanitary conditions of food establishments. The questionnaire was divided into 5 sections. Section A which aimed at obtaining information on socio-demographic characteristics of clients contained nineteen questions. Section B consisted of ten questions which measured consumers' knowledge of food-borne diseases. Information on experiences relating to food- and water-borne diseases was documented with the aid five questions in section C. Sections D and E described the consumers' concerns about food hygiene in eating places and their perception of quality of services provided. They were consisted three and five questions respectively. The last part which is section F focused on factors influencing consumers' choice of restaurants.

3. **Key Informant Interview (KII) Guide:** Two types of Key Informant Interview (KII) guide were developed to obtain information on guidelines for the establishment of food premises, their enforcement and factors influencing compliance from the view of decision-makers in the LGA and the executive operators of food establishments in the selected wards. Key informants were purposively selected based on their position and experience in operation of public food establishments in the LGA.

4. **Focus Group Discussion (FGD) Guide:** Focus Group Discussions (FGDs) were conducted among operators of food establishments. The aim was to gain insight into the factors guiding establishment and operations of food establishments; monitoring and supervision of activities of operators of food premises; in-service training attendance and; factors influencing provision of sanitary facilities in public food establishments in the area using a developed FGD guide (appendix a).

3.7. Validity and Reliability

Validity

A number of steps were taken to enhance the validity of the instrument used for data collection. First, the instruments were carefully scrutinized by the co-researchers, lecturers and my supervisor to ensure its content validity. Necessary corrections were made to ensure clarity and obtain the salient and crucial information of interest in respect of the study.

Second, training was done for four research assistants comprising of two males and two females who were used for data collection. The males were working as interviewers in a longitudinal study on dementia that had been using the area as study site for the past 15 years. So they had a wealth of knowledge about the area. They were supported by a female graduate and another female, an Ordinary National Diploma (OND) Certificate holder. They were fluent in English and *Yoruba* languages. The training of the research assistants was conducted at the Faculty of Public Health building on Thursday 24th and Friday 25th April 2008. Their training covered the scope of the background, objectives, scope and methodology of the study after which they were introduced to the data collection instruments on item by item basis. The training lasted for two (2) hours after which the research assistants were taken to the faculty canteen to do a mock assessment with the study instruments. After this, deliberations were made on individual recordings. Intra-observer differences were noted and discussed. This exercise enabled the researcher to assess the level of recording and observation skills of the research assistants. A copy of each of the study instruments was given to each of the research assistants to take home and read for better understanding. Issues generated were discussed the following day.

Third, the questionnaire was pre-tested on twenty (20) food establishments in *Beere*, in Ibadan North LGA, which afforded the opportunity to improve on the final draft of the questionnaire used for the data collection.

Reliability

To ensure the reliability of the instrument, the following steps were taken:

The questionnaire was pre-tested on twenty (20) respondents in five (5) food establishments in *Beere,* in Ibadan North LGA to ensure reproducibility. Analysis was then carried out using Cronbach's Alpha correlation coefficient of the SPSS (Statistical Package for Social Sciences) which afforded the opportunity to improve on the final draft of the questionnaire used for the data collection.

3.8. Procedure for Data Collection

Data collection took place between 29th April and 27th May 2008. A description of the processes involved in collection for this study is provided below.

Qualitative Data Collection Procedure: Before the conduct of the FGDs, visits were made to the executives of the state Association of Food Handlers to explain the purpose of the qualitative phase of the study and modalities for carrying out the FGDs. It was through these visits that it was suggested to carry out the discussions during zonal association meetings that took place once in a month in each of the four wards for cooperation and active participation of food operators in the study area. Four FGDs were conducted, one in each of the four wards that constituted the study area. The discussions were held during the zonal meetings. The researcher and her team got to the venues of the meetings (which usually held at the shop of the president of the zonal association) early. The first ten members were selected for the discussions which were conducted simultaneously as the association meeting proceeded. This approach was used due to the difficult nature of assembling food operators together at any other time.

Quantitative Data Collection Procedure: During this period, each of the selected food establishments was visited daily by two research assistants. Research assistants set out early in the morning and approached the owners/operators of the outlets to explain purpose and seek consent for the study. In situations where neither was around, repeat visits were made as no other employee was ready to give permission due to their perception that research assistants were from the health authority. During data collection, research assistants sat down in the eating area and sought consumers' permission to be interviewed after their meals. The first six consumers who gave their consents were interviewed in each outlet. During the period of waiting, research assistants surveyed

establishments to observe activities on-going within and outside, the sanitary facilities available and hygiene behaviour of food handlers and; jointly filled the observation checklist for each facility.

3.9. Data Analysis

A coding guide was developed to facilitate coding and data entry into the computer. The investigator checked all the administered questionnaire copies one by one and edited them when necessary. Each questionnaire copy was coded and entered into the computer using SPSS software version 15. The data entered into the computer were subjected to descriptive (i.e mean, median and mode) and inferential (i.e Chi-square and ANOVA) statistical treatment. Finally, information obtained were summarised and presented in tables and charts.

Qualitative information items from KII interviews with policy makers and programme managers at the state and LGA levels and those from FGDs with operators of food establishments were transcribed verbatim, translated into English and manually analyzed using the thematic-content analysis approach that involved grouping together similar themes in each transcript and identifying emerging trends and differences found across the transcripts. Qualitative data were presented alongside quantitative interpretations using descriptive and, where possible, verbatim quotes and case illustrations.

3.10 Limitation of the Study

This study was not without some limitations. One of these was that investigators depended on the information given by the interviewees. Another limitation was dearth of adequately enough studies published on the subject matter in Africa, especially Nigeria from which appropriate references could be made. Therefore, references were made mostly to publications from other continents.

3.1.1. Ethical consideration

The confidentiality of the respondents was ensured and protected as there was no request for names, personal addresses or any other type of identifier. Research assistants were of good conduct and did not act coercively or in any unethically unacceptable manner. Records were kept and stored in a safe place. Informed consent was obtained from the respondents before administration of the questionnaire.

CHAPTER FOUR

4.0. RESULTS

This chapter presents the results on the sanitary conditions of food establishments and their patronage in selected communities in Ibadan North-West Local Government Area of Oyo State. The results are divided into two sections – results from observations of sanitary provisions, environmental conditions; personal hygiene practices of food handlers in food establishments and those generated from interviews with food consumers.

The results from the observations are organised into four subsections – the characteristics of food establishments surveyed, sanitary provisions, internal and environmental conditions, and observed personal hygiene of food handlers.

The results from the interviews with food consumers are organized into six subsections as follow: Socio-demographic characteristics of consumers, consumers' knowledge of food-borne diseases, experiences relating to food and water-borne diseases, concerns about food hygiene in eating places, consumers' perception of quality of services provided, factors influencing consumers' choice restaurants.

4.1. Findings from Observations:

4.1.1 Characteristics of Food Establishments

The characteristics of the food establishments surveyed include the following:

Structural Location of Food Establishments

Based on location, three types of food establishments were identified in the study area including those establishments located either as part of a commercial (34%) or a residential (34%) building; and those that stood alone (32%) (Figure 4.1). More than half (54%) were made of brick while 34%, 5.7% and 5.7% were wooden, stall and counter respectively (Figure 4.2). Majority (59.3%) were situated in premises where other human activities were carried out that include a food raw material seller (30.3%) and a barbing salon (21.2%). Other human activities around food establishments visited are shown in table 4.1. The walls of about two-thirds (64.8%) were both cemented and painted.

Moreover, the floors of a majority (83%) were cemented. However, ceiling was available in only 37.7% of the establishments.

Registration

Evidence of registration with the government and the food vendors association was seen in 77.8% and 40.7% of the food establishments respectively (figure 4.3). Focus Group Discussions revealed several reasons for the absence of certificates of operations in food establishments in the area. Participants in all the group discussions revealed that new members might not have certificates due to delays in their collection from appropriate authorities. Few participants also added that the certificates might be kept away by those members that had been operating for many years who were well known to most of the people that came for inspection. Moreover, comments from three participants are summarized in each of the following statements: "when inspectors come and they demand for the certificates, we may say we have shown it to you not quite long ago and they won't disturb us anymore"; "some members may keep the original and display photocopies which may not be well taken care of" and; "members that are stubborn and disobedient won't display them, no matter what".

Services rendered

Most food establishments (87%) offered both take-away and eat-in services. However, 7.4% and 5.6% offered only take away or eat-in services respectively (figure 4.4).

Figure 4.1: Structural Location of Food Establishments Surveyed

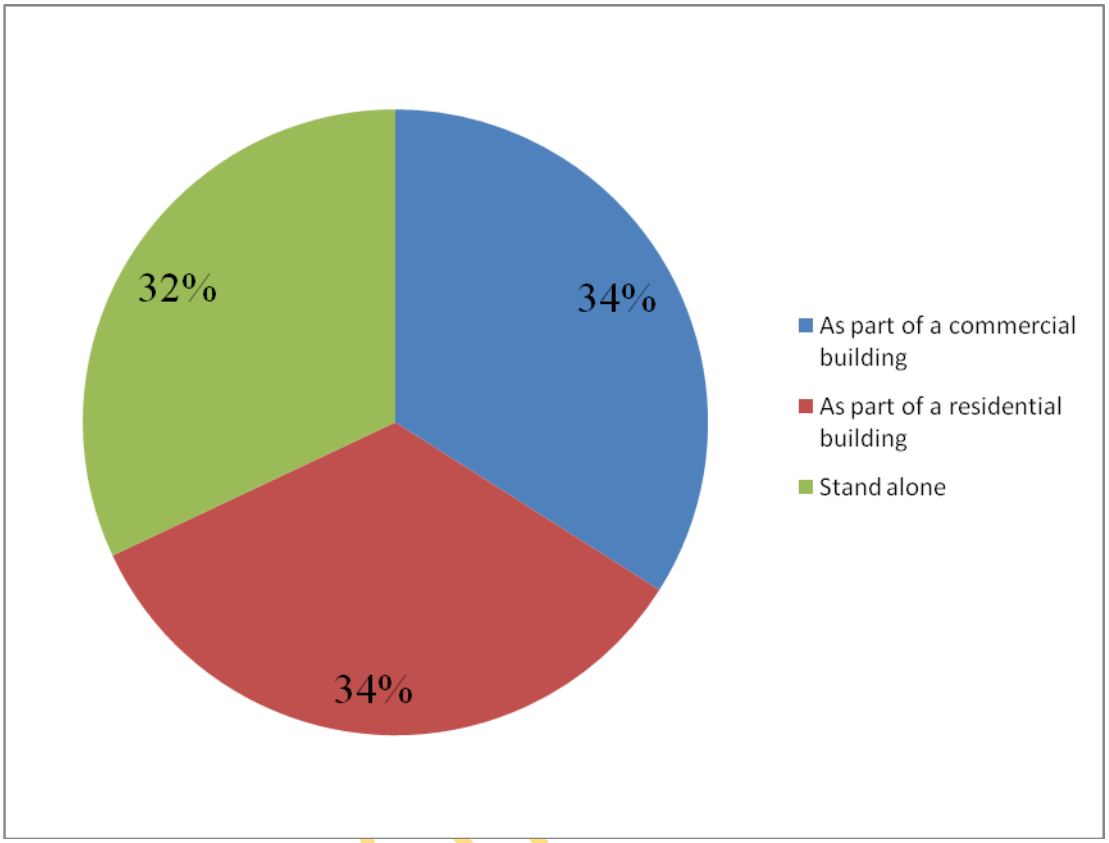


Figure 4.2: Type of Food Establishments

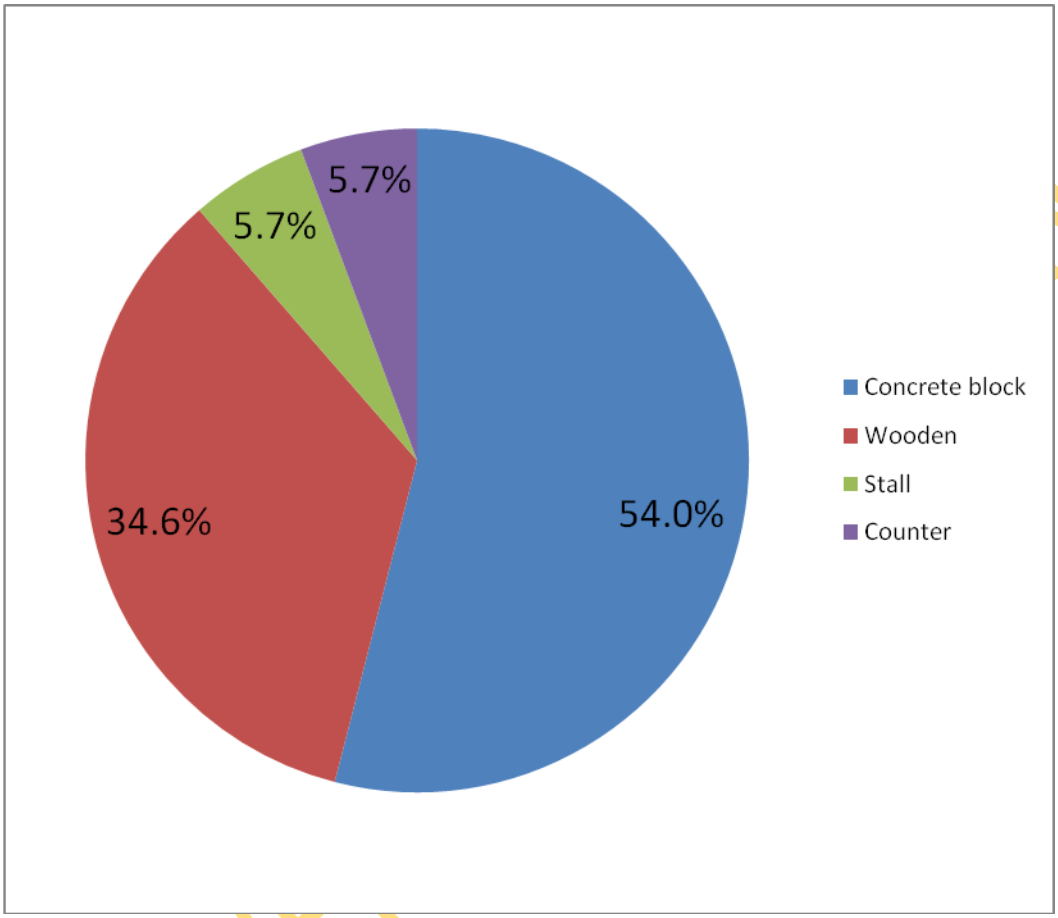


Table 4.1: Human Activities around Food Establishments

Type of Activities	Frequency	%
Food raw material seller	16	30.3
Barbing salon	11	21.2
Hairdressing salon	3	6.1
Electronics repairer	3	6.1
Carpentry workshop	3	6.1
Beer parlour	3	6.1
Wood seller	3	6.1
Others*	12	18.0

* Spare part seller, shoe maker, provision stall, video club, fashion designer's shop, film house

Figure 4.3: Availability of Evidence of Registration in Food Establishments

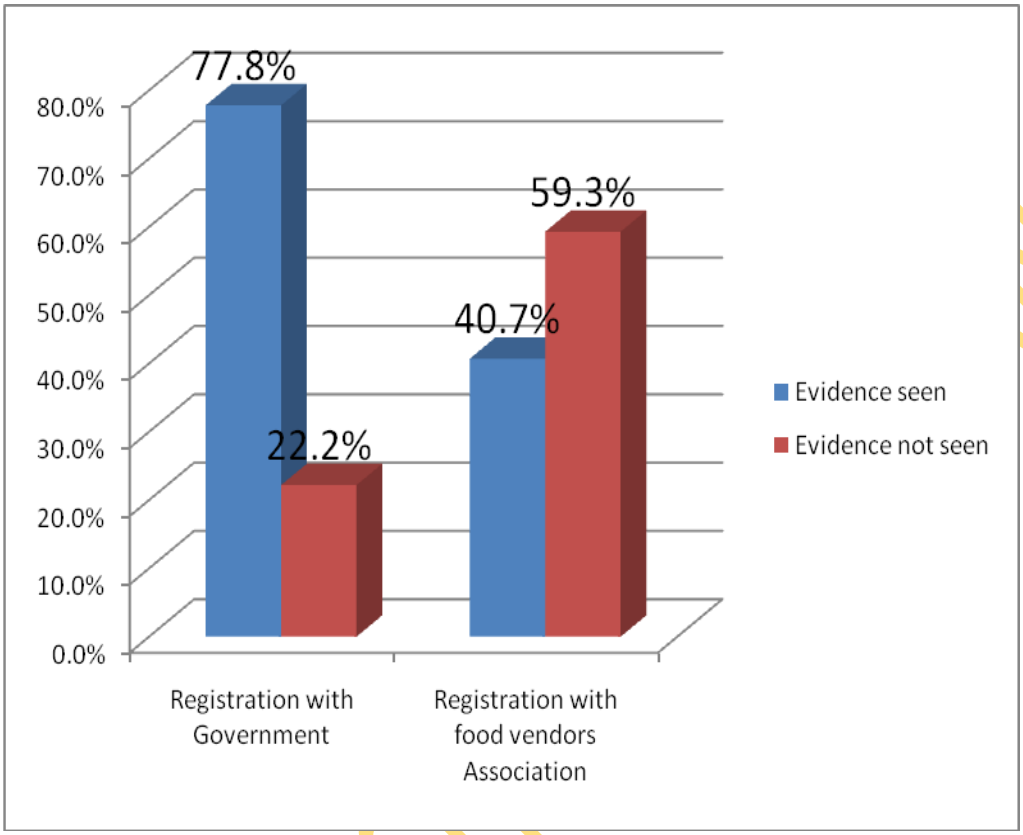
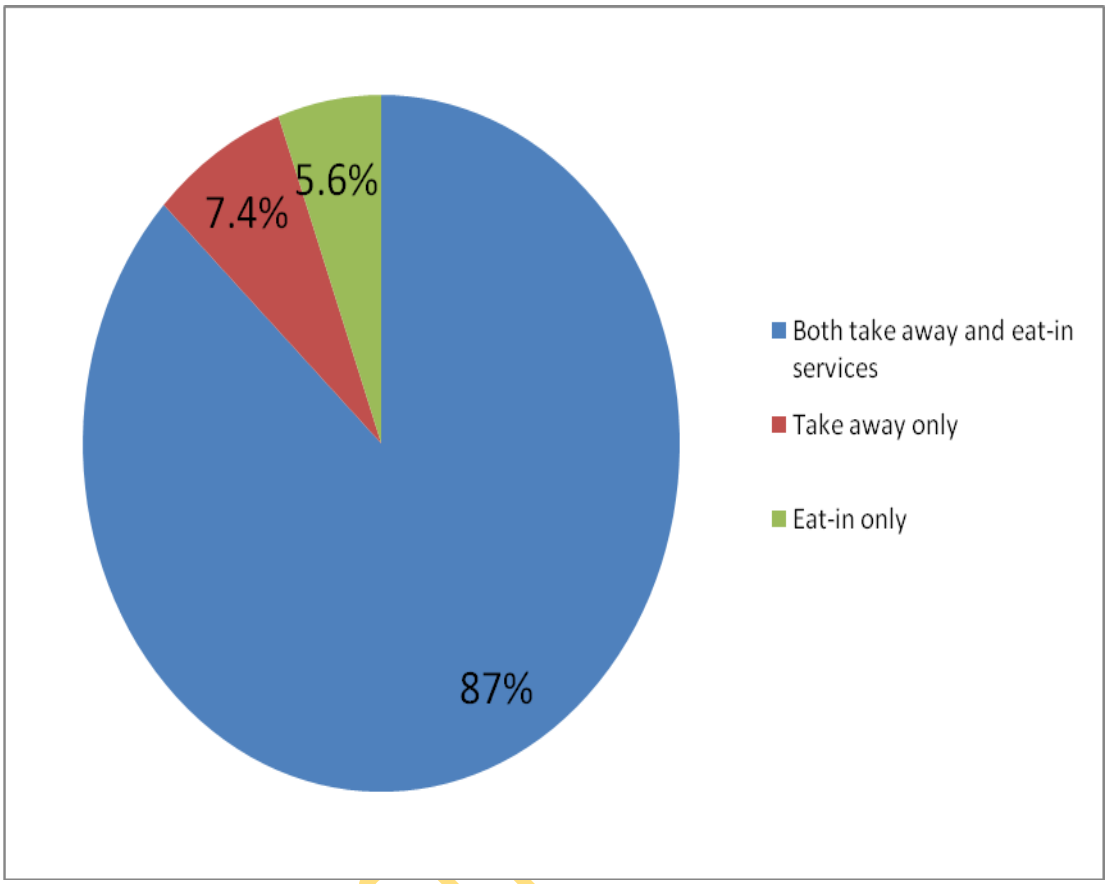


Figure 4.4: Types of Services Rendered by Food Establishments



4.1.2. Sanitary Provisions in Food Establishments

The reports on the sanitary facilities available in the food establishments surveyed are summarized in tables 4.2 to 4.5.

Waste disposal

Majority of food establishments (72.2%) had dustbins or containers for storing solid wastes. However, the solid waste disposal facilities were covered in less than one-third (29.6%) establishments. Liquid wastes were disposed in open gutters in more than two-thirds (79.6%). Other means of disposing liquid wastes include through covered gutters (13%) and on the floor outside (7.4%). Functioning latrine and urinary facilities were available in 21.6% and 18.5% of the food establishments respectively. Of these, 12.9% and 18.5% were met clean and with doors respectively (table 4.2).

Participants in all group discussions agreed that adequate facilities were not available for disposing solid wastes. A participant summarised this situation thus: "solid wastes are collected in a bag and are disposed by paying a carrier (between N100 and N150) who deposits them somewhere that is unknown to her. This is usually done early in the morning before anybody wakes up". Another respondent added:

"We learnt that there are adequate facilities for disposing solid wastes by the government. However, due to poor road network where such vehicles are parked is a distance from us. Moreover, people's experience with the agency responsible for waste management shows that they are difficult to reach. So we devise our own method so as to stay in business otherwise where would we put all the wastes generated on daily basis".

A participant further added "we usually throw some into the gutters when it is raining for flood to wash them away". The following comments from few respondents further suggest that less emphasis is placed on provision of facility for removing solid wastes: "We don't generate much solid waste because of two reasons. First, we don't deal with leaves. Secondly, there are various means of making good use of these products including the nylons used for wrapping solid food (*eba, amala and Iyan*) and used water sachets are used to assist in combustion while vegetable sticks are collected by those rearing animals".

Moreover, the finding of the observational checklist on disposal of liquid wastes was confirmed during the FGDs where there was a general consensus among all group discussants that liquid wastes were disposed through open gutters.

Table 4.2: Availability of Facilities for Waste Removal in Food Establishments

How waste is removed	Frequency	%
Solid waste		
Dust bin or other containers available	39	72.2
Waste container not available	15	27.8
Waste container found covered	16	29.6
Liquid wastes disposed on		
Open gutter	43	79.6
Covered gutter	7	13
The floor outside	4	7.4
Human waste		
Urinary facility available		
Yes	10	18.5
No	44	81.5
Toilet/latrine available		
Yes	11	21.6
No	43	78.4

Water Supply

Deep well was the main source of water supply in 55.4% of the food establishments. Other sources of water supply included public tap (25%), bore-hole (17.9%) and rain (1.8%). Container water was found to be the type of water commonly used for cooking (77.8%). Others include running tap (9.3%), deep well (9.3%) and storage tank (3.7%). Sachet water, container and running tap were the preferred sources of water supply for drinking with 54.1%, 41.0% and 4.9% respectively (table 4.3).

Food Cabinet

Cabinets were available for storing cooked food in almost one-third (33.3%) establishments. However, these cabinets were found covered all the time, always opened when not in use and neat in 60%, 73.7% and 100% establishments respectively (table 4.4).

Handwashing and Cleaning Systems

Half (50%) of the food establishments had handwashing basins. Other handwashing methods recorded in these facilities include separate bowls for individuals (11.1%) and indiscriminately on the floor outside (14.8%) (table 4.5). Hand towel was not available in more than half (58.5%) of the food establishments. Moreover, only 28.6% of the 41.5% establishments having hand towels were met clean on the days of the survey.

Table 4.3: Water Supply System in Food Establishments

Type of water supply	Frequency	%
Main sources of water supply		
Deep well	30	55.6
Public tap	13	24.1
Bore-hole	10	16.5
Rain	1	1.8
Source of water for cooking		
Water container	42	77.8
Running tap	9.3	9.3
Deep well	5	9.3
Storage tank	2	3.7
Source of water for drinking		
Sachet water	33	54.1
Container water	25	41.0
Running tap	3	4.9
Ladle available on water container meant for drinking		
Yes	19	77.3
No	6	22.7

Table 4.4: Availability and Condition of Food Cabinets in Food Establishments

Availability and condition of food cabinets	Frequency	%
Food cabinet		
Available	18	33.3
Not available	36	66.7
Food cabinet always covered when not in use		
Yes	39	72.2
No	15	27.8
Met in neat condition		
Yes	2	3.7
No	52	96.9

Table 4.5: Handwashing Systems in Food Establishments

Variable	Frequency	%
Handwashing systems		
Wash-hand basins available	27	50.0
Separate bowls for individuals	6	11.1
Indiscriminately on the floor outside	3	14.8
Not applicable (provide spoon for eating)	13	24.1
Hand cleaning system		
Hand towel/napkin available	22	41.4
Hand towel/napkin not available	32	58.6

4.1.3. Internal and Environmental Condition of Food Establishments

Findings on the environmental condition of the food establishments that have implications on food safety are shown in table 4.6. The presence of animals was observed in 37.0%, heaps of refuse visible in 32.1%, while small children were seen defecating near food premises in 31.5% of food establishments. Other findings on the environmental conditions of the eating area are shown in table 7. The condition of the eating areas in the food establishments showed presence of flies in 44(81.5%), food waste littered the floors and tables of 23(42.6%) and 14(25.9%) respectively. Other conditions reported are shown in table 4.7**.**

Table 4.6: Environmental Condition of Food Establishments Surveyed

Condition	Frequency	%
Heap of refuse visible	17	32.1
Animals roam freely	20	37
Stagnant waste water visible	8	15.1
Animal faeces visible	6	11.1
Domestic animals are kept	10	18.5
Small children seen defecating near food premises	17	31.5

Table 4.7: Condition of Eating Area on Survey Days

Condition	Frequency	%
Food waste seen on table	14	25.9
Food waste littered floor	23	42.6
Presence of flies	44	81.5
Dwelling or sleeping area available	2	3.7
Ventilation good	36	66.7
Lightning good	15	40.5

4.1.4. Observed Personal Hygiene Practices of Food Handlers

The findings from three categories of food handlers observed in the canteens including cooks, servers and dish washers showed that majority of the food handlers in the categories were adult females except for cooks that were mostly adolescents (table 4.8). Results of different types of personal hygiene practices observed among food handlers showed that among the cooks, 87%, 25.9%, 40.7% and 27.8% were observed wearing head covers, aprons, had food or other stains on clothes and with good hand washing habits respectively. None was found sneezing, coughing, chewing gum, stick or tobacco; or having catarrh, sore on skin or long finger nails except for the 1.9% that were found spitting. The observed hygiene-related practices of other category of food handlers (servers and washers) are shown in table 4.9.

Table 4.8: Characteristics of Food Handlers Observed

Variable	Cook %	Server %	Washer %
Sex of employee			
Male	7.4	9.3	5.7
Female	92.6	90.7	94.3
Age group of employee			
Child	0	3.7	5.7
Adolescent	98.1	13.0	15.1
Adult	1.9	83.3	79.2

Table 4.9: Observed Hygiene-related Practices of Food Handlers

Hygiene practices	Cook %	Server %	Washer %
Wear head-cover	87	83	78.8
Wear apron	25.9	24.1	25
Food, other stains on clothes	40.7	35.2	31.4
Seen spitting	1.9	0	0
Seen sneezing	0	0	0
Had catarrh	0	0	0
Had cough	0	0	0
Had sore on skin or whitlow on hands	0	0	0
Chewing gum or stick or tobacco	0	0	0
Long finger nails	0	0	0
Paint nails	0	1	0
Hand washing habit	27.8	24.5	26.9

4.2. Socio-Demographic Characteristics of Respondents

The socio-demographic characteristics of food consumers interviewed during visits to food establishments in the study area are shown in table 4.10. Majority (77.2%) were aged between 20 and 29 years while another 13.4% were in the 40-49 year age group. Forty-four (9.3%) were fifty years and above. None were aged below 19 years and between 30-39years. The male-female ratio of respondents was 3:1 comprising 448(76.4%) males and 138(23.6%) females. About half (50.8%) were married while (46.9%) were still single and 14(2.4%) widowed. Of the married respondents, majority (95.6%) were living together with their families.

Majority (80.1%) of respondents had secondary education or less while ninety (15.3%) had tertiary education. However, 4.6% had never been to school in their lives. Almost half (42.2%) of food consumers in the local food establishments were engaged in trading activities. Another 185 (31.7%) were artisans / apprentices. Students account for (17.0%) while 3.9% were government workers (civil servants). Ten (1.7%) had no job during the survey period. Most (61.7%) consumers patronising local food establishments surveyed belonged to the Islamic faith, 36.9% and 1.4% were Christians and traditionalists respectively.

A majority of the respondents, 547(92.7%), were Yoruba. The other national ethnic groups were represented as follows: Igbo (4.6%), Hausa (2.0%), Ebira (0.2%), and Urhobo (0.2%). It is noteworthy that other nationalities such as Ghanaians (0.2%) were residing and patronising local food establishments in Nigeria. Most respondents (48.8%) were in the NGN1,000 – 10,000 monthly income range. Others' monthly earning are as follows: NGN11,000 – 20,000 (28.2%) and NGN21,000 and above (14.7%). It is noteworthy that unemployment rate among the food consumers was 8.5%.

Table 4.10: Socio-demographic Characteristics of Food Consumers Interviewed on Survey Days (N = 593)

Variable	Frequency	%
Age group		
20-29	458	77.2
40-49	80	13.4
50-59	38	6.4
60-69	17	2.9
Sex		
Male	453	76.4
Female	140	23.6
Marital status		
Single	301	50.8
Married	278	46.9
Widowed/separated	14	2.4
Educational status		
No education	27	4.6
Secondary or less	475	80.1
Tertiary	91	15.3
Occupation		
Student	101	17.0
Civil servant	23	3.9
Artisan/Apprentice	188	31.7
Trading	250	42.2
Others a	31	5.2
Religion		
Christianity	219	36.9
Islam	366	61.7
Traditional	8	1.4
Ethnicity		
Yoruba	550	92.7
Hausa	12	2.0
Igbo	27	4.6
Others b	3	0.6
Monthly income		
1000-10000	290	48.8
11000-20000	168	28.2
21000 and above	87	14.7
Unemployed	49	8.3

a - clergy, security operative, driver, pensioner, farmer, contractor, unemployed
b - *Ebira, Urohobo,* Ghanian

4.3 Factors Influencing Consumers' Choice of Food Establishments

How the Respondents Got to Know about Food Establishments

Majority (67.1%) of the food consumers got to know about the food establishments by themselves. One Hundred and eleven (18.8%) and 81 (13.7%) were introduced by the social and work relations respectively. Only 2 (0.4%) heard through advertisement (figure 4.5).

Reasons for 'Eating Out'

Reasons why respondents "ate out" are shown in table 4.11. About a third (30.4%) of the respondents ate out due to convenience, another quarter (26.0%) did due to time factor. Taste of the food served and long distance from home drew 19.0% and 16.9% out respectively. Cost considerations (3.3%), previous experience (3.3%), desire for a good lunch after missing breakfast at home (0.6%), being single (0.2%), among other reasons, accounted for the respondents' patronage of food establishment.

Factors Influencing Choice of Food Establishment

About a half (45.5%) of the consumers would consider quality of food in choosing the local restaurants to visit. Another quarter (25.1%) did because of ease of access in location. Environmental sanitation (9.7%), food hygiene practices (10.4%), food handling services (4.1%) and structure (0.4%) were not strong considerations (table 4.12).

Figure 4.5: How the Respondents Got to Know about Food Establishments

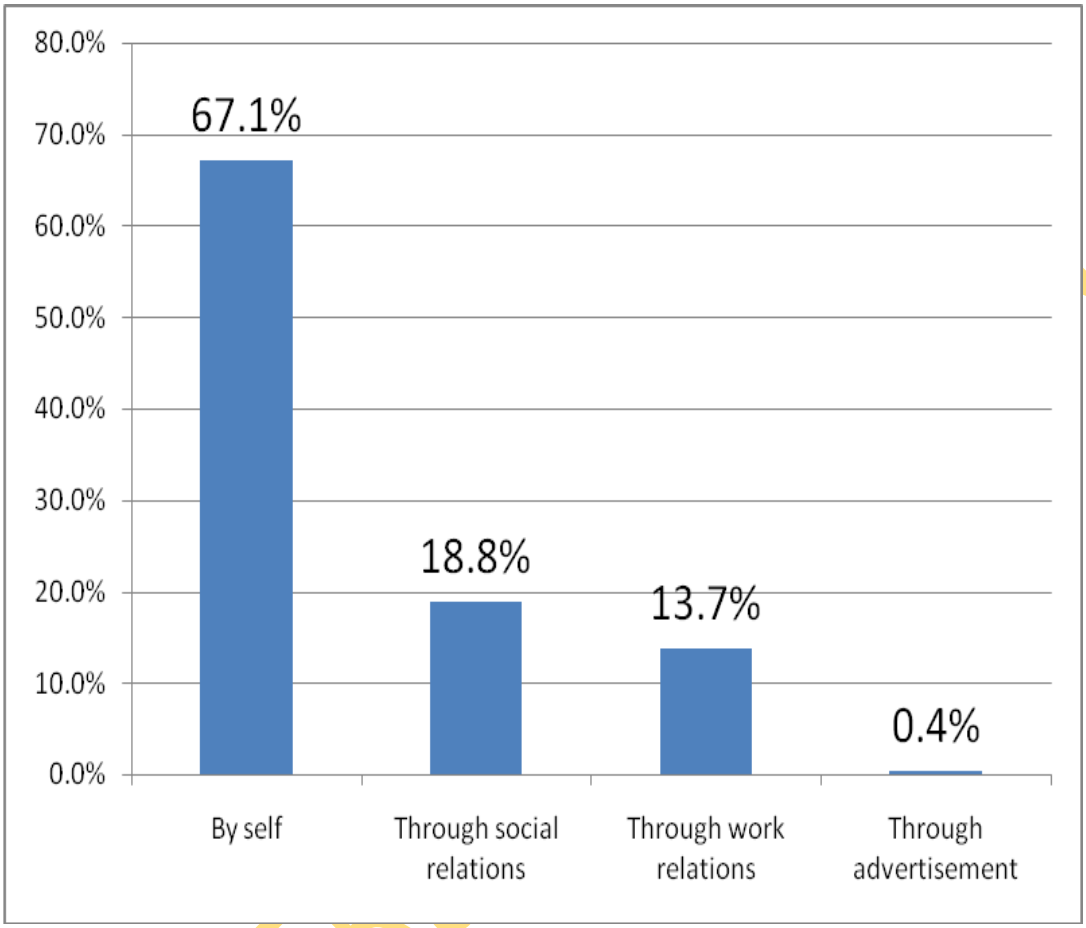


Table 4.11: Respondents' Reasons for 'Eating Out' (N = 593)

Reasons	Frequency	%
Convenience	194	30.4
Time factor	166	26.0
Taste of the food served	121	19
Long distance from home	108	16.9
Cost considerations	21	3.3
Previous experience	21	3.3
Missed breakfast at home	4	0.6
Being single	1	0.2

+ Multiple Responses

Table 4.12: Factors Influencing Respondents' Choice of Food Establishment (N = 593)

Factors	Frequency	%
Food quality	332	45.5
Location / accessibility	183	25.1
Environmental sanitation	71	9.7
Food hygiene practices	63	8.6
Type of food sold	35	4.8
Food handling service	30	4.1
Structure	3	0.4

+ Multiple Responses

4.4 Consumers' Knowledge of Food- and Water-borne Diseases

Findings on the respondents' knowledge about food- and water-borne diseases are reported in this section.

Perceived Causes of Food- and Water-related Diseases

The respondents' perceptions of the cause of food- and water-borne diseases are shown in table 4.13. About a quarter (22.1%) did not believe that diseases could be contracted from food and drinks consumed. However, majority (63.4%) agreed to infection through both food and water/drinks, while 10.4% and 3.1% believed that only through water/drinks and food respectively could disease be contracted.

Perceived Susceptibility to Diseases from Food and Water/drink

Concerning group of people that are susceptible to food and water-borne diseases, majority 361 (80.6%) perceived that there was no exemption. Fifty seven (12.7%) linked susceptibility to poverty and 5 (1.1%) to richness. Eating canned food was implicated by 13 (2.9%) of them. An insignificant proportion (0.7%) linked food borne disease directly with people with poor personal hygiene (table 4.14).

Table 4.13: Respondents' perceived causes of Food- and Water-borne Diseases (N = 593)

Perceived cause	Frequency	%
Through food and water	151	63.4
Through water	126	10.4
Through food alone	50	4.1
Did not believe diseases can be contracted from food and water/drinks	126	22.1

Table 4.14: Respondents' Knowledge of Group of People that are Susceptible to Food-and Water-borne diseases

Group of people	Frequency	%
Everybody	361	80.6
Those who "eat-out"	5	1.1
Those who eat canned foods	13	2.9
Poor people	57	12.7
Rich people	5	1.1
People with ulcer	4	0.9
People with poor personal hygiene	3	0.7

Knowledge of Transmission of Food-borne Diseases

Three hundred and fifty-seven (60.5%) respondents believed that diseases could be contracted through food consumed. According to the respondents, transmission of food-borne diseases could be through eating in dirty environment (37.7%), cooking with dirty materials (14.6%), allowing flies to contact food (12.2%) and eating spoilt/improperly cooked food (19.4%). Other ways by which food-borne diseases could be transmitted as mentioned by respondents are shown in table 4.15.

Knowledge about Transmission of Water-borne Diseases

Four hundred and twenty-four (71.5%) respondents reported that diseases could be contracted through water/drinks. A major source of transmission of water/drink-borne diseases identified by the respondents was drinking contaminated water (59.2%) while only a few (7.2%), mentioned using dirty cups /utensils for drinking, drinking water from uncovered container (6.8%), adding too much chemical to drinking water (5.4%) and sharing cups/cutlery with infected persons (2.6%) among others (table 4.16).

Table 4.15: Respondents' Knowledge of Ways of Contracting Food-borne Diseases (N = 590)

Variable	Frequency	%
Respondents know how to contract food-borne diseases		
Yes	357	60.5
No	233	39.5
Ways of contracting food-borne diseases (N = 357)		
Eating in dirty environment	188	37.7
Cooking with dirty materials	73	14.6
Allowing flies to contact food	61	12.2
Eating spoilt/improperly cooked food	97	19.4
Sharing eating utensils	8	1.6
Consuming too much food	12	2.4
Eating indiscriminately/anywhere	14	2.8
Unhygienic food handling practices	27	5.4
Eating with dirty fingers/plates	15	3.0
Eating canned foods	4	0.8

Table 4.16: Respondents' Knowledge of Ways of Contracting Water-borne Diseases (N = 593)

Variable	Frequency	%
Respondents know how to contract water-borne diseases		
Yes	424	71.5
No	169	28.5
Ways of contracting water-borne diseases (N = 424)		
Drinking contaminated water	356	69.6
Using dirty cups /utensils for drinking	36	7.2
Drinking water from uncovered container	34	6.8
Adding too much chemical to drinking water	27	5.4
Sharing cups / cutlery with infected persons	13	2.6
Drinking sachet water	9	1.8
Drinking well water	9	1.8
Taking too much water/drink	8	1.6
Drinking untreated water	8	1.6
Changing the usual source of water	7	1.4

Knowledge of Name of Food- and Water-borne Diseases

Among others, typhoid and cholera were mostly named as food-borne diseases by 268 (42.9%) and 164 (26.2%) respondents respectively. Very few named malaria, dysentery and diarrhoea (59 (9.4%), 32 (5.1%) and 23 (3.7%) respondents respectively). Others are shown in table 4.17.

Correct knowledge of names of food- and water-borne diseases (typhoid, cholera, diarrhoea and dysentery) is significantly associated with education (15.6%; less than secondary, 84.4%; secondary and above, p=0.000) and not with sex (43.5%, female; 45.3%, male; p=0.390), prior experience of food- and water-borne diseases (p=0.017) and marital status (p=0.229).

Table 4.17: Knowledge of names of food and water-borne borne diseases (N = 593)

Name of disease	Frequency	%
Typhoid	268	42.9
Cholera	164	26.2
Malaria	59	9.4
Dysentery	32	5.1
Diarrhoea	23	3.7
Don't know	21	3.4
Cough	9	1.4
Pile	7	1.1
Tooth pain	6	1.0
Tuberculosis	6	1.0
Others	30	4.9

Others: Appendicitis, asthma, cancer, constipation, diabetes, epilepsy, eye problem, gonorrhoea, heart disease, HIV, ulcer, worm infestation and yellow fever

Knowledge of Symptoms of Food- and Water-borne Diseases

Among others, frequent watery stool, stomach ache, vomiting, fever, and headache were named as common symptoms and signs by 133 (18.5%), 132 (18.4%), 130 (18.1%), 74 (10.3%) and 59 (8.2%) respondents respectively. It is noteworthy that 58 (8.1%) did not know any symptom or sign. Other symptoms reported by some of the respondents are shown in table 4.18.

Correct knowledge of names of signs and symptoms of food- and water-borne diseases (frequent watery stool, stomach ache, vomiting, fever and weight loss) was not associated with sex, prior experience of food- and water-borne diseases, education and marital status of respondents.

Table 4.18: Respondents' Knowledge of Symptoms of Food and Water-borne Diseases (N = 593)

Name of disease	Frequency	%
Frequent / Watery stool	133	18.5
Stomach ache	132	18.4
Vomiting	130	18.1
Fever	74	10.3
Headache	59	8.2
Don't know	58	8.1
Yellow eyes	26	3.6
Weight loss	23	3.2
Weakness	14	2.0
Excess /coloured urine	13	1.8
Loss of appetite	9	1.3
Back pain	8	1.1
Cough	8	1.1
Others	30	4.3

Others: sore throat, shivering, tiredness, catarrh, sneezing, palor, unconsciousness, dizziness, swollen body parts, sleeplessness

Knowledge of Complications of Food-borne Diseases

When respondents were asked about the complications that might result from food- and water-borne diseases, a total of seventeen complications emerged (table 4.19). Death (83.0%) was the most commonly mentioned complication. Other notable complications including weight loss, weakness, ill-health, typhoid and malaria were mentioned by 19 (3.1%), 13 (2.1%), 13 (2.1%), 13 (2.1%) and 6 (1.0%) respondents respectively. Two (0.3%) respondents each mentioned hospitalization, headache and ceasing of menstruation while one (0.2%) each mentioned blindness, hypertension, paralysis, stomach ache, dehydration, tooth removal, cholera and ulcer. Twenty six (4.3%) respondents did not know any complication (table 4.19).

Table 4.19: Respondents' Knowledge of Complications of Food-borne Diseases (N = 593)

Complications	Frequency	%
Death	507	83.0
Weight loss	19	3.1
Weakness	13	2.1
Ill-health	13	2.1
Typhoid	13	2.1
Malaria	6	1.0
Hospitalization	2	0.3
Don't know	26	4.3
Others	12	2.0

Others: blindness, hypertension, paralysis, stomach ache, headache, dehydration, ceasing of menstruation, tooth removal, cholera, ulcer.

Prevention of Food- and Water-borne Diseases

The perceptions of respondents about prevention of food- and water-borne diseases are shown in table 4.20. More than two-thirds, 317 (69.5%), of respondents opined that both groups of diseases are preventable, while 87 (19.1%) and 11 (2.4%) agreed to either water or food respectively could be prevented. A significant association was recorded between marital status of the respondents' and their knowledge of prevention of food- and water-borne diseases (p=0.001). Forty-one (9.0%) disagreed, believing that the diseases were not preventable due to their belief that all foods and water/drinks have certain amount of dirt in them. The economic depression in the country was also implicated for the disagreement. However no association seemed to exist between education, marital status and sex of respondents; and prevention of food- and water-borne diseases.

Table 4.20: Respondents' Perceptions about Prevention of Food- and Water-borne Diseases (N = 456)

Perception	Frequency	%
Perceptions about preventing food and water-borne infections		
Think infections through food and water are preventable	317	69.5
Think infections from water alone are preventable	87	19.1
Think infections from food alone are preventable	11	2.4
Think infections from food and water are not preventable	41	9.0
Why infections are not preventable (N =41)		
All food, water and drinks have dirt, it is only God that can help us	19	46.2
Due to present situation in the country	15	38.5
People that drink good quality water still fall sick	7	15.4

Knowledge of Ways of Preventing Food-borne Diseases

Notable among the ways of preventing food-borne diseases mentioned by the respondents are constantly cleaning the environment (19.1%); covering cooked food when not yet ready to eat to avoid fly contact (18.3%); cooking food properly (11.6%); practice of good personal hygiene by food handlers (7.4%); eating warm food (6.0%), and regular hand-washing before eating (4.7%) among others. It is noteworthy that regular use of antibiotics was mentioned as one of the preventive measures by 21 (4.6%) (table 4.21).

Knowledge of Ways of Preventing Water-borne Diseases

As regards ways of preventing water/drink-borne diseases mentioned by the respondents, the notable ones are boiling water before drinking (34.7%), treating water with 'alum' (16.5%), drinking water with chlorine (10.2%). sieving water before drinking (7.5%), covering water container always (7.0%) and drinking bottled water (12.0%) among others. Again, it is noteworthy that regular use of antibiotics was mentioned as one of the preventive measures by 26 (4.2%) (table 4.22).

Table 4.21: Respondents' Knowledge of Ways of Preventing Food-borne Diseases (N = 593)

Ways of preventing food-borne diseases	Frequency	%
Constantly cleaning the environment	101	19.1
Covering cooked food when not ready to eat to avoid fly contact	97	18.3
Cooking food properly	61	11.6
Cooking with clean utensils	48	9.0
Eating warm food	32	6.0
Regular use of antibiotics	24	4.6
Good preservation of food and food items	18	3.4
Avoid eating anywhere	24	4.5
Good personal hygiene practice by food handlers	39	7.4
Cooking with clean water	29	3.8
Washing hands before eating	25	4.7
Washing eating materials after every use	17	3.2
Washing food materials properly before cooking	17	3.2
Regular inspection of food establishments by environmental health officers	9	1.7
Don't know	5	0.9

+ Multiple Responses

Table 4.22: Respondents' Knowledge of Ways of Preventing Water-borne Diseases (N = 593)

Ways of preventing water-borne diseases	Frequency	%
Boiling water before drinking	217	34.7
Treating water with 'alum'	103	16.5
Treating water with water-guard, chlorine	64	10.2
Drinking packaged/bottled water	75	12.0
Drinking pipe-borne water	55	8.8
Covering water container always	44	7.0
Taking antibiotics regularly	26	4.2
Using clean drinking materials	18	2.9
Drinking water from borehole	8	1.3
Avoiding drinking treated water	6	1.0
Avoiding sharing cups/drinking materials	4	0.6
Sticking to one particular water source	3	0.5
Don't know	2	0.3

+ Multiple Responses

4.5 Experiences Relating to Food- and Water-borne Diseases

Ninety (15.0%) of the respondents had experienced a food- and or water-borne disease in the past (figure 6). This represents a 15% prevalence rate of food/water-borne disease among the at-risk population. Thirty-one (34.3%) occurred within the last six months. Thirty-four (37.4%) occurred between six and twelve months ago and twenty-five (28.3%) more than a year ago (table 4.23).

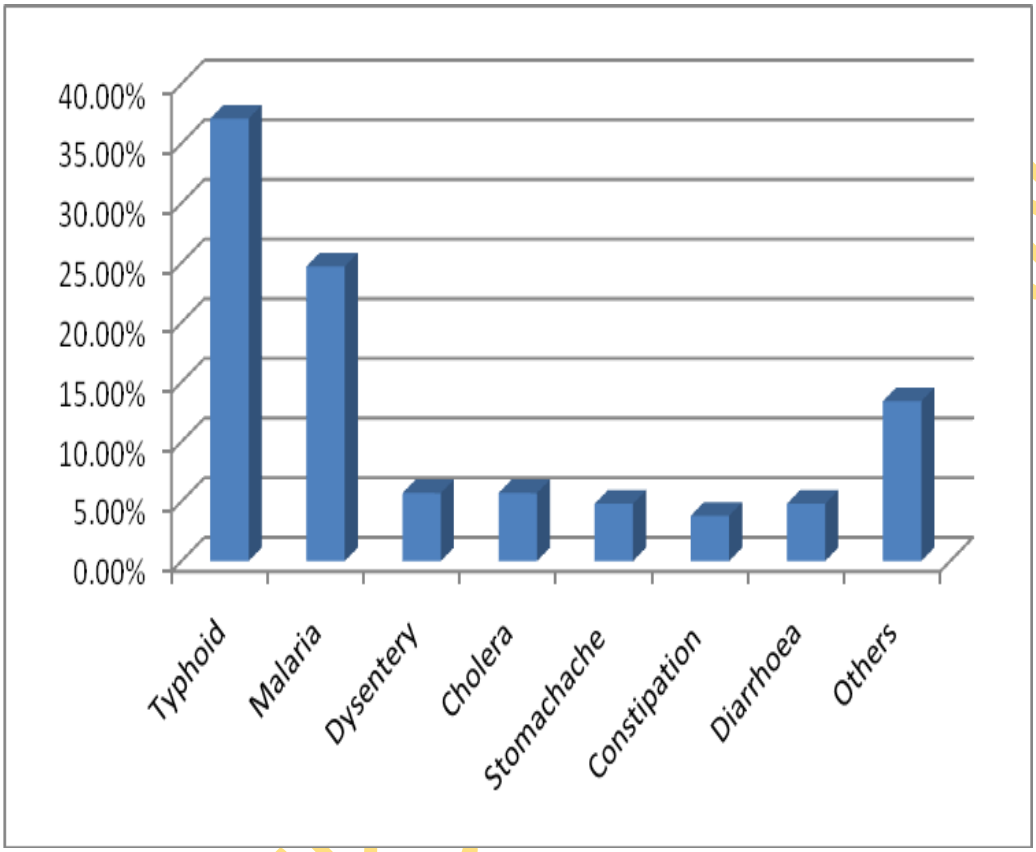
Table 4.23: Previous Experience of Food and Water-borne Diseases among Respondents (N = 593)

Variable	Frequency	%
Respondents had experienced a food and or water borne disease		
Yes	90	15.2
No	503	84.8
Period of occurrence of illness (N = 90)		
Last six months	31	34.3
Between 6 and 12 months ago	34	37.4
More than a year ago	25	28.3

Food or Water-borne Disease(s) Experienced by the Respondents

The type of food- and water-borne diseases experienced were typhoid (37.1%), headache (7.6%), dysentery (5.7%), cholera (5.7%), stomach ache (4.8%), and constipation (3.8%) (figure 4.6). On the perceived cause of the diseases experienced, 42.7% believed it was due to the water drank; 38.7%, due to both food and water consumed; while 18.7% perceived it was due to the food eaten (figure 4.7). Out of the 96 respondents that sought treatment for the experienced food/water-borne disease, 56.6% received health facility treatment, while 14.5% and 23.7 % had treatment at home with and orthodox medicine and herbs respectively. Four of them (4.5%) had no treatment at all.

Figure 4.6: Reported Food-borne Diseases ever Experienced by Respondents



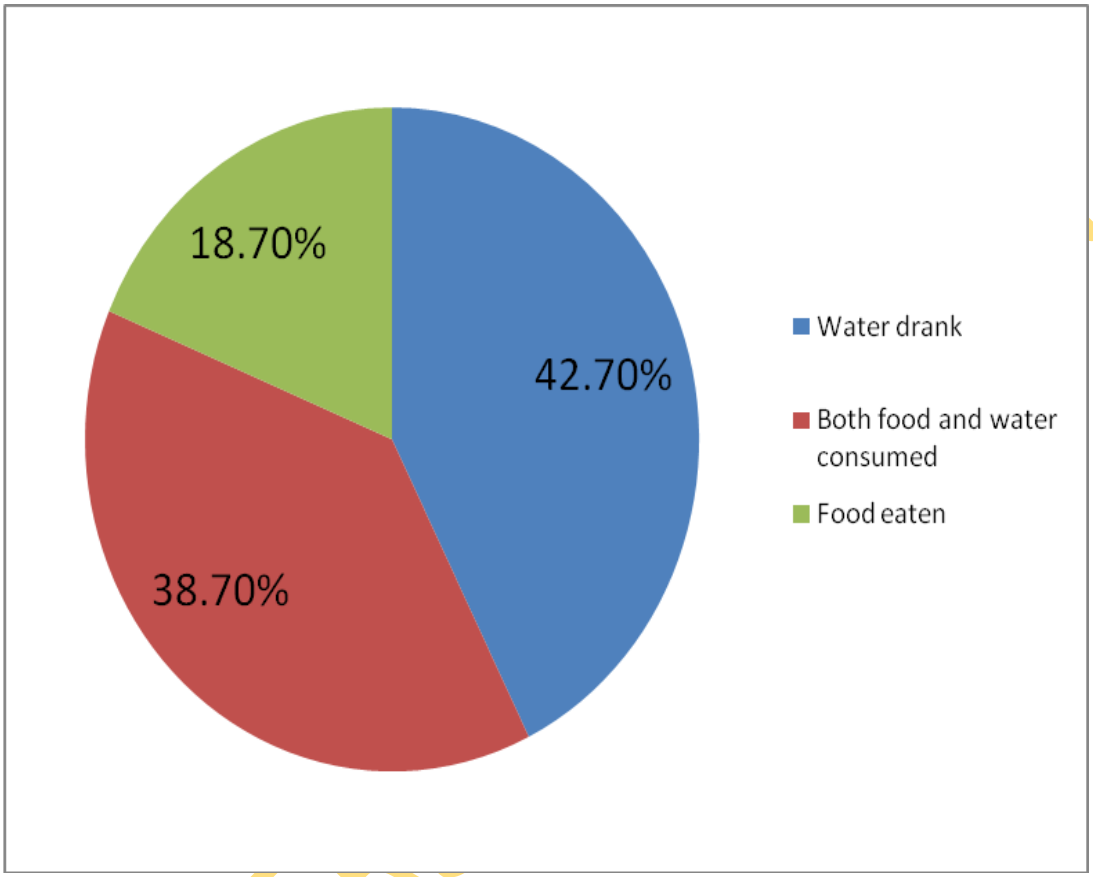


Figure 4.7: Perceived Causes of Food- and Water-borne Diseases Experienced

4.6 Concerns about Food Hygiene in Food Establishment

Majority, 585, (99.0%) of the respondents had one form of concern or the other about the food hygiene in the food establishments in the study area. Major concerns about food establishments as rank-ordered by respondents include neatness of food handlers (96.6%), appearance of food handlers (94.2%), appearance of food establishment (91.0%), location of food preparation site from eating area (82.2.%), location of sanitary facilities (76.6%), actions of staff (60.9%) and make ups on staff (53.0%). Others are shown in table 4.24. The nine respondents who did not have concerns claimed that they cared less about the environmental hygiene, focus was on food taste and cost while some said they bought and 'took away' to eat elsewhere.

Table 4.24: Factors that Heighten Concerns in Food Establishments (N = 593)

Factors that heighten client's concerns	Freq	%
Appearance of food establishments	537	91.0
Appearance of food handlers	556	94.2
Neatness of food handlers	570	96.6
Actions of staff	358	60.9
Make ups on staff	312	53.0
Location of sanitary facilities	451	76.6
Location of food preparation site from eating area	484	82.2

4.7 Consumers' Perceptions of Quality of Services Provided in Food Establishments

Expectations about the Environment of Food Establishments

Certain physical and social attributes are expected in food establishments. Of the 311 (52.6%) respondents who agreed to this the presence of electricity/electrical appliances e.g. refrigerator, fans, radio /TV sets, etc (45.9%) topped the list followed by renovation/expansion (12.6%); provision of chairs/tables, table covers, towels, curtains/blinds, sanitary facilities (12.6%). Others are shown in table 4.25.

Table 4.25: Quality of Service Expected by Respondents

Quality of service	Frequency	%
Provision of social infrastructure	227	50.8
Provision of sanitary facilities	63	12.7
Improved Personal hygiene of food handlers	18	3.6
Improved courtesy of food handlers	34	3.8
Renovations/expansion	50	10.1
Location of cooking area away from eating area	14	2.8
Nettings on doors and windows	25	5.0
Serving food with trays	12	2.4
Provision of table cover clothes	11	2.2
Keeping cooked meals inside cabinet	10	2.0
Others	5	1.0

Others: provision of cloak room, provide toothpick, adding locust bean to soup, increase varieties of food/drinks

+ Multiple Responses

Satisfaction with Hygiene Practices in Food Establishments

With regards to hygiene-related practices in the food establishments surveyed, respondents frequently reported satisfaction with food handlers wearing head cover (97.6%) and uniforms (91.5%), location of food preparation site from eating area (86.4%) and location of sanitary facilities (56.1%). Respondents less frequently reported satisfaction with the following in food handlers; paint on nails (15.9%), long finger nails (9.2%), stains or food on dresses (7.4%). Others are shown in table 4.26.

Table 4.26: Extent of Satisfaction with Hygiene-related Practices of Food Handlers (N = 593)

Hygiene Practices	Frequency	%
Head cover	577	97.6
Apron, uniform with cap or head-ties	541	91.5
Location of food preparation site from eating area	502	86.4
Location of sanitary facilities	330	56.1
Paint on nails	93	15.9
Long finger nails	54	9.2
Food or other stains on clothes	44	7.4
Chewing gum, stick or tobacco	13	2.2
Spitting	11	1.9
Sneezing	10	1.7
Catarrh	10	1.7
Cough	9	1.5
Sore on skin whitlow on hand	9	1.5

4.8 Ratings of Hygiene-related Behaviour and Practices

Despite the experiences, concerns and expectations expressed by food consumers, 51.9% rated the hygiene-related behaviour and practices in the food establishments in the study area as good, 18.0% as excellent and 26.4% as average (table 4.27).

Table 4.27: Ratings of Hygiene-related Behaviour and Practices (N = 590)

Rating	Freq	%
Very poor	7	1.2
Poor	15	2.5
Average	156	26.4
Good	306	51.9
Excellent	106	18.0

4.9 Test of Hypotheses

The results of the hypotheses testing are shown below:

Hypothesis 1: There is no significant association between registration status of food establishments and availability of facilities for disposing wastes (refuse, and human urine and faeces). The results of the findings are shown in table 4.28. The table shows a significant association (p=0.008) exist between registration status and availability of facility for collecting refuse. Therefore, the null hypothesis was rejected. However, there were no significant association between registration status and availability of facility for disposing human wastes (urine, p=0.328; faeces, p=0.179). Therefore, hypothesis 1 was rejected for these variables.

Hypothesis 2: There is no significant association between structural location of food establishments and availability of sanitary facilities. The results of the findings are shown in table 4.29. A significant association exits only between location of food establishment and availability of urinary facility (p=0.026). Therefore, the null hypothesis was rejected. However, there were no significant association between registration status and availability of waste bin (p=0.113) or toilet facility (p=0.127). Therefore, hypothesis 2 was rejected for association between structural location of food establishments and availability of waste bin and toilet facility.

Hypothesis 3: There is no significant association between demographic characteristics of respondents (sex, education and income level) and belief that people can contract diseases from food and water consumed. Significant associations exist between sex (p=0.000), education (p=0.002) and income level (p=0.000) of respondents and belief that diseases can be contracted from food and water (table 4.30). Therefore, the null hypothesis was rejected for these variables.

Hypothesis 4: There is no significant association between demographic characteristics of respondents (sex, education and income level) and perception of quality of service provided in food establishments. Significant associations exist between level of education (p=0.041) and monthly income (p=0.038); and perception of quality of service (table 4.31). Therefore, the null hypothesis was rejected for these variables. However, no

association was recorded with sex (p=0.852). So the null hypothesis was rejected for this variable.

Hypothesis 5: There is no significant association between demographic characteristics of respondents and concerns about hygiene-related practices in food establishments. The results of the findings are shown in table 4.32. There was no significant association between sex, education and income level; and concerns about hygiene-related practices in food establishments. Therefore, the null hypothesis was rejected for these variables.

Hypothesis 6: There is significant association between demographic characteristics of respondents and experience with food-/water-borne diseases. Significant associations exit between sex (p=0.009), education (p=0.003) and income level (p=0.000) and; experiences with food/water borne diseases (table 4.33). Therefore, the null hypothesis was rejected for these variables.

Table 4.28: Association between Registration Status of Food Establishments and Availability of Facility for Disposing Refuse, Urine and Faeces

Availability of sanitary facilities	Registration status of food establishments (Licensed with Government)			Statistics: x^2 Value	Null Hypothesis
	Yes	No	Total		
Refuse /Waste bin with cover:					
Available	10	6	16	0.008	Rejected
Not available	8	30	38		
Total	**18**	**36**	**54**		
Urinal:					
Available	2	8	10	0.328	Accepted
Not available	16	28	44		
Total	**18**	**36**	**54**		
Latrine /Toilet:					
Available	2	9	11	0.179	Accepted
Not available	16	27	43		
Total	**18**	**36**	**54**		

Table 4.29: Association between Structural Location of Food Establishments and Availability of Sanitary Facilities

Availability of sanitary facilities	Structural location of food establishments				Statistics : x^2 Value	Null Hypothesis
	Commercial building or office	Part of residential building	Stand alone	Total		
Refuse /Waste bin with cover:						
Available	6	3	7	16	0.113	Accepted
Not available	12	15	10	37		
Total	**18**	**18**	**17**	**53**		
Urinal:						
Available and functional	0	3	7	10	0.026	Rejected
Not available	18	15	10	43		
Total	**18**	**18**	**17**	**53**		
Latrine /Toilet:						
Available and functional	1	3	7	11	0.127	Accepted
Not available	17	15	10	42		
Total	**18**	**18**	**17**	**53**		

Table 4.30: Association between Demographic Characteristics of Food Consumers (sex, education, and income) and Their Belief that People Can Contract Diseases from Food and Drinks Consumed

Consumer's Demographic characteristics	Believe that people can contract diseases from food and drinks consumed				Total	Statistics: x^2 Value
	Yes, food only	Yes, drinks only	Yes, food +drinks	No		
Sex:						
M	17	35	298	94	444	0.000
F	7	26	69	35	137	
Total	**24**	**61**	**367**	**129**	**581**	
Educational background:						
Never to school	1	2	12	11	26	0.002
Primary	9	12	70	25	116	
2^0 (Incomplete)	3	17	64	38	122	
2^0 (complete)	9	26	155	41	231	
Tertiary	2	4	70	14	90	
Total	**24**	**61**	**371**	**121**	**585**	
Monthly income:						
₦1000-5000	6	20	107	56	189	0.000
₦6000-10000	1	14	75	17	107	
₦11000-15000	4	9	54	21	88	
₦16000-20000	1	3	45	15	64	
₦21000 & above	7	2	66	13	88	
Unemployment	4	13	24	8	49	
Total	**23**	**61**	**371**	**130**	**585**	

Table 4.31: Association between Demographic Characteristics of the Respondents and Perceptions of Quality of Service Provided in Food Establishments

Consumer's Demographic characteristics	Perceptions of quality of service provided in food establishments					Total	Statistics: x^2 Value	Null Hypothesis
	Very Poor	Poor	Average	Good	Excellent			
Sex:								
M	5	12	118	226	84	445	0.852	Accepted
F	2	3	34	77	22	138		
Total	**7**	**15**	**152**	**303**	**106**	**583**		
Educational background:								
Never to school	0	0	6	13	8	27	0.041	Rejected
Primary	2	3	34	64	12	115		
2^0 (Incomplete)	0	3	26	64	29	122		
2^0 (complete)	1	9	63	116	44	233		
Tertiary	4	0	26	47	13	90		
Total	**7**	**15**	**155**	**304**	**106**	**587**		
Monthly income:								
₦1000-5000	1	7	45	96	39	188	0.038	Rejected
₦6000-10000	3	2	28	56	19	108		
₦11000-15000	0	3	25	50	9	87		
₦16000-20000	3	2	15	32	13	65		
₦21000 & above	0	1	30	36	22	89		
Unemployment	0	0	12	34	4	50		
Total	**7**	**15**	**155**	**304**	**106**	**587**		

Table 4.32: Association between Demographic Characteristics of Respondents and Concerns about Hygiene-related Practices in Food Establishments

Consumer's Demographic characteristics	Concerns about hygiene-related practices in food establishments		Total	Statistics: x^2 Value	Null Hypothesis
	Yes	No			
Sex:					
M	443	4	447	0.566	Accepted
F	135	2	137		
Total	**578**	**6**	**584**		
Educational background:					
Never to school	27	0	27	0.261	Accepted
Primary	113	3	116		
2^0 (Incomplete)	121	2	123		
2^0 (complete)	231	1	232		
Tertiary	90	0	90		
Total	**582**	**6**	**588**		
Monthly income:					
₦1000-5000	187	3	190	0.752	Accepted
₦6000-10000	107	1	108		
₦11000-15000	86	1	87		
₦16000-20000	64	0	64		
₦21000 and above					
Unemployment	89	0	89		
Total	49	1	50		
	582	**6**	**588**		

Table 4.33: Association between Demographic Characteristics of Respondents and Experience with Food/water-borne Diseases

Consumer's Demographic characteristics	Experience with food/water-borne diseases		Total	Statistics: x^2 Value	Null Hypothesis
	Yes	No			
Sex:					
M	76	371	447	0.009	Rejected
F	11	127	138		
Total	**87**	**498**	**585**		
Educational background:					
Never to school	3	23	26	0.003	Rejected
Primary	13	103	116		
2^0 (Incomplete)	10	113	123		
2^0 (complete)	40	194	234		
Tertiary	24	66	90		
Total	**90**	**499**	**589**		
Monthly income:					
₦1000-5000	21	169	190	0.000	Rejected
₦6000-10000	16	91	107		
₦11000-15000	16	72	88		
₦16000-20000	3	62	65		
₦21000 and above	28	61	89		
Unemployment	6	44	50		
Total	**90**	**499**	**589**		

CHAPTER FIVE

DISCUSSION

The discussion of findings is presented under five headings: Provision of sanitary facilities; Hygiene-related practices of food handlers; Knowledge of respondents about food- and water-borne diseases; Experience of food- and water-borne diseases and ; Perceptions of sanitary provisions and hygiene-related practices of food handlers

5.1 Findings

Provision of Sanitary Facilities

The findings of this study reveal inadequate provision of sanitary facilities in the food establishments surveyed. Of particular concern was the poor availability and insanitary conditions of available facilities for disposal of solid and liquid wastes, water supply and handwashing systems; and screenings on doors and windows and food cabinet. These findings suggest that the food produced in these establishments might be susceptible to contaminations from two sources viz human (handlers/consumers) and vectors (that spread food- and water-borne diseases). Moreover, the observed human and animal faeces, heap of refuse and indiscriminate disposal of liquid wastes attracted flies (as confirmed by the presence of flies in 82% of the food establishments) which are mechanical vectors that facilitate the spread of cholera and diarrhoeal diseases. Similarly, poor availability of sanitary facilities in these establishments suggests that both human and non-human wastes were indirectly (washed by rain water from gutters or open surface) or directly deposited into the river. Epidemic outbreaks from pollutions are not uncommon in inner-core area of Ibadan. A typical example was the cholera outbreak in Foko in 1974 (Tokun 1998).

Two studies in Ethiopia have reported similar findings on sanitary facilities in food establishments across. In Zewey town, Southern Ethiopia, Kumie et al., (2002) found that liquid and solid wastes disposal facilities were grossly inadequate in 73.5% and 81% of food establishments respectively. In another study in Awassa town, Mariam et al., (1999) reported that 64%, 27.9%, 57.3% of food establishments had no latrines, dispose liquid and solid wastes in open fields respectively. These findings are indications

that there always exist risks of food contamination at many points in the chain of events at food establishments in Africa.

A number of factors may be responsible for the deplorable conditions of sanitary facilities in food establishments in the present study. First, is the nature of the study area. The study was conducted in a traditional-urban poor-resource region in the city of Ibadan with characteristic features of poor planning for drainage, road networks and human waste disposal, as well as poor access to pipe-borne water supply and other social amenities (Onibokun and Faniran, 1995; Adedimeji et al., 2008). Some of these features were confirmed in FGDs where operators of food establishments mentioned several challenges in the provision of sanitary conveniences such as lack of space to construct toilet/latrine, poor access to refuse disposal truck provided by the government and indiscriminate disposal of liquid wastes due to poor drainage system.

A second factor is weakness on the part of regulatory agencies saddled with the responsibility of enforcing compliance with minimum standards for establishing food premises in the area. For example, less than half of the food establishments were registered with the appropriate authorities at the time of this study. Moreover, evidence of registration with a food association was more than with the government. Similarly, the environmental health unit of the local government was found to be deficient in its role in training and continuing education based on the wide gap between trainings as well as the scope of such trainings. During the FDGs most of the participants revealed that the last time they had any training was more than a year ago which focused on recycling waste products (nylon, usually generated at their premises) to raw materials that would fetch money if sold to manufacturers of plastics.

Third, the FGDs revealed that most of the operators of the food establishments were drawn by profit motives and that other considerations such as ensuring the provision of basic sanitary facilities were given less priority when starting a food business based on comments such as “it is a means of livelihood”; “other issue such as environmental cleanliness is given less priority because no place in Ibadan is neat”; “you will need a minimum of fifty thousand naira (N50,000) to meet your basic requirements which is not easy to come by”.

Hygiene-related Practices of Food Handlers.

Changes in epidemiology of food-borne diseases may be attributed to development in food processing, preparation and handling practices (Angellilo et al., 2000). Although appreciable proportion of the three categories of the food handlers observed wore protective clothing (apron and caps) and none was seen with practices that have potential of food contamination such as sneezing and coughing, long and painted fingernails, and open wounds; the poor handwashing habits reported is a concern. Cross contamination may occur from contacts with many things other than food in the establishments. For example, the presence of children and their faeces around the establishments suggests that these children belong to the handlers of food who may not be careful to wash their hands appropriately anytime the children defecate. Contaminated hands may be the most important means by which enteric viruses are transmitted (Lillquist et al., 2005). Similarly, contaminations may occur by touching money.

Knowledge of Respondents about Food- and Water-borne Diseases

Respondents were highly knowledgeable about the specific aspects of food- and water-borne diseases assessed in this study including the diseases causation, signs and symptoms, consequences and prevention. The mostly reported food- and water-borne conditions by respondents namely cholera, typhoid, diarrheoa are actually the most reported in the literature (Mead et al. 1999; Lyonga et al., 2009). Similarly, most respondents (63.4%, 80.6% and 83%) believed that "illnesses can be contracted through food and water"; "everybody is susceptible to food- and water-related diseases" and "death as a complication of such illnesses" respectively. According to the Health Belief Model, this group of respondents would require little cues for them to take actions to prevent food and water-related diseases.

This level of knowledge may appear unusual for the study area and may attribute to a high level of education displayed by respondents with 85.5% having secondary education or more. Another possible explanation is that since many commercial activities were found around the food establishments, patrons might have been people from other areas who came to work in the study area and consequently patronize the food establishments. Moreover, these findings highlight the effectiveness of Information, Education and Communication strategies in improving public knowledge about food safety issues among respondents.

Respondents' Experience of Food- and Water-borne Diseases

The experience of food- and water-borne diseases among the respondents in this study was low (about one out of every six respondents with just seven cases in the last one month before the study). This finding implies that respondents were taking precautionary measures to ensure safety with the food and water consumed. This finding corroborates the high knowledge of respondents on the causes, prevention and threats of illnesses contracted from food and water. However, the report that about half (56.6%) of such cases eventually received treatment at the health facility is discouraging. This figure is higher than a report that only about 1-10% of actual cases of food-borne illnesses in developing countries may be reported (Mead et al. 1999).

This finding has important implications. First, it does not allow for proper planning of interventions by the health authority. Second, it suggests that some cases might have become complicated before they eventually reach the health facility due to mismanagement. Third, it implies that self medication is still a common practice in Nigeria corroborating the opinion of Goodman et al (2007). Therefore the high knowledge of food- and water-borne diseases demonstrated by respondents in this study needs to be matched with appropriate treatment-seeking behaviour if mortality and serious economic losses resulting from patronizing public eating places are to be reduced in the area.

Perceptions of Sanitary Provisions and Hygiene-related Practices of Food Handlers

Contrary to expectations that the level of knowledge about food- and water-borne diseases displayed by respondents would have potential to positively influence their perceptions of sanitary provisions in the food establishments in the study, more than two-third of the respondents rated the provisions of sanitary facilities and hygiene-related practices of food handlers as good and excellent as 56.1%, 97.6% and 91.5%, were satisfied with the location of sanitary facilities, wearing head covers and apron/uniform respectively. This level of satisfaction was further confirmed by preference for social infrastructure such as refrigerator, fan and television by 50.6% above provision of sanitary facilities (12.7%). This finding confirmed Ajuwon's (2001) assertion that acquisition of knowledge does not always lead to positive health practice. Similar findings have been reported in other studies. For example, Ajuwon (2001) in his study reported that awareness of condom does not translate to use.

Implication for Health Education

Health Education is the part of Health Care that is concerned with promoting healthy behaviours. Health education is therefore any planned combination of learning experiences designed to predispose, enable, reinforce volountary behaviour conducive to health in individuals, group or communities (Green andKreuter,1991). Health education can play an important role in bringing about behavioural change necessary to prevent food contamination or the promotion of food safety.

The findings of the study reveal poor availability of sanitary facilities and environmental condition which could lead to contaminations during food processing and consumption in the food establishments. Abdulsalam and Kaferstein (1993) and Oyemade et al., (1998) earlier reported that many factors that promoted food-borne diseases were due to poor environmental sanitation which manifested or resulted from insanitary means of refuse and excreta disposal as well as poor drainage. These findings underscore the importance of equipping food operators and handlers with food safety education with emphasis on the link between insanitary working environment and food contamination as well as information provision to stakeholders on the identified problems.

Educating Food Operators and Handlers

The education of food operators and handlers can be in form of a 2-day training programme with the overall objective of increasing their knowledge about food safety and hygiene. Specifically, the training may have the following objectives.

1. Increase the knowledge of participants about food-borne diseases.
2. Increase knowledge of participants about bacterial food poisoning.
3. Increase the knowledge of participants about the relationship between insanitary working environment and food contamination.
4. Increase knowledge of participants about cross contamination during food preparation.

The training will be organised in collaboration with the Environmental Health unit of the State Ministry of Health and the Association of operators of public food establishments in the study area. The involvement of the Environmental Health unit will guarantee government approval and backing of the training while the Association of operators of food vendors will assist in mobilization of members for attendance through their weekly meetings.

A training curriculum will be developed to achieve the objectives stated. The topics that will be covered by the curriculum in achieving the objectives include the following.

Objective one: Increase the knowledge of participants about food-borne diseases

Participants will be introduced to the definition, causes (humans, vectors, microbial intoxication/infection, naturally occurring toxins, chemicals), signs and symptoms (including diarrhoea, nausea, vomiting, abdominal pain, mild fever and chilling), consequences (including hospitalization, high cost of treatment-seeking, absenteeism from school and work, death) and prevention of food-borne diseases.

Objective two: Increase knowledge of participants about bacterial food poisoning.

Participants will be introduced to micro-organisms that cause food poisoning, their significance, types (including salmonella, staphylococcus, C. Perfringes, Bacillus cereus),

life-cycle (incubation period, means of access to kitchen, food usually affected, symptoms, how soon they strike and go) and prevention.

Objective three: Increase the knowledge of participants about the relationship between insanitary working environment and food contamination.

Participants will be educated on sanitary practices that promote spread of food-borne diseases – dirty environment, poor availability of sanitary facilities, throwing liquid wastes in open drainages or on the ground, lack of availability of receptacles for disposing solid wastes, or availability of receptacles without cover, burning of refuse.

Objective four: Increase knowledge of participants about cross contamination during food preparation.

Participants will be informed about food handlers' practices that lead to cross-contamination during food preparation including: improper hand washing (after; toilet use, handling raw food materials, touching money, handling handkerchief, touching nose, cleaning child); wearing hand and neck jewelries; talking while handling food; dirty apron and head gears; disease states such as presence of whitlow, diarrheoa, cough and catarrh; use of contaminated cooking materials (using same knife and food contact surfaces for handling both raw food materials and cooked food). Prevention of cross-

contamination through regular cleaning of hand and food contact surfaces will also be covered.

The curriculum will be made available to individuals who will act as facilitators for their contributions before the training. The methods to be employed in imparting knowledge during the training include teaching, role play and demonstration. In addition, there will a practical session where microscopes will be used to reinforce knowledge of respondents on micro-organisms causing food poisoning. Microscopes and cultures of micro-organisms will be made available for this session. Participants will be made to observe micro-organisms through the microscopes for them to know that micro-organisms really exist.

A pre- and post-training assessment will be conducted to evaluate the effect of the training on participants' knowledge about aspect of food safety and hygiene covered by the training.

Conclusion

This study revealed deficiencies in the sanitary provisions in food establishments but a fair hygiene-related practices of food handlers and a high knowledge about food and water-related diseases among food consumers interviewed. Results of the study highlight several factors influencing availability of sanitary facilities in the food establishments surveyed including lack of resources, profit making motives and poor access to facilities for waste removal. Similarly, the presence of children and the practice of rearing domestic animals around food establishments have implications in comprising the wholesomeness and safety food meant for sales. Regulatory agencies need to enforce elementary but basic rules regarding the establishment of public eating places and their working conditions through continued training of food operators and handlers and continued sanitary inspections in order to safeguard the safety of food products and health of the public at large.

Recommendations

The recommendations made based on the findings of this study are as follows:

1. Government should make the provision of adequate drainage system and waste disposal facilities in disadvantaged areas of Ibadan a priority. This approach will increase the access of food establishments in these areas to these facilities with the potential of reducing the risk of contaminating food or the potable water supply.

2. Food handlers should be encouraged to provide nettings on windows and doors to prevent the entries of flies/insects into food eating areas.
3. There should be well organised and regular training programmes for all food handlers including the old and new members. The training programmes should focus on personal hygiene and environmental sanitation practices indentified in the study which have potential for causing food- and water-borne diseases. Periodic assessments of the effectiveness of training and instruction programmes should be made, as well as routine supervision and checks to ensure that procedures are being carried out effectively.
4. There should be regular inspection and supervision of the activities of food handlers by environmental health authorities to ensure compliance with laid down standards guiding establishments of public eating places.

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APPENDIX 1

QUESTIONNAIRE ON CONSUMERS' PERCEPTION OF FOOD-BORNE DISEASES, QUALITY OF SERVICES AND FACTORS INFLUENCING CHOICE OF RESTAURANT

Serial No.: ……

1. WARD: ……..……. ……
2. AREA / NEIGHBOURHOOD: …… ……
3. NAME OF FOOD PREMISE: ……..
4. ADDRESS OF FOOD PREMISE: ……...
5. NAME OF THE QUESTIONNAIRE ADMINISTRATOR: ……
6. DATE OF QUESTIONNAIRE ADMINISTRATION: ……
7. TIME STARTED…… TIME ENDED: …… (Duration in minutes ……)
8. PERIOD OF QUESTIONING: - Morning /Afternoon /Evening
9. TYPE OF FOOD EATEN / BOUGHT: ……

Introduction:

Dear Customer / Consumer,

I am Mrs. O.M. Fatunmbi, a postgraduate student of Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan. I am conducting a study on evaluation of sanitary conditions of local restaurants and factors influencing consumers' choice in Ibadan North-West L.G.A. You have been selected to answer the following questions because of your experience and patronage at this local restaurant. I wish to assure you that whatever information provided by you will be kept confidential. Such information will add to body of knowledge and inform decisions by relevant authorities, operators of local restaurants in improving sanitary conditions of their facilities.

I would want to seek your opinion about the services provided by this local restaurant; knowledge of food-borne diseases, perception of hygiene-related behaviour and practices and factors influencing your patronage. Please be as honest as possible. Thank you.

SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF CONSUMERS

10. What is your age? _ _ _ _ _ _ _years

11. Sex of the Respondent?

a. Male

b. Female

12. What is your marital status?

a. Single

b. Married

c. Widowed

d. Separated / Divorced

e. Others (please specify).

13. Family Living Status: If married, are you currently living together with your spouse (wife/husband) and children?

a. Yes

b. No

If No, give reasons for not living with spouse (……)

14. What is your occupation?

a. Student

b. Civil servant

c. Artisan / Apprentice

d. Trading

e. Unemployed

f. Others (please specify).

15. What is your highest educational qualification?

a. Never being to school

b. Primary

c. Secondary (incomplete)

d. Secondary (completed)

e. Tertiary

f. Others (please specify)

16. What is your religion?

a. Christianity

b. Islam

c. Traditional religion

d. Others (Please specify)

17. What is your ethnic background?

a. Yoruba

b. Hausa

c. Igbo

d. Others (please specify)

18. How far is your house from here?

a. Few houses away

b. Next Street

c. Had to take transports

19. How far is your place of work from here?

a. Few houses away

b. Next street

c. Had to take transports

20. What is your estimated total income from all sources in a month [N…….]

SECTION B: CONSUMER'S KNOWLEDGE OF FOOD BORNE DISEASES

21. Do you believe that people can contract diseases from food / drinks consumed?

1. Yes, through food only
2. Yes, through water/ drinks
3. Yes, through food and water/drinks
4. No

If No, skip Questions 22 to 31

22. If yes, which group of people do you think are susceptible to food and water-borne diseases?

1. Everybody 2. Those who eat-out 3.People who eat canned foods
4. Poor people 5. Rich people
6. Other (specify) ……..

23. Kindly state the names, signs and symptoms, and possible complications of disease(s) by filling the table?

Name of Food-borne Disease	Symptoms/Signs	Possible complications

24. Do you know any way(s) by which infections can be contracted through food?

    1. Yes 2. No

25. If yes, kindly mention 2 ways by which infections can be contracted from food?

    ……

    ……

26. Do you know any ways(s) by which infections can be contracted through water/drinks?

    1. Yes 2. No

27. If yes, kindly mention 2 ways by which infections can be contracted from water/drinks?

    ……

    ……

28. Do you think infections from food and water/drinks are preventable?

    ……

    ……

29. Do you think infections from food and water/drinks are preventable?

    1. Yes, infections from food only 2. Yes, infections from water only

    3. Yes, infections from and water 4. No

30. If food and water-borne diseases are not preventable, why do you think so?

    ……

    ……

31. If yes to Question 30 above, list ways of preventing food and water-borne diseases.

    (i) Ways of preventing food-borne diseases

    1……

    2……

    3……

(ii) Ways of preventing water-borne diseases

1……

2……

3……

SECTION C: EXPERIENCES RELATING TO FOOD AND WATER-BORNE DISEASES

32. Have you ever had any food and water-borne diseases?

1. Yes 2. No

If No, skip Questions 33 to 36

33. If yes, how long ago was that: _____(yrs/mths)

34. What disease(s)/infection did you have?

1……

2……

3……

4……

35. Do you think this was caused from food or drink consumed?

1.From food 2.From water/drinks 3.Food and water consumed

36. What did you do to obtain complete cure when this happen?

1. Treated at home with herbs 2. Treated at home with orthodox medicine
3. Had to visit a health facility 4. Nothing

SECTION D: CONCERNS ABOUT FOOD HYGIENE IN EATING PLACES

37. Do you have concerns about food hygiene in eating places?

1. Yes 2. No

38. If No, give reasons why you don't have any concern(s) about food hygiene in eating places.

1……

2……

3……

39. If yes, which of the following are most likely to heighten your concern(s) about choice of eating place? (kindly tick Yes or No in each of the following)

Nature of concern	**Yes**	**No**
Appearance of the food establishment (Type of Structure, Floors, Walls, Furniture, Space)		
Appearance of food handlers (whether they wear uniform, apron, cap or head ties)		
Neatness of food handlers (if there is food or other stains on clothes)		
Actions of staff (spitting, sneezing, pricking nose, coughing, chewing gum/stick/tobacco		
Make ups on staff (long finger nails, paint lips/nails)		
Location of sanitary facilities from eating area		
Location of food preparation from eating area		
Others (specify).		

SECTION E: CONSUMER'S PERCEPTION OF QUALITY OF SERVICES PROVIDED

40. Are there certain qualities expected of services provided in this restaurant?
    a. Yes
    b. No
41. If yes, what quality of services are you expecting? [*Write down list as mentioned]*
    a. ……
    b. ……
    c. ……
    d. ……..
    e. ……..
42. Are you satisfied with the following quality items in this restaurant?

Quality item	**Response (Yes, No or Don't know)**
Access route	
Environmental sanitation	
Structure	

	Sanitary facilities and condition	
	Personnel hygiene practices	
	Food quality	
	Quality of services rendered (Personnel attitude)	

43. Which of the following hygiene-related behaviours and practices are you satisfied with in this restaurant?

Hygiene Factor		**Response (Yes/No)**
	Wear Head cover	
	Wear apron, uniform with cap or head ties	
	Had Food, other stains on clothes	
	Seen spitting	
	Seen sneezing	
	Has catarrh	
	Has cough	
	Has sore on skin or whitlow on hands	
	Chewing gum or stick or tobacco	
	Has long finger nails	
	Paint nails	
	Location of sanitary facilities	
	Location of food preparation from eating area	

44. How do you rate the hygiene-related behaviours and practices of food handlers in this restaurant?

a. Very poor
b. Poor
c. Average
d. Good
e. Excellent

SECTION F: FACTORS INFLUENCING CONSUMER'S CHOICE OF RESTAURANT

45. How did you get to know about this local restaurant?

a. Self
b. Social relations (Family /Friends, etc)
c. Work relations
d. Advertisement
e. Other (Please specify) ……

46. Give reasons why you eat outside your home

a. Time factor (do not have much time to prepare food at home)
b. Convenience
c. Taste of food
d. Low cost (relatively cheaper to eat out)
e. Distance of home from place of work
f. Past practices (Habit)
g. Other reasons (please specify) _ _ _ _ _ _ _ _ _

47. Which of these following factors influence your choice of eating in this particular restaurant?

a. Location (including accessibility)
b. Environmental sanitation (premises, drainage, waste disposal, etc)
c. Structure
d. Food hygiene practices (preparation, serving practices, storage, etc)
e. Food handling service (including attitude, courtesy of food handlers)
f. Personnel hygiene (including dressing, health status, etc)
g. Food quality
h. Cost of food

48. Most times, do you:

a. Eat in
b. Take the food away
c. Both

49. How regularly do you eat or buy food from this restaurant?

a. Once a day
b. Twice a day
c. Thrice a day

d. Once a week

e. Occasional (once in a fortnight)

f. Rarely (Once in a more than a month)

50. Most preferred meal eaten out?

a. Breakfast

b. Lunch

c. Supper

d. Between meal (any time)

51. Do you eat in other restaurants apart from this one?

a. Yes

b. No.

52. Give reasons for your answer ……..

53. What could be done to improve the present hygiene and serving practices of this restaurant?

APPENDIX 11

OBSERVATION CHECKLIST

FOR INSPECTION OF FOOD PREMISES

Serial No.: ……

1. WARD: ……..…….. ……

2. AREA / NEIGHBOURHOOD: …… …….

3. ADDRESS/ LOCATION OF FOOD PREMISE: ……

4. NAME OF THE OBSERVER: ……

5. DATE OF OBSERVATION: ……

6. TIME STARTED…… TIME ENDED: …… (Duration in minutes ……)

7. PERIOD OF OBSERVATION: - Morning /Afternoon /Evening

8. NUMBER OF STAFF IN THE RESTAURANT: ……..…….

9. TYPES OF FOOD SOLD / SERVED: ……

10. Category:

a. Concrete Block structure

b. Wooding building

c. Stall (Roofed shed)

d. Counter (Table)

e. Others (please specify) ……..

11. Access route to Local Restaurant

f. Footpath

g. Non-tarred road

h. Tarred road

i. Other (please specify) ……..

12. Location of local restaurant

a. In a commercial building / office

b. Part of residential building

c. Stand alone

d. Others (please specify) ……..

13. Direct communication with premises where other human activities are being carried out

e. Yes (Please indicate type of activity ……..)

f. No

14. Type of food service rendered

g. Take away

h. Sit down

i. Both

j. Others (please specify e.g. catering)

S/No.	Variable of Interest (with Options)	Response (Yes or No)	Comment
15	Licensed (with Government)		Evidence seen (Y/N)
16	Membership / Registration with Association		Evidence seen (Y/N)
Environmental sanitation:			
17.	Human feaces visible		
18.	Animal feaces visible		
19.	Dustbin / container available for food waste		
20.	Heap of refuse visible		
21.	Goats, Chickens etc roaming freely		
22.	Stagnant waste water visible		
23.	Disposal of liquid waste: Open gutter Covered gutter Soak away Others (please specify)		
24.	Slaughtering of animals nearby		
25	Blood and other waste left on ground		

Description of Restaurant (Structure)			
26.	Type of Floor Cemented Not cemented Rugged Tiled / carpeted Other (please specify)		
27.	Type of Wall Cemented Cemented and painted Not cemented Other (please specify)		
28.	Ceiling available		
29.	Seat and Tables Number of Seat Number of Tables		
30.	Any table surface dirty or stained		
31.	Covered or netted cabinet for cooked food		Cleanliness (Y/N)
32.	State / Condition of the cabinet cover Closed when not in use Always opened		Cleanliness (Y/N)
33.	Small children or toddlers playing or defecating within the food premise		
34.	Any dwelling or sleeping area		
35.	Ventilation Good Poor		
36.	Lighting Good Poor		
37.	Domestic animal or pets kept or seen within the LR		
38.	Rodent droppings		
39.	Presence of flies		

40	Netting of windows		
41	Netting on entrances		
42	Fire extinguisher available		
43	Presence of more than one exit		
Storage Facilities			
44	Separate and enclosed room for eating		Hygienic (Y/N)
45	Separate and enclosed room for cooking		Hygienic (Y/N)
46	Separate and enclosed room for storing cooked food		Hygienic (Y/N)
47	Separate and enclosed room for storing unprepared food		Hygienic (Y/N)
48.	Fridge available		Functional (Y/N)
49.	Freezer available		Functional (Y/N)
50.	Separate and enclosed Cloakroom (Changing room)		Hygienic (Y/N)
51.	Separate room for washing plates and utensils		Hygienic (Y/N)
52.	Separate room for storing Utensils and Equipment		Hygienic (Y/N)
Sanitary Facilities and Condition			
53	Main source of water Rain Deep well Bore hole Surface water (Stream, Pond, River, etc Public Tap Others (please specify)		

54.	Water supply for cooking and washing: Type available Running tap Container water Storage Tank Others (please specify)		
55.	Water supply for drinking: Type available Running tap Container water Sachet (*'Pure'*) water Bottled water Other (please specify)		
56.	If in container, is there one cup / bowl for water collection?		
57.	Hand-washing Separate bowls for individuals Wash hand basins Indiscriminate (outside, floor, etc) Others (please specify)		
58.	Hand towel or napkin available		
59	If available (towel or napkin) is it clean?		
60.	Functional Urinal available		
61.	Functional latrine/toilet available		Sanitary (Y/N)
62	Latrine has door		
63.	Latrine is clean		
6.4	Refuse or Waste bin with cover available		
65.	Food waste on the ground		
66.	Food waste on the table		

Employees' Hygiene Practices						
Demographic / Hygiene Factor		**Cook**	**Server**	**Washer**		
67.	Sex *(Male or Female)/No. of staff*					
68.	Age Group (*Child, Adolescent or Adult)*					
69	Wear Head cover (*Yes or No)*					
70	Wear apron, uniform with cap or head ties (*Yes or No)*					
71.	Food, other stains on clothes (*Yes or No)*					
72.	Seen spitting (*Yes or No)*					
73.	Seen sneezing (*Yes or No)*					
74.	Has catarrh (*Yes or No)*					
75.	Has cough (*Yes or No)*					
76.	Has sore on skin or whitlow on hands					
77.	Chewing gum or stick or tobacco					
78.	Long finger nails					
79.	Paint nails					
80.	Handwashing habit					

General remarks:

Overall grading of the premises:.....

Recommendations:.....

APPENDIX 111

Key Informants Guide.

1. Is your premises registered / licensed with government? If no, why? If yes, what are the stages of registration? *(Ask for copy of Registration)*
2. Membership of Food Handlers' Association:

a. Do you belong to any Association of Food Handlers? If yes, give name and address of Association. If no, why?

b. How regularly does the Association meet?

3. Are you aware of Government Bye Law on Food premises regulation? If yes, how did you know about it?
4. Are you aware of, then do you have a medical certificate of fitness by LGA Health Department?
5. Training:

a. Have you attended any training? If yes, who organised it? *Ask for copy of certificate of Participation/Attendance, if any)*

6. Inspection:

a. Do the LGA inspectors come to your restaurant for regular inspections? If yes, when was the last visit? What was the result of their inspection? If no, do wish they come for inspection from time to time? If no, why?

7. Knowledge of food borne diseases:

a. Name 5 food borne diseases

b. Name 2 possible complications for each disease mentioned

c. Name 5 key steps to ensure food safety and prevent food borne diseases

8. Interior lime-washed within last twelve months Y/N, if no, how often?
9. Major challenges facing your work as operator of food premises or food handler
10. Suggestions for improving food premises and handling.

APPENDIX 1V

A typical food establishment located as part of a residential building

APPENDIX V

A food establishment with wooden structure

APPENDIX VI

A shed that served as a food establishment

APPENDIX VII

A food establishment with open drainage for disposing liquid wastes

APPENDIX VIII

The net on the door and windows of this food establishment is opened, which allows flies and other insects into eating area.

APPENDIX 1X

The Minimum Health Requirements of a Restaurant/Public Eating House

and

Rules and Regulations for Food Handlers

…….

As stated in

The Local Government Laws and Orders (1957)

Published in the Western Region of Nigeria Gazette

Eating house: means any premises where food is sold for human consumption on the premises

Food preparing and food preserving establishment: means any premises where foodstuffs are prepared or preserved or exposed for sale for human consumption off the premises

Type of foodstuffs to be displayed: See pg 498 of Bye Law 3 1st Schedule of 1957

All containers, coverings and utensils used are to be kept in a clean and sanitary condition

Regulated premises:

- Be licensed by the LGA upon meeting the set standard as inspected by the Medical Officer of Health. Same shall be renewed regularly as stipulated
- No direct communication with any other premises
- Dimension
  - An area not less than 200sq ft
  - Average height of not less than 10ft
  - Average width of not less than 10ft
- A paved floor of not less than 2 inches of concrete floor
- With functional drainage
- Interior lime washed at least once every twelve months
- No sleeping or used as a dwelling house
- No animal, bird, reptile shall be allowed or kept within the premises
- Every reasonable precaution shall be taken by the owner to render fly proof, to keep down vermin
- Adequate means of escape to the open air from any exhaust fumes or any other hazard

- Water supply from approved sources
- Adequate approved sanitary toilet facilities
- No infected person should be employed
- Access by Health Officer to inspect regularly

"There should be a separate room for eating and a separate room for the kitchen; the floor of every public eating room shall be concrete or other impervious materials and the walls shall be capable of being easily cleansed; in the eating room, there should be adequate lightings and ventilation; no living or sleeping room shall be open directly into a public eating room; in every public eating room shelves or cupboards shall be provided for the storage of plates and other utensils and suitable chairs or benches shall also e provided; in every kitchen an adequate covered receptacle for the disposal of refuse shall be provided and maintained by the Licensee; there should be suitable arrangements for the washing of plates and utensils; no owner or proprietor of a restaurant or eating house or persons-in-charge shall allow any person suffering from an infectious or contagious disease to take part in the preparation or serving of food in connection with the restaurant or eating house; no animals or fowls likely to cause a nuisance shall be kept in the compound of any restaurant or eating house; no person shall obstruct or resist any officer or other person appointed by the Local Government who is acting or purporting to act in the performance of any duty relating to any of the purposes of these Minimum Health Requirements; the Local Government in its absolute discretion may withdraw any license if any alteration is made to any premises licensed there under after the license has been granted and any person who contravenes or fails to comply with the provisions of any of these minimum health requirements shall be prosecuted in a court of law by enforcing the relevant and appropriate adoptive bye-law".

1. Separate room for eating and a separate room for the kitchen;
2. Floor of every public eating room shall be concrete or other impervious materials
3. Walls shall be capable of being easily cleansed;
4. Adequate lightings and ventilation;
5. No overcrowding
6. No living or sleeping room shall be open directly into a public eating room;
7. Shelves or cupboards shall be provided for the storage of plates and other utensils and
8. Suitable chairs or benches shall also e provided;

9. Adequate covered receptacle for the disposal of refuse shall be provided and maintained
10. Suitable arrangements for the washing of plates and utensils;
11. No person suffering from an infectious or contagious disease to take part in the preparation or serving of food in connection with the restaurant or eating house;
12. no animals or fowls likely to cause a nuisance shall be kept in the compound of any restaurant or eating house;
13. No person shall obstruct or resist any officer or other person appointed by the Local Government who is acting or purporting to act in the performance of any duty relating to any of the purposes of these Minimum Health Requirements;
14. The Local Government in its absolute discretion may withdraw any license if any alteration is made to any premises licensed there under after the license has been granted and any person who contravenes or fails to comply with the provisions of any of these minimum health requirements shall be prosecuted in a court of law by enforcing the relevant and appropriate adoptive bye-law"

APPENDIX X

Personal Hygiene and Sanitation Practices by Operators of Restaurants or Eating Houses/Food Handlers

…….

Modified Content of Inspectors' Report

(Oyekan, 1993)

Date and Time of Inspection

Name and address of owner / licensees / proprietor (ress)

Name of Establishment

Registration

Menu Board

Situation of restaurant or eating house

Description of restaurant or eating premises

Description of rooms:

- public eating room,
- kitchen,
- service room,
- utensils room, store, cloakroom accommodation

Description of:

- Ventilation and lighting
- Waste water or refuse disposal
- Water supply
- Latrine accommodation, Urinal,
- Refuse disposal
- Trade process
- Employees (Personnel, staff
  - No. of males : females
  - State of health
  - Cleanliness
  - Uniform with caps or head ties
  - General remarks

Overall grading of the premises and

Recommendations

APPENDIX XI

Golden Rules for Safe Food Preparation

(Highlighting basic personal hygiene and environmental sanitation of food handlers)

(WHO, 1989)

1. Choose food processed for safety
2. Cook food thoroughly
3. Store cooked food immediately
4. Reheat cooked food thoroughly
5. Avoid contact between raw foods and cooked foods
6. Wash hands repeatedly
7. Keep all kitchen surfaces meticulously clean
8. Protect foods from insects, rodents and other animals; and
9. Use pure water for both preparation and drinking

WHO (2005) stressed that "Good food hygiene can contribute towards preventing the transmission of pathogens responsible for many food-borne diseases. Governments, industry and consumers have shared responsibility in ensuring the safety of food". WHO has long been aware of the need to educate all food handlers, including professionals and ordinary consumers, about their responsibility for food safety. After nearly a year of consultations with food safety experts and risk communicators, WHO introduced the Five Keys to Safer Food poster in 2001.

The WHO's ***Five Keys to Safer Food*** are simple rules elaborated to promote safer food handling and preparation practices:

keep clean,
separate raw and cooked,
cook thoroughly,
keep food at safe temperatures, and
use safe water and raw materials.

However, this simple message is not enough and in October 2004 WHO produced a draft version of a basic training manual for food safety professionals, teachers and other interested organizations to use in training food handlers and consumers including, school children.

The 5 keys manual, entitled "Bring Food Safety Home", has two objectives: 1) to provide generic food safety training material that can be used as a framework to produce food safety training smaterials for a variety of audiences at the national level; and 2) to provide recommendations on how this basic material can be adapted for different audiences based on the social, economic and cultural differences between countries.

Append XII

1.) SCOPE

This Nigerian Code of Practice for Street-Vended foods specifies the general hygienic requirements and practices for the preparation and sale of street-vended foods in Nigeria.

2.) TERMINOLOGY

2.1. Appliances: means the whole or any part of any utensil, machinery, instrument, apparatus or article used or intended for use, in or for making, preparing, keeping, selling or supplying of food.

2.2. Crockery: means all the glasses, plates, cups, saucers, spoons, forks, ladies, chopsticks and other articles used in serving and consumption of food, including disposable articles.

2.3. Disposable Articles: means any appliance, container, implement, utensil or wrapper that is intended for use only once in the preparation, storage, display, consumption or sale of food.

2.4. Impermeable: means not allowing the passage of water and/or fluid.

2.5. Microorganisms: means any microscopic living organisms that can cause disease or food spoilage.

2.6. Mobile Vendor: means any person with/without a vehicle, going from place to place for the purpose of preparing, serving, displaying, distributing or delivering any street vendor food.

2.7. Perishable Food: means food that is of such a type or is in such a condition that is may spoil.

2.8. Water: means water which compiles with the Nigerian Standard for Drinking Water Quality (NIS 554:2007)

2.9. Readily Perishable Food: means perishable food that consists wholly or partly of milk, milk products, eggs, meat, poultry, fish or shellfish, or ingredients that are capable of supporting the progressive growth of microorganisms that can cause food spoilage, food poisoning and other food borne illness.

2.10. Ready-to-eat Food: Any food (including beverages) which is normally consumed in its raw state or any food handled, processed, mixed, cooked or otherwise prepared into a form in which it is normally consumed without further processing.

2.11. Relevant Authority: means thee Ministries and Agencies having responsibility and any local or officially recognized authority.

2.12. Sealed Container: means food grade container such as

2.12.1 Haematically sealed containers

2.12.2 Sealed jars with anchor and crown type closures

2.12.3 Milk bottles sealed with aluminum caps

2.12.4 Glass jars and bottles with screw and

2.12.5 Cans and similar containers with seals

2.13. Street Food Centre: means any public place or establishment designated by the relevant authority for the preparation, display and street foods by multiple vendors.

2.14. Street Foods: ready-to-eat foods prepared and/or sold by vendors and hawkers especially in streets and other similar public places (see FAO Food and Nutrition Paper 46).

2.15. Street Food Stall: means a place where street food is prepared, displayed, served or sold to the public. It includes carts, tables, benches, baskets, chairs, vehicles, with or without wheels and any other structure approved by the relevant authority where on it or in it, any street foods are displayed.

2.16. Utensil: means any appliance, container and equipment including traditional types used in the preparation, storage and sale of foods.

2.17. Waste Water: means sullage water arising as a result of thee activity of vendors.

2.18. Waste Container: means any form of food grade container which is used solely for the purpose of storing and serving and has not been used previously for any other purposes which could cause contamination of the water stored in it.

3.0 GENERAL REQUIREMENTS

3.1. LICENSING OF VENDORS: No vendors shall conduct his/her business of preparation, packing, storage, display and sale of any street foods unless he/she is licensed under the relevant food regulations.

3.2. CONDITIONS FOR LICENSING:

3.2.1 No relevant authority shall issue or renew the license of any vendor who does not commit himself to complying with all the requirements of this Nigerian Code of Practice.

3.2.2 It is essential that basic training in food hygiene and safety is carried out by the relevant authorities prior to issuing or renewing the license of street food vendors.

3.3. DISPLAY OF NOTES:

3.3.1. Every licensed vendor shall at all times display conspicuously his/her License and any other notices that are required by the relevant authorities to be displayed.

3.4. PEST AND ANIMAL CONTROL:

3.4.1. Every vendor shall at all time take appropriate measures to keep his/her stall free from animals and pests, including rodents, files, insects or vermin infestation to prevent contamination of the food.

3.4.2. Every vendor shall, on becoming aware of the presence of any such pest/or harborage, immediately take all practicable measures to get rid of the pest or harborage and to prevent infestation.

3.4.3. Any food found to have become contaminated by pests shall be appropriately disposed of in a hygienic manner.

3.4.4. The contamination of food with pest control materials such as poisons must be prevented.

3.5. STREET FOOD ADVISORY SERVICE:

3.5.1. To facilitate the enforcement of this code of practice, the relevant authority shall provide advisers whose roles would be

3.5.1.1. to work with the vendors offering them on-site advice and guidance to improve their operations in accordance with the Code;

3.5.1.2. to participate in the design and/or delivery of thee formal training of vendors which is to be provided by the authorities in view of issuance and renewal of licenses;

3.5.1.3. to work in close collaboration with the enforcement personnel, including the officers in charge of registration and renewal; so that the code of practice is well understood and correctly applied;

3.5.1.4. when applicable, to train the enforcement personnel and regularly organize joint inspections to monitor progress in the application of the code of practice and;

3.5.1.5. to inform consumers as per Section 3.6 of these guidelines

3.5.2. Advisors should be good communicators, familiar with the requirements of the Guidelines, and have good understanding of both problems of the vendors and the protection of consumers.

3.5.3. Advisors should possess the trust and respect of vendors, consumers and enforcement personnel.

3.5.4. The advisors shall be, as far as possible, conversant with the Codex International Code of Practice - General Principles of Food Hygiene (CAC/RCP 1-1969, Rev 3,(1997)), including the Codex Guidelines for the application of the Hazard Analysis Critical Control Point System (HACCP), in order to assist vendors to optimize the use of scarce resources.

3.6. CONSUMER EDUCATION

3.6.1. The relevant authority shall inform consumers through posters, the media and the publicity campaigns about hazards associated with street foods and the steps the authority requires street food vendors to take to minimize those hazards.

3.6.2. Consumers shall also be informed of their responsibility in ensuring that they do not contaminate, dirty or litter street food vending sites.

3.6.3. Street Food Advisory Services shall have the leading role in the elaboration of information material and in the monitoring of consumers' education

4. VENDOR

4.1. HEALTH STATUS OF VENDORS

4.1.1. Any vendor, helper of food handler who is suffering from jaundice, diarrhoea, vomiting, fever, sore throat with fever, discharge from ear, eye and nose, visibly infected skin lesions (boils, cuts, etc.) shall cease from handling food in any capacity and seek medical treatment.

4.1.2. Any vendor, helper or food handler who has been identified as or is known to be or has previously been a carrier of food-borne diseases organisms, shall not be involved in any food handling activity until certified by a Medical Officer of Health or any other medical practitioner as a non-carrier.

4.1.3. Any vendor, helper or food handler shall be required to be immunized against food- and water-borne diseases such as typhoid, hepatitis A or any other food- and water-borne diseases as required by the relevant authority.

4.2. PERSONAL HYGIENE AND BEHAVIOUR

Every vendor, helper or food handler, during the conduct of his business, shall observe the following:

4.2.1. Wear an identification tag if issued and required by the relevant authority.

4.2.2. Dress in clean and proper attire.

4.2.3. Wash hands thoroughly with soap and clean water before and after handling food, after visiting the toilet, after handling unsanitary articles, touching animals, touching raw food, after handling toxic and dangerous materials as and when necessary.

4.2.4. Finger nails shall be kept short and clean at all times.

4.2.5. Hair shall be kept clean and tidy and should be covered during operation.

4.2.6. Non-infected cuts shall be completely protected by a water-proof dressing which is firmly-secured and routinely checked.

4.2.7. Shall not smoke or chew chewing gum while preparing or serving food.

4.2.8. Refrain from any unhygienic practices such as spitting and cleaning noses, ears or any other body orifice.

4.2.9. Shall not squeeze or cough onto the food.

4.2.10. The use of gloves is not recommended.

4.2.11. No vendor is allowed to use the stall as a sleeping or dwelling place, or for any other personal activity.

4.3. TRAINING OF VENDORS

4.3.1. Every vendor, helper of food handler shall undergo a basic training prior to licensing and further training as required by the relevant authority. Training is to be conducted by the relevant authority or other institutions recognized or approved by the relevant authorities. Vendors should also be made aware of their responsibility to consumers and to be informed of available credit facilities and other sources of finance to assist and improve their businesses.

4.3.2. Simple posters illustrating the “dos” and “don’ts” of street food preparation and vending should be widely and prominently displayed in relevant places for the benefit of both vendors and consumers.

4.4. VENDOR’S ASSOCIATIONS

The Formation of street food vendor associations or cooperatives should be encouraged to provide a liaison point with the relevant authorities in view of facilitating the implementation of control measure.

5. DESIGN AND STRUCTURE

5.1. LOCATION

5.1.1. The location of street food stall(s) shall be suitable for the purpose of avoiding contamination of the food prepared and served or sold at or from the stall. Stalls shall be located in areas designated by the relevant authorities.

5.1.2. Section 5.1.1. Shall also apply to mobile vendors

5.1.3. The area where the stall is located and immediate surroundings shall be easy to clean and capable of withstanding repeated washing and scrubbing.

5.1.4. The space in and around the vendors' stall shall be free of unnecessary stored goods or articles and discarded articles in order to permit easy access for cleaning.

5.1.5 The stall shall have a convenient access to an inlet of a drainage system on any suitable means of disposing waste water in a sanitary manner.

5.2. STRUCTURES

5.2.1. Vendors' stall shall be of a type approved by the relevant authority and shall be constructed from impervious materials that can be easily cleaned such as stainless steel, aluminium, glazed tiles or any other materials as approved by the relevant authority. It shall be properly constructed as to be readily cleaned and maintained in a good state or repair at all times.

5.2.2. Food preparation areas and working surfaces shall be made of a smooth and impermeable food grade material.

5.2.3. All cooking ranges, washing equipment, working tables, shelves and cupboards on or in which food is placed shall be at least 45cm above the ground.

5.2.4. There shall be adequate provision of artificial light of sufficient to ensure a reasonable standard of illumination for every part of the stall.

5.3. SANITATION

5.3.1. Water Supply: Vendors shall ensure sufficient supply of potable water at all times. Where necessary, such as in the case of mobile vendors or where potable water supply is not yet available, water shall be stored in clean water containers in conformance with Section 6.1.

5.3.2. Waste Water Disposal: Vendors' stalls should have an efficient waste water disposal system which shall be maintained in a good state of repair. The system shall be

large enough to carry peak loads and be provided with traps to ensure only liquid waste is discharged into the drain/sewer.

5.3.3. Solid Waste Disposal: Solid waste material should be handled in such a manner as to avoid contamination of food and/or potable water. Waste shall be removed from the working area of the stall as often as necessary and at least daily. All solid wastes shall be properly disposed into suitable containers which are secured with tight-fitting lids or placed in rubbish bins or central rubbish bins.

Immediately after disposal of the waste, receptacles used for storage and any equipment which has come into contact with the waste shall be cleaned using one of the methods described in Section 6.5. The waste storage area should also be cleaned daily.

Waste receptacles, equipment which has come into contact with the waste and waste storage areas shall be disinfected when required by the relevant authority. Only appropriate and suitable sanitizing agents shall be used. In areas without garbage collection service, solid waste is to be disposed of in a sanitary manner, as recommended or approved by the relevant authority.

5.3.4. Cleaning: All working surfaces, table top, floors and surrounding areas shall be thoroughly cleaned at least daily, using one of the methods described in Section 6.5.

5.3.5. Toilet Facilities: Every vendor, helper of food handler shall have access to toilet facilities which are approved by the relevant authorities and kept at all times in a clean and operational condition.

6.2. APPLIANCES

6.1. The appliances shall be kept clean. The equipment, including containers for storing drinking water, shall be made of materials which do not transmit substances, odours or taste, are not absorbent (unless its use is intended for that purpose and will not result in food contamination), are resistant to corrosion and capable of withstanding repeated cleaning and disinfection.

6.2. Every cutting surface used in the preparation of food shall be free from cracks and crevices, with only reasonable wear and tear, and shall be cleaned using one of the methods described in Section 6.5 at least on the following occasions:

6.2.1. Before and after daily operations; and

6.2.2. Especially after having put unclean material or on food on its surface is subsequently to be used to cut street foods or foods to be consumed raw.

6.3. Cooked and uncooked food shall be handled with separate utensils.

6.3.1. Cooked and uncooked food shall be stored separately.

6.4. Every vendor shall ensure that all defective, damaged, cracked, rusted, chipped and unsuitable appliances and crockery are removed from use and discarded.

6.5. All utensils shall be regularly cleaned by thoroughly washing them in warm water containing adequate amount of soap or other suitable detergents and then either immersing them for one-half (1/2) minute in boiling clean water and draining them or, for two (2) minutes in potable water at a temperature of not less than 77 degree centigrade (77 C) and draining them.

In the case where non-disposable crockery is used and water at 77 C or boiling temperatures is unavailable, potable water, wash soap or detergent and running water rinse is allowed. However, this method is not preferred.

6.6. Disposable crockery shall be used only once and properly disposed of. In the case where non-disposable crockery is used, the crockery is to be cleaned after each use using the method described for utensils in Section 6.5

6.7. All appliances are to be maintained in good state of repair.

6.8. All washed and clean utensils and crockery shall be handled; stored or transported separately from unclean and used utensils and crockery and other sources of contamination. They shall be stored in a clean and protected area which is not accessible to pests or vermin.

6.9. Only containers made of food grade material, not previously used for non-food use, shall be used.

6.10. Wash basins and sinks for cleaning utensils and washing hands shall always be clean and maintained in a good state of repair.

6.11. Towels used for wiping crockery shall be clean, handled in a sanitary manner and only be used for that purpose.

6.12. Containers used for table side condiments shall be kept clean and maintained in good condition and protected from pests.

6.13. All hands services articles such as napkins, towels and hand wash basins, disposables towels and soap shall be provided at all times.

7. FOOD PREPARATION

7.1. REQUIREMENTS FOR INGRIEDIENTS

Every vendor shall ensure the following:

7.1.1. Supply of ingredients, including ice, shall be from known and reliable sources.

7.1.2. The food handling method employed shall be such as to minimize the loss of nutrients.

1.1.3. Freshness and wholesomeness of ingredients to maintain quality and safety of food.

7.1.4. Transportation of ingredients shall be made in a manner so as to prevent exposure to the environment, spoilage and contamination.

7.1.5. Only permitted food additives shall be used and the amount added shall follow the specifications provided.

7.2. COOKING AND HANDLING

7.2.1. Soak and thoroughly wash fresh vegetables and fruit whether for cooking or consuming raw, with sufficient running potable water to remove adhering surface contamination.

7.2.2. Where appropriate, wash raw food before using in food preparation to reduce the risk of contamination. Never wash perishable raw food with other foods that will be consumed raw or in a semi-cooked state.

7.2.3. There shall be an area for handling, storing, cleaning and preparing raw food ingredients, separate and apart from the cooked, street food display, handling and serving areas.

7.2.4. Thawing: Frozen products, especially frozen vegetables can be cooked without thawing. However, large pieces of meat or large poultry carcasses often need to be thawed before cooking. When thawing is carried out as an operation separated from cooking this shall be performed only in

7.2.4.1. A refrigerator or purpose-built thawing cabinet maintained at a temperature of 4 C or

7.2.4.2. Running potable water maintained at a temperature not above 21 C for a period not exceeding 4hours; or

7.2.4.3. A commercial micro-wave oven only when the food will be immediately transferred to conventional cooking units as part of a continuous cooking process or when the entire, uninterrupted cooking process takes place in the microwave oven.

Note: Hazards associated with thawing include cross-contamination from drip and growth of micro-organisms on the outside before the inside has been thawed. Thawed meat and poultry products should be checked frequently to make sure the thawing process is complete before further processing or the processing time should be increased to take into account the temperature of the meat.

7.2.5. The time and the temperature of cooking shall be sufficient to ensure the destruction of non-spore forming pathogenic micro-organisms.

7.2.6. Water used for the purpose of drinking, preparation of hot or cold drinks and beverages shall be of water quality, or of clean quality and boiled or disinfected in any other way such as the use of an appropriate chemical agent.

7.2.7. Ice should be made from water. Ice shall be handled and stored so as to protect it from contamination. Contamination used to transport or store ice shall meet the requirements for water containers prescribed by Section 2.19.

7.2.8. Food shall not be re-heated more than once and the only portion of the food to be served shall be re-heated. A temperature of at least 75 C shall be reached in the centre of the food within one-hour of removing the food from refrigeration. Lower temperatures may be used for reheating providing the time/temperature combinations used are equivalent in terms of destruction of micro-organisms to heating to a temperature of 75 C.

7.2.9. Utensils used for tasting food shall be washed immediately after use.

7.3. SERVING FOOD

Every vendor shall observe the following:

7.3.1. All vendors purchasing street foods for the purpose of serving or selling must assure that such food is from licensed and reliable sources.

7.3.2. Cooked street foods shall not be handled with bare hands. Clean tongs, forks, spoons or disposable gloves shall be used when handling, serving or selling food.

7.3.3. All crockery used shall be clean and dry and not handled by touching the food contact surfaces.

7.3.4. Plates filled with food shall not be stacked one on top of the other during display, storing or serving.

7.3.5. Food grade packing materials shall be used.

7.3.6. Printed materials shall not be used to serve food. Only food grade aluminium foil, waxed paper, food grade plastic and any other suitable material shall be used for packing and serving food.

7.3.7. Never blow into plastic bags, wrappers or packages intended to be used for food packaging.

7.3.8. All beverages offered for sale shall be used dispensed only in their individual original sealed containers or from taps fitted to bulk containers and made of food grade plastic or other suitable material. Bulk containers shall be covered with tight fitting lids.

7.3.9. Cut fruit or other foods ordinarily consumed in the state in which they are sold shall be set out in an enclosed display case, cabinet or similar type of protective device and shall be displayed in a manner which will not affect the wholesomeness and cleanliness of such foods.

7.3.10. Food handlers shall avoid handling money. If this is unavoidable, the food handler shall wash his hands after handling money and before handling food again.

7.3.11. Ready-to-eat foods intended for continuous serving should be protected from environmental contamination and kept at the following holding temperatures:

a.) for food served hot……..60°C or above;

b.) for food served cold……..7°C or below;

c.) for food served frozen……-18°C or below;

7.3.12. A food warmer shall be used to maintain continuous holding temperatures (Section 7.3.11 (i) and shall not be used for re-heating purposes (Section 7.2.8.)).

7.4. UNSOLD FOOD

All unsold food cooked food and prepared beverages that cannot be properly preserved shall be disposed of in a sanitary manner at the end of the day.

7.5. TRANSPORTATION OF STREET FOODS

7.5.1. Street foods which require transportation to the point of sale shall be placed in a well protected, covered and clean container to avoid contamination.

7.5.2. Any vehicle used in transporting food shall be clean and in good condition, appropriately equipped to accommodate any special requirements of the food being transported and provide protection from environmental contamination.

7.5.3. Milk shall be transported to the point of sale in an insulated container maintained at a maximum temp. of 4°C.

7.5.4. Street foods shall not be transported together with raw food and ingredients, animals, toxic substances and other materials which may contaminate food.

7.6. FOOD STORAGE

7.6.1. The food shall at all times be kept clean and free from contamination and be adequately protected from pests, environmental contaminants and stored at proper temperatures where appropriate.

7.6.2. Readily perishable food shall be placed or stacked so that it is not likely to be contaminated by contact with raw food, pet, food, toxic substances or any other materials which may cause contamination. The bulk of readily perishable foods shall be stored in clean containers placed in a clean ice box or refrigerator in which the food shall not exceed a temperature 10°C. Quantities displayed for continuous serving shall not be handled according to the requirements listed in Section 7.3.11.

7.6.3. All dry ingredients shall be stored and maintained in their original labelled commercial container or ensuing containers and shall be properly labelled as to the content and designed to prevent moisture absorption.

7.6.4. All non-perishable food shall be stored in a clean, protected and closed container/cupboard to prevent cross contamination by pests.

7.6.5. Once cleaned, following the requirements of Sections 7.2.1. and 7.2.2., the bulk of perishable raw food including wet milled legumes, cereals or pulses shall be separated in containers preferably placed in a clean box, a refrigerator or a freezer to prevent spoilage.

7.6.6. Refrigerators and freezers shall not be overloaded and their temperatures shall be maintained at a maximum of 4°C and -18°C or below, respectively.

7.6.7. All enclosed spaces, cupboards, shelves and racks used for the storage of food shall be constructed so as to be easily cleaned and to protect the food from pests.

7.6.8. All food stored in bulk shall be stored in an orderly fashion and shall be placed so as to facilitate ventilation, inspection and the detection of pests.

7.6.9. All food shall be stored and handled separately from toxic, poisonous, deleterious and injurious substances.

7.6.11. Date marking on all food shall be checked before the food is used. Expired food shall not be sold or used for the preparation of food.