

# **Perception Of Consumers on Safety of Food in Abuja Municipal Area Council, Abuja, Nigeria.**

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Study program: Business Administration and Agribusiness

Date and place: 05/07/2022, Dronen

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## Preface

My name is Oluwaremilekun Alimi I am a student at Aeres University of Applied Sciences in Dronten. I am concluding my study Business Administration and Agribusiness where I specialized in International Food Chain Management with a thesis report.

This thesis could be useful to consumers to have insight into the safety level under which the food they consume are being prepared. Additionally, this research could be used by relevant institutions to enforce necessary rules for food producers to create a safe and nutritious food for consumers.

I want to thank my supervisor and fellow classmates, for helping me understand the process, as well as being available for information and debates. I want to thank my family, for supporting me through the process and providing extra motivation when needed.

## Summary

Challenges on food safety has been around for so long and there have been several policies developed by local governments and international agencies to ensure foods get to the final consumers in the safest condition. knowing the rationales, mindsets, beliefs, and practices that shape the decisions of consumers and food vendors is critical to develop and inform interventions to improve food safety at formal and informal markets. Those interventions should enable consumers to demand safer food and vendors to deliver it. However, knowledge of consumer perception on food safety is limited. To fill this knowledge gap, this research was undertaken to dig deeper in the perception of consumers in Abuja Municipal Council, Abuja in Nigeria, which is the most populous municipal in the State.

The main question of this research is *What is the consumers perception on the safety of food consumed within Abuja Municipal Council Area of Abuja, Nigeria?* This question was answered by important findings regarding the estimated reports retrieved from the questionnaire shared in the region. Data was collected by means of survey. The target group of this included low and highly educated residents between the age of 30 and 39 living around the busiest hubs where selling, buying and consumption of food takes place. The Survey was distributed in person through a proxy and 387 questionnaires was returned while 13 was not returned.

This research found out that consumers are aware and are conscious of food safety in their domain irrespective of their educational background, gender. However, income has a significant effect on the perception of consumers on preference for foreign food over locally produced foods based on safety reasons. Higher incomes earners do prefer foreign food because there is a general assumption that foreign products have gone through rigorous stages examination and certified fit for consumption by international agencies for consumption. Consumers check the expiry dates on the packaged food and able to use natural instincts to identify fresh foods such as fresh fruits and vegetables that are still in good condition from the ones that are not. Food processing and packaging were ranked 1<sup>st</sup> as the most highly unsafe stages of the food supply chain while in-home food preparation ranked 5<sup>th</sup> respectively in the stage of food chain that consumers perceived most unsafe.

The main recommendation of the research is that there should be adequate sensitization both at individual family level and those involved in providing food for the public on the need for safe handling of food especially in preparation, packaging, and storage.

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# 1 Introduction

## 1.1 Background of the Study

In most parts of the world, eating habits have long been dependent on a mixture of local production and imported conserved foods. More recently, manufactured foods have become an important part of many peoples' diets and many of the world staple foods are now traded internationally as commodities. Although goods, money, knowledge and influence flow along all chains, the number and complexity of transactions along an individual chain, and therefore, the capacity for any actor to exert a strong influence on others varies enormously with the type of chain or network involved. Basic experiences show that food supply is not necessarily congruent with consumption. Globally, nationally and locally, food may be available but not accessible or affordable. Studies of extreme dislocation such as famines and normal conditions both illustrate how social factors shape markets and how markets do not necessarily respond to need (Olafeke, 2020).

Food safety is an integral part of food security and is defined as protecting the food from microbial, chemical, and physical hazards that may occur during all stages of food production, including growing, harvesting, processing, transporting, retailing, distribution preparing, storing and consumption, to prevent food borne illness. Because of insufficient food to meet demand on the African continent, most people are only concerned with satisfying hunger and do not give necessary attention to food safety. While many regulatory agencies such as National Agency for Food and Drug Administration and Control (NAFDAC) and the Standard Organization of Nigeria (SON) have recorded remarkable impact in this area, some scholars think much is still left undone (Ladele & Ayoola, 2017). According to Pretty (2016), concerns have increased about the environmental impacts and safety of food in the past several years.

This public uneasiness had spurred multiple investigations of where and how food is produced and the corresponding impacts on our environment and climate. According to NRI (2015), it is believed that the assembling of baseline data on the presence of microorganisms and toxin in food origin by improving the practice and reliability of on-site rapid tests for microbial and toxicological hazards in food and animals is a sure way of improving the health standard of food. Another way is identification of baseline safe levels for chemicals and microorganisms in food reduction of toxin and pesticide residue and reliability of on-site rapid test for microbial and toxicological hazards in food and animals. Others are the reduction of veterinary drug residue level in meat and meat products, dairy products and poultry as well as adequate livestock and poultry waste management. It is further stated that unless there is a standard procedure for ensuring wholesome food, the next global problem will not only be the absence of food but consumption of intoxicated foods. The increased damaging activity to which the environment continues to be exposed is a sure way of arriving at this unpleasant destination for mankind. The time to look at the evolving trends in food safety and environmental hygiene and the public health challenges arising from them is now. Sound knowledge of the challenges will position the study to make the best efforts to reduce the negative impact of infectious diseases related to environmental problems.

## 1.2 Statement of the Problem

Despite the efforts by governments and both multilateral and bilateral agencies, weaknesses remain in national food safety control systems. There seem to be the absence of enforceable policies, regulatory mechanisms, resources, and coordination in addressing the challenge. The burden of food borne diseases in the African Region is difficult to summarize, but available data for diarrhoea alone due to contaminated food and water could have estimated mortality rate around 700,000 persons per year across age groups (FAO, 2018). The case of the death of 10 out of 650 secondary

school teachers who were reportedly killed by food poisoning and several others hospitalized after taking their lunch at a workshop organized by Katsina State ministry of education at Kofur Yan'daka, Katsina State is worrisome (Compass Newspaper, 2011). The incident of the death of 7 persons (grandmother, mother, and 5 children) at Odo Oba community close to Ogbomoso, who were suspected to have died of food poisoning after a meal of fish and amala as reported by Tribune Newspaper of 15<sup>th</sup> December 2011, is devastating. Equally worthy of note is the report of FAO (2020), in Bekwara Local Government Area of Cross River State, where 2 children died and 122 people hospitalized because of food poisoning due to indigestion of moi-moi and beans that were said to have contained a large dose of highly toxic pesticides. The case of food poisoning tragedy at Owerri, Imo State as reported by The Vanguard Newspaper of Monday 8<sup>th</sup> July 2013, where the joy of a family turned sour as no fewer than thirty (30) of their invited guests for child dedication ended up in hospitals after consuming a suspected poisoned Igbo delicacy (Ugba), is another threatening story.

FAO (2020) puts it succinctly that “bacteria, parasites and virus are the major causative agents of food borne diseases in the African Region”. Outbreaks of cholera, which occurs due to contaminated water, are common in the region and available data show an upward trend. There are multiple sources of contamination from the environment, and contaminants could enter the food during production, harvest, storage, retailing and preparation for consumption. It is imperative that food safety remains a concern in all situations in order to derive maximum benefits from even the little available food. Unsafe food not only results in ill-health but also has economic consequences in the area of hospital fees and international trade losses.

In Nigeria, NAFDAC has destroyed aflatoxin and many imported contaminated foods worth more than US200,000 or N30,200,000 (FAO,2021). Available data according to FAO, show, that a cholera outbreak in Tanzania in 1998, and a ban on Ugandan fish exports to EU markets resulted in a similar loss. Food safety is a shared responsibility that requires the common vision of all stakeholders. The problem is based on the perceived nature of unsafe food, with its attendant risks. Are consumers aware of these problems? Literature revealed that there was a limited understanding of safety of food in Nigeria even though the issue of food safety was given due attention over the years. It was also revealed that there was a certain level of resistance to change of unhealthy pattern of consumption of food because of belief or tradition. The health implication of unsafe food also constitutes a problem to the consumers. It is against this backdrop that this study examined the perception of consumers on the safety of food in Abuja Municipal Area Council.

### 1.3 Objectives of the Study

The broad objective of this study is to determine the perception of consumers on the safety of food in Abuja Municipal Area Council. Specifically, the study:

- i. Ascertain the effect of educational background on consumers' perceptions of food safety in Abuja Municipal Area Council.
- ii. Ascertain the effect of gender on consumers' perceptions of safety of food in Abuja Municipal Area Council.
- iii. Determine the effect of income on consumers' preference for foreign food based on safety reasons in Abuja Municipal Area Council
- iv. Determine the level of consumers awareness of the environmental impact on safety of food in Abuja Municipal Area Council.

## 1.4 Research Questions

The research question and sub-questions for this research have been formulated as follows.

*What is the consumers perception on the safety of food consumed within Abuja Municipal Council Area of Abuja, Nigeria?*

The sub-questions for this research are:

- i. Does educational background prevent consumers from determining the basic evaluative criteria for determining food safety in Abuja Municipal Area Council?
- ii. Does gender differ in perception of the stages of food chain that are most unsafe in Abuja Municipal Area Council?
- iii. Does income have any effect on consumer perception of food safety in Abuja Municipal Area Council?
- iv. What is the environmental impact on safety of food in Abuja Municipal Area Council?

## 1.5 Research Hypotheses

The following research hypotheses are adopted:

- i. Educational background has no significant effect on the perception of consumers of the safety of food in Abuja Municipal Area Council.
- ii. Gender has no effect on consumers' perception of safety of food in Abuja Municipal Area Council
- iii. Income does not significantly affect the perception of consumers' preference for foreign food based on safety reasons.
- iv. There is no significant difference on consumers' perception of environmental impact on safety of food in Abuja Municipal Area Council

## 1.6 The Significance of the Study

Thus, study of this nature will bring to light the need for consumers to ascertain how safe the foods they consume are. Health, they say is wealth. A healthy nation is a wealthy nation. From the introduction, it is obvious that some foods people consume are unhealthy. If consumers are not aware of the health status of the food they consume, it poses a great risk to the nation as it can lead to an outbreak of epidemics which will bring about great economic loss to the country and even death of citizens. This work would bring to light the views of consumers on the safety aspects of food consume. It would help consumers to observe and maintain personal hygiene especially in the areas of washing and cleaning of hands, decent way of preparing and serving food, storage of food after preparation, and maintaining adequate sanitation in and around were foods are prepared and stored.

It is the responsibility of the government to protect its citizenry from the consumption of contaminated food. This work would guide the government in formulating enabling laws to guide food safety in Nigeria, most especially in monitoring public or street food providers and to guide farmers on the application of pesticides and veterinary drugs residues whose excesses could cause food borne diseases and chemical contamination of foods. The policy makers will also benefit immensely as this study outlined the areas to focus their policies on. Generally, it will awaken the public to create more awareness and consciousness on consumers food safety in Abuja Municipal Area Council.

## 2. Review Of Related Literature

### 2.1. Introduction

This chapter focused on the review of relevant related literature that provided a conceptual base and theoretical framework for this study. A detailed overview of consumers' perception of safety of food in Nigeria was carried out.

### 2.2. Food Safety

The recent food crises and its great diffusion through the media had as consequence a reduction of the consumer's confidence in the products that they buy and consume. These events also served to disclose some of the existing problems in the current marketing chain, in which many sectors result to have low, or no transparency or unknown ones to the consumers. For moreover, these crises had demonstrated that science and technology, in set with the governmental regulation do not offer guarantees that the risks associated with food have acceptable levels (Alvensleben,2007). The field of consumer behaviour has been explored extensively, with a view to understanding how, when and why consumers make purchase decisions. Common research themes have included studies that explored what factors influenced the purchase making decision process and the attitudes towards a product, which depend heavily on his perception of the product (Padberg et al, 2007).

According to Becker (2009), the world food market, in general, and the Portuguese market has suffered from several food scares. Consumers are therefore, more and more concerned about food safety and quality, more discredit about food supply, desiring more transparency in production and distribution channel and for some products, losing their trust in the production process. According to Henson and Northern (2008), food scandals drive the individual consumers to react in different ways, depending on their perceptions of the risks associated with the product.

Consumer behaviour is very complex and determined by emotions, motives, and attitudes (Alvensleben, 2007). The attitudes play a fundamental role in consumer behaviour field, because it determines his disposition to respond positively or negatively to an institution, person, event, object or product (Azjen & Fishbein, 2006). However, the relations between motives/attitudes and consumer behaviour are not unilateral. Consumption leads to experience with the product, and vice versa this affects attitudes. When a consumer evaluates a product alternative that may satisfy the same need, desire or want, he integrates the perceptions of the alternatives into an overall judgment, or attitude, about the attractiveness of each product alternative (Steenkamp & Trijp, 2018). In their alternative evaluation, the perception of sanitary risk due to the consumption of certain products could drive consumers attitudes away from those products. Government regulation of this sector is a response to market failure and the necessity of the social regulator to interfere in order to assure consumers that the products are healthy (Caswell & Mojuszka, 2019). The existence of concerned consumers has been well documented over the past the years. Throughout this period reports, surveys and academic research have consistently highlighted the existence of consumers who are concerned about a broad spectrum of issues ranging from the environment and animal welfare, through to social concerns.

Recently, a report by the New Economic Foundation (Doane, 2020), suggests that despite the rapid growth of ethical consumerism to date, this is only the beginning of a market which has immense future potential. The impact of crises including food and mouth disease, nitrofurans, salmonellas and dioxin scare has focused attention on food production, quality, and food safety. For example, since the food and mouth disease outbreak, the number of vegetarians, meat reducers and vegans in the Europe, and specially the UK, has risen significantly. In UK, the value of the vegetarian foods market has increased by 56% between the year 2005 and 2010, (Mintel, 2010). In

Portugal, consumption of beef declined sharply by 21% in 2009 (Henson and Northen, 2008), as well in all European Union countries where beef meat reducers rounds 30% in 2009 (Lusk & Fox, 2017).

Studies of consumer at an individual level may help to understand the concept and perception of food safety, that is, the trade-off between quality and safety. However, there is a certain resistance to change unhealthy food habits because of tradition. Many consumers agree on eating healthier diet as long as there are not significant changes in their consumption's pattern (Ben, Angulo, and Gill, 2007). Despite the attention to the subject of food safety and the rising concern for quality issues, developing a deep understanding of the safety food in African and Nigeria in particular is limited (Omotayo & Denloye, 2019)

Globalization, growing incomes, fluctuating relative prices, urbanization and migration are leading consumption behaviour to high value agricultural products in many developed and developing countries. These factors require changes both in food technology and food distribution systems (Cowan, 2018).

There is an increasing consumer's concern for food safety and quality and, at the same time, there has been a significant market increment in differentiated or high value products consumption, including organic products. The goal of food consumption is not only body nourishment but also health improvement over lifetime. If the food available is not safe or its consumption does not enhance health, it does not contribute to food security. In this sense Ogunugbe (2011) concludes: "food safety does not jeopardize food security; both act together to enhance human health".

According to FAO (2020), the fields of food safety and quality are complicated and multidimensional. The food safety and quality have economic, social, cultural, environmental and political consequences and they are related not only to the first step of agricultural production but also to production site, animal health, storage conditions, marketing, hygiene conditions and regulations, consumer awareness, food habits and new technologies such as genetically modified products. At the same time the relationship between social actors and the policies, social and cultural differences are quite closely related to the concepts of food safety and quality. The determination of the gender perception necessitates the analyses of the responsibilities and roles of women and men in the production system, storage conditions, marketing, hygiene conditions, food habits and new technologies such as genetically modified products. Women and men play different roles based on the socio-economic characteristics of the nation and agricultural structure. These roles may differ even between the regions, but the safety perceptions of women and men are the same in terms of food hygiene and safety for consumption.

Quality uncertainty has played a key role in literature about safety and products liability. From all the articles dealing with health and food safety, the most relevant is that by Ott (2020), which demonstrates that, although suppliers can determine quality, by incurring greater costs, consumers cannot test safety before purchase, and then bad goods tend to drive out good ones. Consumers will purchase products depending on their perceived quality expectations. Cowan (2018), suggest that the attributes of quality-nutritional content, i.e; safety attributes of food; convenience; place and manner of product production, including environmental production processes are all valued according to the consumers' subjective perception. Some consumers look for good safety and are willing to pay higher prices for "healthy or nutritive products", since they increase their utility level reducing health risks. However, consumers are unable to ascertain food safety before purchase, being this the most important constraint to economic efficiency in the production and marketing of food safety. "The information problem faced by consumers undercuts economic incentives for

producers to produce a safer product. Less safe food drives out safer food, and government intervenes in the market to guarantee an acceptable level of food safety (Weiss, 2018).

### 2.3. Food Regulation in Nigeria

Like many other developing countries, Nigeria faces the challenge of providing adequate food supply for its teeming population. Towards this end, policies and programmes aimed at boosting agricultural and food production are being actively promoted. However, the issue of food safety possesses a more daunting challenge. Like several other countries, Nigeria has to contend with the problem of food borne diseases with their attendant social, economic and health costs (Omotayo & Denloye, 2019).

They stated that realizing the central focus that the issue of food safety is attracting globally, Nigeria needs to take appropriate and pragmatic steps to ensure food safety and quality for domestic consumption and export. This is because food has been identified globally as not only a biological need but also as an economic and political weapon. It is constantly a potential source of socio-political problems in communities and nations. An effective national food safety policy should therefore provide the assurance that food supplied to the consumers is adequate, nutritious, of good quality and wholesome.

### 2.4. Empirical Review of Related Studies

In a survey conducted by Ojo (2020) on “food processing, transportation, storage and safety of farm produce in south-east zone”, result shows that food processing was still at crude stage because of lack of modern processing equipment, high cost of transportation and damage on foods due to bad roads. Farmers according to the study complain that the popular Abakaliki rice was perceived to be unsafe for consumption because it contains stones, of low nutrition and dirty. The study further reveals that plantain and banana that are rich in iron and vitamin was not completely safe for consumption because it was believed that retailers of these produce used harmful chemicals to induce them to ripe quickly.

A study carried out by Okoh (2020), on “preservation and safety of foods produced in the South South zone” shows that although the farmers believed that their produce are cheap, available and safe for consumption, yet the presence of impurities like stones, pieces of wood, rats dropping, etc, in garri, rice and palm oil have arose the interest of consumers (both literates and illiterates) to exercise careful observation during purchase. Okoh, says that pork was seen to be unsafe for consumption by some consumers because it was believed that it contains worm, while others forbids it on religious belief. Produce like banana, sugar cane, vegetables and pineapple are harvested and sold out immediately to avoid decay because the farmers lack storage facilities. The investigation further reported that farmers do observe some levels of storage by tying yam on erected bans covered with palm front to avoid exposure to direct sun light. The study concluded that produce like maize, cotton seed, groundnut, cocoa and plantain are dried and kept in bags and tins for sales in future.

Research conducted by Olofin (2019), in the northern region to determine the “impact of environmental factors on agricultural produce and their safety”, shows that produce such as tomatoes, orange, mango, pawpaw, guava, etc discovered by farmers to have ripped before the normal time as a result of weather, attack by rodents, or even diseases are harvested and sold without delay. The farmers further disclosed that sometimes weevils eat up the most nutritive parts of cereals such as beans, maize, millets, and rice thereby rendering these produces economically useless. As a result, some farmers have resorted to preserving their produce with chemicals. The cases of infections and deaths according to the study that resulted from consumption of foods

preserved with harmful chemicals especially the cases of the popular “killer beans” of 1996, 2004, 2009, and 2012 were traced to such preservations. The study concluded that sometimes diseases are detected in meats and chickens that infected livestock and poultry from the environment where they are processed in the form of rearing, transportation, preparation, sales or storage. Such infections instil fear on consumers and brings doubt on the safety of these produce.

### 3. Research Methodology

#### 3.1 Introduction

This chapter dealt with the research methodology. This includes the research design, population of study sampling techniques, sample size determination, method of data collection, distribution of questionnaire, and method of data analysis.

#### 3.2 Research Design

The type of research design that is adopted for this study is quantitative research, the survey design. In this survey design, the respondents are categorized according to their ranks and locations. The respondent's opinions will be sought in the subject matter. Also, this study is descriptive in nature. This method is chosen because it is the method that best interprets consumer perception of food safety, without loss of facts.

#### 3.3 Sampling Size

Sampling is the act or technique of picking an apt sample from the population for the study (Kothari, 2018). The research adopted purposive sampling procedure. The used of purposive sampling is necessary since the study only considered those that reside in Abuja Municipal Area Council.

#### 3.4 Research Instrument

##### **Primary Sources**

Research instruments for data collection mean the tools which is used to collect data for the purpose of answering research questions (Ojo, 2020). The instrument that is utilised for the study is a questionnaire; that is designed and purposively administered to targeted respondents in the study area. The questionnaire is structured into relevant sections. Section one focused on the personal data of the respondents. Section two contained information's designed to provide answers to the Research Questions. The respondents were asked to answer all the questions raised on the questionnaire.

##### **Secondary Sources**

The secondary sources of data include textbooks, journals, and relevant literatures on perception of consumers on the safety of food in Abuja Municipal Area Council among residents of Abuja Municipal Area Council.

#### 3.5 Method of Data Analysis

The data for this work were presented in tables. The tables were structured to capture the essential areas of the questionnaire as well as other relevant information. The data were analyzed and presented in tables with version 2.0 of Statistical Package for Social Sciences (SPSS), using the mean and standard deviation to answer the research questions. Hypotheses were tested with analysis of variance(ANOVA), Mann-whitney Z test and t-test statistical tools.

## 4. Data Presentation and Analysis

### 4.1 Introduction

This chapter presents the results of the analysis of data generated from respondents during the field work. The first section addressed the demographic characteristics of the respondents that dealt with respondent's background, the second section highlighted the responses to the research questions, while the third section showed the testing of the stated research hypotheses. The entire analyses in this research were done using SPSS (Statistical Package for Social Sciences) version 2.0. The detailed computer printouts are attached as appendix to this work.

*Table 4.1 Return of Questionnaire Distributed to Respondents*

Questionnaire	Number of Respondents	Percentage (%)
Returned	387	97
Not returned	13	3
<b>Total</b>	<b>400</b>	<b>100</b>

Source: Field Survey, 2022

Table 4.1 shows that three hundred and eighty-seven 387 (97%) of the sampled respondents returned their questionnaire while thirteen 13(3%) did not. The high response rate was achieved due to repeated visit to respondent's locations and their interest on the subject matter.

### 4.2 Demographic Characteristics of the Respondents

The demographic characteristic of the respondents was presented in this section with the aid of tables. The first table is on gender by occupational distribution of the respondents. The results are as present in table 4.2 below.

*Table 4.2: Gender by Occupational Distribution of Respondents*

Gender	Occupation						Total
	Civil Servants	Farmers	Business	Unemployed	Private		
Male	46(11.9%)	23(5.9%)	45(11.6%)	4(1.0%)	5(1.3%)	123(31.8%)	
Female	77(19.9%)	34(8.8%)	88(22.7%)	37(9.6%)	28(7.8%)	264(68.2%)	
<b>Total</b>	<b>123 (31.8%)</b>	<b>57 (14.7%)</b>	<b>133 (34.4%)</b>	<b>41 (10.6%)</b>	<b>33 (8.5%)</b>	<b>387 (100%)</b>	

Source: Field survey, 2022

From Table 4.2, it can be observed that out of the 387 (three hundred and eighty-seven) respondents, one hundred and twenty three (123) were male representing 31.8%, while the rest two hundred and sixty four (264) were women, representing 68.2% of total respondents. There were 46 male that were in civil service representing 11.9% of total respondents, while 77 (19.9%) were female civil servants. From the 57(14.7%) respondents that constituted the farmers, 23(5.9%) were male while 34(8.8) were female. Those in business were 133 (34.4%) in number out of which

45(11.6%) were male, while 88(22.7%) were female. There were 41 respondents that were unemployed and out of which 4(1%) were male and 37(9.6%) female. The number of respondents that were in private practice were 33(8.5%) which comprises 5(1.3%) male and 28(7.8%) female.

Table 4.3: Age by Educational Qualification of Respondents

		Age					Total
		Below 20	21-29	30-39	40-49	50 and above	
<b>Educational Qualification</b>	Fslc	6(1.6%)	6(1.6%)	11(2.8%)	3(.08%)	4(1.0%)	30(7.8%)
	Ssce/ Gce/ Ond	5(1.3%)	33(8.5%)	66(17.1%)	18(4.7%)	20(5.2%)	142(36.7%)
	Hnd/B.S c/B.Ed	0(0%)	65(16.8%)	68(17.6%)	27(7.0%)	20(5.2%)	180(46.5%)
	M.Sc and above	0(0%)	3(0.8%)	27(5.9%)	4(1.0%)	5(1.5%)	35(9%)
<b>Total</b>		<b>11 (2.8%)</b>	<b>107 (27.6%)</b>	<b>168 (43.4%)</b>	<b>52 (13.4%)</b>	<b>49 (12.7%)</b>	<b>387 (100%)</b>

Source: Field survey, 2022

On the educational qualification of the respondents, 30(7.8%) were first school leaving certificates holders, while, 142(36.7%) have SSCE/GCE/OND. One hundred and eighty respondents were holders of HND/B.Sc/B.ED representing 46.5%. Those respondents that holds M.Sc and above were 35 in number representing 9% of the total respondents. On their age grouping, 11(2.8%) were below 20 years, while 107 (27.6%) were between 21-29 years. The age of 168(43.4%) respondents fell between 30-39 years, while 52(13.4%) were between 40-49 years, 49 (12.7%) of the respondents were 50 years and above.

Table 4.4: Distribution of Respondents by Income and Location

		Location		
		Urban	Rural	Total
<b>Income</b>	0 -20,000	30(7.8%)	68(17.6%)	98(25.3%)
	20,001-40,000	146(37.7%)	40(10.3%)	186(48.1%)
	40,001-60,000	23(5.9%)	2(0.5%)	25(6.5%)
	60,001-80,000	45(11.6%)	4(1%)	49(12.7%)

	Above 80,000	26(6.7%)	3(0.8%)	29(7.5%)
	<b>TOTAL</b>	<b>270</b> <b>(69.8%)</b>	<b>117</b> <b>(30.2%)</b>	<b>387</b> <b>(100%)</b>

**Source:** Field survey, 2022

It can be observed that out of the 387 respondents, 98(25.5%) had on the average monthly income of N20,000, while 186(48.1%) had monthly income of between N20,001 to N40,000. Also 25(6.5%) of the respondents had income of N40,001 to N60,000 and those whose income were between N60,001 and 80,000 were 49 in number representing 12.7%. The rest 29(7.5%) had high income of above N80,000. The table also shows that majority of the respondents were resident in the urban areas representing 69.8% (270) of the respondents. Only 117(30.3%) of the respondents were resident in the rural areas.

#### 4.3: Research Questions and Testing of Hypotheses

In this section, the research questions formulated were answered using mean and standard deviations and hypotheses were tested accordingly as stated in chapter three.

##### *Basic Evaluative Criteria for Determining Food Safety*

Does educational background prevent consumers from determining the basic evaluative criteria for determining food safety?

*Table 4.5: Basic Evaluative Criteria for Determining Food Safety*

	<b>Items</b>	<b>FS LC</b>	<b>SSC E/G CE/ OND</b>	<b>HND/ BSC/ B.Ed</b>	<b>M/Sc and above</b>	<b>Total</b>	<b>Percn tages of total</b>
a.	NAFDAC number	30 (7.8%)	142 (36.7%)	180 (46.5%)	35 (9.0%)	387	100%
b.	Freshness	10 (9.6%)	37 (34.9%)	50 (47.2%)	9 (8.5%)	106	27.4%
c.	Place of production	11 (9.1%)	39 (32.2%)	62 (51.2%)	9 (7.4%)	121	31.3%
d.	Food appearance	8 (6.4%)	44 (35.2%)	67 (53.6%)	6 (4.8%)	125	32.3%
e.	Expiring date if available	30 (7.8%)	142 (36.7%)	180 (46.5%)	35 (9%)	387	100%
f.	Sales environment	9 (7.6%)	42 (35.3%)	58 (48.7%)	10 (8.4%)	119	30.7%
g.	Distribution network	10 (8.4%)	40 (33.6%)	62 (52.1%)	7 (5.9%)	119	30.7%

**Source:** Field survey, 2022

The consumers (respondents) usually check for the NAFDAC number as well as expiring date if available on all food items before purchasing. These options received 100% responses this is so because total number of respondents is 387.

Another factor considered important is the food appearance with 32.3% response. This was closely followed by place of production (food origin) with 31.3%, while both sales environment and distribution network had 30.7% responses respectively. Then the freshness of food item was also considered with 27.4%. The above responses show that the consumers irrespective of their education background perceive highly the issue of food safety. This is due to uniformity of the responses across the various educational qualifications.

### *Hypothesis One*

H<sub>0</sub>: Education has no significant effect on the perception of consumers on safety of food in Abuja Municipal Area Council

H<sub>a</sub>: Education has a significant effect on the perception of consumers on safety of food in Abuja Municipal Area Council

Analysis of variance (ANOVA) was used in testing this hypothesis. The results are presented below.

*Table 4.6: Mean Responses to Hypothesis One*

	<b>Fslc</b>	<b>Ssce/Gce/Ond</b>	<b>HND/B.Sc /B.ED</b>	<b>M.Sc and above</b>
	30	142	180	35
Pesticide residues are a major food safety concern	3.2000 (1.2703)	3.5282 (1.5097)	3.4111 (1.5052)	3.6286 (1.4160)
Bacteria are a major food safety concern	3.0333 (1.098)	3.5775 (1.3438)	3.5000 (1.3883)	3.3429 (1.4939)
Foreign bodies/objects are major food safety concern.	3.400 (1.4762)	3.5141 (1.4476)	3.3111 (1.4809)	3.6857 (1.4301)

(Standard deviation in parenthesis)

**Source:** Field survey, 2022

*Table 4.7: ANOVA Results for Hypothesis One*

	<b>SV</b>	<b>df</b>	<b>SS</b>	<b>MS</b>	<b>F-ratio</b>	<b>P-Value</b>	<b>Remark</b>
Pesticide residues are major food safety concern	Trt	3	4.11	1.370	0.623	0.600	Not Significant
	Error	383	841.937	2.198			
	Total	386	846.067				
Bacteria are major food safety concern.	Trt	3	8.063	2.688	1.449	0.228	Not Significant
	Error	383	710.500	1.855			
	Total	386	718.563				

Foreign bodies/object are major food safety concern.	Trt	3	5.859	1.953			Not Significant
	Error	383	820.792	2.143	0.911	0.436	
	Total	386	826.651				

**Source:** Field survey, 2022

From the above results, the p-values are all greater than 0.05 which is the significant level. Therefore, there is not have enough evidence to reject the Null hypothesis at 5% level of significance. The study conclude that educational background has no significant effect on the perception of consumers on safety of food in Abuja Municipal Area Council.

#### *Stages of Food Supply Chain that are most unsafe*

Does gender differ in perception of the stages of food chain that are most unsafe?

This research question was answered using responses to question nine in the research instrument.

The responses are as tabulated below:

*Table 4.8: Mean Ranking on Whether Respondents Differ in Perception on the Stages of Food Chain that are Most Unsafe*

	Items	Mean rank	Position
1	Processing	2.3488	1st
2	Packaging	2.7494	2nd
3	Storage of food after cooking (refrigeration, warming, etc)	2.8708	3rd
4	Distribution (including storage)	3.1938	4th
5	In-home food preparation	3.2067	5th
6	Production	3.4419	6th
7	Wholesale/retail marketing	3.5685	7th
8	Consumer travel to and from the place of purchase	3.7881	8th

**Source:** Field survey, 2022

From Table 4.8 above, the stage of foods chain that both gender perceived most unsafe is the processing stage which have the highest mean rank of 2.3488. This was followed by the stage of food packaging with a mean rank of 2.7494 and the storage of food after cooking (refrigeration, warming, etc.) with a mean rank of 2.8708. The fourth rank stage of food chain that the consumers perceived most unsafe is the distribution stage (including storage) with mean rank 3.1938. In-home food preparation had a mean rank of 3.2067 to rank fifth. The stage of production of food is also considered as unsafe as it was ranked 6<sup>th</sup> with mean rank of 3.4419. Wholesale/ retail marketing ranked 7<sup>th</sup> with 3.5685 as the mean rank and consumers travel to and from the place of purchase was ranked the least with mean rank of 3.7881.

*Hypothesis Two*

H<sub>0</sub>: Gender has no significant effect on the consumers' perception of safety of food in Abuja Municipal Area Council

H<sub>a</sub>: Gender has a significant effect on the consumers' perception of safety of food in Abuja Municipal Area Council

This hypothesis was viewed from the perception of safety concern of respondents.

Table 4.9: Result for Hypothesis Two

Stages of food chain considered most unsafe	Sex	n	Mean Rank	Sum of Rank	Mann Whitney Z	P- Vale	Remark
Production	Male	123	195.76	24076	-0.213	0.831	Not Significant
	Female	264	193.19	51002			
Processing	Male	123	180.26	22171.5	-1.723	0.884	Not Significant
	Female	264	200.4	52906.5			
Packaging	Male	123	188.33	23164.5	-0.703	0.482	Not Significant
	Female	264	196.64	51913.5			
Distribution (including storage)	Male	123	189.41	23297.5	-0.561	0.575	Not Significant
	Female	264	196.14	51780.5			
Wholesale/retail marketing	Male	123	179.35	22060	-1.781	0.075	Not Significant
	Female	264	200.83	53010			
Consumer travel to and from the place of purchase	Male	123	184.4	22681.5	-1.165	0.244	Not Significant
	Female	264	198.47	52395.5			
In-home preparation	Male	123	197.8	24330	-0.465	0.642	Not Significant
	Female	264	192.23	50748			
Storage of food after cooking (refrigerating, warming, etc.)	Male	123	188.15	23142	-0.719	0.472	Not Significant
	Female	264	196.73	51936			

Source: Field survey, 2022

The second hypothesis was tested using Mann Whitney z test since the observation used were non-parametric (ranking) in nature. The p-value ( $p > 0.05$ ) shows that the Null hypothesis would not be rejected in all cases thereby concluding that gender has no significant effect on the consumers' perception of safety of food in Nigeria.

*Effect on Consumers' Perception of Safety*

Does income have any effect on consumers' perception of safety?

The responses of the consumers as tabulated by income and safety concern are presented in the Table below.

*Table 4.10: Responses on Whether Income has any Effect on Consumers' Perception of Safety of Food*

Monthly Income Level	Mean Responses			
	Pesticide residue are major food safety concern(MFSC)	Bacteria are major food safety concern (MFSC)	Foreign bodies/ objects are MFSC	Remark
0 - 20,000	3.2755	3.2245	3.4082	All accepted
20,001 - 40,000	3.6505	3.5645	3.3979	All accepted
40,001 - 60,000	3.2800	4.000	3.7200	All accepted
60,001 - 80,000	3.3469	3.3469	3.1633	All accepted
Above 80,000	3.1724	3.5517	3.8621	All accepted

Source: Field survey, 2022

From Table 4.10, all the responses were greater than 3.00, which shows that on the five-point Likert scale, with an average of  $(5+4+3+2+1)/5 = 3$ , the consumers based on various income level do agree that food safety is a major concern to all. Thus, one cannot at this stage conclude that the perception differs significantly or not. But literally income has no effect on their perceptions as food safety is a major concern to all respondents, irrespective of their income level.

*Hypothesis Three*

H<sub>0</sub>: Income does not significantly affect the perception of consumers' preference for foreign food based on safety reasons.

H<sub>a</sub>: Income has a significant effect on the perception of consumers' preference for foreign food based on safety reasons.

*Table 4.11: Mean Responses to Hypothesis Three*

I prefer foreign products to locally made products for health reasons					
Income level	0-20,000 (98)	20001-40,000 (186)	40001-60,000 (25)	60001-80,000 (49)	Above 80,000 (29)

Mean	2.8061	3.6667	3.5200	3.1224	2.9655
Standard deviation	1.2407	1.4282	1.3267	1.3328	1.4011

**Source:** Field survey, 2022

*Table 4.12: ANOVA Table for Hypothesis Three*

SV	Df	SS	MS	F-ratio	P-Value
Treatment		54.786	13.697		
Error	4 382	709.12	1.856	7.378	0.000
Total	386	763.907			

**Source:** Field survey, 2022

The third hypothesis was answered using responses from questions 33 which states “I prefer foreign products to locally made products for health reasons. An ANOVA test was performed using income as a factor. The mean and standard deviation are shown in Table 4.11, whereas the results of the ANOVA test are shown in Table 4.12. From the results, we obtained a p-value of 0.000 which is less than our chosen significant value of 0.05. The study therefore reject the Null hypothesis and conclude that “Income has a significant effect on the perception of consumers on choice and preference for foreign food based on safety reasons”.

Environmental Impact on Food Safety in Nigeria

### **What is the environmental impact on food safety in Nigeria?**

This question sought to know the perception of consumers of safety of foods prepared within and outside their immediate environment.

This research question was answered using responses to questions 12 to 18 on the research instrument. Where VUS= Very Unsafe, SHUS= Somehow Unsafe, U=undecided, SHS= Somehow Safe, and VS= Very Safe. Their opinions are as tabulated in Table 4.13 below:

**Table 4.13: Perception of Consumers of Safety of Foods Prepared within and outside their Immediate Environment**

Question item	(1) VUS	(2) SHUS	(3) U	(4) SHS	(5) VS	Sum	Mean	SD
The food system in Nigeria	30	165	160	11	21	989	2.556	0.887
The food system in your state and the neighbouring states	48	188	143	8	0	885	2.287	0.704
The food system in your state	48	192	136	11	0	884	2.284	0.714

Food system in a neighbouring state	56	203	120	8	0	854	2.207	0.704
The food in Nigeria and its neighbouring countries	49	212	126	0	0	851	2.199	0.643
A National supply chain that occurs entirely within Africa	57	205	125	0	0	842	2.1757	0.664
A global supply chain that occurs in multiple countries outside Africa	60	214	113	0	0	827	2.137	0.655

**Source:** Field survey, 2022.

From Table 4.13, respondents considered food within their immediate environment as most safe as compared with those from outside their immediate environment. Thus, one can say that the environment somehow affects the perception of the consumer on food safety.

*Hypothesis Four*

H<sub>0</sub>: There is no significant difference on consumers' perception of environmental impact on safety of food in Abuja Municipal Area Council

H<sub>a</sub>: There is a significant difference on consumers' perception of environmental impact on safety of food in Abuja Municipal Area Council

This hypothesis was tested using one sample student t-test. Seven items were considered and their results are as shown below.

*Table 4.14: Results for Hypothesis Four*

Item		N	Mean Rank	SD	t-value	P-Vale	Remark
Food system in Nigeria		387	2.5556	0.8868	-9.859	0.000	significant
The food system in your state		387	2.2842	0.7139	-19.723	0.000	Significant
Food system in a neighbouring State		387	2.2067	0.7043	-22.158	0.000	Significant
The food in Nigeria and its neighbouring countries)		387	2.1990	0.6432	-24.501	0.000	Significant
The food is your state and its neighbouring States		387	2.2868	0.7037	-19.936	0.000	Significant
		387	2.1757	0,6637			

The national supply chain that occurs centrally within Africa.					-24.431	0.000	Significant
A global supply chain that occurs in multiple countries outside Africa.		387	2.1370	0.6553			
					-25.910	0.000	Significant

A cut off point of 3.00 was used for the computation at 5% significant level.

**Source:** Field survey, 2022

The Null hypothesis was rejected in all seven items indicating that there is a significant difference on consumers perception on environmental impacts on safety of food in Abuja Municipal Area Council. Although the awareness is poor as shown on the mean table above yet result shows that from the research questions consumers prefer food produced within Nigeria for safety reasons as most consumers are not convinced that the processing of foods produced outside their environment are well handled.

## 5. Discussion of Results

This research titled “perception of consumers on safety of food in Abuja Municipal Area Council” was conceived from the fact that there are perceived problems associated with food safety in Nigeria, judging from the activities of NAFDAC and other related agencies. The outbreaks of cholera and other food borne diseases in the African countries called for an investigation into the issue of food safety and consumers perception of it. From the analysis of the research questions the following findings were observed.

1. All the consumers are aware and are conscious of food safety in their domain irrespective of their educational background. This is in line with Ogundugbe (2020), opinion that there is an increasing consumers’ concern for food safety and quality and, at the same time, there has been a significant market increment in differentiated or high value products consumption. The goal of food consumption is not only body nourishment but also health improvement over lifetime. If the food available is not safe or its consumption does not enhance health, it does not contribute to food security.
2. They usually check for NAFDAC number and expiring and manufacturing date of products before purchasing. One of the reasons for this level of awareness is the fact that NAFDAC has made its core mandate a household name in Nigeria. Some of these mandates include: to protect the public against injury to health through the consumption of unwholesome foods; to restrain the sale of foods which are unhygienically prepared, adulterated, spoilt, contaminated, and improperly labelled food products; and enlightenment of consumers on manufacturing and expiring dates of products before purchasing, amongst others.
3. Food appearance is of importance to the respondents. According to Izugbara (2018), many consumers of rice perceived the popular Abakaliki rice to be unclean, low nutrition, local, and full of stones. Even cassava that is processed into tapioca (abbacha), and fufu (akpu), through fermentation and widely consumed especially in the southern part of Nigeria is perceived by some consumers as a product that smells. As a result, some consumers would like to touch and sometimes take it closer to their nose to ascertain whether the product (akpu) has unpleasant odour.
4. Food processing and packaging were ranked as the most highly unsafe stages of the food supply chain. This is supported by a report presented by Compass News Paper in June 2012, that ten secondary school teachers were killed by food poisoning, while several were hospitalized in Katsina, the Kastina State Capital. The incident occurred at a workshop organized by the state ministry of education for 650 teachers at the Government Day Secondary School (GDSS), Kufur Yan’daka, Katsina. It was gathered that soon after taking their lunch, supplied by a popular corporate caterer, some of the teachers started vomiting and stooling, as a result they were rushed to the Federal Medical Centre, Katsina and the Police Clinic for medication. Ten of the affected teachers reportedly died because of the poisoning. This unfortunate incident is no doubt a product of indecent way of processing, packaging, and serving the food supplied to the teachers.
5. Also, of importance to consumers on food safety is the storage of food after cooking (refrigerator, warming, etc). Consumers preserve their food in refrigerators or warm to avoid decay, sour, and contaminations. People have been diagnosed of different infections because of consuming poisoned foods. This is supported by FAO’s (2010), report that, some people in Bekwara Local Government area of Cross River State suffered from food poisoning due to indigestion of moi-moi and beans. As a result, about 122 people were

hospitalized, while deaths of two children were recorded. The moi-moi and beans were said to have contained a large dose of highly toxic pesticides.

6. Distribution and in-home preparation were also rank 4<sup>th</sup> and 5<sup>th</sup> respectively in the stage of food chain that consumers perceived most unsafe. According to FAO (2020), there are multiple sources of contamination from the environment, and contaminants could enter the food during production, harvest, transportation, storage, retailing and preparation for consumption. It is imperative that food safety remains a concern in all situations to derive maximum benefits from even the little available food. Unsafe food not only results in ill-health but also has economic consequences in hospital fees and international trade losses.

The formulated hypotheses were tested with various statistical tools and result shows that two Null hypotheses were accepted: hypotheses one, and two, while hypotheses three, and four were rejected. From the test of hypotheses, the study discovered that:

- i. Education has no significant effects on the perception of consumers on the safety of food in Abuja Municipal Area Council. This is supported by the study carried out by Okoh (2020), on “preservation and safety of foods produced in the South-South zone” which shows that although the farmers believed that their produce were cheap, available and safe for consumption, yet the presence of impurities like stones, pieces of wood, rats dropping, etc, in garri, rice and palm oil have arose the interest of consumers ( both literates and illiterates) to exercise careful observation during purchase.
- ii. Gender has no significant effect on consumers’ perception of safety of food in Abuja Municipal Area Council. This is in line with the statement of FAO (2020), that the fields of food safety and quality are complicated and multi-dimensional. The food safety and quality have economic, social, cultural, environmental, and political consequences. The determination of the gender perception necessitates the analyses of the responsibilities and roles of women and men in the production system, storage conditions, marketing, hygiene conditions, eating habits and new technologies such as genetically modified products. Women and men play different roles based on the socio-economic characteristics of the nation and agricultural structure. These roles may differ even between the regions, but the safety of food perceptions of women and men are the same in terms of food hygiene and safety for consumption.
- iii. Income has significant effect on the perception of consumers on preference for foreign food based on safety reasons. This is supported by the view of Ogundugbe (2021), state that, the economic factors which tend to favour consumers preference for foreign products centre around product quality, price, and product availability. There is a popular belief that the qualities of local products are lower than those of their imported counterparts. There is evidence in the literature to substantiate this view. In a survey of 195 consumers in Lagos metropolis, Ogundugbe, found that 90 percent of the respondents considered locally produced rice inferior to the imported ones.
- iv. There is a significant difference on consumers’ perception of environmental impact on safety of food in Abuja Municipal Area Council. Although the awareness is poor; yet result shows that from the research questions consumers prefer food produced within Nigeria with a mean of 2.556. This is in line with MacGregor and Bill (2011), opinion that many survey respondents perceived in USA that locally grown foods were healthier than foods grown at distant locations, and that science has proven these health benefits.

These respondents perceived that local food chains (for produce) were likely to emit fewer greenhouse gases than a comparable distant chain, and nearly half of the respondents were willing to pay more for produce produced within their immediate environment.

## 6. Summary of Findings, Conclusion and Recommendations

### 6.1 Introduction

This chapter summarize the major findings generated from data analysis. It also includes the concluding remarks, and recommendations.

### 6.2 Summary of Findings

The following are the summary of major findings from the data analysis.

- i. From Table 4.2, result shows that 34.4% representing one hundred and thirty-three respondents were in the business of buying and selling thereby giving them an insight as people who are not just consumers but also as those who are experienced in buying of food items.
- ii. Majority of the respondents (considering the number in each age group) were between 30 – 39 years. The implication of this is that the respondents were matured enough to give relevant information on safety of food items considering their age and educational qualifications as shown in Table 4.3.
- iii. Majority (270 respondents representing 69.8%) were resident in urban areas where more buying, selling and consumption of food items takes place. It therefore implies that these respondents were more enlightened and exposed enough to give meaningful judgment on whether a particular food item is safe for consumption or not as depicted in Table 4.4.
- iv. Result also shows that consumers usually check for NAFDAC number as well as expiring date if available on items before purchasing. One of the reasons for this level of awareness is the fact that NAFDAC has made its core mandate a household name in Nigeria.
- v. From the analysis in Table 4.8, result shows that the stage of food chain that consumers perceived most unsafe is the processing stage. Safe food handling which includes receiving, cleaning, preparation, and cooking, cooling, and re-heating, packaging and storage, etc., should be taking seriously to avoid food born disease.
- vi. From Table 4.10, result shows that food safety is a major concern to all irrespective of their income level. That is even the poor considers safety as an important factor in buying and consumption of food items.
- vii. Result further shows that respondents consider food within their immediate environment as most safe as compared to those from outside their immediate environment. This implies that environment somehow affect the perception of consumers on food safety.

### 6.3 Conclusion

In this study, the researcher has carefully examined the main research question which is “*What is the consumers perception on the safety of food consumed within Abuja Municipal Council Area of Abuja, Nigeria?*”, with special interest in both locally produced foods and imported ones. The sampled respondent’s interest on the subject matter was high, hence their co-operation. All the respondents are educated and majority of them are resident in the urban areas, indicating that they are well exposed to the issues of food safety.

Based on the responses of the respondents, the study concluded that consumers are aware and conscious of food safety in their domain and does not treat it with levity. That is why most times they take their time to read through products manufacturing ingredients, and manufacturing and expiring dates.

Consumers perceived foods produced within and around their immediate environment to be most safe for consumption compared with the foods that comes from other areas. Consumers are also conscious of food storage after cooking or processing to avoid contamination. This is because people have been diagnosed of different ailment contacted from consuming poisoned foods.

Finally, it is important to note that consumers are showing concern on food safety in all situations to derive maximum satisfaction from even a little available food. Unsafe food does not only result to ill-health and death, but also has tremendous economic consequences in hospital fees, and both local and international trade losses.

#### 6.4 Recommendations

Based on the findings of this study the researcher recommended the following:

- i. Food poisoning in Nigeria has been a serious issue as revealed by the study, that the stage of food chain that consumers perceived most unsafe is the processing stage. Therefore, there should be adequate sensitization both at individual family level and those involved in providing food for the public on the need for safe handling of food especially in preparation, packaging, and storage.
- ii. Consumers should not restrict themselves to the consumption of foods prepared within their immediate environment. Instead, they should be proactive in determining how safe foods from other regions are before purchase and consumption as the widely proposed food security by Food and Agricultural Organization (FAO), and individual countries can only be realized through interdependent, and consumption of foods produced within and outside a region or continent.
- iii. Food producers including farmers should adhere strictly to the code and conduct guiding preparation and provision of safe food to the public as respect for health and sanctity of human life is paramount in-service delivery of this nature. That is food business operators should control food hazards using systems such as Hazard Analysis and Critical Control Point (HACCP). They should: identify any steps in their operations which are critical to the safety of food; implement effective control procedures at those steps; monitor and control procedures to ensure their continuing effectiveness; and review control procedures periodically, and whenever the operations change.
- iv. In the case of imported foods, Nigeria government should collaborate with other countries and regulatory institutions in capacity building in terms of manpower, infrastructure, and logistics for effective risk analysis of food safety and food security, information management, and biotechnology.
- v. More research work should be carried out on the topic with wider coverage and focus on food security and its sustainability strategies in Nigeria or Africa.

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## Appendices

### Appendix A – Food Regulatory Agencies in Nigeria

#### **Nigeria-National Agency for Food and Drug Administration and Control**

The National Agency for Food and Drug Administration and Control (NAFDAC) is a Nigerian government agency under the Federal Ministry of Health that is responsible for regulating and controlling the manufacture, importation, exportation, advertisement, distribution, sale and use of foods, drugs, cosmetics, medical devices, chemicals and packaged water

([www.nafdacnigeria.org](http://www.nafdacnigeria.org))

NAFDAC has various basic functions. According to the requirements of its enabling decree, the agency was authorized to carry out the following functions ([www.nafdacnigeria.org](http://www.nafdacnigeria.org)) use APA.

- \* Regulate and control the importation, exportation, manufacture, advertisement, distribution, sale and use of foods, drugs, cosmetics, medical devices, bottled water and chemicals.
- \* Conduct appropriate tests and ensure compliance with standard specifications designated and approved by the council for the effective control of quality of food, drugs, cosmetics, medical devices, bottled water, and chemicals.
- \* Undertake appropriate investigation into the production premises and raw materials for food, drugs, cosmetics, medical devices, bottled water and chemicals and establish a relevant quality assurance system, including certification of the production sites and of the regulated products.
- \* Compile standard specifications, regulations, and guidelines for the production, importation, exportation, sale and distribution of food, drugs, cosmetics, medical devices, bottled water, and chemicals.
- \* Undertake the registration of food, drugs, medical devices, bottled water and chemicals.
- \* Control the exportation and issue quality certification of food, drugs, medical devices, bottled water and chemicals intended for export
- \* Establish and maintain relevant laboratories or other institutions in strategic areas of Nigeria as may be necessary for the performance of its functions.

NAFDAC envisions that by making these functions known, that its actions will be apparent “in all sectors that deal with food, cosmetics, medical devices, bottled water, and chemicals to the extent of instilling extra need for caution and compulsion to respect and obey existing regulations both for healthy, living and knowledge of certain sanctions or default. Despite the establishment of NAFDAC, the sale and use of fake drugs did not end.

### Appendix B – Institutional Arrangements

#### **Institutional Arrangement**

Omotayo and Denloye (2019), state that the responsibilities for regulating and monitoring food safety standards and practices revolve on the following government organizations and agencies:

1. Federal Ministry of Health
2. National Agency for Food and Drug Administration and Control (NAFDAC)
3. Standards Organization of Nigeria (SON)

## 1. The Federal Ministry of Health

Federal Ministry of Health has the responsibility for formulating national policies, guidelines and regulations on food hygiene and safety as well as the monitoring of their implementation. It is also responsible for establishing guidelines for the requirements for the nutritive value of food, and monitoring of food environments and handlers, control of food borne disease, the quality of public water supply as well as national and international matters relating to food ([www.fao.org](http://www.fao.org)).

Other responsibilities of the ministry include:

- To protect the public against injury to health through the consumption of unwholesome foods.
- To restrain the sale of foods which are unhygienically prepared, adulterated, spoilt, contaminated, and improperly labeled food products.
- To ensure inter – ministerial and multi – sectional collaborative activities.
- To conduct public health surveillance of food premises, food handlers and equipment used for processing.
- Ensure proper inspection and registration of all food premises.
- Collaborate with non-governmental organizations and ensure community participation.
- Educate the populace on sound hygiene and safety practices ([www.fao.org](http://www.fao.org)).

## 2. National Agency for Food Drug Administration and Control (NAFDAC)

NAFDAC is the parastatal under the Federal Ministry of Health, charged with the responsibility for the regulation and control of imported and locally processed foods and bottled water, at the Federal and State levels of the government.

**NAFDAC Achievements** Maybe better to short summarize the important achievements and move this part to the appendix?

NAFDAC has made several achievements over the years, including:

- The creation of 6 Zonal and 36 state offices for easy accessibility, which are being equipped to function effectively,
- Organization of workshops to enlighten various stakeholders, such as (a) pure water producers (b) the Patent and Proprietary Medicine Dealers Association (PPMDA), and (c) the National Union of Road Transport Workers and National Association of Road Transport Owners (NURTW & NARTO),
- Raising awareness not just in Nigeria, also in other countries like [India](#), [China](#), [Pakistan](#), [Indonesia](#), and [Egypt](#),
- Holding meetings, in concert with the Chairman, House Committee on Health and his members, with Ambassadors of countries identified with exporting fake drugs into Nigeria and solicited their support to stop the trend,

- Achieving excellent results in the fight against counterfeit drugs, as evidenced by the public destruction of about 2 billion Naira worth of drugs from four sources, namely those handed over by repentant traders those found in secret warehouses on tip off by the drug sellers and the public, and those seized by the drug sellers' internal task forces and NAFDAC task forces,
- Launch of anti-counterfeiting technologies by the Nigerian presidency, see note below:

Although the project has been launched, there are serious concerns of complicity, compromise and lack of professionalism in the delivery of the project; it does not however appear that the Presidency is aware of this. The above is buttressed by the following:

a. The fact that there are many unanswered questions about the intrigues behind the final emergence of SPROXIL as the technology provider amidst multiple claims and duly communicated evidences of technology theft. It is believed that the DG may have inadvertently (or otherwise) provided the platform that facilitated the theft.

- What was most surprising to observers is how the DG ignored and blocked all efforts to bring this to his knowledge. Ordinarily, it is expected that the NAFDAC DG at his level of education and exposure should have shown respect for intellectual property rights. Observers are still studying to understand the real cause of this leadership failure: if it is purely a factor of ignorance, or overzealousness in his attempt to record 'some kind of achievements' as a match for the lofty standards set by his predecessor's (Prof. Dora Akunyili), or if it is to do with any personal interest.

b. The fact that there are also unanswered questions of management irresponsibility, lack of prudence and respect for institutional contractual obligations by Dr. Paul Orhi in his administration of the Project. Dr. Paul Orhi officially awarded multiple contracts on the same project to different organizations; he encouraged each party to invest their resource and refused honoring his contractually obligations or providing the parties with official termination of the contract or explanations. People have questioned the rationale behind this act given his backgrounds in Law; could it be that he is just careless, intoxicated by the power that his position is accorded with, or is he taking undue advantage of the weakness of the law in his host environment. All these are subjects of research by keen followers of events and developments in African leaders.

- Observers' concerns are based on the fact that this act has raised litigations against NAFDAC which will usually end up in the organization paying out huge sum of money in legal fees and penalties for breach of contracts by the time the cases are disposed of. In many scenarios such cases are usually not finished during the tenor of the officer in question and the defaulting officers are often not brought back to account for their leadership failure.

- Ensuring the formation of a wholesale Drug Mart as the bedrock of the sanitization exercise,

- Making NAFDAC activities more efficient to reduce delays in, for example, registration and inspection,

- Holding consultations with national and international stakeholders leading to various areas of assistance, including, in the areas of staff training, equipment donations and information sharing from United States Food and Drug Agency (USFDA), Environmental and Occupational Health Science Institute (EOHSI), South African Medicines and Medical Devices regulatory Agency (SAMMDRA),

- Sending proposals for reviewing obsolete laws to the National Assembly, and

- Putting new guidelines and standard operating procedures (SOP) in place for all regulatory processes ([www.nafdacnigeria.org](http://www.nafdacnigeria.org)).

3. **Standards Organization of Nigeria (SON)** Is this part relevant for your thesis or maybe better for appendix?

The Standards Organization of Nigeria is responsible for the formulation of standards on the composition of imported and locally manufactured foods. Many standards of food and food products as well as a good number of codes of hygienic practices for food and products have been established. These standards and codes are reviewed periodically to reflect current trends in technological and industrial development ([www.son.org.ng](http://www.son.org.ng)). They include the following:

**A. Environmental Hygiene**

Potential sources of contamination from the environment should be considered. In particular, primary food production should not be carried on in areas where the presence of potentially harmful substances would lead to an unacceptable level of such substances in food.

**B. Hygienic Production of Food Sources**

The potential effects of primary production activities on the safety and suitability of food should be considered at all times. In particular, this includes identifying any specific points in such activities where a high probability of contamination may exist and taking specific measures to minimize that probability. The Hazard Analysis and Critical Control Point (HACCP) -based approach may assist in the taking of such measures.

Producers should as far as practicable implement measures to:

- control contamination from air, soil, water, feedstuffs, fertilizers (including natural fertilizers), pesticides, veterinary drugs or any other agent used in primary production;
- control plant and animal health so that it does not pose a threat to human health through food consumption, or adversely affect the suitability of the product; and
- protect food sources from faecal (human waste) and other contamination.

In particular, care should be taken to manage wastes, and store harmful substances appropriately. On-farm programmes which achieve specific food safety goals are becoming an important part of primary production and should be encouraged.

**C. Handling, Storage and Transport**

Procedures should be in place to:

- sort food and food ingredients to segregate material which is evidently unfit for human consumption;
- dispose of any rejected material in a hygienic manner; and
- Protect food and food ingredients from contamination by pests, or by chemical, physical or microbiological contaminants or other objectionable substances during handling, storage and transport.

Care should be taken to prevent, so far as reasonably practicable, deterioration and spoilage through appropriate measures which may include controlling temperature, humidity, and/or other controls.

**Cleaning, Maintenance and Personnel Hygiene at Primary Production**

Appropriate facilities and procedures should be in place to ensure that:

- any necessary cleaning and maintenance is carried out effectively; and
- an appropriate degree of personal hygiene is maintained.

**E. Food Control and Monitoring Equipment**

In addition to the general requirements in (d), equipment used to cook, heat treat, cool, store or freeze food should be designed to achieve the required food temperatures as rapidly as necessary in the interests of food safety and suitability, and maintain them effectively. Such equipment should also be designed to allow temperatures to be monitored and controlled. Where necessary, such equipment should have effective means of controlling and monitoring humidity, air-flow and any other characteristic likely to have a detrimental effect on the safety or suitability of food.

These requirements are intended to ensure that:

- harmful or undesirable micro-organisms or their toxins are eliminated or reduced to safe

levels or their survival and growth are effectively controlled;

- where appropriate, critical limits established in HACCP-based plans can be monitored; and
- temperatures and other conditions necessary to food safety and suitability can be rapidly achieved and maintained.

#### **F. Containers for Waste and Inedible Substances**

Containers for waste, by-products and inedible or dangerous substances, should be specifically identifiable, suitably constructed and, where appropriate, made of impervious material. Containers used to hold dangerous substances should be identified and, where appropriate, be lockable to prevent malicious or accidental contamination of food.

#### **G. Water Supply**

An adequate supply of potable water with appropriate facilities for its storage, distribution and temperature control, should be available whenever necessary to ensure the safety and suitability of food. Potable water should be as specified in the latest edition of WHO Guidelines for Drinking Water Quality, or water of a higher standard. Non-potable water (for use in, for example, fire control, steam production, refrigeration and other similar purposes where it would not contaminate food), shall have a separate system. Non-potable water systems shall be identified and shall not connect with, or allow reflux into, potable water systems.

#### **H. Drainage and Waste Disposal**

They should be designed and constructed so that the risk of contaminating food or the potable water supply is avoided.

#### **I. Cleaning**

Adequate facilities, suitably designated, should be provided for cleaning food, utensils and equipment. Such facilities should have an adequate supply of hot and cold potable water where appropriate. Could be suitably located and designated.

#### **J. Storage**

Where appropriate, food storage facilities should be designed and constructed to:

- permit adequate maintenance and cleaning;
- avoid pest access and harbourage;
- enable food to be effectively protected from contamination during storage; and • where necessary, provide an environment which minimizes the deterioration of food (e.g. by temperature and humidity control).

The type of storage facilities required will depend on the nature of the food. Where necessary, separate, secure storage facilities for cleaning materials and hazardous substances should be provided.

#### **K. Packaging**

Packaging design and materials should provide adequate protection for products to minimize contamination, prevent damage, and accommodate proper labeling. Packaging materials or gases where used must be non-toxic and not pose a threat to the safety and suitability of food under the specified conditions of storage and use. Where appropriate, reusable packaging should be suitably durable, easy to clean and, where necessary, disinfect.

#### **L. Water**

Only potable water, should be used in food handling and processing, with the following exceptions:

- for steam production, fire control and other similar purposes not connected with food; and
- in certain food processes, e.g. chilling, and in food handling areas, provided this does not constitute a hazard to the safety and suitability of food (e.g. the use of clean sea water).

Water re-circulated for reuse should be treated and maintained in such a condition that no risk to the safety and suitability of food results from its use. The treatment process should be effectively monitored. Re-circulated water which has received no further treatment and water recovered from processing of food by evaporation or drying may be used, provided its use does not constitute a risk to the safety and suitability of food.

**M. Water as an Ingredient**

Potable water should be used wherever necessary to avoid food contamination.

**N. Ice and Steam**

Ice and steam should be produced, handled and stored to protect them from contamination. Steam used in direct contact with food or food contact surfaces should not constitute a threat to the safety and suitability of food.

**O. Cleaning Programme**

Cleaning and disinfection programmes should ensure that all parts of the establishment are appropriately clean and should include the cleaning of cleaning equipment.

Cleaning and disinfection programmes should be continually and effectively monitored for their suitability and effectiveness and where necessary, documented.

Where written cleaning programmes are used, they should specify:

- areas, items of equipment and utensils to be cleaned;
- responsibility for particular tasks; • method and frequency of cleaning; and
- monitoring arrangements.

Where appropriate, programmes should be drawn up in consultation with relevant specialist expert advisors.

**P. Waste Management**

Suitable provision must be made for the removal and storage of waste. Waste must not be allowed to accumulate in food handling, food storage, and other working areas and the adjoining environment except so far as is unavoidable for the proper functioning of the business.

Waste stores must be kept appropriately clean.

**Q. Monitoring Effectiveness**

Sanitation systems should be monitored for effectiveness, periodically verified by means such as audit pre-operational inspections or, where appropriate, microbiological sampling of environment and food contact surfaces and regularly reviewed and adapted to reflect changed circumstances

**R. Lot Identification**

Lot identification is essential in product recall and also helps effective stock rotation. Each container of food should be permanently marked to identify the producer and the lot. Codex General Standard for the Labeling of Prepackaged Foods (CODEX STAN 1-1985) applies.

**S. Product Information**

All food products should be accompanied by or bear adequate information to enable the next person in the food chain to handle, display, store and prepare and use the product safely and correctly.

**T. Labeling**

Prepackaged foods should be labeled with clear instructions to enable the next person in the food chain to handle, display, store and use the product safely. Codex General Standard for the Labeling of Prepackaged Foods (CODEX STAN 1-1985) applies.

**U. Consumer Education**

Health education programmes should cover general food hygiene. Such programmes should enable consumers to understand the importance of any product information and to follow any instructions accompanying products, and make informed choices. In particular consumers should be informed of the relationship between time/temperature control and food-borne illness.