

**HYGIENE PRACTICES OF FOOD HANDLERS AND  
ENVIRONMENTAL ASSESSMENT OF SELECTED *BUKATERIA*  
WITHIN IBADAN NORTH LOCAL GOVERNMENT AREA, IBADAN,  
NIGERIA**

**BY**

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## DEDICATION

This research work is dedicated to the Immortal, the Invisible and the only Wise GOD. He is the One that kept me and made this work a success. To HIM be glory and praise forevermore.

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## ABSTRACT

The vending of cooked foods in makeshift structures or premises locally called *bukateria* is an established business in most Nigerian cities. Little is documented about the environmental sanitation of these facilities and the hygiene practices of food handlers who work in them. This study therefore assessed the sanitary conditions of the *bukaterias*, food handlers' personal hygiene practices and awareness of habits for preventing Food Borne Diseases (FBDs) in Ibadan North Local Government Area (IBNLG).

A descriptive cross sectional survey was conducted. A three-stage random sampling technique was used to select 350 *bukaterias* in seven out of 12 wards in IBNLG. In each *bukateria*, a validated questionnaire was used to collect data from one food handler selected by balloting where more than one existed. However, where only one food handler existed, he/she was purposively selected. An observational checklist was also used to document the characteristics of each of the selected *bukateria*. Water samples were randomly collected from 10% of the *bukateria* for total coliform count using the Most Probable Number (MPN) method. Results were compared with the WHO guideline limits. Data were analyzed using descriptive and Chi-square statistics.

Participants' mean age was  $38.5 \pm 11.2$  years and 88.6% were females. The listed personal hygiene practices for preventing food contamination included: regular bathing (33.0%), wearing clean clothing/apron (27.2%), well kempt covered hair (14.6%) and daily brushing of teeth (11.0%). Participants' food hygiene practices included: protecting food from contaminants (21.4%), use of clean water for cooking (19.4%) and use of clean cooking utensils (19.1%). Many participants listed diarrhoea (47.6%) and cholera (37.3%) as common FBDs usually contracted through use of contaminated water. Only 5.2% stated that FBDs could be contracted through an infected cook. The meat and fish storage practices among participants included boiling and frying (61.6%) and use of refrigerator (33.0%). None of the *bukateria* had a toilet facility. However, 49.3% had toilets within the vicinity which food handlers and customers could use. Sources of water used at the *bukateria* included: borehole (40.8%), shallow well (24.4%) and tap (20.2%). Common pests of public health importance found at the *bukateria* included: flies (48.3%),

cockroaches (24.4%) and rats (16.5%). More participants (56.5%) within 15-39 years age range reported the practice of hand washing with soap and water after using the toilet than those aged 40 years and above (43.5%). The difference was however not significant ( $p>0.05$ ). Above half (52.6%) of participants disinfects their *bukaterias* daily. It was observed that only 20.6% of the *bukaterias* had unblocked drains while 20.7% had well covered dustbins. Some *bukaterias* (27.0%) had properly fitted nets on windows and doors. Analysis of the water samples showed that 57.0% had an average MPN index of 50 coliforms/100ml of water which was higher than the WHO standard of 0 coliform/100ml for drinking water.

The sanitary conditions of the *bukaterias* and some of the practices by food handlers could facilitate the occurrence of food borne diseases. Health education strategies such as training and supportive supervision are needed to address the problems.

**Key words:** *Bukateria*, Food Borne Diseases (FBDs), Food Handlers, Hygiene practices, Sanitation.

**Word count:** 496



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## ACRONYMS

<b>BGLB:</b>	<b>Brilliant Green Lactose Bile Broth</b>
<b>CAC:</b>	<b>Codex Alimentarius Commission</b>
<b>DALYs:</b>	<b>Disability Adjusted Life Years</b>
<b>df:</b>	<b>degree of freedom</b>
<b>EHO:</b>	<b>Environmental Health Officers</b>
<b>FAO:</b>	<b>Food and Agricultural Organization</b>
<b>FBD:</b>	<b>Food Borne Disease</b>
<b>FGD:</b>	<b>Focus Group Discussion</b>
<b>HACCP:</b>	<b>Hazard Analysis Critical Control Point</b>
<b>IBNLG:</b>	<b>Ibadan North Local Government</b>
<b>KII:</b>	<b>Key Informant Interview</b>
<b>LGA:</b>	<b>Local Government Area</b>
<b>MDGs:</b>	<b>Millennium Development Goals</b>
<b>MPN:</b>	<b>Most Probable Number</b>
<b>NPGFS:</b>	<b>National Policy Guide on Food Sanitation</b>
<b>OSFA:</b>	<b>Oyo State Food Seller's Association</b>
<b>PHC:</b>	<b>Primary Health Care</b>
<b>TB:</b>	<b>Tuberculosis</b>
<b>UNICEF:</b>	<b>United Nations Children's Education Fund</b>
<b>WHO:</b>	<b>World Health Organization</b>

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

Through centuries, food has been recognised as important for human beings, in health and disease (Park, 2005). Food is an important part of our daily life as well as a fundamental requirement for our existence since it is the source of nutrients. However, it can be a potential source of ill-health as it is liable to contamination by micro-organisms and toxic chemical agents, either accidentally or otherwise at any point along the food handling chain, that is, from production to consumption (National Policy Guidelines on Food Sanitation, 2006).

Food safety can be defined in practical terms as the absence of adverse health effects following consumption (Lucas and Gilles, 2003). Food hygiene, on the other hand implies hygiene in the production, handling, distribution and serving of all types of food (Stewart, 1975). The primary aim of food hygiene is to prevent food poisoning and other food borne illnesses. Therefore, food sanitation is said to rest directly upon the state of personal hygiene and habits of the personnel working in the food establishments (Park, 2005). Food safety practices focus on limiting the presence of naturally occurring contaminants and those acquired from cross-contamination and preventing growth of organisms resulting from time and temperature rules not being followed. Hence, food safety begins from the farm where production, harvesting and storage take place; it continues with the processing and preparation and ends on the table when it is being eaten.

Food borne illnesses are defined as diseases, usually either infectious or toxic in nature, caused by agents that enter the body through the ingestion of food (WHO, 2000). Most

reported food borne illnesses or diseases (FBDs) are caused by foods prepared by and mistreated or mishandled in food service establishments (Roberts, 1982).

Food control is defined as a mandatory regulatory activity of enforcement by national or local authorities to provide consumer protection and ensure that all foods during production, handling, storage, processing, and distribution are safe, wholesome and fit for human consumption; conform to safety and quality requirements; and are honestly and accurately labelled as prescribed by law (FAO/WHO, 1976). The foremost responsibility of food control is to enforce the food law(s) protecting the consumer against unsafe, impure and fraudulently presented food by prohibiting the sale of food not of the nature, substance or quality demanded by the purchaser. Confidence in the safety and integrity of the food supply is an important requirement for consumers. Food borne disease outbreaks involving agents such as *Escherichia coli*, *Salmonella* spp. and chemical contaminants highlight problems with food safety and increase public anxiety that modern farming systems, food processing and marketing do not provide adequate safeguards for public health. Factors which contribute to potential hazards in foods include improper agricultural practices; poor hygiene at all stages of the food chain; lack of preventive controls in food processing and preparation operations; misuse of chemicals; contaminated raw materials, ingredients and water; inadequate or improper storage (FAO/WHO, 2001).

Food services establishments covers an extensive range of food businesses and for each type, there are specific requirements. However in this study, the attention is on public small-scale eating establishments or premises with standards lower than that of a canteen, locally called *bukateria*; a name with a root from a Hausa word "*buka*" literally meaning a hut or shed for housing. *Buka*, according to Microsoft Encarta Dictionary Tools (2006), means a street stand where food is sold while *bukateria* on the other hand has been defined as "a makeshift structure or premises where food is prepared, sold and eaten by consumers" (National Policy Guidelines on Food Sanitation, 2006). These two words: *buka* and *bukateria*; have similar meaning, referring to sub-standard structure where ready to eat foods (locally prepared indigenous foods) are sold and/or eaten.



In this study, therefore, the two words are used interchangeably, one seen as an abbreviation of the other. Foods from this facility form the commonest source of nutrient for most of Nigeria's city populations especially the average working-class group and at times school pupils. It provides the population with their daily required energy hence, helping to meet the recommended daily allowance (RDA) or dietary intake (RDI) at anytime with lower cost.

In Nigeria, malnutrition (either general due to starvation or specific nutrient deficiency) is a major public health problem - a state where adequate nutrients are not delivered to the cells to provide the substrate for optimal functioning (Akinyele, 2005). Inadequate dietary intake and diseases particularly infectious, play a role with underlying factors such as household food insecurity, inadequate health services and care, indicates its link to poverty (Latham, 1997). In the aetiology of malnutrition, diarrhoea appears to be the single most important disease (Mata, Kronmal, Urrutia and Garcia, 1977; Martorell, 1975). This shows that diarrhoea which is a food borne disease is related to malnutrition. Hence, a reduction in the frequency, intensity and duration of diarrhoeal attacks will not only save millions of lives but will also contribute substantially to the reduction of malnutrition in developing countries. A high level of food safety is one important way to attack the problem of diarrhoea (Arday-Kolci, 1986).

The dramatic growth of cities in the developing world has brought with it a new challenge - widespread and increasing urban poverty. However, efforts to address the unique problems of urban poverty lag far behind the growth of the problems themselves. Antipoverty initiatives have traditionally targeted rural areas, which were presumed to have been worse off than urban areas. But the problems of poor city dwellers have become more pressing, including the issues of how the urban poor earn their livelihoods and the ways in which this affects key indicators of human welfare, such as food security and nutrition, especially of children (Maxwell, Levin, Annar-Klemesu, Ruel, Morris and Ahiadcke, 2000).

With increasing level of development, urbanisation and changes in lifestyle, many families and individuals now depend on ready-to-eat foods as a major source of nutrition.



Street foods have been defined by the Food and Agricultural Organization of the United Nations (FAO) as 'ready-to-eat foods and beverages prepared and/or sold by vendors and hawkers, especially in streets and other similar public places (Simopoulos and Bhat, 2000).

Street foods are a heterogeneous food category consisting of meals, drinks (water inclusive) and snacks. They are inexpensive and available foods that, in many countries form an integral part of the diet, because they are consumed with regularity and consistency across all income groups, but particularly among the urban poor and in some countries, by children (Simopoulos and Bhat, 2000).

Street vending of food is an age old feature of life in many countries. In many developing countries, socio-economic changes have combined to promote such trade (Aiday-Kotei, 1986; Latham, 1997). Street-vended foods provide the following benefits:

- a) a source of inexpensive, convenient and often nutritious food for urban and rural poor;
- b) a source of attractive and varied food for tourists and the economically advantaged;
- c) a major source of income for a vast number of persons, particularly women; and
- d) a chance for self-employment and the opportunity to develop business skills with low capital investment (WHO, 1996a).

In contrast to these potential benefits, it is also recognized that street-food vendors are often poor and uneducated and lack appreciation for safe food handling. Consequently, street foods are perceived to be a major public health risk. If a community is to have the full benefits of street-vended foods with minimal risk of FBD, government intervention is required to ensure that the standard of safety for such foods is the best attainable in the context of the prevailing local situation (WHO, 1996a).

## 1.2 Statement of the Problem

By including water supply, sanitation and hygiene in the Millennium Development Goals (MDGs), the world community has acknowledged the importance of their promotion as development interventions and has set a series of goals and targets (WHO, 2004). Goal seven, which is on environmental sustainability highlights target 10; that is, halve, by 2015, the proportion of people without sustainable access to safe drinking water. Water supply, sanitation and hygiene are the three strongly related problems associated with FBDs such as cholera, diarrhoea and typhoid; which are common health and social problem in Nigeria and particularly, in Ibadan.

The rapid proliferation of small eating houses popularly called *buka* in the study area which is Ibadan North Local Government (IBNLG) may be due to the fact that they are easy to manage, they have increasing number of clientele which can be explained by the density of the population or probably because they have lesser requirements as compared to restaurants and other food service establishments. The increase could make effective monitoring and supervision by the local authority difficult. Also, because there is no uniformity in the structure and condition for operating at *bukaterias* in IBNLG, poor practices has been on the increase. Environmental sanitation is a major source of great concern in the study area and this serve as a contributory factor to the increase in the prevalence of FBDs. Most people generally often lack appreciation for good hygiene practices which promotes healthy living. This act runs across all works of life and since it is of utmost importance among food handlers, the need for this study.

There is not enough documentation about the environmental sanitation of the *bukaterias* and the hygiene practices of food handlers who work in them. Few studies have reported food handlers' hygiene and food safety practices in Nigeria. Musa and Akande (2003) carried out a descriptive study to determine food safety practices among food vendors in secondary schools in Ilorin, Kwara state. Idowu and Rowland (2006) assessed the prevalence of parasites with direct transmission and the level of hygiene among food vendors in schools and on the streets in Abeokuta, Ogun state. Adejumo (2006) assessed food handlers' personal hygiene and sanitation practice in Oyo state.



This study, apart from assessing food handlers' personal hygiene practices and their knowledge of foodborne illness, also investigates the microbial quality of the water used at the various *bukas* in IBNLG.

### 1.3 Rationale/Justification for the Study

The justification for this study in Nigeria and in Ibadan in particular is as follows:

- 1) There is a peculiar problem of environmental sanitation; inadequate and insufficient supply of potable water and lack of basic sanitary provisions including facilities for simple hygienic practices in Ibadan.
- 2) Food-borne illnesses such as diarrhoea, dysentery and typhoid form a significant part of the morbidity and mortality profile of Nigerians and have been on the increase in recent times (FAO/WHO, 2005a). Consumption of unwholesome food prepared under an unhygienic condition in a poor environment is one of the factors responsible for the increase.
- 3) There is an increasing number of small scale food establishment (*bukateria*) in the Ibadan metropolis especially in areas with high activities and around the inner densely populated areas where they are patronized on a daily basis. There is question of safety of the foods provided for the population by these facilities.
- 4) The failure of inspection, monitoring and regulation of these *bukaterias* by the local authorities; the food, premises and supervision of food handlers has serious public health implications.
- 5) There is under reporting of cases of FBDs at health facilities which has led to poor monitoring and surveillance coupled with the inability to trace a FBD to eating a street vended food prepared in an unhygienic environment.



## 1.4 Objectives of the Study

The broad objective of this study was to assess the sanitary conditions of the *bukaterias*, food handlers' personal hygiene practices and awareness of habits for preventing FBDs in Ibadan North Local Government Area (IBNLG).

## 1.5 The Specific Objectives

The specific objectives were to:

- 1) Assess the level of knowledge of food handlers on food safety.
- 2) Assess the personal hygiene practices of food handlers related to food hygiene.
- 3) Determine the knowledge of food handlers about FBDs.
- 4) Assess food handlers' practices of food storage and preservation.
- 5) Assess the role of the environmental health officers (EHOs) in *bukateria* operations.
- 6) Assess environmental and sanitary conditions at the various small scale food enterprises (*bukateriu*).

## 1.6 Limitation of the Study

A survey such as this involving a population of food handlers, majority of who are independent adults, had its peculiar challenges at different stages. However, the only limitation of this study was the inability to carry out medical examination on the food handlers as intended to determine the health conditions of the food handlers and their management of common ailments that can be linked to FBDs. This was not achievable due to lack of cooperation by the medical doctors who were meant to work with the investigator.

## CHAPTER TWO

### LITERATURE REVIEW

This chapter is an insight to previous studies in Nigeria, Africa and other countries of the world on factors affecting food safety and how to ensure that food consumed does not cause health hazards. The concept of food, nutrition, type of foods, and the type and mode of operation at the various eating establishments in the study area are also discussed. It highlights the importance of personal hygiene practices such as hand washing, the relevance of potable water and environmental sanitation in food production and processing. This chapter also dwells on etiology of food borne diseases (FBDs) focusing on microbial origin, the disease burden as well as its antecedent social causes.

#### 2.1 The Concept of Food, Nutrition and Food Types

Every living thing struggles for survival and human beings are no exception. The importance of food is seen in the fact that it is a basic means of sustenance and an adequate food intake, in terms of quantity and quality, is a key for healthy and productive life (Omonona and Agoi, 2007). The word "food" as defined in the National Policy Guidelines on Food Sanitation (2006) has a wider meaning than everyday use, and includes drinks, water, articles and substances of nutritional value which are used for human consumption and other products of a like nature and use, articles and substances used as ingredients in the preparation of food; but does not include live animals or birds, live fish which are not used for human consumption while they are alive. All definitions of food point to it as a basic necessity of life. It is important for existence; reproduction, growth and development of every race, culture or tribe which is passed on from one generation to the other.

The Universal Declaration of Human Rights adopted in 1948 affirmed the fundamental right of all people to adequate food, health and medical care. Also, in the global campaign of Health for All, promotion of proper nutrition is one of the eight elements of



primary health care (WHO/UNICEF, 1978). Nutrition, the science of food and its relationship to health is a complex subject which has moved from the general notion of what constitutes a balanced diet to a more coherent understanding of the patterns of and the prevention of food and nutrition related diseases of public health importance throughout the world. In the developing world, numerous deficiency diseases persist, especially in the rural areas, which are the result of essential nutrient deficiencies in the daily diet. These now coexist with the increasing presence of diet-related chronic diseases in the adult typically seen only in industrialized, developed countries. Nutrition also deals with the social, economic, and cultural issues related to making the right food choices and to purchasing and eating the 'correct' types of food in the 'appropriate' quantities, as well as the factors that determine this aspect of essential daily human activity and behaviour (Akinyele, 2005; Park, 2005; Shetty, 1994).

The nutritional well-being of an individual denotes the attainment of a physical, social and mental state which results from the consumption of the essential nutrients in adequate quality and quantity in addition to having access to good environment, health and care (Akinyele, 1993). In order to achieve nutritional security, clusters of determinants namely: food security, adequate care and health have been identified by UNICEF (1990). The broad area of food security may be usefully disaggregated into questions relating to *adequacy* of food availability and *stability* of both food availability and access (Ruel et al., 1998).

Adequacy of food availability means that the overall supply should potentially cover overall nutritional needs in terms of quantity (energy) and quality (providing all essential nutrients); furthermore, it should be safe (free of toxic factors and contaminants) and of good food quality (taste, texture, and so on). Also, the types of foodstuffs commonly available (nationally, in local markets, and eventually at the household level) should be culturally acceptable (Oshaug, 1994).

Stability of the food supply and of access to food presupposes environmental sustainability, implying that there is a judicious public and community management of the natural resources that have a bearing on the food supply; and also presupposes



economic and social sustainability in terms of conditions and mechanisms securing food access. This implies just income distribution and effective markets, together with various formal (public-sector) and informal safety nets. These could be public social security schemes, programmatic interventions, income-generating programs, and numerous forms of community transactions, and self-help and solidarity networks, the latter taking on particular importance when people have to cope with shocks and crisis situations of various kinds (Oshaug, 1994).

Food is essential in order to stay healthy; hence consumption of safe food substances is health promoting. Health, as defined by WHO (1985), is a state of physical, mental and social well being and not merely the absence of disease or infirmity. According to Ruel et al., (1998), health, one of the three conditions for nutrition security, is determined by a series of factors that act at three levels. At the community level, factors such as the quality of the overall environment (biological pathogens and chemical pollutants in air, food, and water), and the availability, cost, and quality of services such as water, electricity, sewage, refuse disposal, and health services are important health determinants. At the household level, the most important factors include the general conditions of the household, including the type of housing, the availability and cost of water and hygienic facilities, and the number of rooms per household member (an indicator of crowding); the availability of food; and household caring behaviours related to the use of preventive and curative health services, the use of water and hygienic facilities to provide a healthy, hygienic, and safe environment, and food-related behaviours such as the acquisition of food, the intrahousehold allocation of resources, feeding practices (including breast-feeding), and food preparation methods. At the individual level, the determinants of health relate to the interactive mechanisms among an individual's food and nutrient intake, nutritional status, and health status.

Food can be sourced for in variety of ways with the urban people more dependent in the purchase of food while the rural people often produce their own food. Tabatabai (1993) and Maxwell et al., (1998) have reported that food expenditures can make up as much as 60 to 80 percent of total income among low-income urban households. A recent study in Accra, Ghana found that households purchase 90 percent of their food (Maxwell et al.,

1998). Also Omonona and Agoi, (2007), noted that food accounts for a substantial part of a typical Nigerian urban household budget. This clearly indicates that for a household in the urban region to be food secured, the ability to earn cash income and the prices of food are determinants. This gives room for more jobs to be created for the people to meet their daily spending on buying of food. This is significant since the study area, Ibadan North Local Government is an urban center.

The many cultural traditions and changing tastes introduce new foods and food-making processes to growing populations around the world. According to Jelliffe (1974), food habits vary from one cultural group to another because each group in its own evolution sets a complex pattern of standardized behaviours. Individuals within a culture respond to the approved behavioural pressures by selecting, consuming and using those foods which are available to them. Therefore, 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 (Adejumo, 2006).

Food classification is important when planning balanced diet. According to Park (2005), foods may be classified in many ways by:

- a) Origin: animal and plant or vegetable.
- b) Chemical composition: carbohydrates, fats, minerals, proteins, and vitamins.
- c) Prolominant function: body-building (fish, meat, milk, poultry, pulses, etc), energygiving (cereals, sugars, roots and tubers, etc) and protective foods (vegetables, fruits, milk).
- d) Nutritive value (cereal and millets, fruits, vegetables, condiments and spices etc).

Also, the type of food crop grown and eaten by a group of people could be a peculiar feature in that locality. Within Nigeria for instance, the federation can be stratified on the basis of the relationships between: the agroecological zone and type of farming systems; crops grown and foods consumed; and type of food consumed (intake) and micronutrient



deficiencies (Maziya-Dixon et al., 2004). Food is viewed in different ways and this has been noted by Brieger (1985) since not all countries have the same resources and history. According to him, classification of food for developing nutrition education is necessary and more appropriate if the method used is a culturally acceptable one for easy comprehension by the people. Based on this premise, discussion on food hygiene and contamination in *bakterias* is better done by focusing on the traditional food groups which the people of Ibadan North Local Government Area are used to.

Foods are also grouped according to cultural perspective. A study by Brieger (1985) revealed that Yoruba mothers perceive the function of food differently than do modern nutrition scientist. According to him, foods were grouped under seven headings – starchy food, soup ingredients, meat, leafy vegetables, fruits, snacks and pap/porridge with condiments. The Yoruba names in each category or class are: *Okele* (starchy/bulky carbohydrates); *Elo* (soup ingredients); *Ewebe* (green vegetables); *Eran* (meat including poultry, snail, etc and/or fish), *Eko mimu or Ogi* (hot pap/porridge) with condiments; *Eso* (fruits) and *Ipanu* (snacks). In the study area, the types of food prepared and served are in combinations and at times the type of meal served depend on what time of the day it is served. The food groups are: *Okele* (bulky carbohydrates) which include *Amala (Lafin)*: white, made from cassava chips and *Amala dudu*: black, made from yam chips), *Iyan* (pounded yam), *Eba* (made from *Gari* a product of cassava) and *Fufu* (from cassava). *Eran* (meat, includes beef, goat, chicken, snail, fish and egg), *Elo* (ingredients) include pepper, tomatoes, onions, palm and vegetable oil which are used in making the stew or soup and they usually go with the *Ewebe* (*Ewedu* or *Efo*: refers to different types of green vegetables; and *Ila*: Okra and also *Gbegiri*: beans soup) for easy swallowing of any of the bulky carbohydrate foods. This combination or meal is most time served any time from noon. Another combination is in the group of *Ipanu* (snacks) and it include *Iresi* (rice either white or jollof), *Ewa* (beans), *Dodo* (fried plantain), *Iru didi/stse* (fried or boiled yam), and any of the breakfast condiments.

When discussing issues related to food hygiene, it may be important to classify foods based on the potential hazard they may constitute as either low or high risk food. A *high risk* food as defined by Sprenger, (1999) are "ready-to-eat foods which, under favourable



conditions, support the multiplication of pathogenic bacteria and are intended for consumption without further treatment that would destroy the pathogens". High risk foods are identified as potential causes of food borne illnesses and to prevent the hazard, it is important to obey basic food safety principles. One of the ways of reducing microbial risk of food contamination is by keeping to the temperature rules, that is, food must be stored at temperatures which are unfavourable for their activities.

## 2.2 Public Eating Establishments

In recent times, there is an increase in number of public eating establishment and this is as a result of several factors- a major one is increased urbanization. The movement of people from rural areas to urban centres has led to a need for feeding large numbers of working people on a daily basis away from their residences. Urbanization has led to the proliferation of street food vendors and hawkers made up mostly of women (90%) from families that moved into the urban centres (Akinyele, 1993).

Poverty coupled with lack of gainful employment in the rural areas push people out of their villages in search of better livelihood in the cities (Egunjobi and Agbola, 1993; Maxwell et al., 2000; Mabogunje, 2007). Often time, these migrants do not possess the skills or education to enable them to find better paid, secure employment in formal sector hence, they settle for work in informal sector. Also in the cities is a population who were earlier employed in the formal sector but lost their jobs due to some reasons and are forced into the informal sector. For example, in India, according to the government's pre-budget Economic Survey for 2004-05, the total workforce in the formal sector is around 27 million while the small-scale industries provide employment to 28 million workers. The Survey notes that employment in this sector grew from 24 million in 2000-01 to 28 million in 2004-05 whereas employment in the formal sector is stagnant at 27 million since 1991. The activities in the informal sector can be categorized into two sections – the self-employed and casual (non-permanent) labour. a major section of the self-employed work as street vendors (Bhowmik, 2005). Female labor-force participation has been steadily increasing throughout the developing world, particularly in Southeast Asia and Latin America. More than 60 percent of total female employment in the majority of West

African cities is in the informal sector (Becker, de Bodisco, and Morrison 1986 in Meagher 1995). In West Africa, women are 60–80 percent of the urban work force in trading; in Asia and Latin America, women dominate trading and manufacturing in the urban economy (ILO 1995).

Eating establishment means any premises where ready-to-eat food is prepared for sale or sold to the public, and includes the following types of operations: restaurants, lunch counters, snack bars, canteens (roadside), canteens (recreation facilities, i.e. rinks, fairs, etc.), cafeterias, banquet facilities, catering outlets and services, delicatessens, bakeries, vending outlets, take-out establishments (Legislative Counsel Office, 2005). In the study area and in fact Nigeria, the most popular type of eating establishments is grouped under the small scale eating houses. This group consists of *bukaterias*, cateries, roadside canteens or restaurants and street-vended foods (National Policy Guidelines on Food Sanitation, 2006). Of all these, *bukaterias* are the most common small scale food business in the study area and they are usually found in public transport centres such as motor garage, bus/taxi parks, market areas, construction sites, artisan workshops as well as around institutions. Adajumo (2006), also in his study stated that food canteens locally called *bukas* are the only forms of food eating establishments in Ibarapa North Local Government Area, a LGA in Oyo State. According to the National Policy Guidelines on Food Sanitation (2006), small scale food premises are places where food and beverages are prepared and/or sold by vendors for immediate consumption or consumption at a later time without further processing or preparation. These take different forms structurally and vary slightly on their mode of operation.

Generally, *street food* is a term used to classify all foods sold and eaten outside the home (Simopoulos and Bhat, 2000). Tinker (1997), in her study of street foods in seven countries of Asia and Africa, shows expenditures on street foods ranging from 16 percent of household food budgets in Bangladesh to 50 percent in Nigeria. Smaller and poorer families tend to spend more on street foods than other households. A study in Ghana (Maxwell et al., 1998) finds higher street food expenditures among the poorest groups. Households in the poorest expenditure quintile spent an average of 39 percent of their total food budget on foods purchased away from home, compared to 26 percent of the top



quintile, a finding confirmed by Tinker in cities of Bangladesh and the Philippines. According to Tinker (1997), in Indonesia and the Philippines, urban households spend up to 25 percent of their food budgets on street foods, a proportion that remains constant across income groups. Also, small families in urban areas of Thailand spent 58 percent of their food expenditures on street foods, compared to 36 percent of families with eight members or more.

Street foods offer many advantages; they are inexpensive, include variety and traditional foods, are quickly served, ready to eat and provide both nutrition and tasty meals to consumers (Akinyele, 1993). In many cases, street foods are cheaper than home prepared meals, especially when time spent shopping and cooking and the cost of transport and fuel are factored in (Tinker, 1997). Ruel (1998) also noted that street foods can be a significant source of food for many urban dwellers, both in terms of energy intake and food expenditure. In Ibadan, Nigeria, 98 percent of schoolchildren bought their breakfast in the streets (Children in the Tropics, 1994). Even if more expensive per unit than raw foods, purchase of prepared street foods can free-up time for the worker to engage in income-generating activities that have a greater benefit to the household than food preparation, especially in cases where traditional foods require long preparation times (Atkinson, 1992).

Food vendors are an important feature in most cities of the world. In addition to offering quick meals to people, the vendors are a positive factor in the local economy. It offers employment to poorly educated individuals who may otherwise be unemployed (Akinyele, 1993). Ahmad (2000) also provides interesting information on these vendors. He noted that the street food industry provides employment to women and migrants with low educational background. Day labourers, rickshaw pullers, migrants from rural areas and the homeless depend on street food vendors for their nutrition. Street foods may be, in some cases, the lowest-cost foods available. Vendors may be able to acquire raw materials through family or ethnic networks, or purchase discounted quantities at reduced prices. They may also rely on unpaid (in wages) labor from family members (Children in the Tropics, 1994).



However, most times the consumers who depend on street food are more interested in its convenience than in question of its safety, quality and hygiene (Collins, 1997; Barro et al., 2002b; Mensah et al., 2002). Several studies (FAO, 1986; Akinyele, 1987; 1991; 1992) have shown that street foods have potential for serious food poisoning outbreaks due to microbiological contamination and use of non-permitted food additives, colours and presence of other adulterates. Many small-scale food enterprises operate as backyard industries located in the owner's house, near the wastes, sewages, under trees without any sanitary system. The lack of appropriate site constitutes a risk for food contamination (Barro et al; 2007). The conditions under which street vendors operate are usually unsuitable for the preparation and selling of food (Bryan et al., 1988; Ekanem, 1998; Mosupye and von Holy, 1999). In most cases, running water is not available at vending sites and hand and dishwashing are usually done in one or more buckets or pans of water, sometimes without soap. Waste water and garbage are discarded in the streets providing food and harborage for insects and rodents. Foods are usually not effectively protected from dust and flies which may harbor food borne pathogens and safe food storage temperatures are difficult to maintain (Bryan et al., 1988; Ekanem, 1998). There are thus potential health risk associated with initial contamination by vendors during preparation and through post-cooking handling and cross-contamination (Bryan et al., 1988). Hence, because of poor hygiene people often fall ill after eating street food. They are mainly victims of water borne diseases (Ahmad, 2000).

According to other studies on street foods carried out in Africa, their tremendous unlimited and unregulated growth have placed a severe strain on city resources, such as water, sewage system and interferences with the city plan through congestion and littering adversely affecting daily life (Canet and N'Diaye, 1996; Barro et al., 2002a). Vendors often have poor level of education, unlicensed, untrained in food hygiene, technology and work under crude unsanitary conditions (Barro et al., 2002a; 2006a; Muinde and Kuria, 2005). The hygienic aspects of street food processing and vending operations are a major source of concerns for food control.

In order to ensure safety of foods consumed at public eating establishment, laws, regulations, or guidelines have been put in place which must be met in general as well as

specific requirements. For instance, the general requirements for small-scale food premises are: "food vendors shall obtain the necessary license and have sound knowledge and skills on hygiene handling of foods" (NPCFS, 2006). According to the Local Government Laws and Orders (1957), published in the Western Region gazette, the following are the minimum health requirements of a public eating house and the things which a food handler must not do. These are:

- 1) there should be a separate room for eating and a separate room for kitchen;
- 2) the floor of every public eating room shall be of concrete or other impervious materials and the walls shall be capable of being easily cleansed;
- 3) in the eating room, there should be adequate lighting and ventilation;
- 4) no living or sleeping room shall open directly into a public eating room;
- 5) in every public eating room shelves or cupboards shall be provided for storage of plates and other utensils and suitable chairs or benches shall be provided;
- 6) in every kitchen an adequate covered receptacle for the disposal of refuse shall be provided and maintained by the Licensee;
- 7) there should be suitable arrangements for the washing of plates and utensils;
- 8) no owner or proprietor of a restaurant or eating house or person 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;
- 9) no animals or fowls likely to cause a nuisance shall be kept in the compound of any restaurant or eating house;
- 10) 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;
- 11) 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 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.

The Environmental Health Officers are solely responsible for ensuring that all the necessary requirements are met and the laws and guidelines are complied with in respect of personnel, equipment and processes carried on therein. This is achieved through routine inspection of the food premises. This inspection is done using a checklist divided into external and internal inspection and a report is written based on what was observed at the premises. The inspector's report includes details such as date and time of inspection, name and address of the owner/proprietress and that of the eating house. Some external features of the premises that are included in the report are location of premises; adequacy of structure, toilet facilities, water supply, waste water and refuse disposal. While the internal include: adequacy of lighting and ventilation, hand washing facilities, evidences of smoke nuisance, cracked wall and defective floor, rat and pest infestation, hanging cobwebs and soot (National Policy Guidelines on Food Sanitation, 2006; Oyekan, 1993).

### 2.3 Personal Hygiene Practices

Hygiene behaviour plays an important part in low-cost water supply and sanitation programmes but it is an area often overlooked because of the difficulty in studying behaviour (Kallenthaler and Pinfold, 1995). Park (2005) explained that attitudes, beliefs, knowledge amongst others are the factors influencing human health behaviours of which cultural and social factors provide a setting for individuals. Peoples' cultural beliefs and practices are reflected in their habits and these invariably build up their personality. A person's hygiene behaviour therefore can promote health when good habits are employed or ruin it when bad habits persist. Clean habits generally covers improving one's personal appearance which include: keeping clean body through frequent bathing, care of the teeth, hair, hand and feet nails, hand washing with soap and water at critical points



especially after using the toilet (Heinz, 1993). According to the Queensland Health, the most important personal hygiene practices for food handlers are:

- 1) do whatever is reasonable to prevent their body, anything from their body or anything they are wearing, coming into contact with food or food contact surfaces;
- 2) do whatever is reasonable to stop unnecessary contact with ready-to-eat food;
- 3) wear clean outer clothing, depending on the type of work they do;
- 4) make sure bandages or dressings on any exposed parts of the body are covered with a waterproof covering;
- 5) not eat over unprotected food or surfaces likely to come in contact with food;
- 6) not sneeze, blow or cough over unprotected food or surfaces likely to come into contact with food;
- 7) not spit, smoke or use tobacco or similar preparations where food is handled; and
- 8) not urinate or defecate except in a toilet.

The many advantages offered by street vended foods, has made the practice of eating out a common socially acceptable norm in Nigeria (Oyejide, Oladepo and Oke, 1999). However, the quality of the food, hygiene practices of handlers and food handling environment could be of public health concern since poor food-handling and hygiene practices in domestic kitchens are thought to be the cause of a significant amount of food borne illness (Jay et al., 1999). Diarrhoeal disease, one of the FBDs, is a leading cause of morbidity in young children as well as the adult population especially those with compromised immunity. Amongst the risk factors for its transmission are 'poor' hygiene practices. Carter et al., (1998), reported from a prospective follow-up study in rural Nicaragua of the effect of a number of hygiene practices upon diarrhoeal disease in children under age two years old. 172 families, of whom half had experienced a higher than expected rate of diarrhoea in their children and the other half a lower rate, participated. Hygiene behaviour was observed over two mornings and diarrhoea incidence was recorded with a calendar over the course of five months. Of 46 good practices studied, 39 were associated with a lower risk of diarrhoea, five were unrelated, and a higher risk was observed for two. The washing of hands, domestic cleanliness, and

the use of diaper/underclothes by the child had the strongest protective effect against diarrhoea. Mothers with more than three years of primary school education and in a comparatively better economic position, including having a radio, exhibited comparatively better general hygiene behaviour. Education had a slightly stronger effect when a radio was present. They however reported that individual hygiene behaviour seems to be highly variable compared to the consistent behaviour of the overall community. A consistent relationship between almost all hygiene practices and diarrhoea was detected, more schooling producing better hygiene behaviour. The high variability of hygiene behaviour at the individual level requires repeated observations (at least two) before and after the hygiene education in the event one wants to measure the impact of the campaign on the individual.

Ekanem, Adedcji and Akintoye (1994), reported in their study that foods from street vendors may serve as one source of diarrhoeal illnesses and such episodes could be prolonged following repeated exposure, especially in children who are fed mainly with a low-energy and low-nutrient-density diet such as 'ogi' (maize pap). Though, there have been both national and international previous similar studies on personal hygiene and handling practices of the food handlers of eating establishments, little has been reported on the study area. In a descriptive study carried out in Nigeria to determine food safety practices among 185 food vendors in secondary schools in Ilorin, some of the major unhygienic practices observed among the food vendors were poor care of used utensils 100(54%), use of previously used water for washing and cleaning, lack of covering apron among the vendors 128(69%) and lack of wash hand basin for immediate cleaning 61(33%). Only 85(46%) of the respondents used soap and water to clean their utensils while the rest 100(54%) used unhygienic methods to clean their utensils (Musa and Akande, 2003).

### **2.3.1 Hand Washing and Food Handling**

The hand is one of the most important parts of the human body since it is used to achieve so many of life functions; in feeling, touching, handling or holding. The hands of food handlers can be pivotal as vectors in the spread of food-borne disease due to poor



personal hygiene or cross-contamination (Setiabudhi, Theis and Norback, 1997). According to Taylor et al., (2000) there is evidence from the food industry to show that microorganisms are transferred to the hands in the process of handling food and through poor personal hygiene after visiting the lavatory, resulting in the hands being heavily contaminated with enteric pathogens. The transmission of enteric-related pathogenic microorganisms via the hands of food handlers thus continues to be a problem in the food industry (Barza, 2004). Hand-washing, a simple and effective way to cut down on cross-contamination, is all too often forgotten (Rippel, 2002). It was reported that 42% of food-borne outbreaks which took place from 1975-1998 in the United States of America had been caused by the hands of food handlers (Ayçiçek et al., 2004). When not washed with soap, hands that have been in contact with human or animal faeces, bodily fluids like nasal excretions, and contaminated foods or water can transport bacteria, viruses and parasites to unwitting hosts (WELL Fact Sheet, 2005).

In food processing and preparations, the hands play a significant role. This is why hand washing is essential in food safety and hygiene. Hand washing is a cornerstone of public health, and new hygienic behaviours and sanitary services were principal drivers of the sharp drop in deaths from infectious disease in affluent countries in the late 19th century. According to Fewtrell et al., (2005), turning hand washing with soap before eating and after using the toilet into an ingrained habit could save more lives than any single vaccine or medical intervention, cutting deaths from diarrhoea by almost half and deaths from acute respiratory infections by one-quarter (WELL Fact Sheet, 2005; Kepos, 2008).

People all over the world wash their hands with water. The belief that washing with water alone to remove visible dirt is sufficient to make hands clean is commonplace in most countries. But washing hands with water alone is significantly less effective than washing hands with soap in terms of removing germs, and hand washing with soap is seldom practiced. Around the world, the observed rates of hand washing with soap at critical moments range from zero percent to 34 percent (Planner's Guide, 2008). Using soap adds to the time spent washing, breaks down the grease and dirt that carry most germs by facilitating the rubbing and friction that dislodge them and leaves hands smelling pleasant



(which creates an incentive for soap's use). With proper use, all soaps are equally effective at rinsing away the germs that cause disease (Hand washing Handbook, 2008).

Allwood (2004), in his attempt to have baseline data on the practice of hand washing among public restroom users, conducted an observational study for more than a year at three large events held at Minnesota state fair ground. The total average observed hand washing at the three events was 40% among males and 68% among females. Hand washing with soap was observed among 68% adults, 28% of them rinse with water only while 7% neither rinse nor wash their hands after using the rest room. Hand washing with soap is a life-saving intervention within the technological and financial reach of all countries and communities. But promoting it requires appeals not necessarily to health, but to other things that people value, such as comfort, social status, nurture and a wish to avoid disgust (WELL Fact Sheet, 2005). More hand washing with soap would make a significant contribution to meeting the Millennium Development Goal of reducing deaths among children under the age of five by two-thirds by 2015.

A recent review (Curtis and Cairncross, 2003) of all the available evidence suggests that hand washing with soap could reduce diarrhoea incidence by 47% and save at least one million lives per year. This is consistent with other studies which found that 12 hand washing interventions in nine countries achieved a median reduction in diarrhoea incidence of 35% (Hill et al., 2001). Many of the most successful interventions provided soap to mothers, explained the faeco-oral route for disease transmission, and asked mothers to wash their hands before preparing food, and after defecation.

According to the World Bank Group (2008), one of the practices identified to be changed in order to promote hand washing and hygienic behaviours is targeting the four most critical: hand washing with soap (or ash or other aid) before food preparation and after dealing with faeces; latrine use and safe disposal of children's faeces; safe weaning food preparation; and safe water handling and storage. This is why the United Nations General Assembly has designated 15<sup>th</sup> of October (the first-ever which was celebrated in 2008) as the Global Hand washing Day to echo and reinforce its call for improved hygiene practices especially the washing of hands with soap.

### 2.3.2 Head Covering and Wearing of Apron during Food Preparation

Part of the mandatory personal hygiene of food handlers is the use of personal protective clothing which includes wearing of head cover and apron or uniform during food preparation (Park, 2005). This practice is essential in food hygiene because it goes a long way in protecting food from risk of contamination. Ibidapo et al., (1981), reported that none of the food handlers at the facilities he studied used apron and only a few (17%) used head covers while cooking. Similarly, the study by Ekpo et al., (1985) on socio-cultural aspect of food preparation patterns in Igbo-Ora, found out that the standard of hygiene during food preparation in *bukas* was generally poor. Majority of food handlers did not cover their heads and did not wear apron while working. Many of them were found to be naked while preparing food. These are practices that have potential for compromising food quality (Adejumo, 2006).

Lues and Van Tonder (2006) investigated the occurrence of indicator bacteria on hands and aprons of food handlers in a retail group and determined the relationship between the occurrence of organisms on hands and on aprons. In this study, samples were collected from the hands and aprons of food handlers and analyzed for the presence of total viable counts (TVC), total coliforms, *Escherichia coli*, members of the family Enterobacteriaceae and *Staphylococcus aureus* in order to assess the levels of contamination and to establish possible relationships. Noteworthy TVC were present on 98% of hands and 84% of aprons sampled and conformed to the national standard of  $1 \times 10^2$  cfu cm<sup>-2</sup> without exception. Coliforms were present on 40% of food handler's hands and on 26% of aprons and when compared to the literature by Moore and Griffith (2002) which suggests a target value of less than 2.5 cfu cm<sup>-2</sup>, 32% of food handlers exceeded the target with regard to hands and 8% with regard to aprons. *E. coli* was found to exceed the limit only in the case of one food handler. Enterobacteriaceae were present on the hands of food handlers (44%) and on aprons (16%), ranging between 5 and  $1.8 \times 10^1$  cfu cm<sup>-2</sup> on hands and between 5 and  $2.9 \times 10^1$  cfu cm<sup>-2</sup> on aprons. *S. aureus* counts were present on 88% of hands and 48% of aprons and ranged between negligible and  $9.8 \times 10^1$  cfu cm<sup>-2</sup> for hands and up to  $6.2 \times 10^1$  cfu cm<sup>-2</sup> for aprons. They concluded



that no significant statistical correlation occurred between the organisms on hands and aprons, indicating that the latter were not likely to be cross-contaminated by hands.

## 2.4 Training and Evaluation of Training Effectiveness

Food handler training is seen as one strategy whereby food safety can be increased, offering long-term benefits to the food industry (Smith, 1994). A postal survey of manufacturing, retail and catering food businesses by Mortlock, Peters, and Griffith (2000) revealed that only less than 10% had failed to provide some food hygiene training for staff. Though those catering establishments without food hygiene training in the study above may be seen as few, they can be identified as risk because lack of training especially for food managers may restrict their ability to assess risks in their business and to assign appropriate hygiene training for their staff (Egan et al., 2004).

In a randomized, controlled trial of an education intervention to reduce diarrhoea through improved personal and domestic hygiene behaviours, 18 geographically separate village clusters (sites) in rural Zaire were selected by Flaggerly et al., (1994). For 12 weeks baseline information on the diarrhoeal morbidity of 2082 children aged 3-35 months was collected at weekly home visits, and structured observations of hygiene practices related to diarrhoea were made on a subset of 300 families. Intervention messages addressed disposal of animal faeces from the yard, handwashing after defecation and before meal preparation and eating, and disposal of children's faeces. Three months after the start of the intervention and exactly 1 year after the baseline studies, a second diarrhoeal morbidity study and a second observational study were conducted in order to evaluate the intervention. Result showed that Children in intervention communities experienced an 11% reduction in the risk of reporting diarrhoea during the peak diarrhoeal season, compared to controls ( $P < 0.025$ ). The largest differences were seen among children aged 24-35 months, with those from intervention communities reporting significantly fewer episodes, shorter mean durations and hence fewer days of diarrhoea. There was some evidence that greater reductions in diarrhoea occurred in sites where the quality of the intervention, a scored measure of volunteer efficacy and community participation, was highest. The authors concluded that hygiene education may be an effective approach to



reduce the incidence and duration of diarrhoeal episodes in rural Zaire. Children aged 2 years appear to benefit the most.

The Manpower Services Commission (1981) defined training as 'a planned process to modify attitude or skill behaviour through learning experience to achieve effective performance in an activity or range of activities'. Evaluation is integral to the cycle of training, providing feedback on the effectiveness of the methods used, checking the achievement of the objectives set by both the trainer and trainee and in assessing whether the needs originally identified have been met (Bramley, 1996). Criteria that may be used for evaluating the effectiveness of a training programme include reaction to training, knowledge acquisition, changes in job-related behaviour and performance and improvements in organisational-level results (Kirkpatrick, 1967). Research on training effectiveness has focused primarily on factors that are directly related to training content, design and implementation (Tannenbaum and Yuki, 1992). However other factors outside the training environment may influence the effectiveness of any programme (Tracey, Tannenbaum and Kavanagh, 1995). These outside factors according to Putra, (1999) could be individual and work environment that may also associate with training effectiveness.

### 1) Individuals characteristics

- a) Individual's ability to learn and acquire new knowledge and skills can have a direct influence on training preparation and performance. Some of the factors that individual should have is his or her ability to construct and evaluate problematical information. If trainees possess these, thus learning would be comparatively quick and efficient. Individuals' ability can be assessed throughout the selection process and to make selection decisions, managers must know about the skills, knowledge and attitudes required to perform the essential tasks and duties.
- b) An individual's attitude toward work may also affect his or her willingness to apply the newly acquired knowledge and skills on the job after training has been accomplished. Such individuals' commitment should also be considered

to ensure his or her desire to achieve good performance. Indeed, if individuals possess a high degree of commitment to their jobs, it is very likely they will regard training as valuable and easy to transfer their new 'capital' back on the job.

- c) Individuals' willingness may lead to increase their motivation. In addition, those who are motivated to go to training are more likely to learn and use their newly acquired knowledge and skills to the workplace. Now the issue is how to enhance motivation. It is managers' job to boost their motivation and to understand employees' values and needs. To find out which motivation - either external motivation or internal motivation or can be both - managers must constantly examine and work together with their employees.

## 2) Working atmosphere

- a) Working atmosphere may have a considerable impact on someone's preparation for and transfer of training. Hospitality managers must be concerned with factors such as individual's awareness about the work situation and systems as they influence learning and performance.
- b) Social association may also play a major element of the work environment that can influence training effectiveness. Organization's social norms and values that support learning can have a positive impact on an individual's willingness to attend and learn during training, as well as to transfer learning back to the job. Peers support can also be successful to encourage individuals to use the newly acquired knowledge and skills. 'Buddy' system is very helpful for someone who remains unsure to apply newly gained skills and knowledge.
- c) Organizational systems such as the appraisal and reward systems. Performance appraisal is used to identify performance discrepancies and this will form the training needs analysis to determine the exact cause of performance gap. Furthermore, if someone can demonstrate a great performance, he or she should be rewarded. And this can be seen through every individual who shows what they have acquired through training.



d) Finally, continuing learning may have a major impact on the effectiveness of training. Programs such as mentoring, apprenticeships, traineeships, cadetships, attending professional seminars can too influence the effectiveness of training, especially when these learning opportunities accompany what has been gained through training (Putri, 1999).

Despite general acceptance that training efforts must be systematically evaluated, few studies have tried to identify the benefits food hygiene training brings to the industry (Egan et al., 2004). This is illustrated by a survey of the US lodging industry where fewer than 10% of the hospitality companies conducted formal evaluations of their training programmes (Conrad, Woods and Ninemeir, 1994). Researchers have argued that the effectiveness of food hygiene training could be greatly improved if it was designed using health education and psychological theories (WHO, 1988; Rennie, 1995; Griffith et al., 1995; Ehiri et al., 1997b). In designing effective training for food handlers there is a need to fully understand all the factors underlying current food hygiene behaviour in the workplace.

To be effective food hygiene training needs to target changing those behaviours most likely to result in food borne illness. Most food hygiene training courses rely heavily on the provision of information. There is an implied assumption that such training leads to changes in behaviour, based on the Knowledge, Attitudes and Practices (KAP) model. This model has been criticised for its limitations (Ehiri, Morris and McEwen, 1997b; Griffith, 2000). It is accepted that knowledge alone is insufficient to trigger preventive practices and that some mechanism is needed to motivate action and generate positive attitudes (Tones and Tilford, 1994). In an evaluation of food hygiene education Rennie (1994) concluded that knowledge alone does not result in changes in food handling practices. Various studies have shown that the efficacy of training in terms of changing behaviour and attitudes to food safety is questionable (Mortlock, Peters and Griffith, 1999).

In a recent work conducted on street food vending in the Free State Province, in Bloemfontein, South Africa, the microbiological quality of the food sold and the hygienic

conditions under which vendors operated were assessed. The microbiological quality of the foods sampled was compared to existing food safety guidelines. This study found that, overall, the microbiological quality of foods from which samples were taken was within acceptable safety limits, but that the presence of *Escherichia coli*, *Staphylococcus aureus*, *Salmonella* and yeasts was indicative of a degree of ignorance of the food handlers (at the vending sites) towards proper hygiene practices. The study concluded that even though the bacterial levels detected in the food were below the set guideline limits, it was still required that the local authority in that area intervene through health education actions to ensure that the standard of safety of street vended foods is the best attainable even under the prevailing unhygienic environmental conditions (FAO/WHO, 2005b).

Education of food handlers in matters of personal hygiene, food handling, utensils, dish washing, insect and rodent control is the best means of promoting food hygiene. Certain aspects of personal hygiene are therefore required to be continually impressed upon them: the hands, hair, overalls or apron and habits such as coughing and sneezing (Park, 2005).



## 2.5 Hazard Analysis Critical Control Points (HACCP)

Ensuring food safety must not only be tackled at the national level only but also through closer linkages among food safety authorities internationally. This is why the joint Food and Agriculture Organization of the United Nations (FAO) and World Health Organization (WHO) established the Codex Alimentarius Commission (CAC) Food Standards Programme responsible for formulating the standards, codes of practice, guidelines and recommendations that constitute the Codex Alimentarius. The code has had an enormous impact on the thinking of food producers and processors as well as on the awareness of the end users - the consumers. Its influence extends to every continent, and its contribution to the protection of public health and fair practices in the food trade is immeasurable. Codex standards and other related texts are now regarded as the international reference points by the World Trade Organisation (WTO) and are also being adopted by many countries as minimum food standards (CAC/GL 43-2003).

In November 1992, the National Advisory Committee on Microbiological Criteria for Foods (NACMCF) defined seven widely accepted HACCP principles that were to be considered when developing a HACCP plan. In 1997, the NACMCF reconvened the HACCP Working Group to review the Committee's November 1992 HACCP document and to compare it to current HACCP guidance prepared by the CODEX Committee on Food Hygiene. From this committee, HACCP was defined as a systematic approach to the identification, evaluation and control of food safety hazards based on the following seven principles:

**Principle 1: Conduct a hazard analysis.**

**Principle 2: Determine the critical control points (CCPs).**

**Principle 3: Establish critical limits.**

**Principle 4: Establish monitoring procedures.**

**Principle 5: Establish corrective actions.**

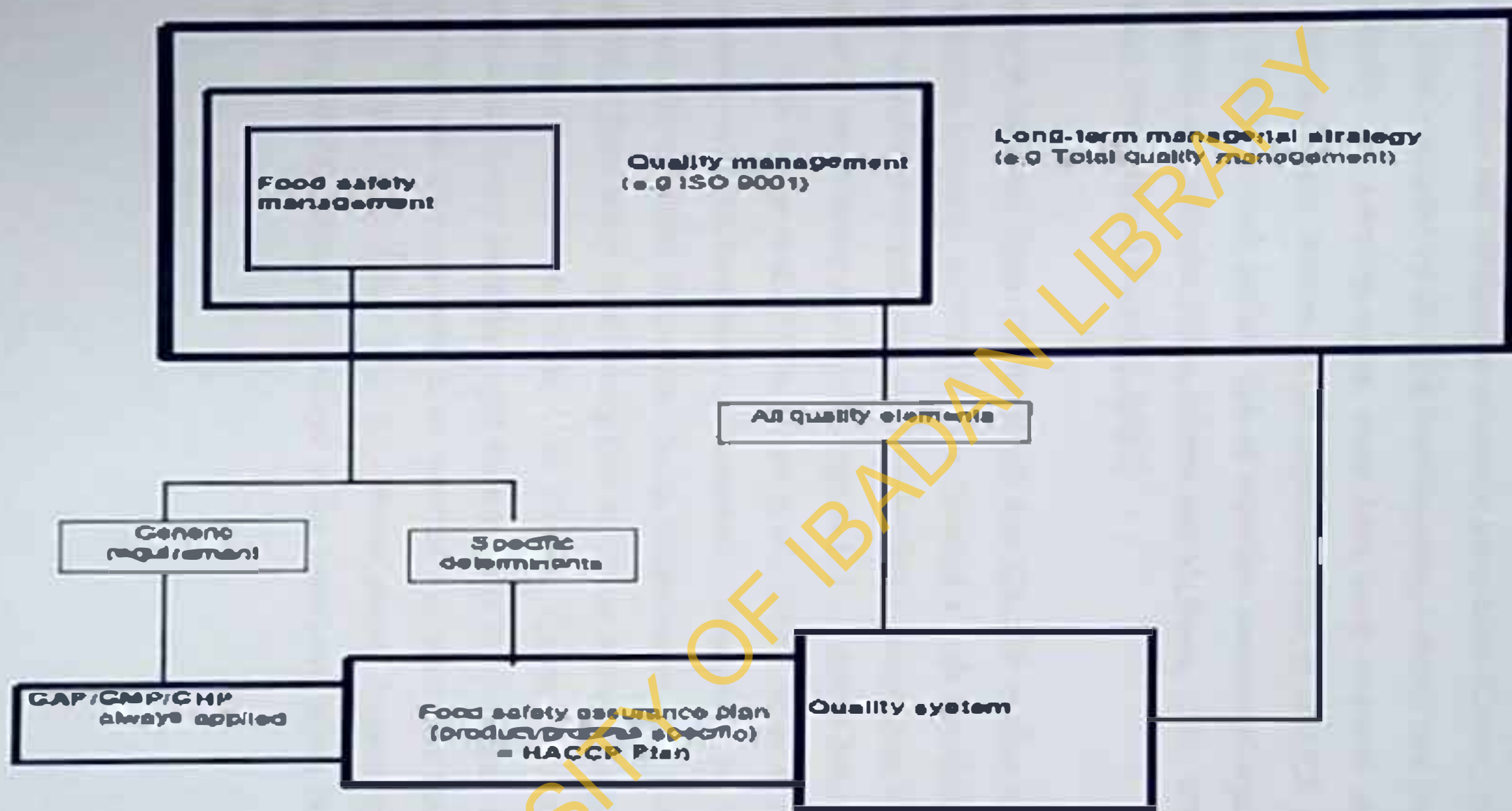
**Principle 6: Establish verification procedures.**

**Principle 7: Establish record-keeping and documentation procedures.**

The Hazard analysis critical control point (HACCP) system and the guidelines for its application were defined by the CAC in its code of practice. The term has become synonymous with food safety and it is a worldwide-recognized systematic and preventive approach that addresses biological, chemical and physical hazards through anticipation and prevention, rather than through end-product inspection and testing. Street food safety management need a Hazard Analysis Critical Control Points (HACCP) and the prerequisite system as Good Manufacturing Practices (GMP) and Good Hygiene Practices (GHPs) to instill professional face to street food operators (Bryan et al., 1988; 1992c).

HACCP is an internationally recognized food safety assurance system that concentrates prevention strategies on known hazards; it focuses on process control, and the steps within that, rather than structure and layout of premises (Kirby, 1994; Worsfold and Griffith, 1995). It is an important component of an integrated approach to food safety. The inter-relationship of HACCP with other food safety tools is illustrated in Figure 2.1. It requires a good understanding of the relationship between cause and effect in order to be more pro-active and it is a key element in Total Quality Management (TQM). HACCP builds on the foundations of well established quality management systems such as Good Manufacturing Practice (GMP), Good Hygienic Practice (GHP), Good Agricultural Practice (GAP), and Good Storage Practice (GSP).





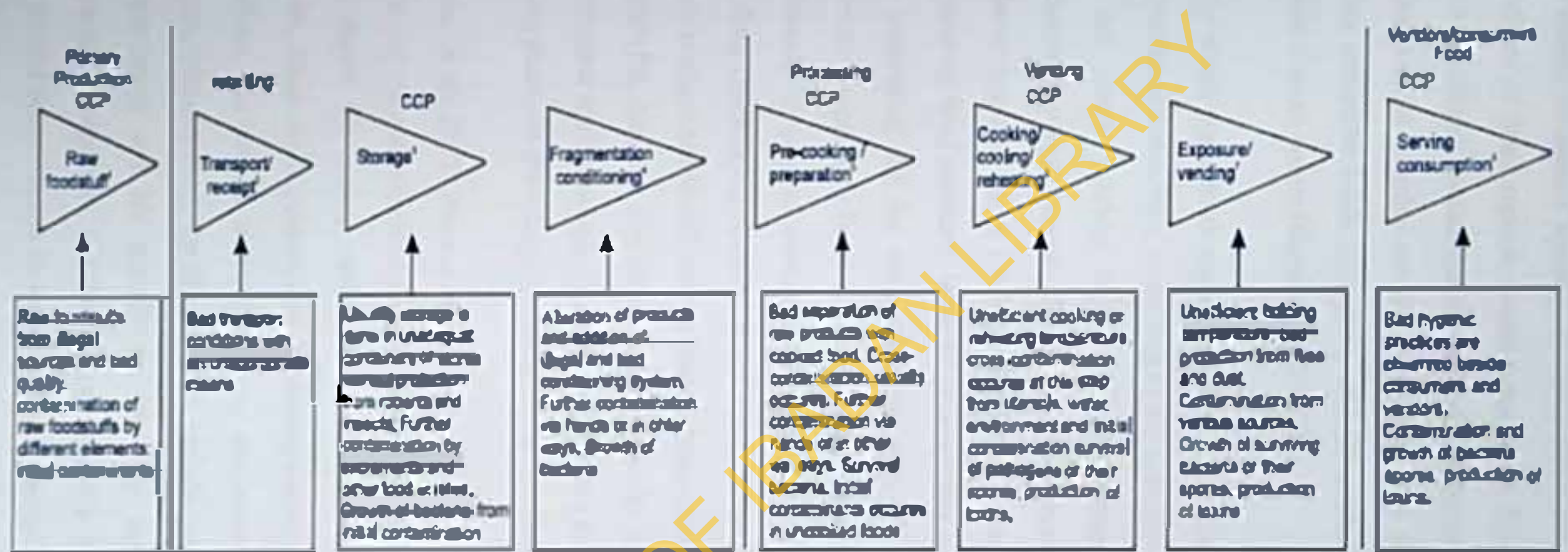
**Fig. 2.1: Food Safety Tools: an integrated approach**

Source: Jouve, et al; 1998.

Every process which deals with preparing or selling food can be classed as a food business activity, including: preparation, processing, manufacturing, transportation, distribution, handling, packaging, storage, selling and supplying. HACCP establishes procedures whereby identified hazards can be reduced or eliminated and it requires documentation and verification of control procedures (Codex, 1997). Whilst HACCP has been widely adopted by the food manufacturing industry and the larger companies in the hospitality and catering sector, there have been concerns about implementation by smaller businesses. Barriers to the implementation of HACCP in small businesses have been identified which include lack of expertise, absence of legal requirements, financial constraints and attitudes (Ehiri, Morris and McEwen, 1995; WHO, 1999; Taylor, 2001; Walker, Pritchard and Forsythe, 2003).

Mosupyc and von Holy (2000) noted that HACCP studies on street-food vending in developing countries worldwide have revealed a high correlation between long holding times at ambient temperatures and high bacterial counts, even though the foods had been cooked at temperatures high enough to kill vegetative forms of most bacteria (Bryan et al., 1988, Bryan et al., 1992a, Bryan et al., 1992b; Bryan et al., 1997). Various safety assurance measures have been implemented throughout the food production chain to prevent street-vended foods from being contaminated with bacteria and viruses. Data generated from street food enterprises in eleven towns belonging to ten west African countries (Burkina Faso, Mali, Cote d'Ivoire, Ghana, Guinea, Benin Niger, Nigeria, Senegal and Togo) identified eight main steps in street-vended foods general production chain and this enterprise tend to be satisfied with what they have achieved (Barro et al; 2007). The figure below (Fig. 2.2) shows current hazards reported, CCP and Good Practices (GPs) violations observed at the main steps along the street food production chain.





**Fig. 2.2: Safe Street Food Production**

**Note:** Identification and description of Hazards, CP and Good Practices violations at different steps of street food production chain in reference to Advised Good Practices recommended by FAO/WHO along the street food chain of production. 1, 2, 3, 4, 5, 6, 7 and 8, indicate different steps in street food production chain. CCP = Critical Control Points

Source – Barro, et al.,: Safe Street Food Production (SSFP).

The others violations specific to one's steps are also described in Fig. 2.2. However, violations of these aspects means presence in food production chain, a risk that leads to direct or indirect contamination of food: the hazards of significance depend on the nature of the food, its intended use and production step. Steps 1, 3, 5, 6 and 7 are most important during uncooked foods processing and for cooked foods, steps 5, 6 and 7 are the main critical control points (Barro et al; 2007).

Many small-scale food enterprises like street food industries, operates under a simple organizational structure, consisting of the manager-owner assisted by a few workers, who do not know modern techniques of management, including book-keeping and maintaining proper records. Street foods are processed generally by traditional methods of beverages and snack foods production. A poor manufacturing practices and personal hygiene of food handlers, lacks of good-quality raw foodstuffs materials and vegetables for processing are the main characteristics. Holding cooked and uncooked foods at ambient temperature for 6 hours or longer without any appropriate holding temperature (reheating in case of cooked food), constitute a major critical control point of street-vending (cook/hold) operations surveyed. In addition cooked foods were subjected to cross-contamination and contamination from various sources such as utensils, knives, raw foodstuffs, flies that sporadically landing on the foods, by vendors bare hand serving and occasional food handling by consumers. Street food producers and vendors neglect food safety practices providing to population unsafe foods (Barro et al; 2007).

Barro et al; 2007, showed street-vended foods contamination mechanism pathways by carrying out risk characterization and assessment based on other authors' work. Figure 2.3 shows the causes, routes and vectors of various contaminations of street-vended foods. Four main vectors can be distinguished. The first vectors include insects and animals, the second is constituted by environmental conditions (weather, dust, rains, winds, urbanization), the third vectors include peoples which acting in street food areas (government and his specific services low actions, hygiene controllers, producers, growers, transporters, consumers and vendors). Finally, the last vectors are represented by natural contaminants as toxins contain in some raw foodstuffs and seafoods.



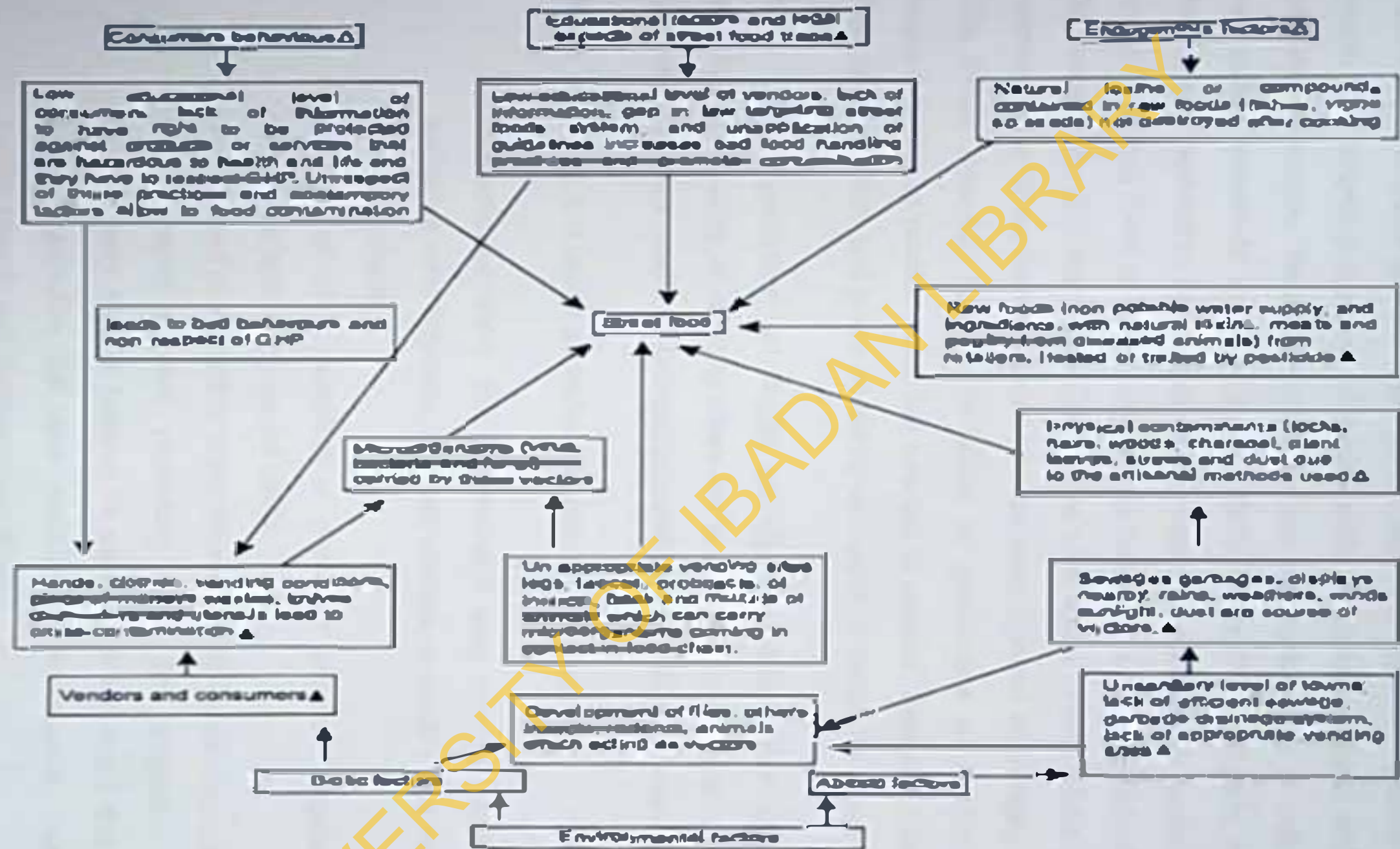


Fig. 2.3: Mechanism of Street-vended Foods Contamination

Note: Mechanism of street-vended foods microbiological and physical contamination vectors and their routes diagram. Arrows indicated contamination routes, dotted arrows indicate indirect routes.

Source: Barro et al; 2007

## 2.6 Potable Water Supply and Food Safety

Every year in developing countries, an estimated 3 million people die prematurely from water-related diseases and 2 million people die from exposure to stove smoke inside the homes. The largest proportion of these deaths are among infants and young children, followed by women, from poor rural families who lack access to safe water, sanitation and modern household fuels (Akiyeye, 2005). Recently in Nigeria, major outbreak of cholera was reported in some parts of the country. According to media reports, about 50 people lost their lives to the scourge while hundreds were hospitalized in Benue state. The disease was also reported in Cross River state where over 60 children died. The most common cause of cholera as indicated by the cases reported is drinking of polluted water (The Punch Editorial, 2008). The failure of government in its duty to broaden the people's access to potable water has resulted in peoples' dependent on untreated water from streams, rivers, and ponds which equally serve as latrine for many citizens.

Water supply, sanitation and health are closely related. Poor hygiene, inadequate quantities and quality of drinking water and lack of sanitation facilities cause millions of the world's poorest people to die from preventable diseases each year.

Water, sanitation and health are linked in many ways as follow:

- a) contaminated water that is consumed may result in water-borne diseases including viral hepatitis, typhoid, cholera, dysentery and other diseases that cause diarrhoea
- b) without adequate quantities of water for personal hygiene, skin and eye infections (trachoma) spread easily
- c) water-based diseases and water-related vector-borne diseases can result from water supply projects (including dams and irrigation structures) that inadvertently provide habitats for mosquitoes and snails that are intermediate hosts of parasites that cause malaria, schistosomiasis, lymphatic filariasis, onchocerciasis and Japanese encephalitis



- d) drinking water supplies that contain high amounts of certain chemicals (like arsenic and nitrates) can cause serious disease.

Inadequate water, sanitation and hygiene account for a large part of the burden of illness and death in developing countries. For example:

- a) Approximately 4 billion cases of diarrhoea per year cause 2.2 million deaths, most-1.7 million-children under the age of five, about 15% of all under 5 deaths in developing countries.
- b) Diarrhoeal diseases account for 4.3% of the total global disease burden (62.5 million DALYs - disability adjusted life years). An estimated 88% of this burden is attributable to unsafe drinking water supply, inadequate sanitation, and poor hygiene. These risk factors are second, after malnutrition, in contributing to the global burden of disease.
- c) Intestinal worms infect about 10% of the population of the developing world, and can lead to malnutrition, anemia and retarded growth.
- d) Three hundred million people suffer from malaria.
- e) Two hundred million people are infected with schistosomiasis, 20 million of whom suffer severe consequences (World Bank, 2008).

## 2.7 Environmental Sanitation and Food Safety

The environment of man is the surrounding external factors and it encompasses all the living and non living, material and non-material things. Giroult (1993) noted the environmental components within the framework of WHO and he mentioned six aspects of supportive environment:

- 1) The physical environment – covers the housing and town planning pattern, air, water, soil, wastes and every other visible component.
- 2) The chemical environment – which refers to pollution and nuisances.
- 3) The biological environment – which refers to conservation of nature and natural ecosystems; animal and plant life.
- 4) The economic environment – which refers to the economic basis of life.
- 5) The social environment – covers the structure and interactions of the diverse human communities, including cultural life.
- 6) The psychological environment – related to psycho-cultural ambience measured by classical mental health indicators and level of psychosocial stress.

World Bank (2000; 2001) has recognized that the environment in which people live from the household to the community to global level significantly affects their health. The environment dictates the basic differentials in the incidence and prevalence of specific diseases or morbidity and therefore, death, at global, state, local, town and even household levels is not in any doubt (Iyun, 1993). More than 50 communicable diseases are associated with poor sanitation, resulting in disease and premature death to millions of people, especially children, every year. With no facilities for disposing of garbage and excreta, and limited access to water for basic hygiene, the urban poor are especially vulnerable to epidemics of water-related and vector-borne diseases (Wright, 1997).

In a cross-sectional survey to identify the risk factors for diarrhoea among children, the environmental and personal hygiene practices of 526 mothers of children aged less than five years was studied in two markets in Ibadan - one with poor sanitary conditions (Bodija) and the other one with better sanitation facilities (Gbagi). A questionnaire was used for collecting information on social and demographic characteristics, personal and



environmental hygiene practices, including sources of food and water for their children, waste-disposal practices and occurrence of diarrhoea among their children aged less than five years. Sixty (23%) women of the Bodija market mentioned that tap water was the source of drinking water for their children, while 91 (34%) brought water from their homes, and 45 (17%) bought it from vendors in the market. The corresponding figures for women of the Gbagi market were 41 (16%), 98 (38%) and 19 (7%). Two hundred and thirty-four (90%) women in Gbagi prepared breakfast at home for their children compared to 216 (81%) women in Bodija. This difference was statistically significant ( $p < 0.05$ ). Waste disposal and personal hygiene practices were poorer among the women in Bodija. Yet the occurrence of diarrhoea was not significantly different in both the markets. Risk factors for diarrhoea identified in this study were water and food bought from vendors, child defaecation practices, mothers' cleaning up practices after child's defaecation, and refuse-disposal practices. The inherent risk of sale of unwholesome food and water by vendors is a great concern for public health authorities in Nigeria. Efforts to control diarrhoea must not only be focused on improving mothers' knowledge about food hygiene but also on environmental hygiene practices within the community (Oyemade et al., 1998).

In a descriptive survey conducted on 29 public eating places, Ibidapo et al., (1981), reported common features such as poor lighting and ventilation (40%), inadequate floor space (75%), absence of plastered walls (25%) while four of the eating establishments are built with iron roofing sheets. The use of firewood for cooking was reported in all the facilities and smoke from kitchen pollutes the eating areas. Only five had access to toilet facilities, waste water is poured indiscriminately while only 62% had dust bins.

## 2.8 Aetiology of Food Borne Diseases (FBDs)

Food borne diseases (FBDs), often called food poisoning encompass a wide spectrum of illnesses and are a growing public health problem worldwide. The disease is basically traceable to presence of foreign substance in the food ingested. A foreign substance could be classified based on its origin as biological, chemical or physical. However, FBDs may be classified into two: intoxication and infection.

Food borne intoxications occur due to presence of naturally occurring toxins in food (e.g. endemic ascitis - alkaloids), certain bacteria (e.g. botulism), some fungi (aflatoxin) or certain chemicals (Park, 2005).

Food borne infections is caused by pathogenic microorganisms present in ingested food. Microorganisms are a very diverse group varying in their appearance, ability to carry out different biochemical transformations, remarkable ability to grow in wide variety of different environments and in their interactions with other organisms, in particular humans (Prescott et al; 2002). Organisms such as bacteria, fungi, protozoa, viruses and worms (nematodes) that cause diseases are all pathogens and are abundant in all environmental media that is, air, land, water and even food. In the presence of organic substances, these organisms thrive well.

Foods contaminated with disease producing organisms are the principal source of the simple diarrhoeas, food poisoning, bacillary and amoebic dysentery. These are closely associated with an unsanitary environment and inadequate personal hygiene (Mensah et al., 1999). Pathogens causing diarrhoea are spread via the faecal-oral route and infection may be caused by drinking contaminated water. There are also a variety of ways by which diarrhoea is transmitted almost all of which, either directly or indirectly, involve the hands (Feachin, 1984; Kallenthaler et al., 1995). Improper practices responsible for microbial food borne illnesses have been well documented (Bryan, 1988b) and typically involve cross-contamination of raw and cooked foodstuffs, inadequate cooking and storage at inappropriate temperatures. Food handlers may also be asymptomatic carriers of food poisoning organisms (Cruickshank, 1990).



When a new food borne disease appears, there is a natural history to the challenge, starting with first detection and description; the development of means to diagnose and treat the new infection; investigations into the sources, reservoirs, and transmission pathways; and finally prevention stratagems that improve to the point that the disease no longer presents an important problem. Each of the many known FBDs is somewhere on this progression, and more are likely to be appreciated in the future. The spectrum of FBDs is a dynamic range of threats. An array of bacterial, viral, and parasitic pathogens that cause food borne infections are currently recognized as public health problems (Tauxe, 2005) see Table 2.1.

Mosupye and von Holy (1999), in an earlier survey conducted to gain an overall indication of the microbiological safety of ready-to-eat street vended foods sold in a typical South African setting of a major taxi rank in the Johannesburg Central Business District, collected food samples and analysed for bacteria count. The results obtained from this survey were compared to results reported in similar studies conducted in other countries and also considered in comparison to environmental conditions under which the street food vendors were noted to operate. This study concluded that the production of relatively safe street-vended foods, with low bacterial counts, was possible even under improper hygiene conditions and a lack of basic sanitary facilities.

Despite an increase in the number of food handlers receiving food hygiene training, a high proportion of food poisoning outbreaks still occur as a result of poor food handling practices. Clayton et al., (2002), in their study of beliefs and self-reported practices of 137 food handlers from 52 small to medium-sized food businesses in Wales, reported that generally, food handlers were aware of the food safety actions they should be carrying out but identified a number of barriers which would prevent them from implementing these practices. These barriers included lack of time, lack of staff and a lack of resources.

**Table 2.1: Food borne Pathogens**

<b>Bacteria</b>	<b>Viruses</b>	<b>Parasites</b>
<i>Bacillus cereus</i>	Norovirus*	<i>Cryptosporidium</i> *
<i>Brucella</i>	Rotavirus*	<i>Cyclospora</i> *
<i>Campylobacter</i> *	Astrovirus*	<i>Giardia lamblia</i> *
<i>Clostridium botulinum</i>	Hepatitis A	<i>Toxoplasma</i> *
<i>Clostridium perfringens</i> *	Anisakis	<i>Trichinella</i>
<i>Enterobacter sakazakii</i> *	Prions	Bovine encephalopathy agent*
<i>E. coli</i> O157:H7*		
<i>E. coli</i> non-O157 STEC*		
<i>E. coli</i> other diarrhoeogenic*		
<i>Mycobacterium bovis</i>		
<i>Salmonella</i> Typhi		
<i>Salmonella</i> non typhoidal		
<i>Shigella</i>		
<i>Staphylococcus aureus</i>		
<i>Streptococcus</i>		
<i>Vibrio cholerae</i> , toxigenic (O1 and O139)*		
<i>Vibrio vulnificus</i> *		
<i>Vibrio parahaemolyticus</i> *		
<i>Yersinia enterocolitica</i> *		

NOTE: Pathogens characterized as food borne within the last 30 years are indicated with an asterisk.

Source: Tauxe (2005); Adapted from Tauxe (2002).



Bacteria responsible for food poisoning can grow in food quickly, especially in warm and moist conditions. Just a single bacterium on an item of food left out of the fridge overnight could harbour many millions of bacteria by the morning. This is because most bacteria grow best and increase in number in a moist environment between 5°C and 60°C - a range of temperatures known as the 'growth' or 'danger' zone. Colder or hotter than this, bacteria cannot grow effectively. This explains why one of the basics of food hygiene is to keep raw or cold food cold, and cooked or hot food, piping hot (Bupa's Health Information, 2006).

Bacteria that cause food poisoning are found in many foods, including:

- a) meat and meat products - such as minced meat and pâtés
- b) poultry - such as chicken or turkey
- c) seafood - fish and shellfish
- d) eggs and raw egg products (such as mayonnaise)
- e) unpasteurized milk (or milk contaminated after pasteurization)
- f) soft and mould-ripened cheeses
- g) cooked foods - such as fried rice

Ehiri and Morris (1996) point out that data on risk factors for food borne diseases (Bryan, 1988; Evans et al., 1998) imply that most outbreaks result from faulty food handling practices. A study in the USA suggested that improper food handler practices contributed to approximately 97% of food borne illnesses in food-service establishments and homes (Howes et al., 1996). Consequently, in order to reduce food borne illness it is crucial to gain an understanding of the interaction of prevailing food safety beliefs, knowledge and practices of food handlers (WHO, 1988).

In a national telephone survey in the United States of America by Attekrose et al., (1996) on consumer knowledge of food borne microbial hazards and food-handling practices, 1,620 of at least 18 years old were randomly selected. Respondents were interviewed about their recognition of food borne pathogens, foods at risk for transmitting infection, knowledge of safe food handling, and food-handling practices. One-third of the

respondents who prepared meals reported unsafe food hygiene practices: e.g., they did not wash hands or take precautions to prevent cross-contamination from raw meat. Unsafe practices were reported more often by men, adults 18 to 29 years of age, and occasional food preparers than by women, persons 30 years old or older, and frequent food preparers. Respondents who identified a food vehicle for *Salmonella* spp. were more likely to report washing their hands and cleaning cutting boards after preparing raw meat and poultry. The results raise concerns about consumer food-handling practices. The influence of food safety training, food-handling experience, and age on food-handling practices should be studied further. Awareness of a food vehicle for *Salmonella* spp., for example, may indicate knowledge of the etiology of food borne disease that promotes safe food handling. Understanding the factors associated with safe food handling will assist in development of effective safe-food instruction programmes.

Many intestinal parasites' life cycle are directly associated with lack of hygiene habits and to the unfavourable environmental and sanitary conditions that make easier the person to person transmission, of protozoa and helminthes (Ramirez, 1975). In a study to verify the occurrence of intestinal parasitic infection in 104 school food handlers (cooks and helpers) in Brazil; Costa-Cruz, Cardoso and Marques (1995), reported that intestinal parasites were found in 85.0% of the studied schools and 47.1% of the food handlers were found positive. Among the 49 infected food handlers, 32(65.3%) carried a single parasite and 17(34.7%) carried two parasites. According to them, the following were the parasites found: *Giardia lamblia* (21.1%), *Entamoeba coli* (21.1%), hookworms (9.6%), *Ascaris lumbricoides* (5.8%), *Entamoeba histolytica* (2.9%), *Hymenolepis nana* (1.9%), *Strongyloides stercoralis* (1.0%).



## 2.9 Burden of Food Borne Diseases (FBDs)

Poor access to clean water, non-observance of basic sanitation and hygiene which are essential preventive and control measures of food borne illness, has no doubt contributed significantly to the Nigerian's dismal life expectancy which according to 2006 Human Development Report, declined from 51 in 2004 to 43 in 2006 (The Punch Editorial, 2008). Food borne illness is estimated to affect more than 76 million people in the United States each year, resulting in 325,000 hospitalizations and 5,200 deaths, but its true incidence is unknown because FBD is difficult to diagnose, the vast majority of these illnesses and more than half of such deaths are attributed to "unknown agents" (Mead et al., 1999). Many people with symptoms of food borne illness do not seek medical attention, further contributing to under diagnosis. These circumstances, in addition to the rapid distribution of food on both a national and global scale, make it nearly impossible to detect even a large food borne outbreak in time to limit its impact. The annual cost of medical expenses and productivity losses associated with the five most prevalent, diagnosable food borne illnesses is nearly \$7 billion (Vogt, 2005).

Despite a lack of accurate statistics in the prevalence of food borne illnesses and outbreaks in Nigeria, evidence from developed countries, where environmental sanitation and control of food borne illnesses are better managed, indicate that food-related illnesses, still account for significant ill-health, socio-economic losses and deaths. Surveillance data from the Federal Ministry of Health shows increasing trend in the number of cases of FBD such as cholera, food poisoning and typhoid/paratyphoid fevers. For example, while in 1994, 3,173 and 22,525 cases of cholera and typhoid/paratyphoid fevers respectively were reported, these figures increased to 9,254 and 68,846 cases, respectively by 1998. Surveillance data for 2001 showed that these figures increased to 10,294 and 73,949 cases respectively (National Policy Guidelines on Food Sanitation, 2006).

The processes of food borne outbreak detection and investigation remain highly challenging. Most often, outbreak investigations occur after the fact. This is because findings from outbreak investigations enable public health authorities to identify new

food borne pathogens, trace their entry into the food chain, and thereby reveal opportunities to improve food safety. Reliable epidemiological estimates on the burden of these diseases are important in order to assess the impact of food safety measures and advise policymakers on the cost effective use of resources. Although several international initiatives are under way, no precise and consistent global information exists to date (WHO, 2006).

## 2.10 Social Causes of Food Borne Diseases (FBDs)

It is common knowledge that the custom of eating out which was once limited to special occasions, has become embedded in the Nigerian culture because of the state of economy and urban pressure like metropolitan growth, distance from home to work or school and long hours of employment of women outside the home. This now contributes to the great number of commercial food establishments, proliferation of mass eating places and increased presence of uncontrolled street food vendors in Nigerian cities and villages, so that at least in a day, a meal is consumed away from home. Furthermore, hotels, hospitals, industry and school establishments also routinely provide meals for their customers, employees and students. The attendant errors resulting from these are lack of proper safety and sanitation in food management (FAO/WHO, 2005).

The social, economic decline in the country has brought about an expansion of private entrepreneurship in the food business such as street food vending. The street food vendors are often poor, uneducated and are unaware of the importance of food hygiene and safety. The environment in which the food is vended often is poor and this increases the risk of food contamination. The open display and exposure of cooked food meant for human consumption to contaminants such as dust and flies is a common practice which has largely contributed to the increase of FBDs. Food hygiene and safety practices in Nigeria have yet to be fully developed (FAO/WHO, 2002).

In 1983, in their report, the Joint FAO/WHO Expert Committee on Food Safety, which was convened at WHO Headquarters in Geneva in 1983, identified both the importance



and potential hazards of street-vended foods. Because of the possibility of microbiological, chemical and physical contamination, which conceivably could occur under street conditions, the Committee concluded that efforts must be made (a) to educate the personnel involved; (b) to improve the environmental conditions in which the trade is practiced; and (c) to provide the essential services to assist street food vendors in assuring the safety of their wares (WHO, 1996).

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## CHAPTER THREE

### METHODOLOGY

This chapter deals with the description of the study area, the study design, the study population, sampling techniques, data collection method and laboratory procedure for bacteriological analysis of water samples.

#### 3.1 Study Area

The study was carried out in Ibadan, the capital of Oyo State of Nigeria. Ibadan is an ancient city in West Africa dominated by the Yoruba speaking tribe. It lies between latitude 7° and 9°30' East of prime meridian (Fajehinsan, 1988). Ibadan was created in 1829 as a war camp for warriors coming from Oyo, Ife and Ijebu (Falola, 1984). It is a metropolitan city situated in the South-western part of Nigeria, 78 miles inland from Lagos and also a prominent transit point between the coastal region and the areas to the north. Ibadan covers a land area of 12 kilometers radius with Mapo hall as the centre. It has an altitude generally ranging from 152 to 213m with isolated ridges and peaks rising to 274m (Sridhar and Ojediran, 1983). Ibadan is a densely populated city with various types of occupations undertaken by its inhabitants (Fig. 3.1).

There are 33 Local Government Areas in Oyo State of which 11 LGAs are in Ibadan metropolis. Ibadan North Local Government Area is one of the 11 LGAs and it covers the larger part of the inner city with variety of activities and a denser population. According to the 1991 population Census, it has a total population of 300,937 people with male population of 150,837 and female population of 149,100 people. However, the recent report of the 2006 Population and Housing Census breakdown of National and State provisional population total, Ibadan North LGA has a total of 306,795 people; made up of 153,039 males and 153,756 females out of a total of 5,591,589 in the State. It is the



second most populous LGA after Ibadan North East LGA which has a population of 330,399 people (National Population Commission, 2006).

Ibadan North Local Government (IBNLG) was carved out of the defunct Municipal Government along with others under the then Federal Military Government of Nigeria on 27<sup>th</sup> of September, 1991. The LGA comprises of areas between Beere roundabout through Oke-arc to Mokola, Oke Itunu and Ijokodo. Again, from Beere roundabout to Gate, Idi-ape to Bashorun and up to Lagos/Ibadan expressway, Secretarial, Bodija, University of Ibadan and Agbowo areas (Fig. 3.2). The headquarters of IBNLG is Bodija.

The Local Government is bounded in the north by Akinyele LG, in the west by Iddo LG, Ibadan South-West and also Ibadan South-East LGs. In the east, it is bounded by Ibadan North East and Lagelu LGs (Olusegun, 2001). There are twelve political wards in Ibadan North Local Government Area and they are shown in Table 3.1.

### 3.2 Study Design

This study is a descriptive cross sectional survey with both survey and laboratory components. It is aimed at assessing the sanitary conditions of the *bukaterias*, food handlers' personal hygiene practices and their awareness of habits for preventing food borne diseases/illnesses. The information obtained in this survey was derived from the interviewer administered questionnaire, focus group discussions and observation checklist. Also, as water quality is essential for food hygiene, there was an aspect of bacteriological analysis of water or indicator organisms (Coliforms).

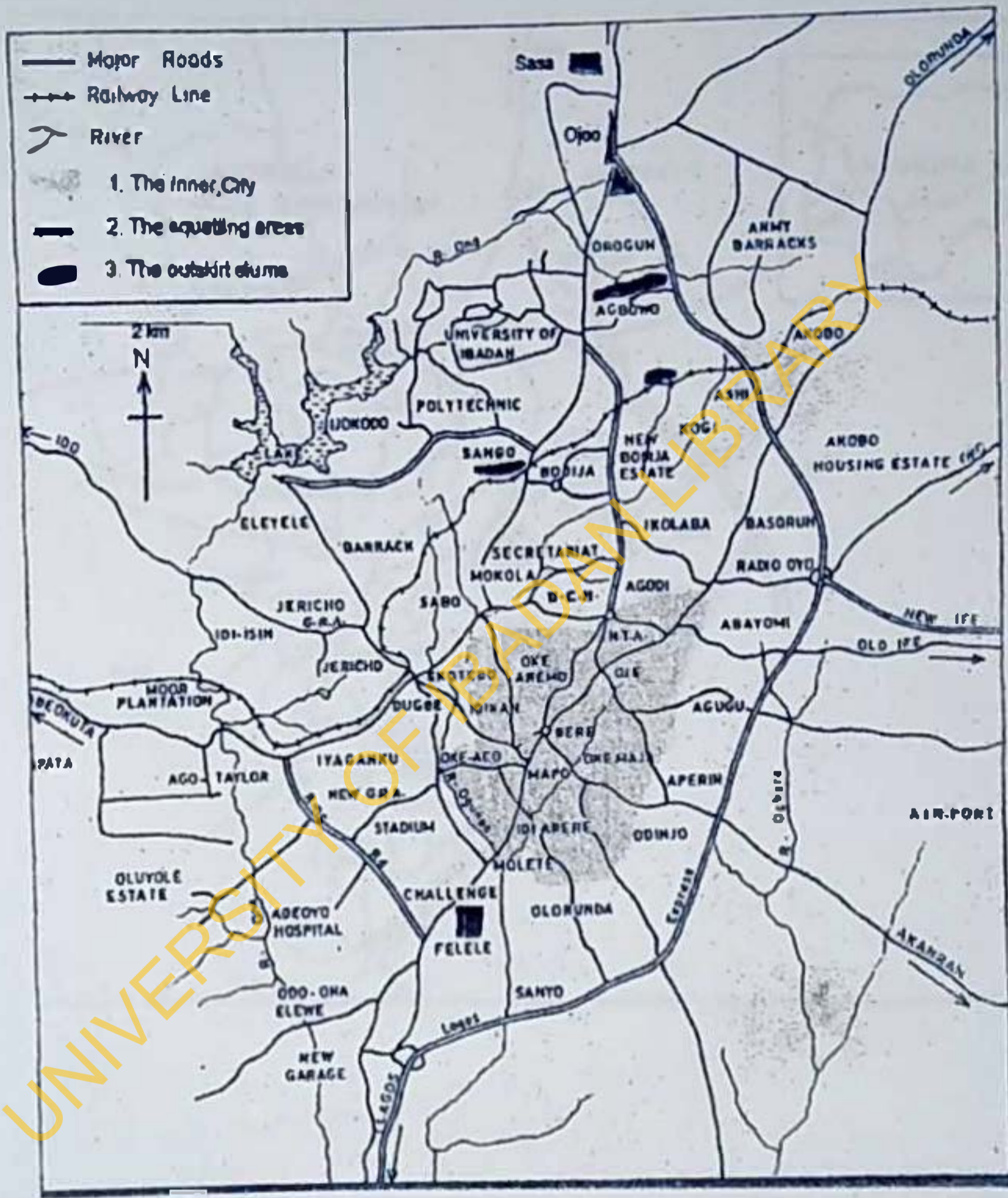


Fig. 3.1: Map of Ibadan Metropolis



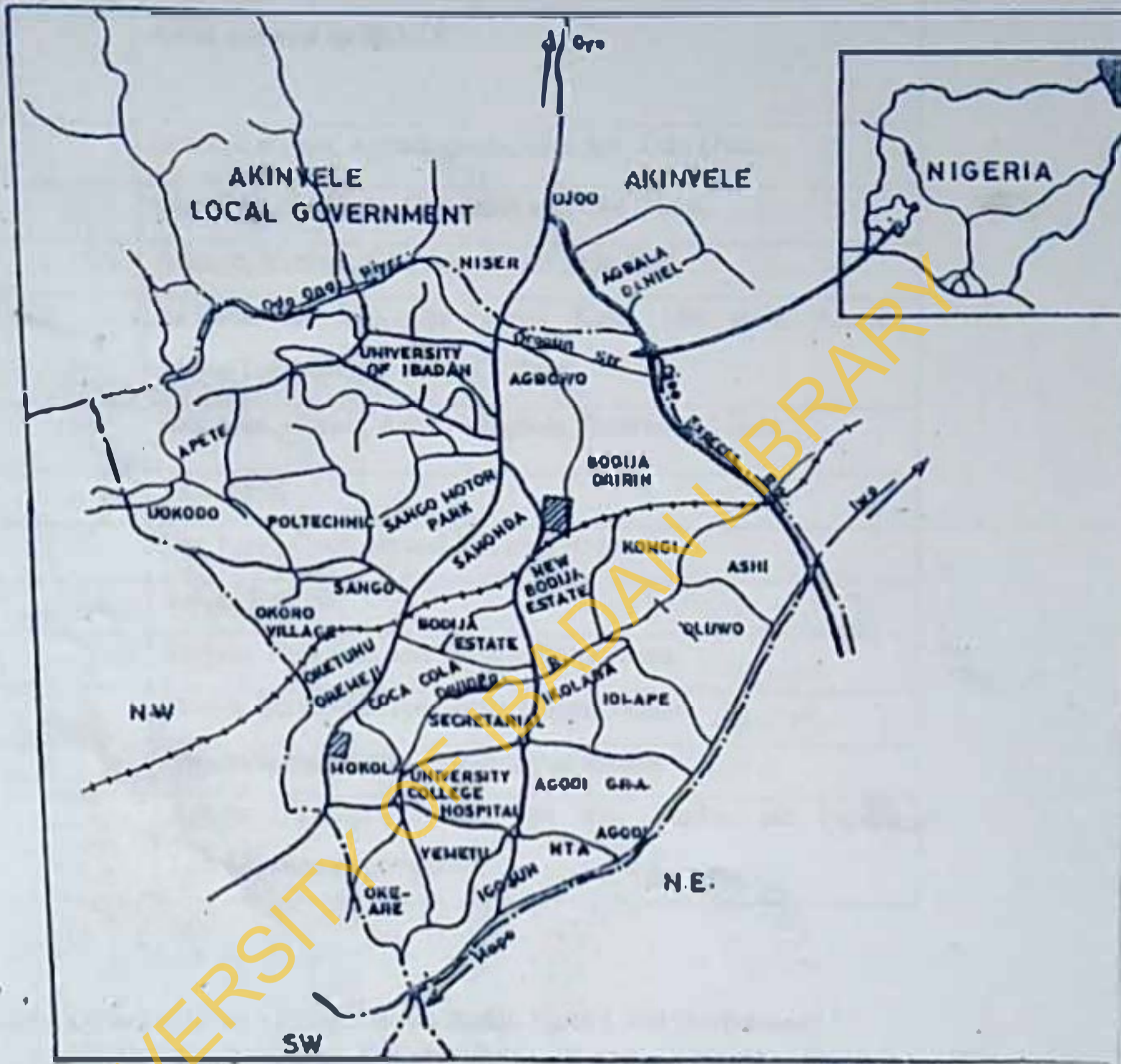


Fig. 3.2: Map of Ibadan North Local Government Area

**Table 3.1: Political wards in IBNLG and the Areas**

<b>Ward</b>	<b>Areas covered by IBNLG</b>
1	Beere, Keninke, Agbadagbudu, Oke Arc, Odo Oye.
2	Ode Oolo, Inalende, Oniyawin and Oke Oloro.
3	Adcoyo, Yemetu, Oke Aremo and Isale Alfa.
4	Itu Iaba, Idi omo, Oje Igosun, Kube, Oke apon, Abenla, Alivo/Total Garden and NTA Area.
5	Bashorun, Oluwo, Ashi, Akingbola, Ikolaba and Gate.
6	Sabo Area.
7	Oke Itunu, Cocacola and Ore meji Areas.
8	Sango, Ijokodo.
9	Mokola, Ago Tapa and Premier Hotel Areas.
10	Bodija, Secretariat, Awolowo, Obasa, Sanusi.
11	Samonda, Polytechnic, University of Ibadan.
12	Agbowo, Bodija Market, Oju Irin, Barika, Iso Patako, Lagos/Ibadan Express road.

Source: Olusegun (2001): Hand book on Ibadan North Local Government.



### 3.3 Data Collection

#### 3.3.1 Study Population

In order to identify the study population, it is appropriate to have an operational definition of *bukateria* and food handler. *Bukateria* is a substandard eating place that provides food at low price with less ideal environmental conditions. It is poor in terms of structure and management with few numbers of staff. Therefore, the study population included the people working at these food facilities that are within the Ibadan North LGA of Oyo State.

A food handler is anyone who works in a food business and who either handles food or surfaces that are likely to be in contact with food such as cutlery, plates and bowls. A food handler may do many different things for a food business including making, cooking, preparing, serving, packing, displaying and storing food. Food handlers can also be involved in manufacturing, producing, collecting, extracting, processing, transporting, delivering, thawing or preserving food (Queensland Food Industry Fact Sheet 10, 2000).

#### 3.3.2 Sampling Frame

There is an association for all food sellers in Oyo state, that is, Oyo State Food Sellers' Association (OSFA). The secretariat of this body is situated at Oranyan, Orita aperin - Elekuio (along the Dccre-Mapo axis of Ibadan). The researcher was able to get the total estimate of all food sellers (including the food hawkers) in IBNLG, which was given as 1029 as at August 2007. This estimate was derived from the number of tickets issued to members on monthly basis which serve as their dues.

#### 3.3.3 Sampling Technique

Multistage sampling technique was adopted. Three stages of sampling were involved in this study which led to the selection of participants. The first stage was the selection of the wards; since it is expensive and cumbersome to study the whole wards in the LGA. Seven out of the twelve political wards were therefore randomly selected and they are

wards- one, four, five, six, eight, nine and twelve. The second sampling stage was the selection of *bukaterias* to be studied. There are different areas within the wards and in each area, clusters of *bukas* exists especially within units such as offices, institutions, industrial sites, market places, motor parks, mechanics and artisans' workshops. Simple random sampling method was used to select the *bukas*. The third stage was participant selection by balloting where more than one food handler exists in a *buka*. However, where only one food handler exists, he/she was purposively selected. The number of *bukaterias* observed and participants interviewed were based on the study sample size.

### 3.3.4 Sample Size Determination

The sample size for this study was calculated to obtain results within 95% confidence interval. In a study carried out to determine food safety practices among food vendors in secondary schools in Ilorin, Nigeria (Musa and Akande, 2003), one of the major unhygienic practices observed was use of previously used water for washing and cleaning 128(69%). In calculating the sample size for this study the environmental parameter for consideration is water availability since water is important for any hygienic behaviour. Hence, sample size was calculated using the formula below:

$$N = \frac{Z_{\alpha}^2 PQ}{d^2}$$

(Bangboye, 2005)

Where:

$N$  = sample size

$d$  = degree of accuracy i.e. precision level 5%

$Z_{\alpha}$  = confidence level (95%) which is the standard normal deviate corresponding to  $\alpha$  at 5% given as 1.96

$P$  is the proportion of food vendors who make use of previously used water for washing/cleaning given as 128(69%).

$Q$  is equal to  $1 - P$ ; that is  $1 - 69\% = 0.31$



$$\text{Therefore: } N = \frac{1.96^2 \times (0.69)(0.31)}{(0.05)^2} = 328.69$$

$$N = 328.69$$

The calculated sample size  $N$  is 328.69. However, the sample size was approximated to 350. So that 350 participants were interviewed from 350 *bukaterias*. A study participant was either - a proprietor, a server, a dish washer, a cook or a cleaner (role definition). Observation checklists covered the sampled area for their environmental characteristics to be documented.

### 3.3.5 Sampling Area

The areas sampled were places within the seven randomly selected wards within IBNLG. Specific areas covered in this study were:

- Beere, Kaninke, Agbadagbudu, Oje temidire, Oke – Are, Odooye
- Itu taba, Idi omu, Oje Igosun, Kube, Oke Apon, Gbenla, Irefin, Aliwo, NTA
- Bashorun, Oluwo nla, Ashi, Akingbola, Ikolaba, Gate
- Sabo area
- Sango market, Sango tipper, Sango garage, Sango Igbajo, Ijokodo
- Mokola market, Ago tapa, Ago Igbira, Premier area
- Agbowo, Bodija market, Bodija oju-irin, Bodija isopako

These areas vary in population, size, activities, location and altitude. The area sampled consists of market places, offices, institutions, industrial sites, motor parks, mechanics and artisans' workshops.

### **3.4 Study Methods**

The study methods employed include survey, field and laboratory and statistical methods.

#### **3.4.1 Survey Methods**

There were two aspects to this study survey. The qualitative methods are the Key Informant Interview (KII) and the Focus Group Discussion (FGD). The quantitative methods involved the use of questionnaire and observational checklist (for detail of research instruments see appendix I-IV).

##### **3.4.1.1 Key Informant Interview**

The qualitative started with key informant interview with the Local Government Authority (Council). The Chief Environmental Health Officer was interviewed on food safety issues, licensing and training of food sellers in IBNLG (see appendix I). The interview which lasted for about 30 minutes was conducted by the researcher and a research assistant previously trained before the session. The researcher asked the question while her assistant did the writing. Also, a tape recorder was also employed and permission to do this was sought before the commencement of the session.

##### **3.4.1.2 Focus Group Discussion (FGD)**

The second qualitative phase of this survey was the FGD. There were seven sessions of FGD which was conducted in each representative area (purposively selected) of the seven wards in the IBNLG. An average of 30 minutes was used with each of the group. Before the FGD commenced, the researcher did a proper community entry in each area where it was conducted, though what would be called the first entry was the meeting with the executives of the Oyo State Food Seller's Association (OSFA). However, it was necessary to have another for better acceptance.



At each FGD, not less than three persons (research assistants) were present apart from the researcher to conduct the FGDs, each person had a role to play. All the seven sessions of the FGD was anchored/conducted by an experienced researcher who took some time out to understand the study questions and ensured proper translation from English to Yoruba language before the commencement of the FGDs. Some of the issues covered during the discussion included the nature of the food business, factors that makes people choose food business, how people learn the trade, some general problems faced by food sellers, diseases which can be contracted through food and how to prevent them (see appendix II).

Each group for the FGD consisted of 10 Food sellers and at each session, participants were briefed on the nature of the study with emphases on voluntary participation and strict confidentiality of information provided. Also, permission to make use of a tape recorder was sought while participants were given slight refreshment as incentive at the end of the session.

#### 3.4.1.3 Questionnaire

The quantitative aspect of the study includes data collection through questionnaire administration. A 60-item, semi-structured, interviewer administered questionnaire which was divided into five sections labelled A, B, C, D and E (see appendix IV) was administered to participants to obtain information on the following areas:

- a) Socio-demographic information;
- b) Knowledge related to food hygiene;
- c) Practices related to food hygiene;
- d) Environmental characteristics and
- e) Health condition.

A face-to-face interview was preferred to self administration because apart from the fact that better understanding was ensured in the latter, not all participants could write while some others sees writing as a huge task. Most of the interview was conducted in Yoruba language while a few was in English (for those who do not understand Yoruba). A total of five trained persons along side the researcher conducted the interview. Before an

interview, the purpose of the study was made known to each participant, confidentiality of information guaranteed and verbal consent was received.

#### 3.4.1.4 Observation Checklist

An observation checklist was used to examine the *bukateria* environments and the food sellers at these facilities so as to ascertain their compliance to stipulated policy guide on food sanitation and food handlers (NPGFS, 2006). Therefore, the checklist was divided into three sections which are:

- a) Personal hygiene; which covers the appearance of the food handler, prevention of foods/contact surface from foreign bodies, times at which hand washing takes place and how they wash their hands.
- b) Physical surroundings; which covers the environmental features, waste disposal and management e.g. drainage system, refuse and wastewater disposal pattern. Other areas covered by the checklist included closeness of *bukateria* to major road or canal, presence or absence of animal or human faeces on site and toilet facility available.
- c) Structure and condition of *bukateria* which takes care of the housing condition including flooring, ventilation and net fittings; also the vector control, water storage pattern, washing and keeping of plates and other cooking utensils (see appendix III).

#### 3.4.2 Standardization of Instruments

The instruments used for this study - focus group discussion, semi-structured questionnaire and observation checklist, were pre-tested on 35 food handlers from Akinyele/Moniya LGA and was analysed. Results showed that the instruments could be used to achieve the study objectives.



### 3.4.3 Field and Laboratory Methods

This aspect involved collection and analysis of environmental sample, which is water. In this study, water is the medium of interest. Water samples collected for analysis were those from the source or storage containers, used for cooking, cleaning or washing of plates and utensils and that which is provided for drinking in the *bukaterias*. The microbiological quality of water used in food preparation is very important in order to avoid occurrence of food borne illness. The main analysis was limited to coliform bacterial count and plate count. The presence of coliforms in water usually indicates contamination with human and/or animal faeces since human pathogens that gain entry to water through faecal contamination are potential health hazards, hence, the need for the analyses.

The coliform group comprises all aerobic and facultative anaerobic, gram negative, non-spore-forming, rod shaped bacteria that ferment lactose with gas and acid formation within 48 hours at 35°C. The standard test for the coliform group may be carried out either by multiple-tube fermentation technique (through presumptive-confirmed phases or completed test) or by Membrane Filter (MF) method (Clesceri, et al; 1989). For this study, the multiple-tube fermentation technique was adopted. The procedure permits appraising the sanitary quality of water and the effectiveness of treatment processes.

Since it is costly to analyse water samples from all the *bukaterias* that were studied, a fraction of 10 per cent of sample size was used, that is a total of 35 samples was collected and analysed for total and faecal coliform count. The number of water samples collected per ward depended on the number of *bukas* studied in each of the selected seven wards (since the number of *bukaterias* in each ward vary) hence, resulting in a ratio of 1 sample to 10 *bukaterias*. Therefore, in every 10 *buku* studied, water sample was collected from one selected by balloting.

### 3.4.4 Statistical Methods

All the data collected were analyzed using descriptive and inferential statistics by employing the SPSS software version 15. Descriptive statistics were summarized using proportions, means, standard deviations, bar graphs, pie charts and frequency tables. Chi-square statistics was used to test for relationship/association between qualitative variables at 95% confidence interval.

### 3.5 Laboratory Procedure

The method used in the laboratory to detect the presence of coliforms in the water samples collected was the multiple-tube fermentation technique which utilizes selective and differential liquid media into which multiple aliquots of serial dilutions were inoculated. The multiple-tube fermentation techniques yield the statistically derived Most Probable Number (MPN) of organisms per aliquot (100 ml) of water. This number, based on certain probability formulas, is an estimate of the mean density of coliforms in the sample (Clesceri, et al; 1989).

#### 3.5.1 Sterilization of Apparatus

Laboratory apparatus used for this study include glass bottles for the collection of water samples, petri dishes, wash bottles, inoculating loop, Durham tubes, Mac Cartney bottles (or fermentation tubes), conical flask and pipettes.

Different sterilization methods and techniques were adopted in order to achieve to some extent a sterile environment. The type of method used depends on the object to be sterilized. However, the methods that were used are: physical methods using the heat and chemical methods using alcohols and other disinfectants.

Introduction of heat; either moist or dry heat to an object will control microorganisms. Effectiveness of this method is achieved if a precise measure of the heat is introduced that is the thermal death point (TDP).



Moist heat or steam sterilization was carried out in the laboratory using autoclave. Prepared media were sterilized in the autoclave under temperature of 121°C and 15 pound pressure for a period of 15 minutes.

Dry heat sterilization was achieved through an oven. The item sterilized using this method were the glass wares which were placed in the oven at 160°C for 3 hours. Also, naked spirit flame was used on the inoculating loop during inoculation.

Sterilants such as alcohols and phenols were used for surface cleaning in the laboratory.

### 3.5.2 Preparation of media

The media that were used for the analysis were nutrient agar, MacConkey broth and Brilliant Green Lactose Bile (BGLB) Broth.

The nutrient agar is a complex medium which is sufficiently rich and complete to meet the nutritional requirements of many different microorganisms (Prescott et al., 2002). Hence, it was used for the surface cultivation of microorganisms that may be present in the water samples collected. It was prepared in the laboratory following the manufacturer's specification of 28 grams in 1 litre (1000ml) of distilled water. This was prepared in a conical flask, corked with a ball of cotton wool and covered with aluminum foil before it was put in the autoclave for sterilization.

The selective media used were MacConkey broth and BGLB broth. The MacConkey broth was used for the presumptive test while the BGLB broth was used for the confirmed or confirmatory test. Only positive results from the presumptive test at 35°C for 48 hours were submitted for the confirmatory test. The preparation of these two media is similar in that there are two preparations; single strength and double strength preparations. Preparation for each medium was in accordance to their specifications –

#### MacConkey broth:

- Single strength was prepared by weighing 35grams of medium powder and dissolving it in 1 litre of distilled water.

- Double strength was prepared by weighing 70 grams of medium powder and dissolving it in 1 litre of distilled water.

#### BGLB broth:

- Single strength was prepared by weighing 35grams of medium powder and was dissolved in 1 litre of distilled water.
- Double strength was prepared by weighing 70 grams of medium powder and was dissolved in 1 litre of distilled water.

#### 3.5.3 Inoculation Process

After preparing the media, sterilization was the next step. Before sterilizing the liquid media, 15 MacCartney bottles was set. In five of the bottles, 10ml of the double strength liquid media was dispensed in each using a sterile pipette while the remaining 10 bottles, contained 5ml of the single strength liquid media. Each set was appropriately labelled. Also, Durham tubes were inserted into each of the 15 MacCartney bottles in an inverted position and autoclaved.

After sterilization, the inoculation process began with serial dilutions. Two dilutions were made:

$10^{-1}$  = 1ml of water sample in 9ml of sterile distilled water, which is the 1:10 dilution factor and

$10^{-2}$  = 1ml from the 1:10 dilution factor in another 9ml of sterile distilled water, to make a 1:100 dilution factor.

The water samples were shaken before the portions were removed to prevent clumping of bacteria cells so as not to give under estimated value. From the "original" water sample (undiluted), 1ml was inoculated using a sterile pipette, into each of the 5 MacCartney bottles containing the double strength of MacConkey broth. Also, 1ml from the first dilution (1:10) was inoculated using another sterile pipette, into the next set of 5 MacCartney bottles containing single strength MacConkey broth while the last set of 5 MacCartney bottles contained the second dilution (1:100). This was the process followed for the presumptive test.



The confirmatory test followed a similar process for preparation of the media but the differences were the inocula. All positive results from the presumptive cultures as evident from gas formation were inoculated (subcultured) into their various BGLB broth preparations using sterile inoculation loop.

The procedure followed for the colony count was the pour plate method using already sterilized nutrient agar. One milliliter each of the original water sample (undiluted), the 1:10 and the 1:100 was put in three petri dishes using sterile pipettes. This was then mixed with the liquid agar that has been cooled to about 45°C. Each was gently swirled then allowed to set before incubation.

#### 3.5.4 Incubation

For the presumptive test, incubation temperature was at 35°C for 24 hours while the temperature for the confirmatory test was at 44°C for 48 hours. Also, the Petri dishes containing the nutrient agar was incubated at temperature of 35°C for between 18 to 24 hours time duration.

The result was compared with the World Health Organization guideline limit for bacteriological water analysis.

## CHAPTER FOUR

### RESULTS

This chapter presents the result of data analysis from questionnaire survey, observation checklist, key informant interview, focus group discussion and laboratory analysis of water samples collected. Results from the survey include description of the socio-demographic characteristics of the population under study, their knowledge and practices related to food hygiene, environmental characteristics and health conditions.

#### 4.0.1 Socio-demographic Characteristics of Participants

A total of 350 food handlers or sellers from different locations or areas of seven out of twelve wards of Ibadan North Local Government Area were interviewed. The general socio-demographic characteristic of the participants is presented in Table 4.1.

The age distribution of participants shows that more (56.3%) were within the active age group of 25-44 years. Virtually all the participants 310(88.6%) were females. Majority 267(76.3%) of the participants are Yoruba and most 257(73.4%) of them are married. One hundred and twenty one (34.6%) of the food handlers had no formal education while 108(30.9%) of them had basic primary education.

The total number of workers in each *buka* vary from one to 16, however, two was the most common number reported by 135(40.2%) of the respondents. The task performed by the respondents include cooking 300(85.7%), serving of food 253(72.3%), purchasing of raw foods from the market 239(68.3%), storing food 147(42.0%) and packing of plates/cleaning up 95(27.1%). This is shown in Table 4.2. Some 89(25.5%) of the respondents have other source(s) of income.



**Table 4.1: Socio-demographic Characteristics of Participants**

<b>Variable</b>	<b>Number (No.)</b>	<b>Percentage (%)</b>
<b>Age (years)</b>		
15-24	37	10.6
25-34	97	27.7
35-44	100	28.6
45-54	81	23.1
55+	35	10.0
<b>Gender</b>		
Male	40	11.4
Female	310	88.6
<b>Marital status</b>		
Single	47	13.4
Married	257	73.4
Divorced	11	3.1
Widow	23	6.6
Separated	12	3.4
<b>Religion</b>		
Christianity	127	36.3
Islam	194	55.4
Traditional	10	2.9
Others	19	5.4
<b>Ethnicity</b>		
Hausa	26	7.4
Igbo	29	8.3
Yoruba	267	76.3
Others	28	8.0
<b>Highest Level of Education</b>		
No formal education	121	34.6
Primary	108	30.9
Secondary	95	27.1
NCE	8	2.3
Polytechnic	9	2.6
University	9	2.6
<b>Total</b>	<b>350</b>	<b>100</b>

**Table 4.2: Tasks Performed by Respondents**

<b>Task</b>	<b>Number (No)*</b>	<b>Percentage (%)*</b>
Purchase of raw foods from the market	239*	68.3
Cooking/preparing food	300*	85.7
Storing food	147*	42.0
Serving food	253*	72.3
Packing/cleaning up	95*	27.1
Others	42*	12.0
<b>Total</b>	<b>1076*</b>	<b>&gt;100%</b>

\* Multiple responses obtained.



#### 4.0.2 Mode of Training for Food Selling Business

Nearly half of the respondents 123(40.3%) learn the food trading business from their mothers who were engaged in the business before. Some 48(15.7%) learn through apprenticeship, 47(15.4%) of the respondents did not learn the trade but started on their own and 42(13.8%) learn the trade from a relative they stayed with while growing up (Table 4.3). The different food types prepared and sold by participants include *amala*, *eba (gari)*, *fufu*, *iyan*, *tuwo*, yam, beans, rice, plantain, etc.

#### 4.0.3 Membership of Food handlers Association

Two hundred and twenty-nine (66.4%) belong to food handlers association and some of the benefits of joining mentioned by the respondents are financial support/welfare 132(64.4%) and solidarity during social functions 78(38.0%). This is presented in Table 4.4.

#### 4.0.4 Participation in Food Handlers' Training Programme

More than half 236 (67.4%) of the respondents reported that they have attended a food handler's training programme organized by different bodies (Fig.4.1). Issues recalled by respondents that were mentioned or taught at the training programme they attended are: importance of routine medical examination 35(15.4%), business management and customer care 55(24.1%), environmental sanitation 84(36.8%), personal hygiene 128(56.1%) and food hygiene 140(61.4%). Two hundred and twenty-one (63.1%) respondents reported having a trainers' certificate while 246(70.3%) claimed that they have been registered/licensed by the local authority or council.

A significant difference ( $p < 0.05$ ) was observed among 160(72.4%) participants with trainers' certificates who attended training programme organized by the Local Government Health Officers as compared to 38(17.2%) of the participants who attended training organized by private bodies and 23(10.4%) of those who did not remember the name of the organizers of the training programme they attended (Table 4.5). Majority

186(84.2%) of the participants that had a trainers' certificate have also registered their *bukaterias* with the Local Government Authority as against 35(15.8%) that have a certificate but are not registered yet ( $p<0.05$ ). This is presented in Table 4.6.

#### 4.0.5 Experience in Food handling and Participation in Training programme

Table 4.7 shows the relationship between the years of practicing food handling or selling food and attending training programme. One hundred and thirty two (55.9%) of the respondents that have attended food handlers' training programme have been practicing the trade for not more than 10 years compared to 93 (39.4%) that have been practicing food handling between 11-20 years and 11 (4.7%) practicing between 21-30 years ( $p<0.05$ ).

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**Table 4.3: How Food Sellers Learn the Trade**

<b>Mode of learning</b>	<b>Number (No.)</b>	<b>Percentage (%)</b>
Degree/Diploma in Catering	4	1.3
Catering School Certificate	30	9.8
Apprenticeship	48	15.7
Mother	123	40.3
Did not learn	47	15.4
Relatives	42	13.8
Others*	11	3.6
<b>Total</b>	<b>305</b>	<b>100</b>

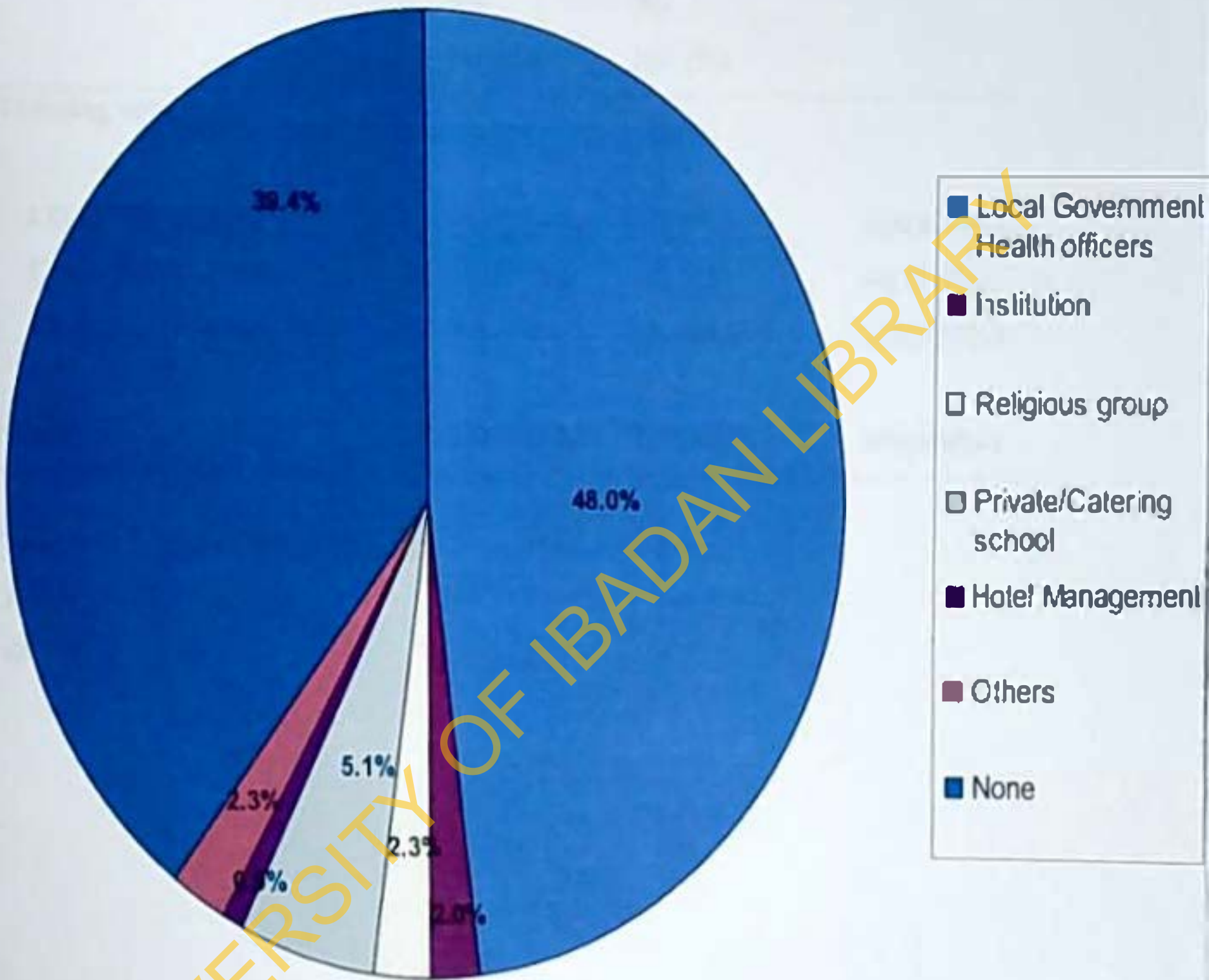
\* Others consist of participants who learn the business through more than one means.

**Table 4.4: Membership of Food handlers Association**

Variable	Yes	No	Total
	No. (%)	No. (%)	
<b>Member of Association</b>	229(66.4%)	116(33.6%)	345(100%)
<b>Benefits of the association to members</b>			
Financial support/Welfare	132(64.4%)	73(35.6%)	205(100%)
Solidarity at social functions	78(38.0%)	127(62.0%)	205(100%)
Assist in obtaining license/certificate	30(14.6%)	175(50.0%)	205(100%)
Decision making/resolving of conflicts among members	71(34.6%)	134(65.4%)	205(100%)

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**Figure 4.1: Organizers of Food Handlers/Sellers' Training programme**

**Table 4.5: Training Programmes and Certificate issuance**

	Award of Certificate		Total
	Yes	No	
	No. (%)	No. (%)	
<b>Training organizer</b>			
I.G Health Officer	160(72.4%)	8(6.2%)	168(48.0%)
Other Private Bodies	38(17.2%)	6(4.7%)	44(12.6%)
Cannot remember	23(10.4%)	115(89.1%)	138(39.4%)
<b>Total</b>	<b>221(100%)</b>	<b>129(100%)</b>	<b>350(100%)</b>

Pearson Chi-Square ( $X^2$ ) = 212.639

P value = 0.000

df = 2

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**Table 4.6: Registration of *bukateria* and issuance of Trainer Certificate**

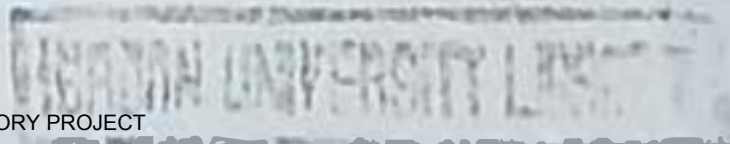
	Trainers' certificate		Total
	Yes	No	
	No. (%)	No. (%)	
<b>Registered</b>			
Yes	186(84.2%)	60(46.5%)	246
No	35(15.8%)	69(53.5%)	104
<b>Total</b>	<b>221(100%)</b>	<b>129(100%)</b>	<b>350 (100%)</b>

Pearson Chi-Square ( $X^2$ ) = 55.289

P value = 0.000

df = 1

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**Table 4.7: Food handling experience in relation to training programme attendance**

	Attended training		Total
	Yes	No	
	No. (%)	No. (%)	
<b>Years of practicing</b>			
1-10 years	132(55.9%)	93(81.6%)	225(64.3%)
11-20 years	93(39.4%)	18(15.8%)	111(31.7%)
21-30 years	11(4.7%)	3(2.6%)	14(4.0%)
<b>Total</b>	<b>236(100%)</b>	<b>114(100%)</b>	<b>350(100%)</b>

Pearson Chi-Square ( $X^2$ ) = 22.176

P value = 0.000

df = 2



#### 4.1.0 Knowledge Related to Food Hygiene

On the knowledge of what food hygiene is all about, 294(84.0%) of the 350 respondents have better practical definitions (Table 4.8). Part of the food hygiene related question was on hazard analysis critical control point (HACCP) of which no respondent had the slightest knowledge of.

##### 4.1.1 Knowledge on Personal Hygiene

Among the 350 respondents in this study, 261(74.6%) reported correctly the personal hygiene that must be practiced by all food handlers. The personal hygiene practices listed by the respondents are: regular bathing 86(33.0%), wearing of clean clothing or apron 71(27.2%), well kempt covered hair 38(14.6%), daily brushing of tooth 29(11.0%), clean short fingernails with no paints 23(8.8%) and proper hand washing before handling food 14(5.4%). This is presented in Figure 4.2.

##### 4.1.2 Awareness of Bye laws

Out of the 350 respondents, 230(70.8%) reported that they are aware of IBNLG bye law relating to sale of food in *bukateria*. From this, only 163(46.6%) respondents were able to state one law correctly (Table 4.9).

#### 4.2.0 Knowledge of Food borne Diseases (FBDs)

Nearly all the respondents 303(86.6%) were knowledgeable about FBDs and could name at least two diseases that are food related (Tables 4.10). Table 4.11 shows the modes of getting FBDs by the respondents.

Out of 310 respondents, only 16(5.2%) stated that typhoid fever, which is one of the FBDs could be contracted through an infected cook while 25(8.1%) stated that FBDs could be contacted through improper hand washing before eating. Also, Table 4.12 shows relationship between typhoid fever and transmission of disease by infected cook.

The respondents 91(47.6%), 59(37.3%) and 53(32.1%) who listed diarrhoea/stooling, cholera and typhoid respectively as FBDs, from a positive response of 191, 158 and 134 respondents; also listed use of contaminated water as a way of contacting or acquiring FBDs (Table 4.13). Each of these associations was found to be statistically significant.

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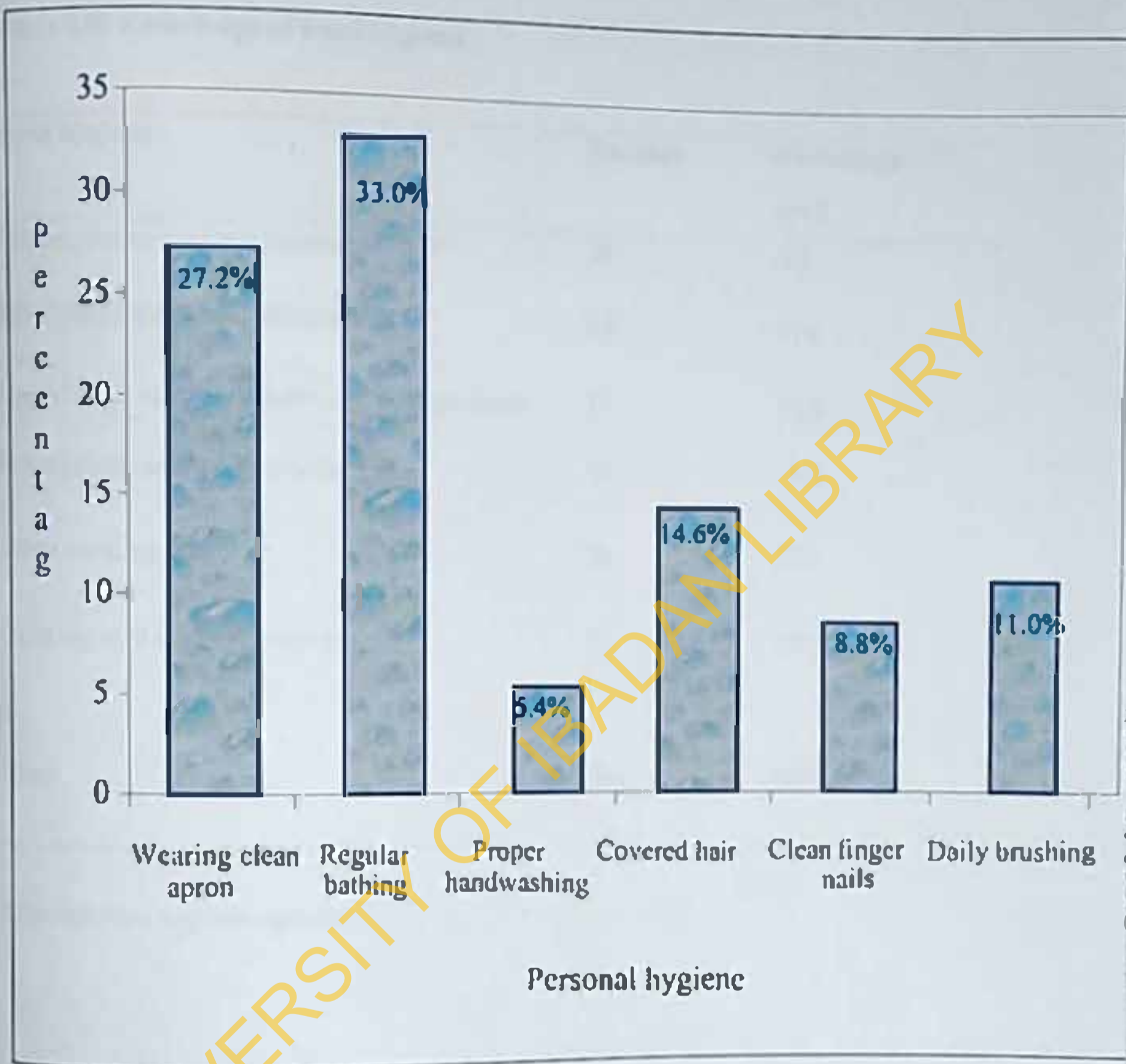


Fig. 4.2: Personal hygiene listed by respondents

**Table 4.8: Knowledge of Food hygiene**

<b>Food hygiene</b>	<b>Number</b>	<b>Percentage (%)</b>
Ensure proper cooking/heating of food*	28	9.5
Protecting food from contaminants*	63	21.4
Use of fresh raw foodstuffs (e.g. pepper, meat)	37	12.6
Use of clean water for cooking*	57	19.4
Clean cooking utensils*	56	19.1
Cooking in clean environment*	53	18.0
<b>Total</b>	<b>294</b>	<b>100%</b>

\*Correct food hygiene options.



**Table 4.9: Respondents awareness of IBNLG Bye laws on food sanitation**

<b>Bye law</b>	<b>Number</b>	<b>Percentage (%)</b>
Law on sanitary and environmental conditions	81	49.7
Law guiding the structure, location or situation of the bukateria	22	13.5
Law on registering, licensing and training of food handlers	26	16.0
Law on medical certification of food sellers	16	9.8
Law on routine inspection of food premises	18	11.0
<b>Total</b>	<b>163</b>	<b>100</b>

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**Table 4.10: List of Food Borne Diseases given by Respondents**

<b>Food Borne Diseases</b>	<b>Number *</b>	<b>Percentage (%)*</b>	<b>Total</b>
<b>Diarrhoea/ dysentery/stooling</b>	<b>201</b>	<b>63.4</b>	<b>317</b>
<b>Stomach ache</b>	<b>161</b>	<b>50.8</b>	<b>317</b>
<b>Cholera</b>	<b>165</b>	<b>52.1</b>	<b>317</b>
<b>Typhoid fever</b>	<b>146</b>	<b>46.1</b>	<b>317</b>
<b>Cough/Tuberculosis</b>	<b>55</b>	<b>17.4</b>	<b>317</b>
<b>Worm infestation</b>	<b>17</b>	<b>5.4</b>	<b>317</b>
<b>Nausea/vomiting</b>	<b>159</b>	<b>50.2</b>	<b>317</b>
<b>Others (e.g. fever, skin rash)</b>	<b>51</b>	<b>19.2</b>	<b>266</b>

\* Multiple responses obtained.

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**Table 4.11: Ways of Contracting Food Borne Disease (FBD)**

<b>Ways of Contracting FBD</b>	<b>Number *</b>	<b>Percentage (%)*</b>	<b>Total</b>
Use of contaminated water	134	43.4	309
Exposing cooked foods to flies and contaminants	115	37.3	308
Use of dirty cooking utensils	24	7.8	308
Eating or using spoilt food materials	106	34.4	308
Over eating	31	10.1	308
Eating/cooking in dirty environment or close to toilet or dumpsite.	86	27.7	310
Improper hand washing before eating or cooking	25	8.1	308
Eating food not well cooked	34	11.0	308
Transmission of disease from an infected cook	16	5.2	310
Not practicing general sanitation	55	17.9	308

\* Multiple responses obtained.

**Table 4.12: Typhoid fever versus transmission of FBDs through an infected cook**

		Infected cook			Total
		Yes N (%)	No N (%)	Don't know N (%)	
<b>Typhoid fever</b>					
Yes	N (%)	8(6.0%)	126(94.0%)	0(0.0%)	134(100%)
No	N (%)	8(5.3%)	141(93.4%)	2(1.3%)	151(100%)
Don't know	N (%)	0(0.0%)	5(41.7%)	7(58.3)	9(100%)
<b>Total</b>		<b>16(5.4%)</b>	<b>272(91.6%)</b>	<b>9(3.0%)</b>	<b>297(100%)</b>

Pearson Chi-Square ( $\chi^2$ ) = 130.763

P value = 0.000

df = 4

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**Table 4.13: Use of Contaminated Water and Related Morbidity Condition**

		Use of contaminated water			Total
		Yes	No	Don't know	
		N (%)	N (%)	N (%)	
<b>Cholera</b>					
Yes	N (%)	59(37.3%)	99(62.7%)	0(0.0%)	158(100%)
No	N (%)	69(54.8%)	55(43.7%)	2(1.6%)	126(100%)
Don't know	N (%)	2(16.7%)	3(25.0%)	7(58.3%)	12(100%)
<b>Total</b>		<b>130(43.9%)</b>	<b>157(53.0%)</b>	<b>9(3.0%)</b>	<b>296(100%)</b>
<b>X<sup>2</sup></b>		<b>139.928</b>			
<b>P value</b>		<b>0.000</b>			
<b>df</b>		<b>4</b>			
<b>Diarrhoea/stooling</b>					
Yes	N (%)	91(47.6%)	99(51.8%)	1(0.5%)	191(100%)
No	N (%)	37(39.8%)	55(59.1%)	1(1.1%)	93(100%)
Don't know	N (%)	2(16.7%)	3(25.0%)	7(58.3%)	12(100%)
<b>Total</b>		<b>130(43.9%)</b>	<b>157(53.0%)</b>	<b>9(3.0%)</b>	<b>296(100%)</b>
<b>X<sup>2</sup></b>		<b>131.300</b>			
<b>P value</b>		<b>0.000</b>			
<b>df</b>		<b>4</b>			
<b>Typhoid</b>					
Yes	N (%)	53(39.6%)	81(60.4%)	0(0.0%)	134(100%)
No	N (%)	75(50.0%)	73(48.7%)	2(1.3%)	150(100%)
Don't know	N (%)	2(16.7%)	3(25.0%)	7(58.3%)	12(100%)
<b>Total</b>		<b>130(43.9%)</b>	<b>157(53.0%)</b>	<b>9(3.0%)</b>	<b>296(100%)</b>
<b>X<sup>2</sup></b>		<b>133.753</b>			
<b>P value</b>		<b>0.000</b>			
<b>df</b>		<b>4</b>			

### 4.3.0 Practices Related to Food hygiene

Most of the respondents 133(45.9%) reported the practice of cleaning/washing of cooking utensils, pots, plates and spoons after they have been used, 117(40.3%) wash theirs before and after use, 35(12.1%) wash before use while 5(1.7%) claimed they could not remember.

Also, respondents reported different time of cleaning their cooking areas. Some 109(39.1%) clean once in a day, 76(27.2%) clean twice daily, 69(24.7%) clean three times a day, 22(7.9%) clean more than three times daily while 3(1.1%) did not remember how many times they clean their *bukas*.

### 4.3.1 Food Preservation and Storage Practices

Raw foods such as meats, fish, pepper, and other perishable ingredients were most times preserved by respondents using more than one method which are boiling and frying, use of refrigerator, salt drying, keeping inside the cupboard and exposing to air; 207(61.6%), 111(33.0), 50(14.9), 50(14.9%) and 39(11.6%) respectively. A few 40(11.9%) do not store or preserve raw food items but purchase on daily basis.

Also, for respondents that make use of a refrigerator to preserve food, a question was asked if the refrigerator contains other items and half gave a positive response 56 (50.5%) while others, 55(49.5%) reported that they do not store other items in their refrigerator apart from food.

Table 4.14 shows how long (time duration) respondents keep already prepared foods before they are consumed by customers. One hundred and sixteen (39.5%) out of 294 participants that responded reported that they usually warm or reheat cooked foods. Prepared foods (depending on type) were kept by participants using more than one means of which food warmer or cooler 286(85.4%), was reported as the most used by participants.

Left over foods at the end of each day were eaten/taken home by some 123(38.4%) of the respondents, some 28(8.8%) used theirs as animal feed, thrown away by others 19(5.9%) or sold to customers the next day 61(19.1%) while other respondents 89(27.8%) claimed they have no left over foods.

### 4.3.2 Hand washing Practices

Majority 276(84.4%) out of 327 respondents reported the practice of frequent hand washing. One hundred and one (34.9%) out of 289 respondents said they wash their hands with water only after making use of the toilet while 147 (50.9%) reported hand washing with soap and water after toilet use. Again, in a follow up question on the practice of hand washing, participants were asked what they do immediately after toilet use. The responses include wash hands with water only 22(7.0%) and wash hands with soap and water 267(85.0%). This is shown on Table 4.15.

More participants 83(56.5%) within 15-39 years age range reported the practice of hand washing with soap and water after using the toilet than those aged 40 years and above 64(43.5%). The difference was however not significant (Table 4.16).

Of all the 350 respondents, only 78(25.5%) reported that they have little children they are taking care of at the buka. Water 48(61.5%) constitutes the most commonly used means by respondents for cleaning up a child after defaecation (Table 4.17).



**Table 4.14: Duration of keeping cooked foods**

<b>Time</b>	<b>Number</b>	<b>Percentage (%)</b>
Not more than 30 minutes	86	24.6
One hour	120	34.3
One hour thirty minutes	10	2.8
Two hours	23	6.6
Three hours	6	1.7
Four hours and above	9	2.6
No response	96	27.4
<b>Total</b>	<b>350</b>	<b>100</b>

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**Table 4.15: Respondents hygienic use of toilet**

<b>Response</b>	<b>Number</b>	<b>Percentage (%)</b>
Clean hands with paper or rag	6	1.7
Do nothing	19	5.4
Wash hands with water only	22	6.3
Wash hands with soap and water only	267	76.3
No response	36	10.3
<b>Total</b>	<b>350</b>	<b>100</b>

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**Table 4.16: Age group of respondents versus Practice of hand washing with soap and water after using the toilet**

Age group	Hand washing		Total
	Yes	No	
	N (%)	N (%)	
15-39	83(56.5%)	64(45.1%)	147(50.9%)
40+	64(43.5%)	78(54.9%)	142(49.1%)
<b>Total</b>	<b>147(50.9%)</b>	<b>142(49.1%)</b>	<b>289(100%)</b>

Pearson Chi-Square ( $\chi^2$ ) = 3.751

P value = 0.053

df = 1

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**Table 4.17: Items used by respondents for cleaning up a child after defecation**

<b>Items</b>	<b>Number</b>	<b>Percentage (%)</b>
News paper/papers	6	7.7
Rags	3	3.9
Toilet papers	15	19.2
Water	48	61.5
Others (not specified)	6	7.7
<b>Total</b>	<b>78</b>	<b>100</b>

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## 4.4.0 Environmental Sanitation Characteristics

### 4.4.1 Toilet Facility

Toilet facilities are not particularly owned by the *bukateria* or participants. However, 165(49.3%) out of 335 of the participants reported having toilets within the vicinity, 43(26.1%) of this reported that the toilet could serve customers as well. Water closet 80(48.5%) and pit latrine 81(49.1%) were the common type of toilets used by participants. Some 109(31.1%) of them gave reasons for not having a toilet and majority responded that space constraint is their main reason for not having one (Table 4.18).

### 4.4.2 Waste Generation and Management

Wastes generated mostly by 329 participants in their *bukateria* include nylon/plastics 125(38%), food remains 80(24.3%) and vegetables 58(17.6%). Figure 4.3 shows the type of wastes that are generated. Participants' collect refuse using buckets 50(15.1%), plastic bags 30(9.1%), dust bins 151 (45.6%), baskets 47 (14.2%); some 14(4.2%) collect or heap wastes in a corner while 39(11.8%) use other means such as sacks and some as animal feed.

### 4.4.3 Water Sources and Storage

Participants' water sources are shown in Figure 4.4. Most of the participants 168 (64.9%) reported that customers usually buy 'pure' or packaged water to drink after eating. However, those who cannot afford packaged water take either tap water 29(11.2%), borehole water 43(16.6%) or well water 8(3.1%) while some participants 11(4.2%) do not provide drinking water for their customers. Water shortage is often experienced by 149(47.2%) of the participants, 127(40.2%) experience it on rare occasions while 40(12.7%) do not. Participants use different storage containers for storing water. Mostly used are drums 218(64.9%), kegs /jerry can 116(34.5%) and plastic tanks 87(25.9%).

This is represented in Table 4.19.

#### 4.4.4 Disinfection of *Bukateria* Surroundings

More than half 102(52.6%) of the participants disinfect their *bukateria* daily (Table 4.20). Chemicals used by participants for disinfection include: Izal 65(32.2%) and Dettol 44(21.8%) while some 63(31.2%) participants make use of kerosene.

A statistical significance was observed ( $p < 0.05$ ) between the group of participants that attended training programme and practice disinfection 167(74.6%) as compared to their counterparts 57(25.4%) who do not practice it (Table 4.21).

#### 4.4.5 Common Pests Mentioned by Participants

Common pests and vectors participants found disturbing and infesting the food premises are: flies 152(48.3%), cockroaches 77(24.4%), rats 52(16.5%), mosquitoes 24(7.6%) and others 10(3.2%) such as ants, termites, sand flies, etc.

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**Table 4.18: Reasons given by Participants for not having toilet facility**

<b>Reasons</b>	<b>Number</b>	<b>Percentage (%)</b>
Space constraint	36	33.0
About to make one	13	12.0
No water for flushing	8	7.3
It should be provided by our land lord	12	11.0
We don't have a specific reason for that	22	20.2
Others	18	16.5
<b>Total</b>	<b>109</b>	<b>100</b>

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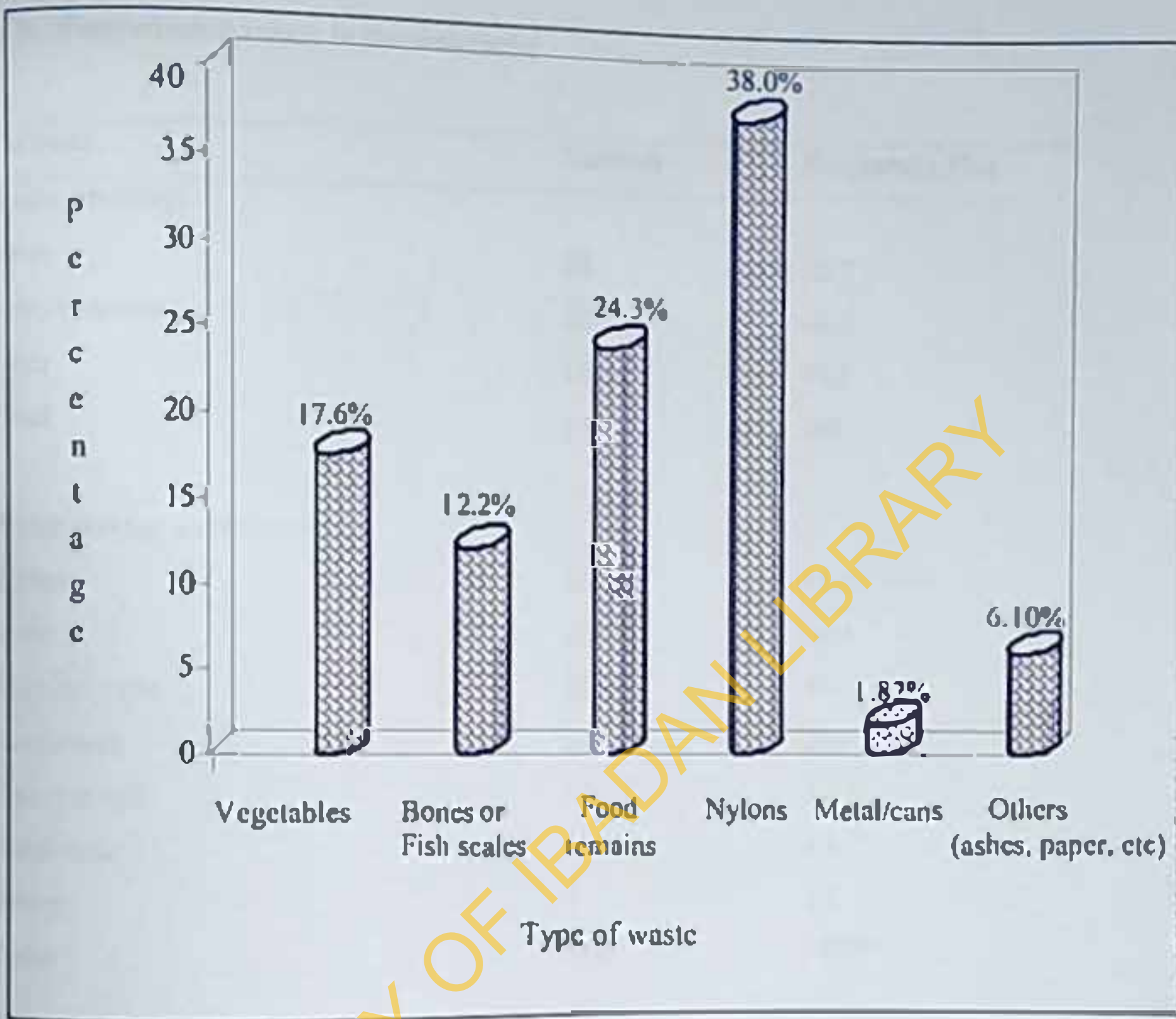


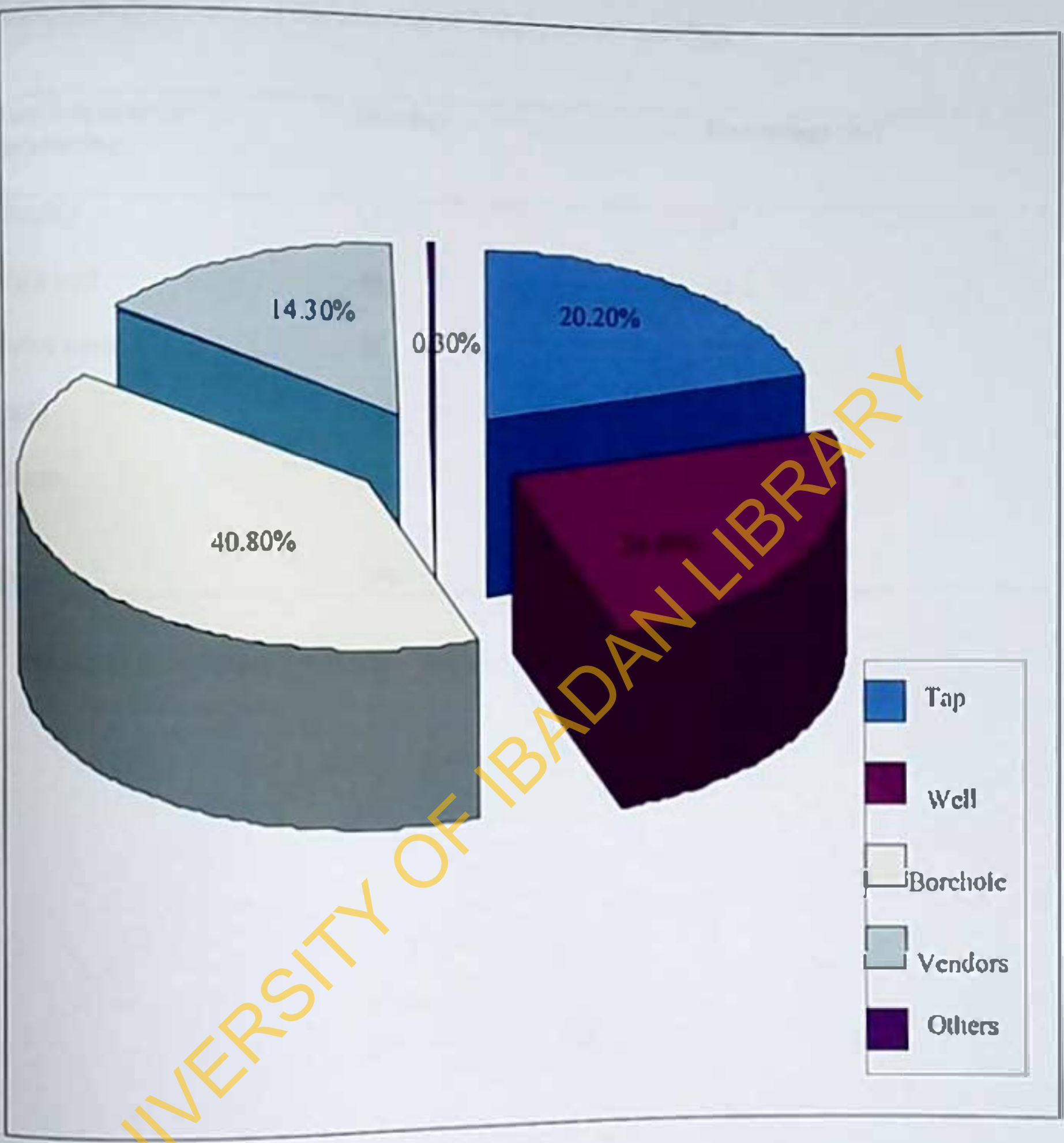
Figure 4.3: Type of Waste generated by Respondents

#### 4.19: Water-related Issues in the Bukateria

Variable	Number	Percentage (%)
<b>Water shortage</b>		
Never	40	12.7
Rare occasions	127	40.2
Often	149	47.2
<b>Total</b>	<b>316</b>	<b>100</b>
<b>Water storage containers*</b>		
Bucket	58	17.3
Drum	218	64.9
Kegs/jerry can	116	34.5
Plastic tank	87	25.9
Concrete tank	10	3.0
Metal tank	17	5.1
Others	4	1.2
<b>Total</b>	<b>510*</b>	<b>&gt;100*</b>
<b>Frequency of washing water storage containers</b>		
Yearly	19	7.3
Twice a year	12	4.6
Quarterly	19	7.3
Monthly	29	11.1
Weekly	104	39.7
Daily	64	24.4
Cannot remember	15	5.7
<b>Total</b>	<b>262</b>	<b>100</b>

\*Multiple responses obtained.





**Fig. 4.4: Participants' water sources**

**Table 4.20: Frequency of Disinfection of *Bukateria* surroundings**

Rate/frequency of disinfection	Number	Percentage (%)
Monthly	15	7.7
Weekends	48	24.7
Twice week	26	13.4
Daily	102	52.6
Others	3	1.5
<b>Total</b>	<b>194</b>	<b>100</b>

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**Table 4.21: Practice of disinfection and participation in training**

		Attended Training Programme		Total
		Yes N (%)	No N (%)	
<b>Disinfection</b>				
Yes	N (%)	167(74.6%)	53(58.2%)	220(69.8%)
No	N (%)	57(25.4%)	38(41.8%)	95(30.2%)
<b>Total</b>		<b>224(100%)</b>	<b>91(100%)</b>	<b>315(100%)</b>

Pearson Chi-Square ( $X^2$ ) = 8.174

P value = 0.004

df = 1

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## 4.5.0 Perceived Health Conditions

Above half 190(56.4%) of the respondents reported that they were in a good state of health. Table 4.22 shows the last time respondents went for a medical examination. Out of 304 respondents, 117(38.5%) reported that they have gone for a typhoid test before. Only 84(29.4%) from a total of 286 respondents, claimed they have had a tuberculosis test before. Reason given by respondents for going for these tests is presented in Table 4.23

The following ailments were reported by respondents: whitlow 36(10.8%), skin problems 39(11.7%), diarrhoea and/or vomiting 53(16.1%), cut and injuries 88(26.7%), cough 165(49.0%), cold and catarrh 233(69.1%), fever and chills 242 (72.7%) and head aches 246(73.4%). Also, eye and respiratory problems was reported by 16(9.5%) and 4(2.4%) from a total of 169 participants that responded.

### 4.5.1 Health seeking behaviour

When ill, respondents treat themselves in different ways (Figure 4.5). Of 321 participants, some 182(56.7%) reported that they do not go to work every time they are ill, 103(32.1%) said they stay off work only when they are severely ill while a few 36(11.2%) do not absent themselves from work for any reason.

### 4.5.2 Health awareness among food sellers

Out of 331 participants, 277(83.7%) responded positively to question on whether they have been told that food sellers should always undergo routine medical test in order to remain in the food business.

**Table 4.22: History of medical examination**

<b>Last period of medical examination</b>	<b>Number</b>	<b>Percentage (%)</b>
More than 2 years ago	7	2.5
Exactly 2 years ago	29	10.4
A year ago	69	24.8
Six months ago	13	4.7
Less than 6 months ago	55	19.8
Weeks ago	37	13.3
Cannot remember when	38	13.7
Never gone for medical examination	30	10.8
<b>Total</b>	<b>278</b>	<b>100</b>

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**Table 4.23: Reasons for undergoing typhoid and tuberculosis tests**

<b>Variable</b>	<b>Number (N)</b>	<b>Percentage (%)</b>
<b>Reason for Typhoid test</b>		
For confirmation when I was ill	27	27.3
To obtain medical certificate of food sellers	67	67.7
Just a routine regular check	5	5.1
<b>Total</b>	<b>99</b>	<b>100%</b>
<b>Reason for Tuberculosis test</b>		
To confirmation T.B last time I had cough	5	6.8
To obtain medical certificate of food sellers	67	90.5
Just a routine regular check	2	2.7
<b>Total</b>	<b>74</b>	<b>100%</b>



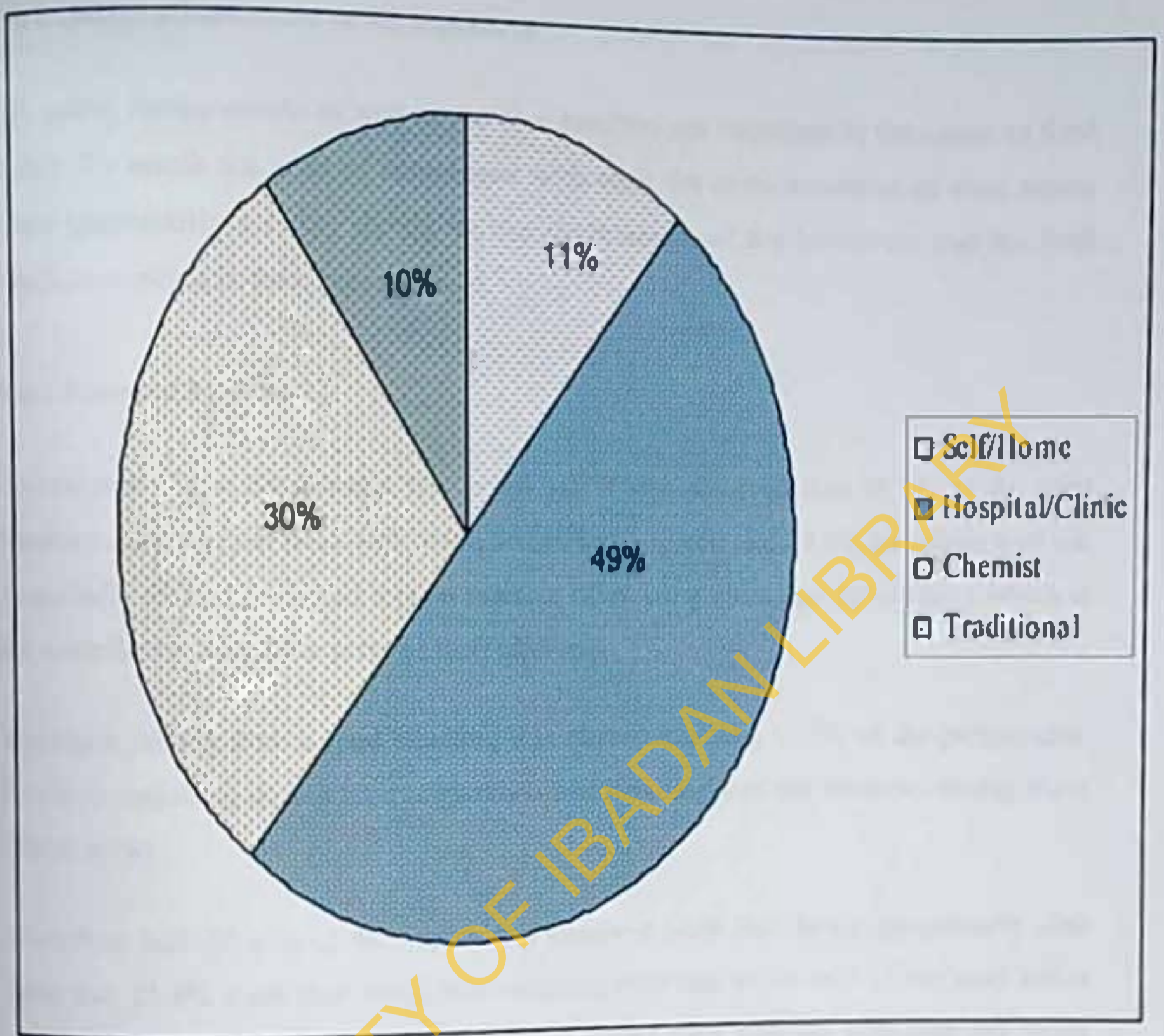


Figure 4.5: Treatment Choice of participants

#### 4.6.0 Observations made at the *Bukateria*

The eating environments as well as the food handlers are important in the aspect of food safety. To assess the level of compliance with what the environment of an ideal eating place (particularly a *buka*) should be, the environment of the *bukaterias* and the food handlers working in them was assessed.

##### 4.6.1 Personal hygiene

Appearance of the participants was noted and it was observed that 78.3% of the food handlers covered their head with scarf, 40.0% had tidy hair and 34.9% had clean well cut fingernails. Only 12.0% had a good practice of wearing clean special clothing which is set aside for cooking (this serve as their uniform).

Excessive talking during food handling was observed among 41.7% of the participants. However, smoking during food preparation and handling was not observed among them (Table 4.24).

More than half (53.1%) of the respondents observed wash their hands immediately after toilet use, 23.4% wash their hands after touching their hair while only 15.4% wash theirs after coughing or sneezing. Also, practice of proper hand washing with soap and water before having contact with food was noticed among 44.6% of the participants. However, hand drying with clean napkin/towel after washing was observed only among 36.0% of them. This is shown in Table 4.25.

##### 4.6.2 Physical surroundings

Based on the external features and the number of rooms used, number of workers (food handlers) and the number of customers; the *bukaterias* observed were classified into small (75.6%), medium (20.3%) and large (4.1%). *Bukaterias* classified as a small facility usually have one food handler: the proprietor and in most cases assisted by his/her child of school age. These facilities have little space and operate mostly in a one room shop built either as a permanent structure from concrete or as a makeshift built with wood



and aluminum. Medium facilities are those with about three food handlers; made up of the proprietor and at least two apprentices or paid workers. Large facilities have bigger space, more workers (four or more) and many customers.

Slaughtering of animals on premises or site was present in only 24.6% *bukas*. Animal faeces were present on the premises in 44.6% of the *bukas* and stagnant waste water was present around the premises of 62.9%.

More than half (53.1%) of the observed *bukaterias* were located close to canals or drainages and only 20.6% had unblocked or flowing drains. Well covered dust bins were found in 20.7% of the *bukaterias* (Table 4.26). It was observed that most *bukas* (82.4%) sourced water from unsanitary wells (Plates 4.1a and 4.1b).

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**Table 4.24: Observed Practices that could promote food contamination**

<b>Variable</b>	<b>Number*</b>	<b>Percentage (%)*</b>
Chewing of sticks/tooth picking	72	20.6
Unclean utensils, pots & cutting boards	290	82.9
Coughing or spitting while handling food	104	29.7
Eating over unprotected food/surface	136	38.9
Excessive talking while handling food	146	41.7
Sneezing, blowing or picking of nose	144	41.1
Smoking while handling food	0	0.0
<b>Total</b>	<b>892*</b>	<b>&gt;100%</b>

\*Multiple observations

**Table 4.25: Hand washing Practices Observed**

<b>Variable</b>	<b>Number*</b>	<b>Percentage (%)</b>
<b>Times hand washing occur</b>		
Before food handling starts	166	47.4
After handling raw food	180	51.4
Immediately after using the toilet	186	53.1
After touching the hair, scalp or body opening	82	23.4
Immediately after coughing or sneezing	54	15.4
<b>Total</b>	<b>668*</b>	<b>&gt;100%</b>
<b>How Food handlers wash their hands</b>		
Washing of hands thoroughly with soap and water	156	44.6
Use of clean and adequate water	138	39.4
Drying of hands with clean towel/napkin	126	36.0
<b>Total</b>	<b>420*</b>	<b>&gt;100%</b>

\*Multiple observations

**Table 4.26: Observed components of the physical surroundings**

Features	Present		Absent		Total
	Number	Percentage (%)	Number	Percentage (%)	
Human/animal faeces	156	44.6	194	55.4	350(100%)
Slaughtering of animals on site	86	24.6	264	75.4	350(100%)
Stagnant wastewaters on premises	220	62.9	130	37.1	350(100%)
Closeness of eatery to canal/drainage	186	53.1	164	46.9	350(100%)
Flowing, well covered drains	72	20.6	278	79.4	350(100%)
Sanitary well	60	17.6	280	82.4	340(100%)
Food waste piled in open/ scatter on ground	90	26.5	250	73.5	340(100%)
Dustbin with cover	72	20.7	276	79.3	348(100%)
Closeness of eatery to major road	126	36.6	218	63.4	344(100%)





Plate 4.1a: Unsanitary well



Plate 4.1b: Unsanitary well





Plate 4.2a: Bukateria with poor housing condition



Plate 4.2b: Bukateria with netted cabinet for covering cooked food





Plate 4.3a: A separate cooking area along the road

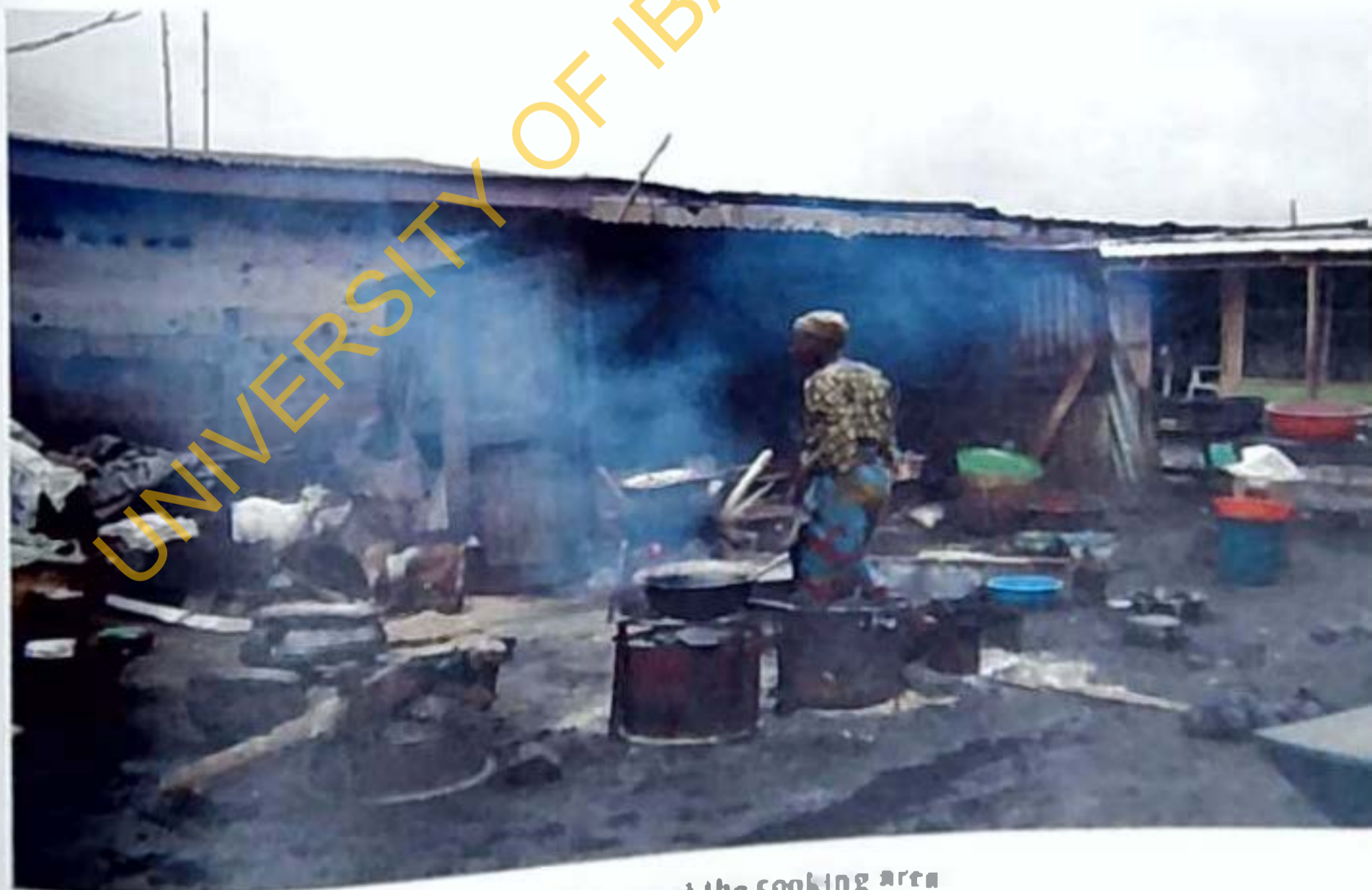


Plate 4.3b: Outdoor cooking: animals around the cooking area





Plate 4.4a: Unhygienic condition - use of dirty water to rinse plate



Plate 4.4b: Poor wastewater disposal method



#### 4.7.0 Laboratory results

The water samples for the bacteriological analysis was 35 in number and it comprises of borehole water source 11 samples (31.4%), well water source 20 samples (57.1%), tap water 2 samples (5.7%), rain water 1 sample (2.9%) and water from vendor 1 sample (2.9%). See Table 4.27.

The presumptive test carried out on 35 water samples collected showed that more than half (57.0%) of them had an average of 50 coliforms/100ml of water. The MPN index recorded ranged between 9 to 350 coliforms/100ml of water sample. This result compared to the WHO guideline for drinking water which is given at 0 coliform/100 ml of drinking water is high (WHO, 1996).

However, in the confirmatory test which is the sub-culturing of the microorganism on BGLB broth, the result was insignificant as a range of 0 - 4 coliforms/100ml of water sample was obtained. This result compared to the WHO guideline for drinking water (above) is high. However, it can be stated that it is still within the permissible level of untreated water entering distribution system (3 coliform organisms/ 100ml of water) and that of unpiped water supplies (10 coliform organisms/ 100ml of water) (WHO, 1996).

In the standard plate count method, colonies were counted and it was observed that samples from well water sources had the highest number of colonies in the three dilutions: 1:10:100. The colonies have different characteristic morphological structures and colours vary from whitish, creamy to grayish forms. Some colonies were distinct while others were fused. The number of colonies varied from as high as 60 colonies in the first dilution (60 cells/ml) of some of the borehole water samples to as high as 100 colonies in the second dilution ( $1.0 \times 10^4$  cells/ml) of some of the well water samples (Table 4.28).

**Table 4.27: Water samples and their sources**

Ward	Number of sample	Water source				
		borehole	well	tap	rain	vendor
1	3	-	3	-	-	-
4	4	1	3	-	-	-
5	4	2	1	-	1	-
6	4	1	3	-	-	-
8	6	1	3	2	-	-
9	5	3	2	-	-	-
12	9	3	5	-	-	1
<b>Total</b>	<b>35</b>	<b>11</b>	<b>20</b>	<b>2</b>	<b>1</b>	<b>1</b>

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## 4.8.0 Findings from Key Informant Interview

### 4.8.1 Role of environmental health officers (EHOs) in ensuring food safety

According to the Chief EHO, the roles begin with siting of the *bukateria*, approval of the premises and licensing. Secondly, routine inspection of the premises so as to identify areas where they are lacking after the place has been established and finally to update the reference as the case may be.

### 4.8.2 Functions and Challenges

The EHOs are able to perform their role or functions by dividing into zones and each zone is subdivided into areas. A health officer is in-charge of an area and when a new buka has been spotted, it is reported and registration is ensured.

The challenges faced most times; according to the interviewee is basically social problems and poverty. He said "majority of those in this food business are in it because there is no other source of livelihood for them. Some or even all the women in the business are bread winners of their family probably because they do not have husband or their husbands have lost their jobs".

Also, another challenge is that some of the premises are not registered or they do not apply before setting up and when they are reported, their *buka* is shut down but people will keep begging on their behalf giving you reasons why the vendor has not been able to do the right thing.

### 4.8.3 Requirements for Establishing Food Business (*bukateria*)

According to the interviewee, requirements vary depending on the type of food business; what is required for establishing a restaurant is quite different from that of a canteen or *bukateria*. However, on the average, the requirements can be grouped majorly into two:

- The location or siting of the place must be good. It must be white washed, painted, screened (all openings such as windows and doors must be screened).

There must be an average store where food is stored and a tight fitting dust bin for waste collection must be present.

- There are health requirements and this equally depend on the food premises be it a bukateria or a canteen.

A bukateria must be screened, white washed, with provision for refuse collection and good water storage facility. Also, provision of a kitchen, a store and a cloak room are also essential.

#### 4.8.4 Training programme for food handlers and response level

There are training programmes which were formerly organized by the State and it usually run for four weeks. However, it is now organized by each local government, training takes place yearly in IBNLG and runs for two weeks and it involves the Primary Health Care (PHC) doctors and nurses.

The training and re-training programme of food vendors has a rather high response level and this is made possible by the assistance of the Food Sellers' Association which helps to mobilize members.



## 4.9.0 Findings from Focus Group Discussion

### 4.9.1 Food Selling Business

All the participants reported that life generally is difficult because of the economic hardship which makes people struggle for survival and to make ends meet in every quarter. Almost all of them believe that the food business is equally affected but many agreed that the trade is a better one compared to other forms of trade in the informal sector. The response made by one of the interviewee was:

*"Food is a basic necessity since everyone needs it. Even if one cannot afford to buy new cloths you just have to feed yourself and your family. This is why the food business is moving well compared to others."*

### 4.9.2 The Reasons People Chose Food Selling Business

Majority of the participants believe that the major reason people chose the food selling business is because of its lucrativeness. With little money, one can start the business and make much profit especially when one cooks well. The second reason given by other participants is that a food seller will be able to provide for his/her family needs. Financially, one will be able to support the family; the ability to meet up with responsibilities especially as a parent. One responded thus:

*"From the same food we are selling, we will eat; our children and husbands will also eat. By this, the problem of feeding is solved."*

Another reason given is that one does not require special skills to start the food selling business. A few also said in addition that people chose food selling business because it makes you famous or popular within your area.

### 4.9.3 Training for the Food Business

Participants mentioned ways by which one could learn the food business. Apprenticeship and learning from ones parent (who was formerly selling food) were mentioned by majority. Only few mentioned formal learning of the business, that is attending school and it is believed that people that acquire such knowledge are mainly into catering



services and hotel management. The following statements capture mode of learning of the food business:

Interviewee at Irefin: *"Majority of the people you find around here starts the business either by apprenticeship or they continue in their mother's profession."*

Interviewee at Bodija: *"Someone that learns the food selling business will always do better since the person would have gone through extensive training under proper supervision. If one is serious and focused, he/she can complete the learning in three months, if one did not learn the business, under few months, the person may be running at a loss instead of making profit."*

Interviewee at Agbowo: *"This food business cannot be done by one person. This is why we need people to work with us as apprentice. In the older days when we were serving as apprentice, we do not get paid but now we pay and also feed them. If you do not have your children around you to assist you then you just need a help but if they are interested in the trade, count yourself lucky"*.

#### 4.9.4 Knowledge on Diseases Contacted From Food

Participants were asked if diseases can be contacted from food and different responses were obtained. Most responded that food in itself cannot bring about disease transmission once it is well prepared in a clean environment. A few mentioned that person cooking can transfer disease such as cough while majority responded that diseases may be contacted from food by cooking in a dirty environment, making use of dirty cooking utensils such as spoons, knives, pots, etc. using bad/spoilt or contaminated ingredients such as pepper, tomatoes, etc for cooking and when food is not well cooked. Almost all the participants mentioned cholera as a food borne disease.

Interviewee at Sabo: *"Diseases such as cholera can be contacted through consumption of contaminated food"*

#### 4.9.4.1 Prevention Strategies for Food Borne Diseases (FBDs)

It was generally accepted that improper cooking can bring about illness. A majority responded that before cooking beans, it must be well picked and washed, also rice should be washed properly using only clean water. The following quotations reflect other prevention methods by participants:

Interviewee at Mokola: *"Hygiene is the first in preventing disease. The pepper must not be rotten; other foodstuffs must be good and well kept. A meal(s) returned or not eaten by a customer must not be transferred back into the cooking pot for it could be a source of infection to others. Also, the person cooking must cover their head".*

Interviewee at Bashorun Oluwo nla: *"The food seller should make sure she treats herself if she has any cough or other diseases which can be transmitted to customers. It is good to visit the hospital to report and treat any sickness. Also, it is good to go for training because one can learn ways of preventing the spread of diseases".*

Interviewee at Agbowo: *"Before anyone can start the food selling business, the person has to be examined and certified fit for the business. The urine, sputum and blood are tested; persons with cough are not allowed to sell food until they have been properly treated".*

#### 4.9.5 Membership of Food Sellers Association

Majority of the participants belong to food sellers association and most of them believe that the association is beneficial. Participants reported that the association works with the local authority and ensures that the members comply with laid down rules and regulations. However, a few who do not belong to the association are referred to as "corner side food sellers" who just set up the business on their own without picking up with the necessary requirements.



#### 4.9.6.0 General Problems Faced by Food sellers

Some general problems identified by participants include high cost of foodstuffs in the market which affects their profits and the poor power supply which affects food storage. Participants reported that food materials are excessively expensive and most of the time they usually purchase their raw foods on credit and make payment after selling. Participants also responded that they like to purchase in bulk since it is cheaper in the long run however, for perishables such as pepper, fish, meat, etc they cannot because of the power shortage. Another problem identified was the lack of uniformity in prices of cooked food. Some of the participants reported that some food vendors, especially those who hawk their food sell at a cheaper rate and are patronized more than vendors who are stationary. Nearly all the participants believed that most of those food hawkers use poor quality raw food materials for their cooking.

#### 4.9.6.1 Problems Related to Water and Environmental Sanitation

Water scarcity and shortage is a big problem faced by the participants. Water is sourced from different sources and more than half reported that they buy the water they use for their cooking from the neighbourhood or from the community borehole project. Some participants responded that on a daily basis they buy water from the public tap in their community and a bucket cost not less than thirty naira and on the average they spend up to seven hundred naira (N700.00) per day. Another challenge is that the queue is usually long and once they do not get to the pump early, they might not get the water they need for the days' business. However, some participants reported they depend on another source of water, that is the well water but this alternative also has its difficulty which is that during dry season, there will be less water and at such times, the water is sold for thirty naira or even more.

Other major problem areas identified by participants include poor drainage system, management of refuse, discomfort caused by firewood smoke and lack of public toilet facility. Majority of the participants reported that they use money to dispose off their wastes. According to them, wastes such as yam peels and vegetable remains are given to



those who rear animals in their areas thereby reducing the quantity of wastes they are to dispose of. Firewood smoke is a problem to some participants who reported that the smoke affect their eyes causing blurred vision and excessive lacrimation (tearing of the eye), while others sees it as no problem because according to them, they do their cooking outside where there is enough air circulation. On the toilet issue, participants have different responses; however majority does not have an individual toilet attached to their *buka*. Most of the participants reported that they make use of toilets within their neighbourhood, some reported that they have to leave whatever they are doing and go home to make use of the toilet which is not so far from the point of selling, while others responded that their landlords have just made provisions by building for them a pit latrine. It was however stated that customers are not allowed to make use of these facilities. Pests such as cockroaches and rodents were the main pests mentioned by the participants affecting them.

#### 4.9.6.2 Common Health Problems of food vendors

Participants responded that they usually have health problems since they overwork themselves especially for those who do not have people assisting them in the food business. Head aches, fatigue, body aches and pains were mentioned as the regular health problems of every food vendor after a hard working day and nearly all the participants reported that they use pain relieving drugs almost on a daily basis. Majority believed that smoke have damaging effect on the eyes and that after a prolong exposure; it results in eye problems during old age.

#### 4.9.7 Routine Inspection by LGA Authority

Participants reported that health workers from their Local Government Area come to their *bukaterias* on routine inspection. The frequency of their visit according to the participants depends on where ones *buka* is situated; those who are situated on main road are regularly visited as compared to those located in the interior areas. It was however reported that on the average, the health officers visits three times a month. Most of the participants reported that they have cordial relationship with the health officers while

others see them as a problem and a threat to their business. Participants desired that the health workers should discharge their duties effectively, they should help in identifying the problems in each area and find ways of solving them especially that which concern food vendors, that is refuse disposal and drainage system.

#### **4.9.8 Personal Hygiene and Food Hygiene**

Majority of the participants believed that personal hygiene has more to do with appearance; dressing neatly, hair tidying and clean cut nails. Some participants also mentioned every day body wash and brushing of teeth. What food hygiene means to participants include buying good raw foods from the market, using clean water, pots, spoons, knives, etc for cooking, cooking in a clean environment and keeping food away from flies, dusts, etc. Some participants believe that if as a food handler they are not practicing hygiene, it may lead to the death of the public.

#### **4.9.9 Routine Medical Examination**

Nearly all the participants were conscious of the importance of routine medical check up or examination. However, only a few do go for their medical examination once in every six month.

#### **4.9.10 Local Government By-laws on Food Sanitation**

The participants were aware of the food sanitation by-laws. Majority of them are familiar with the law on environmental cleanliness of food premises and the consequences of the law which is locking up of the premises.



## CHAPTER FIVE

### DISCUSSION

This chapter focuses on the implications of the findings in line with the objectives of the study. The socio demographic feature of the study population and its correlation with food safety knowledge and practices is discussed briefly. The chapter addresses food handlers' knowledge relating to food hygiene and food borne diseases (FBDs), the personal hygiene practices of food handlers relating to food hygiene and their practices of food storage and preservations. Included for discussion in this section are the environmental and sanitary conditions at the various *bukaterias*. Addressed also are the health conditions of the food handlers and their management of common ailments that can be linked to food borne diseases.

#### 5.1 Socio demographic Characteristics of Food Handlers

It should be noted that harmful effect on people's health arises not only from poverty but also from all kinds of social and educational disadvantages. In this study, nearly all the participants were females and it has been found that the contribution of women to this trade is significant as previously shown by other studies (Ahmad, 2000; Akinyele, 1987; Barro et al; 2000). A possible explanation is that increasing number of women are equally featuring in the informal sector of the economy. The contribution of women to socio-economic development in Africa cannot be over emphasized. Nwangwu (2008), noted that in Africa and all third world countries, women work the land and feed the population.

Majority of the respondents were found to be within the active age group of 25 to 54 years. This is similar to the study by Tedd, Liyanarachchi and Saha (2000) who found that substantive number of street food vendors' ages range between 25 and 60 years with majority being in the age group of 30-40 years. Also, in this study, respondents with no



formal educational background are predominant followed by those who received only the universal basic education. This however has health implication in the sense that education affects the behaviour of an individual because people with formal education are more able to utilize their knowledge to practice some hygiene behaviours (Redmond and Griffith, 2003; Oteri and Ekanem, 1989). The lack of formal education explains why most of the food handlers join the food business early in life since it is a cultural practice for an individual to learn any trade of his/her own interest in order to have a source of livelihood. Learning the food trade takes different forms as some learn while serving or working as help which is a form of apprenticeship. For such people, after some years of learning, they are given the freedom to start their own business. However, many learn the trade from their parent while assisting them at work and thus it brings about continuity of the business. These two forms of learning is the most common among the participants and it could be of benefit since the learning process occurs as a result of practice or experience which can eventually introduce a permanent change in the behaviour of the food handler.

## 5.2 Knowledge Related to Food Hygiene and Food Borne Diseases

Knowledge on safe food handling is important in the control of food borne illnesses. The awareness of a food vehicle for *Salmonella* spp, for example, may indicate knowledge of the aetiology of FBD and hence promote the safe food handling (Altekruse et al., 1996). According to the subjects, raw foods were purchased from the market and it was reported that buying good food items from the market, cooking with good water and preventing food from dust, flies, rodents, and other vectors are important food hygiene practices. Participants were aware of cross contamination of food hence they were conscious that raw foods such as meats and fish must be separated from already prepared foods. These answers contrasted with the actual practices observed in the *bukaterias* and it was found that there was a significant variance between stated (answers provided in response to questionnaire and at the group discussions) and the observed food hygiene practices. Poor food handling practices observed includes use of dirty knives for cutting, not washing pepper and tomatoes with adequate water before blending it. Also observed was piling of



cooking utensils and plates after uses; use of dirty water for rinsing plates and other utensils; and absence of dish towels for drying plates.

Almost all the participants admitted that diarrhoea and cholera are FBDs and are aware that contaminated food or water could cause it. However, other common FBDs caused by microorganisms include Typhoid, Tuberculosis, Botulism, Salmonellosis, and parasitic infections of different types exists and are known world wide as leading causes of morbidity and mortality (Lucas and Gilles, 2003; Nester et al., 2001; Park, 2005; Tauxe, 2002). At the onset of an infectious disease, there are manifestations or signs known as symptoms of that disease. It is the symptoms that serve as a clue in diagnoses and treatment of the disease. The participants were familiar with some symptoms of FBDs such as vomiting, watery stool, stomach aches and cramps. Hence they could associate such symptoms to consumption of unwholesome food. It could be inferred that for the majority of the participants in this study, knowledge of FBD was acquired through the food handlers training programme (for those who attended). Another possible means of knowledge acquisition is the media for those who have never attended a food handlers' training before. Food handlers' knowledge about FBDs has potential for positively influencing their personal hygiene and environmental sanitation practices.

### 5.3 Personal and Food Hygiene Practices

Majority of the respondents in this study were able to list food handlers' hygiene practices such as daily bathing, wearing of clean clothing or uniform while cooking and proper hand washing before handling food. However, in actual practice as revealed by the observation checklist, only few wear aprons and uniforms. Proper hand washing with adequate soap and water before cooking commences and at other critical points such as after using the toilet, sneezing or coughing, itching the body or the hair, is not actually practiced. Many of the participants use the cloth they wear to wipe off sweats from their faces while some use their cloth to wipe their nose after sneezing. All these harmful practices have potential for compromising the safety of the food they sell to their customers. Other personal hygiene practices which need to be addressed through health education include picking of nose, coughing, spitting while handling food and excessive



talking during food preparation or serving. Indiscriminate coughing, sneezing and spitting were habits found to be common among many of the participants. These acts have serious implication on health because droplets from such practices when it falls on food especially already prepared food which needs no further cooking or heating, infection may occur when the food is consumed (Hobbs, 1968; Oyewole et al., 2002).

Poor hygiene practices worthy of mentioning include lack of hand washing; infrequent hand washing; the use of insufficient and poor quality water for hand washing; touching of face, nose and hair during food preparation and lack of separate hand towels were the most common unhygienic practices noted. The identified poor personal hygiene behaviours in this study can promote the occurrence of gastroenteritis such as enteric fevers, the bacillary dysenteries, cholera and other diseases acquired through the faeco-oral route (Lucas and Gilles, 2003; Park, 2005). Hands often act as vectors that carry disease-causing pathogens from person to person, either through direct contact or indirectly via surfaces. It has been said that improved hygiene (hand washing) and sanitation (latrines) have more impact than drinking water quality on health outcomes, specifically reductions in diarrhoea, parasitic infections, morbidity and mortality, and increases in child growth (Esrey et al., 1991; Huttly et al., 1997). Most endemic diarrhoea is not water-borne, but transmitted from person to person by poor hygiene practices, so an increase in the quantity of water has a greater health impact than improved water quality because it makes it possible (or at least more feasible) for people to adopt safe hygiene behaviours (Esrey et al., 1991).

Although the participants have a good knowledge of the importance of hand washing, this knowledge however does not translate into practice. For instance, nearly all the participants knew that it is essential as well as mandatory to wash their hands with soap after defecating or after cleaning up a child that finished defecating, it was however observed that majority only rinse their hands while a few use very little soap with inadequate quantity of water to wash their hands, and instead of drying the hands with towel, they use their wrapper. Hence, in order to translate food handlers' knowledge relating to personal hygiene to action, appropriate motivation and continuous training and performance monitoring are needed.



## 5.4 Environmental Sanitation and Water Use

Water is essential in sanitation. Human and domestic waste from any area has the potential to contaminate not just the local environment, but also groundwater, lakes, and rivers used by many others for supplies of freshwater. Thus the sanitary crisis can take its toll on all city residents, and on the national freshwater resources of developing countries (Wright, 1997). The main sources of water for use at the *bukaterias* were wells and boreholes. Some of the participants have their source of water close to their *bukaterias* most of which were found to be shallow wells while others need to walk far away from their *bukas* within the neighbourhood to get water. Stream and pond water sources were not reported by participants. The microbiological quality of water samples was determined and it was found that water is open to contamination at about three or more ends. One is contamination from the source; it was observed for instance that most of the wells were not sanitary wells. Some wells had no parapet or apron, some had no lid or cover while some that have covers are left open all day. Also, the fact that they were shallow wells makes them open to contamination and pollution through sipping in of sullage and sewage. Another point of contamination of the water is through the container used for fetching since it was observed at some places that different people coming to fetch water introduce their drawing bags into the well. It is important that only one drawing bag is used by all, through this, rate of contamination is reduced. The containers used in storing water could be another major source of contamination for water from other sanitary sources. Only few *bukas* stick to the practice of using one cup to draw water from the storage container which in most cases is a drum. It is important to note that the microbial quality of the water is poor and should not be served for drinking except it has been treated. Drinking of untreated water increases the rate of infection from food and water borne pathogens (Park, 2005).

The waste streams in the *bukas* differ in volume depending on type of food sold, the size of the *bukateria*, the number of staffs and the number of customers patronizing them. Nylons from packaged or "pure" water and those used for wrapping foods constitute the bulk of the waste produced. They are found littering the premises of most *bukaterias* observed and at times contributing to blockage of the drainages. Other solid wastes

observed were mostly biodegradable – vegetable and food remains. To reduce this waste and also the amount spent on waste disposal, some respondents use them as animal feed. Majority use damaged or broken buckets to collect wastes while some use jute bags. Many of the respondents were aware that it is important to cover the waste bins to prevent flies however, not all practice this. It was observed that at some of the *bukaterias* waste waters were indiscriminately thrown around the premises. A few slaughter animals on site and water used in washing the blood litter around the premises. This can attract flies which are major nuisance especially in *bukaterias* that are not screened with nets. Flies are known to be mechanical vectors which facilitate the spread of cholera and diarrhoea diseases.

It was also observed that most *bukas* have no kitchen or a separate cooking area. Cooking was done most times in the open near dusty busy roads which can give room for contamination of food. Also observed in the structure of some of the *bukas* were blocked drains, poor flooring, inadequate lighting and lack of proper ventilation. A majority engaged in weekly general cleaning of their facility while only few clean on daily basis; some in the morning before the day's work while others do theirs at the end of the day.



## CHAPTER SIX

### CONCLUSION AND RECOMMENDATIONS

#### 6.1 CONCLUSION

It should be noted that street vending survives not merely because it is an important source of employment but also because of the services it provides to the urban population. It is important that food served is safe and to ensure this, public health authority must hold this group in high esteem because they come first in administering interventions. For street foods to be safe, the necessary procedures and practices include good personal hygiene, environmental sanitation and processing of food.

Health education is the primary intervention necessary for the prevention of food borne diseases with an objective to influence change in knowledge, attitude, behaviour and practices. The problem of a health educator is simplified when the people can identify their own problems and if they are ready to solve most of them. Ackerley (1994) and Rennie (1995) describe how Social Cognition Models (SCMs) such as 'The Theory of Planned Behaviour' (Ajzen, 1991), 'Tones Health Action Model' (Tones, 1979) and 'The Health Belief Model' (Janz and Becker, 1984) could be used to understand food hygiene behaviour. While these theories differ in the detail of the constructs, they are all grounded in the assumption that a person's behaviour is determined through an examination of their beliefs, attitudes and norms and that these factors need to be examined within social and environmental conditions. These models have previously been successful in understanding and predicting a range of health-related behaviours, such as smoking, exercise and diet (Janz and Becker, 1984; Ajzen, 1991). Although SCMs have not, as yet, been applied to the understanding of food handlers' behaviour in an organizational context, the Health Belief Model has been used to understand consumers' food safety behaviours (Frewer et al., 1993; Schafer et al., 1993; Tinda and Hillers, 1997). Health education is thus a component of strategies to achieve improvement. Such improvement

will be evidenced by: better personal hygiene and self protection; proper methods for washing and sanitizing dishes, utensils, etc; insect and rodent control; waste disposal and house keeping practices.

## 6.2 Recommendations

From the findings of this study, the identified problem areas are majorly in the aspect of environmental sanitation, lack of or inadequate supply of potable water, ineffectiveness of the local authority and other enforcement agency and the unwillingness of food handlers themselves to improve quality of food served in *bukaterias*. For each identified problem area, the following are recommended:

1) To achieve improved hygiene and environmental sanitation in street foods, three major things are identified for successful operation of food establishment. These are: provision of potable water, means of refuse disposal and sanitary premises.

a) Large amount of water is necessary in food processing and preparation. Food handlers generally manage water since it is not readily available. State Government should improve in the area of water projects such that potable water is available and accessible (appropriately located) for the food vendors. Once this need is met, good hygiene practices among food handlers will improve.

b) State and Local Government should provide adequate waste collection vehicles or a central waste point in each area. This will help in preventing littering of the environment and help improve the sanitary state of *bukaterias*.

c) State and Local Government should provide public toilets especially in high density areas that attract these food servicing establishments.

2) Improvement of street vended food should continually be of paramount importance to food control authorities at all levels of the Government. Authorities concerned should carry out their duty effectively so that no *bukateria* is operating below standard. They should find a way of enforcing the laws and ensure



compliance to regulations which makes it mandatory for all food premises assessment.

- 3) Good practices can be promoted and improved upon when inspection and supervision of *bukaterias* are done on regular basis by the local authority. Through regular routine inspection, the need for a food handler's training is identified. Such training needs constitute baseline information for planning and conducting appropriate training programmes.
- 4) Surveillance and monitoring of food borne diseases by local health authority under the Primary Health Care (PHC) should be done continuously and consistently since it is important in disease notification and documentation. Proper documentation of disease occurrence will help in carrying out risk assessments and risk management of food served in *bukaterias*.
- 5) Owners or proprietors of *bukaterias* should not only be interested in profit making but more importantly in operating in a clean and decent environment as required by the law. By keeping a sanitary environment, more customers are attracted to the facility thereby improving sale.
- 6) Proprietors should supervise the practice of hand washing in their *bukateria* and make provision for proper hand washing and drying for their staffs. Also, adequate facilities should be provided for the cleaning of all utensils and equipment before and immediately after use.
- 7) All food handlers (and not only the owners of *bukaterias*) should get trained and certified by a registered medical practitioner to be free from typhoid, cholera, tuberculosis, or any other infectious disease. Before employing any person into the food business, the owner should ensure that the person is trained and medically fit. It is also compulsory that medical examination should be routinely done every 6 months and sick food handlers should stay away from work so as to prevent disease transmission.

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## APPENDICES

### APPENDIX I

#### KEY INFORMANT INTERVIEW WITH CHIEF ENVIRONMENTAL HEALTH OFFICER OF THE IBADAN NORTH LOCAL GOVERNMENT AREA.

1. What are the roles of the environmental health officers (EHO) in ensuring food safety in bukaterias?
2. How are they carried out and what are the challenges?
3. Are all the bukaterias in the Ibadan North registered by the local government?
4. How many bukaterias are registered/licensed by the local government?
5. How do you check/control the proliferation of these bukaterias?
6. Is there any standard of what an ideal Duka should look like?
7. Is there any training program for food handlers/vendors that are organized by either state or federal ministry of health?
8. If there is, what is the response level?
9. Is such training programs free for participants?
10. Are certificates usually issued at the end of the training?
11. What are the requirements before a food business can be established?
12. How long does it take before a license expires?
13. (i) Is there usually a routine medical examination (RME) for the food handlers/vendors?  
(ii) Is it mandatory to do a pre-registration medical screening before starting a food business?

## APPENDIX II

### FOCUS GROUP DISCUSSION (FGD) WITH THE FOOD HANDLERS OF BUKATERIAS ON THEIR HYGIENE PRACTICES

#### Introduction

Good day to you all. My name is Babayo, Abisola Rosemary, a master student of the Department of Epidemiology, Medical Statistic and Environmental Health (EMSEH), Faculty of Public health, College of Medicine, University of Ibadan. I am presently carrying out a research on food hygiene practices among food handlers in bukateria of Ibadan north local government area of Oyo state. My colleagues are-----

We really appreciate you for sparing out of your time to share with us your opinion on food hygiene, sanitation and food borne diseases. Please, be rest assured that all information provided would be used for research purposes only and strict confidentiality would be ensured.

We are very much interested in your candid opinion on these issues so feel free to express your opinions during the course of this discussion. We request your consent to participate voluntarily in this discussion and also to allow us use a tape recorder for effective documentation of the proceedings.

Thanks for your patience and participation.

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S/N	QUESTIONS	HINT/FOLLOW UP
1	How is life generally in Ibadan now a days?	Probe: What about food business; how is it moving?
2	What make people chose food selling business in this community?	Probe for: Factors that make people choose food business over and above other business?
3	How do people learn how to do food business in this community?	Probe for: a) Formal schooling. b) Apprenticeship. c) Training ownership, etc.
4	(i) What are the diseases which one can get from food?  (ii) How can such diseases be prevented by the owners of bukateria/restaurant?	Probe for: a) How common is it for customers to get such health problems from the food they eat in bukaterias in this community? b) If typhoid is not mention Probe for: <ul style="list-style-type: none"> <li>• What is typhoid?</li> <li>• In what way(s) can food sellers spread it?</li> </ul>
5	Do food vendors in this area belong to an association?	
6	(i) What are the problems which food vendors face in this area?  (ii) What are the common health problems of food vendors in this community?	Probe for: a) Problems on the following aspects: procurement, cost, preservation, quality control, contamination?  b) Environmental issues? <ul style="list-style-type: none"> <li>• Water</li> <li>• Toilet</li> <li>• Drainage system</li> <li>• Refuse</li> <li>• Smoke from fuel</li> </ul>
7	(i) What is the relationship between food vendors and the health officers from the local government area?  (ii) What do you like about them?  (iii) What do you not like about them?	Probe for: How often do they come to inspect your premises?
8	(i) We hear people talk about personal hygiene all the time, what is it all about?  (ii) What does food hygiene mean?	

9	How often do food vendors go for routine medical examination in this area?	Probe for: a) How often do people undergo this examination? b) What specific medical examination do they undergo? c) How important is it for people in food selling business to have the medical examination?
10	What is the food sanitation all about?	Probe for: a) What about the Local Government food sanitation bye-laws?
11	Who are the people that monitor food selling business in this area?	a) What do they do? b) How often do they monitor food business?
12	How do food vendors ensure a good customer/client relationship?	

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# IGBIMO IJIRORO TI AGBEYEWỌ PELU AWON OTAJA OUNJE NIPA EKO IMO TOTO

Oro ifihan,

Alafia fun gbogbo yin o. Oruko mi ni Babaoye Abisola Rosemary, akoko imo eko giga ti itesiwaju, ti iso Ajakale arun, akosile onka ati imototo ayika, eka Alafia ara ilu, ile iwe egbogbi, ni ile eko Unifasiti Ibadan. Awon alabasisopo mi ni-----

A fi eni intoore wa han fun akoko yin ti e fi site lati le bawo pe jo soro nipa imo yin lori eko nipa ilera lori ounje, imototo ayika ati awon arun ta le ko latara ounje.

Eto okan yin ti o joju je ohun to ose se pataki fun wa, nitorina, e fi tife tife gbe awon imoran yin na hake fun wa. A nbere fun lyonda yin lati kopa ninu ijiroro yi ati lati to ero igbohun site fun akosile to o daju ti osi jon tiran.

Adupe fun suuru ati ifowo sowopo yin.

S/N	IBERE	OTELE IDAJIUN
1	Bawo ni igbesi aiye ni ilu Ibadan lo de oni?	Waa lo: Bawo ni ounje tita se n lo si?
2	Kini o ma e ti mu awon eniyan ni agbegbe yii yan ounje tita bi ise?	Waa lo: Kini awon idi na ti o mu awon eniyan yan ounje tita ju gbobo isesise to ku lo?
3	Bawo ni awon eniyan ni agbegbe yi se ko ise ounje tita?	Waa lo: a) Eko ti ile-iwe. b) Akose mose tabi omoodo. c) Idani leko ti akoko bere, ati bebe lo.
4	(i) Kini awon arun ti anko lati ara ounje?  (ii) Bawo ni otaja ounje se le daabo bo ile itaja ounje tire lowo awon arun wonyi?	Waa lo: a) Nje owoopo fun awon onihara yin lati ni awon arun lati ounje jije nana awon ile ounje to wa ni agbegbe yi?  b) <ul style="list-style-type: none"> <li>• Kini iba poju-polo?</li> <li>• Ni awon ona wo ni eni ta ounje se le ko ran awon eniyan?</li> </ul>
5	Nje awon ti o n ta ounje ni agbegbe yi ni egbe?	

6	<p>(i) Kini awon waala ti o doju ko awon olounje ni agbegbe yi?</p> <p>(ii) Kini awon isan tabi arun ti o ma n se awon lon ta ounje ni agbegbe yi?</p>	<p>Waa lo:</p> <p>a) Wa ala lon awon wonyi: rira ohun clo, iye owo ohun clo, itoju ohun clo ki o ma baje, amaju to sise deede awon ohun clo?</p> <p>b) Oro to da le ayika wa?</p> <ul style="list-style-type: none"> <li>• Omi</li> <li>• Ile igbonse</li> <li>• Gota</li> <li>• Eli lati ara epo ti a sin da na</li> </ul>
7	<p>(i) Kini ajosepo ti o wa laarin awon olounje ati awon alamojuto slera ti ijoba ibile?</p> <p>(ii) Kini awon nkan ti e fara mo ni pa won?</p> <p>(iii) Kini awon nkan ti e ko fara mo ni pa won?</p>	<p>Waa lo:</p> <p>Bi emelo ni won ma n wa fun amojuto agbegbe?</p>
8	<p>(i) Angbo nipa imototo ara ni igbagbogbo, kini a le so nipato ni pa re?</p> <p>(ii) Kini a mo to tumo so imototo ounje?</p>	
9	<p>Bi emelo ni awon olutaja ounje ni agbegbe yi ma nlo fun awon ayewo ara to ni gbogbo igba?</p>	<p>Waa lo:</p> <p>a) Emelo ni e lo fun idanwo yi?</p> <p>b) Bi awon idanwo wo ni pato ni awon olounje ma n se?</p> <p>c) Nje ero bo ya o se pataki lati se idanwo ati agbeyewo ara ki eniyan to bere ise ounje?</p>
10	<p>Kini imo yin nipa imototo ounje?</p>	<p>Waa lo:</p> <p>Kini e mo nipa ofin ijoba ibile lo ni imototo ounje?</p>
11	<p>Awon wo ni won mojuto ounje tita ni agbegbe yi?</p>	<p>Waa lo:</p> <p>a) Kini won ma a n se?</p> <p>b) Bi emelo ni won se awon amojuto ounje tita yi?</p>
12	<p>Awon ona wo ni awon olounje gba la ti mu daju pe isepo wa laarin won ati awon olubara won?</p>	

**Ese pupo**



## APPENDIX III

### OBSERVATION CHECK LIST FOR ASSESSMENT OF FOOD HYGIENE PRACTICES AMONG FOOD HANDLERS IN BUKATERIA IN IBADAN NORTH LGA.

Name of Bukateria \_\_\_\_\_ Address/location \_\_\_\_\_

Type of facility 1. Small facility ( ) 2. Medium facility ( ) 3. Large facility ( )

Number of rooms in use \_\_\_\_\_ Staff number \_\_\_\_\_

Number of customers per day \_\_\_\_\_ Seat capacity \_\_\_\_\_

Food types \_\_\_\_\_

#### Section A: PERSONAL HYGIENE

##### 1. How is the appearance of food handler?

Features	Good	Fair	Poor	Remark
Body odour/smell				
Cleanliness of the body				
Covering of injuries with waterproof				
Skin condition				
Sore, whitlow on hand				
Tidiness of hair				
Well cut clean finger nails				
Wearing of head covers				
Wearing of special clothing/aprons				
Physical body fitness				

##### 2. How well is food/contact surface prevented from foreign bodies?

Features	Yes	No	Remark
Chewing of sticks/tooth picking			
Unclean utensils, pots & cutting boards			
Coughing or spitting while handling food			
Eating over unprotected food/surface			
Excessive talking while handling food			
Sneezing, blowing or picking of nose			
Smoking while handling food			

##### 3. Does hand washing take place at these times?

Features	Yes	No	Remark
Before they start handling food			
After handling raw food			
Immediately after using the toilet			
After touching their hair, scalp or body opening			
Immediately after coughing, sneezing			

##### 4. How do the food handlers wash their hands?



Features	Yes	No	Remark
Washing of hands thoroughly using soap			
Use of clean & adequate water			
Drying of hands with clean towel/napkin			

### Section B: PHYSICAL SURROUNDINGS

Features	Present	Absent	Remark
Human/Animal faeces visible			
Urinating close to the eatery			
Slaughtering of animals on site			
Blood & waste left on ground			
Stagnant wastewaters on premises			
Closeness of eatery to canal/drainage system			
Flowing & well covered drainages			
Clean toilet fit for use			
Closeness of toilet to the eatery			
Sanitary well (parquet, apron, etc.)			
Sewage or sullage up/down stream to source of water			
Closeness of water source to sewage			
Food waste piled in the open or scattered on ground			
Dustbin with cover			
Closeness of eatery to a major road			

### Section C: STRUCTURE AND CONDITION OF BUKATERIA

Observation	Present	Absent	Remark
Permanent structure made of cement/concrete			
Temporary structure made of plank, iron, etc			
Cracks, fissures & holes on structure			
Clean separate cooking area			
Clean, well protected floor			
Separate & well arranged food store			
Windows and doors in right position for adequate lighting & proper ventilation			
Netting of windows & doors			
Netted windows & doors always closed			
Netted cabinet for covering cooked food			
Rodent droppings, flies, cockroaches, etc			
Water stored in closed containers			
One bowl used for drawing water			
Table surfaces free of food wastes & spills			
Handwashing bowls with clean water & soap for customers (number & frequency of changing it)			
Clean towels/napkins for hand drying			
Clean & well kept plates, cups and cutlery			
Piles of plates for washing in one bowl			
Use of dirty water to rinse plate			
Piling up of cooking utensils after use			



## APPENDIX IV

### QUESTIONNAIRE ON FOOD HYGIENE PRACTICES AMONG FOOD HANDLERS/SELLERS OF BUKATERIA IN IBADAN NORTH LOCAL GOVERNMENT AREA.

Dear Respondent,

I am a postgraduate student of the Department of Epidemiology, Medical Statistics and Environmental Health (EMSEH), College of Medicine, University of Ibadan presently carrying out a research on food hygiene practices among food handlers in bukateria of the Ibadan north local government area of Oyo state. I wish to kindly request your voluntary participation in the study by providing appropriate responses to the questions in this questionnaire. Please, be rest assured that all information provided by you would be used for research purposes only. The information will not be used against you or your business in anyway. I assure you all that you will tell me will be kept secret and other people will not be allowed to have access to the information. Thanks for your co-operation.

Location/Address: \_\_\_\_\_

Serial number: \_\_\_\_\_

**INSTRUCTION:** Please provide appropriate information in the spaces provided or tick (✓) inside the bracket the response(s) that you agree with in the following questions.

#### SECTION A: SOCIO- DEMOGRAPHIC INFORMATION

1. Age of respondent (last birthday) \_\_\_\_\_
2. Gender: 1. Male ( ) 2. Female ( )
3. Marital status: 1. Single ( ) 2. Married ( ) 3. Divorced ( ) 4. Widow ( ) 5. Separated ( )
4. Religion: 1. Christianity ( ) 2. Islam ( ) 3. Traditional ( ) 4. Others (specify) \_\_\_\_\_
5. Ethnicity: 1. Hausa ( ) 2. Igbo ( ) 3. Yoruba ( ) 4. Others (specify) \_\_\_\_\_
6. Highest level of education: 1. No formal education ( ) 2. Primary ( ) 3. Secondary ( )  
4. NCE ( ) 5. Polytechnic ( ) 6. University ( ) 7. Others (specify) \_\_\_\_\_
7. What is your supplementary job/occupation if any? \_\_\_\_\_
8. What kind of task do you perform in your bukateria/canteen?  
(You may tick more than one as it applies to you).  
1. Purchasing raw foods from the market ( ) 2. Cooking/preparing food ( ) 3. Storing food ( )  
4. Serving food ( ) 5. Packing/Cleaning up ( ) 6. Others (specify) \_\_\_\_\_
9. How long (in years) have you been practicing as a food handler/seller? \_\_\_\_\_
10. How did you learn the business? \_\_\_\_\_
11. What types of food do you prepare for sale? \_\_\_\_\_
12. Do you belong to any food handlers association? 1. Yes ( ) 2. No ( )
13. If yes, what do members benefit from the Association?  
i) \_\_\_\_\_  
ii) \_\_\_\_\_  
iii) \_\_\_\_\_

14. Is your bukateria registered by the local government authority? 1. Yes ( ) 2. No ( )

15. How many workers do you have in this food business?  
Male worker \_\_\_\_\_ Female worker \_\_\_\_\_ Total number of workers \_\_\_\_\_

16. Approximately, how many customers does your bukateria serve daily? - \_\_\_\_\_

17. When do you start work and when do you close from work each day?  
When start each day? \_\_\_\_\_ When close each day? \_\_\_\_\_

### SECTION B: KNOWLEDGE RELATED TO FOOD HYGIENE:

Please Tick (✓) the appropriate box:

18. Have you ever attended a food handlers' training program before? 1. Yes ( ) 2. No ( )

19. If yes, what were you taught at the training?

- i) \_\_\_\_\_
- ii) \_\_\_\_\_
- iii) \_\_\_\_\_

20. Were you issued a trainer's certificate at the end of the program? 1. Yes ( ) 2. No ( )

21. Who organized the training program which you attended? \_\_\_\_\_

22. (22.1) What do you think are the personal hygiene practices which every food handler or seller should adopt/exhibit?

- i) \_\_\_\_\_
- ii) \_\_\_\_\_
- iii) \_\_\_\_\_

(22.2) How important are the following practices to food sellers/handlers?

Practices	Important	Not Important
Bathing daily		
Daily brushing of teeth		
Frequent hand washing with water and soap		
Having a well cut clean finger nails		
Neat/well kempt hair while cooking or serving		
Wearing clean clothes/aprons while cooking or serving		

23. (23.1) Have you ever heard about the Ibadan North Local Government Area bye laws relating to the sale of food in bukateria or eating houses?

1. Yes ( ) 2. No ( )

(23.2) If yes, what is it about? \_\_\_\_\_

24. (24.1) Have you ever heard of Hazard Analysis Critical Control Point (HACCP) as a means of ensuring food safety? 1. Yes ( ) 2. No ( )

If No, please go to question 25.

(24.2) If yes, what points can you identify as the Critical Control Points (CCPs) in your bukateria? \_\_\_\_\_

25. (25.1) What is food hygiene?

- i) \_\_\_\_\_
- ii) \_\_\_\_\_
- iii) \_\_\_\_\_

(25.2) The Table below contains a list of practices; for each tick (✓) whether it is part of food hygiene or not?



Practices	Yes	No
Cooking with aluminium pots		
Frying of fish and meat		
Hand washing before and after handling food		
Keeping cooked foods safe and warm		
Proper storage of raw foods		
Not covering cooked food so that it will not be too hot for customers		
Keeping foods away from rodents, cockroaches, flies, etc		
Use of ingredients/condiments to promote food taste		
Using clean water to prepare food		
Serving of food in ceramic/breakable plates		
Keeping raw foods such as meat, fish, etc away from cooked food		
Washing of cutting boards, utensils, etc before and after use		

26. (26.1) List below five (5) food-borne or food related diseases you are aware of.

- i) \_\_\_\_\_
- ii) \_\_\_\_\_
- iii) \_\_\_\_\_
- iv) \_\_\_\_\_
- v) \_\_\_\_\_

(26.2) For each of the following in the Table, tick (✓) the one you agree, disagree or not sure if it may be symptom of food-borne disease?

Symptoms	Agree	Disagree	Not sure
Backache			
Chest pain			
Stomach-aches, Cramps			
Vomiting			
Itching body			
Watery stooling/diarrhoea			

27. (27.1) What are the various ways by which one can acquire the food borne diseases?

- i) \_\_\_\_\_
- ii) \_\_\_\_\_
- iii) \_\_\_\_\_

(27.2) For each of the following options in the Table, tick (✓) whether you agree, disagree or not sure if it is means by which people can get food borne diseases?

	Agree	Disagree	Not sure
Cooking with contaminated water			
Cooking in dirty kitchen or premises			
Drinking soft drink after eating			
Drinking contaminated water			
Eating too much of beans			
Exposing food to flies, dust, etc			
Eating food containing too much of oil			
Inadequate heating/cooking of raw foods			
Lying down immediately after eating			
Using kerosene stove for cooking			
Sampling cooked food with fingers			
Sneezing/coughing over food			



### SECTION C: PRACTICES RELATED TO FOOD HYGIENE.

Please Tick (✓) the appropriate box:

28. How do you preserve/store raw foods such as meat, fish, etc?  
(You may tick more than one as it applies to you).

1. Keep in cupboard ( )      2. Boiling and/or Frying ( )      3. Expose to air ( )  
4. Salting & Drying ( )      5. Refrigerate ( )      6. Others (specify) \_\_\_\_\_

29. If you use refrigerator, does it contain other items apart from the raw foods?

1. Yes ( )      2. No ( )

30. How often do you wash your hands while handling foods?

1. Never ( )      2. Rare occasions ( )      3. Sometimes ( )      4. Always ( )

31. When do you wash your cooking utensils, cutting boards, pots, etc? \_\_\_\_\_

32. How often is the cooking area cleaned? \_\_\_\_\_

33. (33.1) What do you do immediately after using the toilet?

- i) \_\_\_\_\_  
ii) \_\_\_\_\_  
iii) \_\_\_\_\_

(33.2) What else do you do after using the toilet?

1. Clean hands with paper/rag only ( )      2. Do nothing ( )  
3. Wash hands with water only ( )      4. Wash hands with Soap & water ( )

34. Do you have children you take care of or that stay with you at the bukateria/restaurant?

1. Yes ( )      2. No ( )

35. (35.1) If yes, after a child has defecated, what do you use for the cleaning up?

1. News paper ( )      2. Rag ( )      3. Toilet Paper ( )      4. Water ( )      5. Others (specify) \_\_\_\_\_

(35.2) What else do you do after cleaning up the child?

1. Clean hands with paper/rag only ( )      2. Do nothing ( )  
3. Wash hands with water only ( )      4. Wash hands with Soap & water ( )

36. How long does your cooked food stay before consumption? (Specify hours) \_\_\_\_\_

37. Do you reheat/warm already prepared foods?      1. Yes ( )      2. No ( )

38. Where are already prepared foods kept before consumption?

(You may tick more than one as it applies to you).

1. Kept in cooler ( )      2. Kept in plastic bowl ( )      3. Kept in cooking pots ( )  
4. Kept in a stainless ( )      5. Wrapped in sacks/cloth ( )      6. Others (specify) \_\_\_\_\_

39. How do you preserve leftover foods?

1. Refrigerate ( )      2. Expose to air ( )  
3. Leave in a pot ( )      4. Others (specify) \_\_\_\_\_

40. What do you do to all the left over foods?

1. Take home by workers ( )      2. Used/sold as animal feed ( )      3. Thrown away ( )  
4. Sold to customers next day ( )      5. Others (specify) \_\_\_\_\_

### SECTION D: ENVIRONMENTAL CHARACTERISTICS

Please Tick (✓) the appropriate box:

41. (41.1) Do you have any toilet in this bukateria/canteen?      1. Yes ( )      2. No ( )

(41.2) If No, why? \_\_\_\_\_

42. (42.1) If yes, what type is it?      1. Water closet ( )      2. Traditional pit latrine ( )  
3. Bucket ( )      4. Bush ( )      5. VIP ( )      6. Others (specify) \_\_\_\_\_

(42.2) Does the toilet serve customers as well?      1. Yes ( )      2. No ( )

43. Which types of waste is/are mostly generated in your bukateria?

(You may tick more than one as it applies to you).

1. Vegetables ( )      2. Bones & Fish scales ( )      3. Food remains ( )  
4. Nylons ( )      5. Metals/Cans ( )      6. Others (specify) \_\_\_\_\_



44. What do you use for collecting the refuse?
1. Heap in a corner ( )      2. Buckets ( )      3. Plastic bags ( )  
 4. Dust bin ( )      5. Baskets ( )      6. Others (specify) \_\_\_\_\_
45. What is your source of water? (You may tick more than one as it applies to you).
1. Tap ( )    2. Well ( )    3. Borehole ( )    4. Vendors ( )    5. Others (specify) \_\_\_\_\_
46. Where do you get the water you give to customers to drink? \_\_\_\_\_
47. How often do you experience water shortage in your bukateria?
1. Never ( )    2. Rare occasions ( )    3. Often ( )    4. Always ( )
48. What do you use to store water? (You may tick more than one as it applies to you).
1. Buckets ( )    2. Drums ( )    3. Kegs/Jerry cans ( )    4. Plastic tank ( )  
 5. Concrete tank ( )    6. Metal tank ( )    7. Others (specify) \_\_\_\_\_
49. How often do you clean your water storage container(s)? \_\_\_\_\_
50. Do you disinfect your surroundings?    1. Yes ( )    2. No ( )
51. (51.1) Which chemicals do you use to disinfect? \_\_\_\_\_  
 (51.2) How often do you disinfect your surroundings? \_\_\_\_\_
52. Which of the following pests do you commonly find in the bukateria?  
 (You may tick more than one that applies to you)
1. House flies ( )      2. Cockroaches ( )      3. Rats ( )  
 4. Mosquitoes ( )      5. Others (specify) \_\_\_\_\_

**SECTION E: HEALTH CONDITIONS**

Please Tick (✓) the appropriate box:

53. How will you describe your present state of health?
1. Excellent ( )    2. Good ( )    3. Fair ( )    4. Poor ( )
54. If poor or fair, what is wrong? \_\_\_\_\_

55. (55.1) When was the last time you went for a medical examination? \_\_\_\_\_  
 (55.2) Why did you go for the medical examination? \_\_\_\_\_

56. Have you ever gone for any of the following test before?

	Yes	No	Reason for test
Typhoid			
Tuberculosis			

57. (57.1) How often do you have the following ailments?

Ailment	Never	Sometimes	Often	Always
Cough				
Cold and catarrh				
Cuts & other injuries				
Diarrhoea and/or vomiting				
Fever and chills				
Headaches				
Skin problems (boils, rashes, lesions, etc)				
Whitlow				

(57.2) Other ailment(s)? Please specify if any \_\_\_\_\_

58. How do you take care of yourself whenever you are ill?

- 1. Treat self at home ( )      2. Hospital/ Clinic ( )
- 3. Chemist ( )                      4. Traditional ( )

59. Do you stay away from work on days that you fall ill?

- 1. Yes, every time am ill ( )      2. Yes, only in severe illnesses ( )      3. Not at all ( )

60. Have you ever been told that food sellers should always undergo routine medical test in order to remain in the food business?

- 1. Yes ( )                      2. No ( )

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## AYEWO IMOTOTO AYIKA

**OLUBERE LORI ISE IMOTOTO OUNJE LAJUN AWON ONTAJA OUNJE NI ILE OUNJE BUKA TI OWA LABE IJOBA IBILE ARIWA TI ILU IBADAN.**

Alafiyesi tooto,

Emi je omo ile-iwe oni te siwaju ti eka Ajakale onin, Akosile ounka nipa eto egbogi ati Imototo ayika, Ile-iwe ti Egboji, UCII ni ile-iwe giga julo ti Ibadan. Ni asiko yi mo nse iwadi lori bi ase nse imototo ounje laarin awon ontaja ounje ti o wa labẹ akoso ijoba ibile-ariwa ilu Ibadan. Mo bere fun abaseho yin lati ni daju wipe gbogbo idahun yin yio se anfani fun itewo gba awon ayewo yi. E jowo, mo fe ki e mo daju wipe gbogbo esi ti e fun mi yio je lilo fun iwadi nikan soso ati wipe koni ni ipalara fun yin tabi fun ise yin, yio si tun je oun asiran laarin emi ati eyin. Modupe fun ifowo sowopa yin.

Agbegbe/Apejuwe ile \_\_\_\_\_

Number iwe \_\_\_\_\_

**IFILO:** E jowo e fi idahun ti o to si awon aye ti a pese sile tabi ki e li ami yi (✓) si inu aye na eyi keyi ti o ba jomo e ro yin.

### ABALA KINI : IDANIMO P'ATAKI

1. Ojo on alafiyesi (ojo ibi to koja) \_\_\_\_\_
2. Ako ababo: 1. Okunrin ( ) 2. Obirin ( )
3. Ipo alarede: 1. Apon/Wundia ( ) 2. Tokotaya ( ) 3. Adelebo ( ) 4. Opo ( ) 5. Dalemosu ( )
4. Esin: 1. Onigbagbo ( ) 2. Musulumi ( ) 3. Ibile ( ) 4. Omiran (nipato) \_\_\_\_\_
5. Eya: 1. Hausa ( ) 2. Ibo ( ) 3. Yoruba ( ) 4. Omiran (nipato) \_\_\_\_\_
6. Ipo eko: 1. Nko lo si ile-iwe rara ( ) 2. Ile-iwe alako bere ( ) 3. Ile-iwe elekeji sekondari ( )  
4. Ile-iwe ti awon oluko NCE ( ) 5. Ile-iwe giga ti Poli ( ) 6. Ile-iwe to ga julo ti ifasiti ( )  
7. Omiran (nipato) \_\_\_\_\_
7. Kini ise tabi owo miran ti e nse (ti o ba wa rara)? \_\_\_\_\_
8. Kini awon iru ise ti e ma nse ni buka yin? (E le li ami (✓) si inu aye na eyi keyi ti o ba jomo yin).  
1. Rira awon nko elo nje ( ) 2. Ina dida ( ) 3. Titoju ounje/ohun elo ( )  
4. Gbigbe ounje sun ni ( ) 5. Ipalemo/abo lifo ( ) 6. Ise miran ti e se (nipato) \_\_\_\_\_
9. Oti to bi odun melo ti e ti wa ni enu ise ounje tita yi? \_\_\_\_\_
10. Bawo ni e se ko owo/ise yi? \_\_\_\_\_
11. Iru ounje wo ni e ma n se? \_\_\_\_\_
12. Nje e wa ni inu egbe olounje tita bi? 1. Beeni ( ) 2. Becko ( )
13. Ti o ba je beeni, kini awon anfani ti e nri lara ojo se po yi?  
i) \_\_\_\_\_  
ii) \_\_\_\_\_  
iii) \_\_\_\_\_
14. Nje ile ounje yin gba ase itaja lati owo ijoba agbegbe yin bi? 1. Beeni ( ) 2. Becko ( )
15. Osise melo ni o wa ni ile ise yi?  
Osise okunrin \_\_\_\_\_ Osise obirin \_\_\_\_\_ Lapopo \_\_\_\_\_
16. Onibara yin a to bi melo ni ojumo kan? \_\_\_\_\_
17. Ni igba wo ni e ma n bere lesi tun ma n pari ise ni ojo?  
Asiko ti a n bere? \_\_\_\_\_ Asiko ti a n pari? \_\_\_\_\_

### ABALA KEJI: IMO TO DA LORI IMOTOTO OUNJE

E jowo e fi ami (✓) si idahun ti o joju julo.

18. Nje e ti lo sun idani leko awon olounje n? 1. Beeni ( ) 2. Becko ( )



19. Ti o baje beeni, kini awon nkan ti e ninu idani leko na?

- i) \_\_\_\_\_
- ii) \_\_\_\_\_
- iii) \_\_\_\_\_

20. Nje won fun yin ni iwe eri aseyege ni ipari eto na bi? 1. Beeni ( ) 2. Beeko ( )

21. Awon wo ni won se alakoso eto idani leko yi ti e kopa ninu re? \_\_\_\_\_

22. (22.1) Kini awon ero yin nipa ise itoju tabi imototo ara ti gbogbo olounje gbodo ni?

- i) \_\_\_\_\_
- ii) \_\_\_\_\_
- iii) \_\_\_\_\_

(22.2) Bawo ni awon ise si wonyi se se palaki to fun awon olaja ounje?

Ise si	Ose palaki	Ko se palaki
Iwe oio junio		
Fifo eyin ati enuwa tojumo		
Iifo owo ni gbogbo igba pelu onii ati ose		
Gige ati nimo cekana owo daradara		
Sise itoju irun daradara ni igba ti o ba n se tabi bu ounje		
Wiwo aso to mo nigba ti o ba n se tabi bu ounje		

23. (23.1) Nje e ti gbo nipa ofin ijoba ibile ti arwa ilu Ibadan lori ounje tata ni buka tabi awon ile ounje miran? 1. Beeni ( ) 2. Beeko ( )

(23.2) To ba je beeni, kini ofin na da le lori? \_\_\_\_\_

24. (24.1) Nje e ti gbo nipa awon ilana akosile kan ti o je mo ona ti a sele se amojuto ti o ka ojuwon fun ounje? Ti o ba je beeko, eto si ibere 25. 1. Beeni ( ) 2. Beeko ( )

(24.2) Ti o ba je beeni, kini awon nkan ti a le lokasi gege bi amojuto ti ose palaki ko ma ba fa jamba tabi okoba ni ile-itoja ounje yi? \_\_\_\_\_

25. (25.1) Kini e nio nipa imototo ounje?

- i) \_\_\_\_\_
- ii) \_\_\_\_\_
- iii) \_\_\_\_\_

(25.2) Ninu tabiti yi ni awon isesi iu pa ti imototo ounje, e ti ami (✓) si eyi toba ba ero yin mu?

Ise si	Beeni	Beeko
Sise ounje ninu podi tia fi aluminiumu se		
Dindin cia tabi eran		
Fifo owo ki o to bere si ni fi wo kan ounje ati ni ipari re		
Titoju ounje si ibi ti yio ti na lo woro		
Sise itoju to peye fun awon ounje ti o ti se		
Kia ma ba ounje ti a ti se ki o ma ba gbogbo ju fun awon olubara wa		
Titoju ounje kuro ni ibi ti awon ekute, oyan, eshin ati bebelo wa		
Lilo awon nkan ti o mu adun ounje jade		
Lilo omi ti o mo lati fi se ounje		
Lilo owo lati fi gbe ounje fun ni		
Titoju ounje ti a ko ti se bi eran, cia ati bebelo, kuro ninu eyi ti a ti se		
Fifo awon ounje ti a fi nkan, sibi, ati bebelo, ni ibere ati ipari lilo won		



26. (26.1) E ko isan/arun marun (5) ti e mo pe o le ti ara outije wa.

- i) \_\_\_\_\_
- ii) \_\_\_\_\_
- iii) \_\_\_\_\_
- iv) \_\_\_\_\_
- v) \_\_\_\_\_

(26.2) Fun ikan-kan ninu tabili yi, e si ami (✓) si eyi ti e ba gbagbo, eyi ti e ko gbagbo tabi ti e ko mo pe o je apere arun ti o n ti ara ounje wa?

Apere	Mo gbagbo	Mi o gbagbo	Mi mo nipato
Eyin riro			
Igbaya didu			
Inu riro tabi inu kikun			
Eebi			
Ara yi yun			
Igbe gbururu tabi shishon			

27. (27.1) Kini awon ona ti eniyan se le ni isan tabi arun lati ara ounjejiye?

- i) \_\_\_\_\_
- ii) \_\_\_\_\_
- iii) \_\_\_\_\_

(27.2) Fun ikan-kan ninu tabili yi, e si ami (✓) si eyi ti e ba gbagbo, eyi ti e ko gbagbo tabi ti e ko mo pe o je ona ti awon emiyan se le ko isan lati ara ounje?

	Mo gbagbo	Mi o gbagbo	Mi mo nipato
Lilo omi ti ko dara lati fi se ounje			
Ki a maa se ounje ni ile idana ti o doli			
Ki a maa mu mimral ti a ba ti jeun tan			
Ki a maa mu omi ti ko ba dara			
Ti a ba ie ewa to po			
Bi a ba shi ounje si eshin, eruku, ati bebulo			
Ki a maa je ounje ti o ni ororo pupo minu re			
Bi a ko ba ie ki ounje gbona lo tabi jma de inu			
Bi a ba dubule leyin ti a icun tan			
Lilo stofu elopo ovindo si dana			
Ki a maa si ika do inu ounje ti a ba n dana lowo			
Ki a sin tabi wuko si ori ounje			

**ABALA KETA: ISESI TI O JOMO IMOTOTO OUNJE**

E jowo e si ami (✓) si idahun ti o joju julo.

28. Bawo ni e se maa n se itoju/wipamo awon ounje ti e ko ti se bi eran, eja, ati bebulo? (E le si ami (✓) si imu aye na eyi keyi ti o ba je).

- 1. Adu toju re si inu opoti ( )
- 2. A maa n do tabi din ( )
- 3. A maa n shi si ateban ( )
- 4. A maa n fi iyo ra a si sa si orun ( )
- 5. A gbe do mu ero ti mu kan lulu, firiji ( )
- 6. Omiran (nipato) \_\_\_\_\_

29. Ti o ba je firiji le nlo, se e maa n ko awon nkan miran si nu re yato si awon nkan elo ounje yi bi?

- 1. Beeni ( )
- 2. Beeko ( )

30. Igba meloni e maa n fo owo yin nigbati e ban se ounje?

- 1. Rara ( )
- 2. Nigba mitan ( )
- 3. Le kankan ( )
- 4. Nigba gbugbo ( )



31. Ni igba wo ni e maa n fo awon nkan ti e fin dana bi shibi, koko obe, opon ti efin ge awon nkan, et bebelo? \_\_\_\_\_

32. Bi emelo ni e se maa n lun ayika ibi idatta yin se? \_\_\_\_\_

33. (33.1) Kini e maa nse ni kele ti e ba ti lo ile igbonse tan?

i) \_\_\_\_\_

ii) \_\_\_\_\_

iii) \_\_\_\_\_

(33.2) Kini e tun maa n se li e ba lo ile igbonse tan?

1. Mo nu owo mi pelu pepa/akisa nikan ( ) 2. Mi nse nkan kan ( )

3. Mo maa n showo pelu omi lasan ( ) 4. Mo maa n showo pelu omi ati ase ( )

34. Nje e ni awon omo ti entaju ni ike-ounje yin bi? 1. Beeni ( ) 2. Beeko ( )

35. (35.1) Ti o ba je beeni, ti omo na ba yagbe tan, kimi e maa n lo lati fi nu?

1. Pepa/iwe ( ) 2. Aso akisa ( ) 3. Tisu pepa ( )

4. Oni ( ) 5. Omiran (nipato) \_\_\_\_\_

(35.2) Kini e tun maa n se li omo yin ba ti gbonse tan?

1. Mo nu owo mi pelu pepa/akisa nikan ( ) 2. Mi nse nkan kan ( )

3. Mo maa n showo pelu oni lasan ( ) 4. Mo maa n showo pelu omi ati ase ( )

36. Bi wakati melo ni awon ounje ti e ti se maa duro ki e to bere lila? \_\_\_\_\_

37. Nje e maa n lun ounje ti e ti se ra nao bi? 1. Beeni ( ) 2. Beeko ( )

38. Nibo ni e maa n toju awon ounje sise si ki o to di jije? (E le li ami (✓) si inu aye na eyi keyi ti o ba je).

1. Inu apoti amu ounje gbona ( ) 2. Inu ike idamisi ( ) 3. Inu koko idana ( )

4. Inu panu ( ) 5. Aan yii mo ope tabi aso ( ) 6. Omiran (nipato) \_\_\_\_\_

39. Bawo ni a se n se itaju awon ounje to ba se ku?

1. Gbigbe bo inu ero ti mu kan tutu, firiji ( ) 2. Shi shi si ategun ( )

3. Aa n fi si inu koko idana ( ) 4. Omiran (nipato) \_\_\_\_\_

40. Kimi e maa n se si awon ounje to ba se ku?

1. Awon omo se maa gbe lo ile ( ) 2. Tita fun ounje awon ero/nkan isi ( )

3. A maa n da won nu ( ) 4. Aa n ta fun awon ini bara wa lojo keji ( ) 5. Omiran (nipato) \_\_\_\_\_

### ABALA KERIN: ISESI AYIKA

Ejowo e si ami (✓) si idahun ti o joju julo.

41. (41.1) Nje e ni ile igbonse mi buka yin? 1. Beeni ( ) 2. Beeko ( )

(41.2) Ti o ba je beeko, kilo de? \_\_\_\_\_

42. (42.1) Ti o ba je beeni, inu eya wo ni? 1. Ise igbonse olomi ( ) 2. Shalanga ( )

3. Koroba ile-oro ( ) 4. Inu igbo ( ) 5. Ti oni igbalode ( ) 6. Omiran (nipato) \_\_\_\_\_

(42.2) Nje awon onibara yin maa n lo si ile igbonse yi bi? 1. Beeni ( ) 2. Beeko ( )

43. Awon nkan ti ko wulo bi idoti womi o wopo mi ile ounje yin?

1. Awon igi ewebe ( ) 2. Egungun ati epe eja ( ) 3. Ajeku ounje ( )

4. Ora idi ( ) 5. Pangolo ( ) 6. Omiran (nipato) \_\_\_\_\_

44. Kini ohun ti n fi nko idoti? 1. Kikojo si egbekan ( ) 2. Ike ifalowo/koroba ( )

3. Apo-oro ( ) 4. Apete ( ) 5. Omiran (nipato) \_\_\_\_\_

45. Ni bo mi e ti n ni omi ti e n lo? (E le li ami (✓) si inu aye na eyi keyi ti o ba je).

1. Ero ijoba ( ) 2. Kang ( ) 3. Kang de ro ( )

4. Rira lori ikiri ( ) 5. Omiran (nipato) \_\_\_\_\_

46. Nibo ni e ti ni omi ti e n fun awon onibara yin mu? \_\_\_\_\_

47. Bi emelo ni e maa n ni idojuko tabi wafala lori aisi omi ni buka yin?

1. Rama ( ) 2. Nigbo miran ( ) 3. I.eralera ( ) 4. Nigba gbogbo ( )

48. Iní kini e maa n loju omi yin si? (E le li ami (✓) si inu aye na eyi keyi ti o ba je).

1. Koroba/ ike ifalowo ( ) 2. Agba ( ) 3. Kegi ( ) 4. Tanki oni ike ( )

5. Agba oni konkere ( ) 6. Tanki oni inn ( ) 7. Omiran (nipato) \_\_\_\_\_



49. Bi emelo ni e maa n fo ibi itoju omi na? \_\_\_\_\_
50. Nje e maa n lo ogun kankan ti n pa kokoro ati nkan miran ti o n fa arun si awon ayika yin bi?  
 1. Beeni ( )      2. Beeko ( )
51. (51.1) E weni pato ninu awon ogun kokoro wo ni e n lo si ayika yin? \_\_\_\_\_  
 (51.2) Bi e melo ni e n se itoju ayika yin pelu ogun yi? \_\_\_\_\_
52. E wo ninu awon nkan wo yi ni o wo po ninu buka yin? (E le li anij (✓) si inu aye na eyi keyi ti o ba je).  
 1. Esinsin ( )    2. Aayon ( )    3. Ekute ( )    4. Efon ( )    5. Oniran (nipalo) \_\_\_\_\_

**ABALA KARUN: IPO ILERA**

E jowo e fi anij (✓) si idahun ti o joju julo.

53. Kini ipo ilera re ni akoko yi? 1. Daradara ( )    2. Dara ( )    3. Ko dara to ( )    4. Ko dara ( )
54. Ti ko ba dara, kini ohun ti o fa? \_\_\_\_\_
55. (55.1) Nigba wo ni e lo fun ayewo gbeyin? \_\_\_\_\_  
 (55.2) Kini idi ti e se se ayewo naa? \_\_\_\_\_

56. Nje e ti lo fun ayewo wonyi ri?

	Beeni	Beeko	Idi ti e se se ayewo na
Iba ronju ronlo			
Iko awupeje			

57. (57.1) Bi emelo ni e nwa ni awon arun/isan wonyi?

Aisan	Rara	Lekan kan	Leralera	Gbogbo igba
Iko				
Otutu sii olinkin				
Ogbe ati awon ara lara miran				
Igbe gburu tabi eebe				
Iba ali otutu				
Ori filo				
Arun awon ara (cewo, isaka, beebelo)				
Akandan				

(57.2) Nje awon isan miran wa bi? Ti o ba je be, e so ni pato \_\_\_\_\_

58. Dawo ni e se n se itoju ara yin nigba ti e ba n se are?  
 1. Mo n se itoju ara mi ni ite ( )      2. Ilc-iwosan ( )  
 3. Mo n lo ile ita-ogun ( )      4. Ologun ibile ( )
59. Nje e maa n gba aye ni gba ti o ba re yin bi?  
 1. Beeni, nigbogbo igba ( )      2. Beeni, nigbati aisari na ba le ni kan ( )      3. Rara ( )
60. Nje e ti gba pe otaja oanjc gbudo lo fun ayewo oni gba gbogbo ki won ba le ma ta oanjc won bi?  
 1. Beeni ( )    2. Beeko ( )