

AN ASSESSMENT OF THE FOOD SAFETY PRACTICES IN THE NIGERIAN BREAD SUPPLY CHAIN

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Abstract

The current study examined food safety practices in the bread supply chain in Nigeria; using Ekiti State as a case study. Specifically the study examined the bread supply chain, potential bread supply chain quality deterrents, food safety arrangements in the bread supply chain and the level of compliance to food safety regulations. A descriptive cross-sectional survey was used to select thirty-two (32) bakers and ninety six (96) bread sellers. Though most of the respondents were found to have had basic primary school education, their food hygiene and sanitation knowledge was poor while standard food safety regulations were poorly adhered to. Bread sellers' retailing apparatus and environment were not ideal for safe handling of bread to the final consumers. The various agencies charged with food safety mandates were also found to be passive in their responsibility to educate and enforce food safety laws. The study recommends prompt and adequate enlightenment of bread bakers and retailers on the ills of unsafe bread by, agencies mandated to cover food health matters, favourable government policies, provision of soft loans for equipments, food hygiene and environment and the orientation of the citizenry on safe food to influence healthy practices by the handlers of bread.

Keywords: bakeries; bread supply chain; deterrents; food safety; hygiene

Introduction

Safe food is the food that will not cause harm to the consumer when it is prepared and/or eaten according to its intended use (Codex Alimentarius, 2009). Ensuring the safety of food items has become a major challenge globally, especially in the developing countries where safety precautions during food handling activities are still at their infancy stage. Food borne diseases are increasing worldwide, particularly in the developing countries, due to neglect of personal hygiene and food hygiene (SADAOC, 2002). Food handlers with poor personal hygiene could be potential source of infections by micro-organisms. These micro-organisms largely bacteria and other parasites constitute the major causes of wide range food-borne

diseases including cholera, campylobacteriosis, Escherichia coli gastroenteritis, salmonellosis, shigellosis, typhoid and paratyphoid fever, brucellosis, amoebiasis, and poliomyelitis, often transmitted through food, water, nails and fingers contaminated with faeces (Ifeadike *et al.* 2012). The signs and symptoms of food borne illness ranges from gastrointestinal symptoms, such as stomach upset, diarrhoea, fever, vomiting, abdominal cramps, and dehydration, to more severe systemic illness, such as paralysis and meningitis, hence emphasizing the importance of food safety and hygiene in the prevention of food borne illnesses (WHO, 2007). According to the Food and Drug Administration Academy of Nutrition and Dietetics

(2018), the same pathogens that cause food poisoning can cause arthritis, kidney failure, meningitis and Guillain-Barré syndrome. It is estimated that about two to three percent of all food poisoning cases lead to secondary long-term illness such as these. In recent times, health risks associated with the foods that we eat are become alarming (FSANZ, 2001; WHO, 2004, Zeru *et al.*, 2007, Annor *et al.*, 2011; Mukhopadhyay *et al.*, 2012). This has made governments to step-up efforts at combating the menace.

Estimates showed an annual occurrence of 47.8 million, 2 million and 750,000 food borne illnesses in the United States, United Kingdom and France respectively. It is also estimated that in Australia, there are 5.4 million cases of food-borne illnesses every year, causing 18,000 hospitalizations, 120 deaths, 21 million lost days off work, 1.2 million doctor consultations and 300,000 prescriptions for antibiotics (Center for Disease Control and Prevention, 2015).

For Africa, the hazards are similar, African and South-East Asia Regions have the highest burden of Food Borne Diseases. In Africa, Food Borne Diseases account for 142 000 deaths, one-third of the global death toll. 32 000 deaths from non-typhoidal Salmonella (over half of the global death toll for the disease). Most affected are children under 5 years. 70% Diarrheal diseases caused by non-typhoidal Salmonella in children under 5 years by *Escherichia coli* and Food Borne Cholera. Unfortunately, the food safety systems in most countries of the region are generally weak (WHO, 2015). For Nigeria, the country has had her own share. For instance, 10% deaths reported in the Northern part of the county in 2015 were due to acute mycotoxin intoxication. A report also showed water poisoning by terrorist group leading to deaths of scores of animals and the harmful implications on crops and human consumption of such crops. Other incidents in recent years

include the consumption of poisonous noodles and beans that landed many people in the hospitals and the use of banned pesticides in storing agricultural products that resulted in many fatalities. Similar incidences that have persisted include the adulteration of packaged foods products, faking of infant formula food, the use of Potassium bromated in bread and the use of Sudan dye in palm oil (Adeniji, 2015).

Some contaminants can also make the food we eat unsafe. In their own opinion, Ernest and Patino (2010) opined that some of probable immediate effects of chemicals and additives in the food may cause headaches or alter energy level, or they may affect ones risk of cancer, cardiovascular disease and other degenerative conditions. Allen (2006) reported that additives could lead to several health risks. For instance Hydrogenated Fats could lead to cardiovascular disease and obesity. Allergies including asthma, hyperactivity and possible carcinogen can results from consuming food items with Artificial Food Colors. Others risks include common allergic and behavioural reactions, including headaches, dizziness, chest pains, depression and mood swings as well as nervous system and liver malfunctions.

Based on the foregoing the current study evaluated the food safety framework within the bread supply chain in Nigeria. The study is timely as the nation has witnessed many food borne disease incidences. The study findings will help policy makers' efforts at improving sanitation and hygiene practices by actors along the chain, educate bread handlers on those inherent problems in the bread supply chain as well as create landmarks for staple food qualities for Nigeria and similar developing countries.

In the light of addressing the nation's food safety concerns, the current study sought to address the following food safety concerns:

- What is the nature of the bread supply chain?
- What are the food qualities issues in the bread supply chain?
- Are there food safety arrangements or guides in the bread supply chain?

Objectives of the Study

The main objective of the study was to examine the food safety outlook in the bread supply chain for Nigeria, using Ekiti state as a case study. The specific objectives were to;

- i. Describe the socio economic characteristics of bread producers and marketers
- ii. Examine the bread supply channels
- iii. Identify potential food safety deterrents within the bread supply chain
- iv. Evaluate food safety arrangements in the bread supply chain
- v. examine the level of and constraints of compliance to standards in bread supply chain.

Literature Review

Bread is a popular “Ready to Eat” food in the country (Vicki, 1997: Emeje *et al.*, 2010: NAFDAC, 2010), with a population of over one hundred and fifty million people. Ready to Eat foods can become precursors to food poisoning and Food Borne Illnesses. Bread production activities involve many stages right from the farm where wheat is produced and sold as flours from the flour mills to the bakeries and finally as bread to the final consumer via the bread vendors. For such a long supply chain product, different actors with different behaviours are involved before bread finally gets to the final consumer, yet the food safety systems in Nigeria, similar to those of most developing countries are weak, fragmented and not well coordinated; and are therefore not effective enough to adequately protect the health of consumers and to enhance the competitiveness of food exports

(FAO.2005). Concerns on the safety of bread have increased following the indiscriminate use of potassium bromate during its making. During the bread handling process, the processing environment, the health of the workers in the cottage industries and street hawkers are important considerations in ensuring the safety of consumers (Isong *et al.*, 2013). To ensure food safety with regards to bread is therefore worth the effort. This is more so as most food borne diseases can be prevented if the regulations governing food safety are complied with, from production stages to consumption (Medeiros *et al.*2001).

Food Safety and the Bread Trade in Nigeria

Over the years, successive Nigerian governments came up with many programmes and policy initiatives at ensuring the safety and wholesomeness of the nation’s food supply. These notably include the food quality standardization, enforcements laws and agencies. As far back as 1971, several legislative provisions were enacted in different statutes. These include the Public Health Laws of 1917, currently known as the Public Health Ordinance Cap 165 of 1958, Food and Drugs Decree, Number 35 of 1974, Standards Organization of Nigeria Decree 56 of 1971, Animal Disease Control Decree 10 of 1988, Marketing of Breast Milk Substitute Decree 41 of 1990 and the National Agency for Food and Drugs Administration and Control (NAFDAC) Decree 15 of 1993. Two main agencies emanating from these acts were the National Agency for Food and Drug Administration and Control (NAFDAC) and the Standards Organization of Nigeria (SON). NAFDAC is responsible for the formulation of guidelines and regulations on drug, food hygiene and safety, while SON establishes standards and codes of hygienic practices for food and food products in Nigeria. For the commercial

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bread making trade in Nigeria, the business is regulated by guidelines, through the National Agency for Food and Drug Administration and Control (NAFDAC), through 4-point safety standards, that bread bakers should comply with, as follows:

- Consistent production of flour fortified with Vitamins A and C and other " safe enhancers in approved quantities to prevent bakers from adding dangerous chemicals like potassium bromate as flour/bread improvers,
- Compliance with set standards of Good Manufacturing Practice (GMP) and Hazard Analysis Critical Control Points (HACCP) guidelines and requirements of the Agency,
- Stop the use of dangerous ingredients which are not on the list of substances generally regarded as "safe" and
- Bakers should stop the habit of distributing loaves of bread to consumers without proper packaging and in unhygienic conditions (NAFDAC, 2010).

Other food safety support operations are carried out at the States and Local Government Area (LGA) Authorities levels in collaboration with the National Primary Healthcare Development Agency. These agencies have mandates to set policies to control street food vending, catering establishments and traditional markets, environmental sanitation, prevention and monitoring of food environments and the quality of public water.

Methods

Study Location

The study was carried out in Ekiti State, South-west, Nigeria. The state is located between longitudes 40°51' and 50°451' East of the Greenwich meridian and

latitudes 70°151' and 80°51' north of the Equator. It lies south of Kwara and Kogi States, East of Osun State and is bounded by Ondo State in the East and south. The state has a total land Area of 5887.890 sq and an estimated population of 2,737,186 (NPC, 2007). There are 16 Local Government Areas (LGAs) in the state namely: Ado, Ekiti East, Ekiti South West, Ekiti West, Efon, Emure, Gbonyin, Ido/Osi, Irepodun/Ifelodun, Ijero, Ikere, Ikole, Ilejemege, Ise/Orun, Moba and Oyo Local Government Areas. The map of the state is shown in Figure 1.



Figure 1: Map of Ekiti State showing its 16 Local Government Areas

Data Collection

Sampling Technique

The target population involved in this study consisted of bakers and bread sellers in the various LGAs of Ekiti-State. For the study, a two-stage sampling technique was used. The first stage involved the random selection of localities popular for high bread consumption. Eight (8) LGAs headquarters were selected. The second stage was the random selection of major actors; bakers and bread vendors, in the bread supply chain which led to the selection of 32 bakery operators and 96 bread retailers across the selected LGA headquarters. The random selection of bakery operators (32) and bread retailers (96) was based on the respective sampling

frames for bakery operators and bread retailers in the study area. The sample design outlay for the study is shown in Table 1.

Table 1: Sample Design Outlay for the Study

LGA Headquarters	No of Bakeries	No of bread vendors	Total respondents
iJero	4	12	16
Ikole	4	12	16
Oye	4	12	16
Ikere	4	12	16
Ado	4	12	16
Omuo	4	12	16
Ifaki	4	12	16
Otun	4	12	16
Total	32	96	128

Source: Field Survey

Two approaches were used to collect study data. These were the questionnaire and observation guide. The observation involved physical inspection of bread bakers and sellers activities as well as their work environment and facilities. Others instruments were photographs in addition to documentary analysis. These were done to ensure triangulation of data.

Data Analysis

The analytical tools employed for the study comprised mainly the descriptive statistics mean and frequency distribution.

Results and Discussion

Socio-economic Characteristics of Respondents

The frequency distribution for respondents Socio-economics in the study area are presented in Table 2.

Table 2: Socio-economic Characteristics of Respondents

Characteristic	Bread Baker		Bread Sellers		
	Frequency	%	Frequency	%	
Gender	Male	21	66.0	3	3.0
	Female	11	34.0	93	97.0
Age (age group)	13-25	6	19.0	18	18.0
	26-49	19	59.0	40	43.0
	50-above	7	22.0	38	39.0
Marital status	Single	11	35.0	20	21.0
	Married	17	53.0	42	44.0

Level of Education	Widowed	3	9.0	18	19.0	
	Separated	1	3.0	14	16.0	
	None	2	4.0	21	22.0	
Level of Education	Primary	8	26.0	24	24.0	
	Secondary	11	37.0	36	38.0	
	Professional cert.	4	13.0	11	12.0	
	OND	5	16.0	0	0.0	
	HND	0	0.0	0	0.0	
	B.S.C	0	0.0	0	0.0	
	Adult Education	2	4.0	4	4.0	
	Primary occupation	Farming	1	3.0	8	9.0
		Civil servant	3	9.0	2	2.0
		Contractor	0	0.0	0	0.0
Trading		4	13.0	69	71.0	
Bakery		22	69.0	4	5.0	
Years in Business	Others	2	6.0	13	13.0	
	Below 5	12	39.0	22	23.0	
	5-10	18	56.0	42	43.0	
	10-15	2	5.0	19	20.0	
Scale of business	Above 15	0	0.0	13	14.0	
	Small scale	18	56.0	69	72.0	
	Medium scale	11	34.0	20	21.0	
	Large scale	3	10.0	7	7.0	

Source: Field survey

The Table shows that a third of the bread baker respondents (34%) were females while almost all the bread vendors (97%) were females as implied in most studies. (Chukuezi, 2010; Nee et al.,2011). Most of the respondents; bread bakers (59%) and sellers (43%) were agile and of youthful age; between 26 and 49 years of age as for similar studies on Nigeria (Jevsnik et al., 2008; Zain et al., 2002). Few of them: bread bakers (19%) and sellers (18%) were within the age range of 13-25 years while the remaining were in the age range of 50 years and above. The overall result implies that majority of those engaging in bread business were in their economically active age. With regards to educational level of respondents, most of them; bread bakers (94%) and sellers (78%) have had at least the basic primary school education implying that most of them can read and write and can therefore comprehend food safety guides and laws extended to them. These bread sellers and bakers if availed some form of training could become more skillful and experience in handling issues relating to hygiene, sanitation and food

contaminations in their bread businesses. Knowledge is said to be a source of power necessary for everyone to make informed decisions about one’s health and participate actively in promoting health of the community (Kalua, 2001). It is therefore necessary for bread bakers and sellers to acquire some form of knowledge experience to enable them process food items better. Most of the respondents: bread bakers (56%) and sellers (43%) have had 5 to 10 years of experience in the business. Others; bread bakers (39%) and sellers (23%) have had less than 5 years of experience while few bread bakers (5%) and sellers (20%) have had 10 to 15 years. Only few of the bread sellers (14%) have had longer years of experience of over 15 years in the bread selling business.

The scale of bread business operated by the respondents to a large extent determines their level of compliance to food safety guides and laws. In this regard, most of bread bakers (56%) and sellers (72%) operated small-scale bread ventures. Other bread bakers (34%) and sellers (21%) operated at the medium-scale level while the remaining operated large-scale type of ventures in the metropolis environment like Ado-ekiti and ikere-Ekiti towns in Ekiti State.

Bread Retailing Channels

The retailing channel characteristics for bread in the study area is shown in Table 3.

Table 3: Bread Sellers Sale’s Channels

LGA	Shop	Kiosk	Hawk	Motor	Others
Ikole	9	3	0	0	0
Ijero	7	4	0	1	0
Oye-Ekiti	8	1	1	0	2
Ikere	9	3	0	0	0
Ado-Ekiti	8	2	1	0	1
Omuo	7	3	1	1	0
Irepodun	10	1	0	1	0
Otun	8	4	0	0	0
Percentage	68.75	21.87	3.1	3.1	3.1

Source: Field Survey

It is shown that majority of the bread retailers (68.75%) after obtaining their bread from the bakeries sell their bread products mainly from shop outlet. This second popular outlet was the kiosk (21.87%). Vehicular and Manual Street hawking followed and ranked same. The Vehicular and Manual Street hawking were also the least common channels. During the study, it was observed that most of the bread retailers’ kiosks were formerly car garages and public settings where unsanitary drainages were common. These were separated from residential buildings unlike the conventional shops which were usually close to and atimes within residential areas. The sales channel adopted was found to depend largely on the financial status of sellers and consumers patronage.

Bakers Mode of Transport

Enquiry was carried out on the bread bakers’ mode of transporting their bread. Table 4 shows the various transportation modes identified.

Table 4: Bakers Mode of Transport

LGA	Car	Truck	Bus	Bike	Others
Ikole	2	0	2	0	0
Ijero	2	0	1	1	0
Oye-Ekiti	1	0	3	0	0
Ikere	1	0	3	0	0
Ado-Ekiti	2	1	1	0	0
Omuo	2	0	2	0	0
Irepodun	1	0	2	1	0
Otun	2	0	2	0	0
Percentage	40.6	3.1	50	6.3	0

Source: Field Survey

Majority of the bakers (50%) used buses to move their bread to their various retailing destinations. The bus mode was popular, followed by the use of cars (40.6%). The car was mostly used by small scale bakeries to market their limited quantity of bread. Other modes used were the truck and motor bikes. For the bike mode, few bakers (6.25%) used the mode, which

comprised tricycles and motor bikes. The truck was used by fewer bakers (3.1%) in the semi-urban areas who own large bakery facilities and large bread sales. The trucks used were observed to be spacious enough for healthy placement and transport of bread. Another advantage of the truck mode was that, it prevented damage to the bread during transit.

Potential Bread Quality Deterrents

When food handlers do not practice safe personal hygiene, they may become vehicle for transmission of pathogens, through hands, mouth, skin, among others (HPA, 2009). Table 5 indicates the hygiene practices among bread bakers and bread retailers during their business in the study area

From the Table, it is shown that basic safety practices similar to that enacted in the operating NAFDAC food laws in Nigeria, on the use of aprons, hand washing and keeping healthy fingernails during the bread baking and other food processing activities were adhere to by half of the bakers, on the overall. The use of hand gloves and head gears were never employed by many of the bakers. Many of them; bread bakers (56.2%) and bread sellers (40.6%) claimed they have never used hand gloves and head gear. The use of gloves should protect the hands of workers during packaging and sealing the bread nylon cover. This is expected to minimize direct hands contact with the finished bread. Non-use of hand gloves compromises bread safety and the health of people who eat the final bread. Results similar to those of the study were also found by Chukuezi (2010) who reported that 47% of bakers used bare hands while working in bakeries, against the standard practice. This finding was much higher than 16.7% reported by Huq *et al* (2013). The use of the face mask was also neglected as only few adhered to its use during their baking activities. In the case

for the retailers, the use of aprons, hand washing and keeping of healthy fingernails for safe bread packaging and sale activities was adhered to by about one one-third of them; 30.2%, 33.3% and 39.5% for the respective bread handling precautions. For the use of hand glove precautions, many of the retailers never adhered to its usage during packaging and selling of their bread. However most of the retailers (61.4%) were found to cover their naked bread from the bakery before selling them. A major finding was also observed regarding the equipment level of the bakeries in the study area. About half of the bakeries (46.8%) had the basic level of equipment for an ideal hygienic bakery. It was also revealed that most of the bakeries used bromate as a supplement in boosting the bread size. The bromate is however a cancer causing chemical whose usage had been prohibited for use by the operating NAFDAC food laws in Nigeria. The study further revealed that a sizeable proportion of the bread retailers (78%) used cut mattress foams to clean their bread before packaging it for sale.

The evaluation of hygiene level in the bakeries is presented in Table 6. It is shown that most of the Bakeries surveyed had the precursor environmental safety parameters required for a hygienic bakery in terms of their hygiene parameters percentages. None of the bakeries surveyed and observed had sub-optimal parameters. Only two parameters out of the thirteen evaluated, met the optimum requirements for a safe bakery environment. These were maintaining clean equipment and the bakery environment.

Food Safety Knowledge among Bakers and Bread Sellers

The challenge in food safety is that food handlers lack understanding of their roles in ensuring proper personal and environmental hygiene accompanied with

the basic food hygienic practices when they buy, prepare and sell food (WHO, 2015)

Table 7 shows information on the bread bakers/sellers experience/knowledge on bread hygiene and sanitation. The majority of the respondents; bakers (64%) and bread sellers (80%) were experienced and had knowledge of the purchasing quality and proper quantity of ingredients for bread making to a great extent. Others bakers (36%) and bread sellers (20%) had knowledge of food hygiene and sanitation to some extent. The person entrusted with purchasing can buy the product that is best suited for the job, buy the proper quantity of the item, pay the right price for the item, buy from only dependable suppliers and should have knowledge of products and market conditions.

Knowledge on Hazard Analysis and Critical Control Points (HACCP) indicated that only few of the respondents; bakers (5%) and bread sellers (4%) had some knowledge of HACCP. Few others; bakers (15%) and bread sellers (8%) had little knowledge of HACCP while most of them; bakers (85%) and bread sellers (89%) had no knowledge of HACCP at all. About one-third of bakers (30%) and bread sellers (41%) had good knowledge of shelf life, proper storage of bread and the ingredients for bread making while most of the others bakers (65%) and bread sellers (48%) had poor knowledge. A few respondents; bakers (5%) and bread sellers (5%) were well knowledgeable of the regulations governing food vending in Nigeria. In addition, few of bakers (10%) and bread sellers (7%) had little knowledge of the regulations while most respondents; bakers (85%) and bread sellers (88%) had no knowledge at all of the regulations. Similarly on food safety standards, few of baker (5%) and bread sellers (11%) had good knowledge of the food safety standards in Nigeria. Few others; bakers (15%) and bread sellers

(12%) had little knowledge while the majority; bakers (80%) and bread sellers (87%) have no knowledge of the food safety standards in Nigeria at all. Most of the bakers (95%) and bread sellers (88%) had knowledge of the Food and Drugs Act. This means that most of the bread bakers and sellers have no knowledge on regulations governing food vending and food safety standard issues in Nigeria. They therefore operate under their own rules which may go contrary to the rules and safety measures of the Food and Drugs Act for the country

A sizeable number of the respondents; bakers (90%) and bread sellers (84%) had good knowledge of personal cleanliness and hygiene practices. This is a positive indication bread that move along the respondents on the bread chain are most likely to be free from human contaminants that could from poor personal hygienic practices. Food hygienic standards is one of the essential conditions for promoting and preserving human health. Poor hygienic standards are precursors to food-borne disease outbreaks (Oliveira *et al.*, 2003). Most of the respondents (bakers (80%) and bread sellers (86%) had good knowledge of food waste management in terms of waste storage and disposal. Similarly most of the respondents bakers (85%) and bread sellers (79%) had good knowledge of food pests management and control. while about two-thirds of the respondents; bakers (65%) and bread sellers (72%) were well entrenched with general food handling activities like flour processing, bread packaging and distribution.

Food Safety Control Agencies and Inspection

Table 8 shows the food safety agencies availability and their contacts with the study respondents

The Table shows that the Local Authority Environmental Health Unit was mostly responsible for bakery and bread sales

inspection activities in the study area. Inspection by the food and drug law agencies like NAFDAC and NDLEA were at the minimal levels. Most of the bakers and sellers claimed they have had contacts with the Health unit staff implying that the bakers and sellers could be tasked to ensure that their business environments were free from rubbish or debris which could contaminate their bread.

On the issue of inspection frequency by the unit, most of the bakery (80%) and bread sellers (89%) reported they had contacts with the unit inspectors only once a year on average. Very few of them indicated their environments were inspected every quarter of the year (Table 9). Considering that bread is produced and consumed nearly on a daily basis, the inspection frequency of the unit is very low and could therefore be poorly effective.

Compliance to Food Standards

Table 10 provides the respondents compliance to some basic food safety standards in their bread enterprises.

About one-third of bakers (37%) and about two-thirds bread sellers (60%) complied well with regulations on the prohibition against sale of poor quality food. Others bakers (63%) and bread sellers (40%) complied to some extent. A few bakers (10%) and bread sellers (20%) complied with the mandatory fortification of food (bread) with iodised salt regulations while most of the bakers (75%) and bread sellers (70%) complied at a very low extent. The remaining respondents' bakers (15%) and bread sellers (20%) never complied at any time at all.

The proper storage and conveyance of bread regulation was well complied with by some of the bakers (45%) and bread sellers (36%) while the most of bakers (55%) and bread sellers (54%) complied to some extent; below average. Over half of the bakers (60%) and bread sellers (79%) complied well with the regulations on the

preparation, packaging, storage, conveyance and sale of food (bread) under sanitary conditions while few bakers (40%) and bread sellers (21%) complied below the average rate.

On the overall, it could be concluded that the bakers and the bread seller respondents fairly complied with food safety standards. This is shown in the Figures 2 and 3.

Constraints to the Adoption Food Safety Practices

Table 11 shows the various constraints deterring respondents' ability to adhere to food safety standards within the bread supply chain

From the Table, inadequate fund seems to be the major constraints at both the bakers (26%) and bread sellers ends (30%). This was followed by the level of education, respondents knowledge of standard practices, inadequate inputs especially credit and the location of business for bread sellers.

Conclusion and Recommendations

Based on the findings of this study, it is vivid that bakeries in the study area were operated with poor knowledge of hygienic bakery practices, poor hygienic environments and under poor adherence to standard food safety regulations. The bakeries were also faced with constraints that limited their adoption of safe, healthy bread production practices. On the part of the bread sellers, the conditions of their retailing apparatus and environment were not ideal for safe handling of the bread commodities to the final consumers. Food safety regulations were poorly adhered to. The various agencies with food safety mandates were also found to be passive in their responsibility of educating and enforcing food safety laws.

Despite these outcomes, majority of the bakers and bread sellers were found to have had the basic primary school which implies that they could comprehend improved incentives advocated to them.

Based on the study findings, it is recommended that

- Prompt and adequate enlightenment of bakers and bread retailers on the ills of unsafe bread is urgently necessary. In this light, agencies mandated to cover food health matters should step up campaigns to enlighten and coerce safe food practices among the handlers of bread. Regulatory agencies, States ministries of health and environmental health units of local government areas should ensure compliance and adherence of bakeries and bread sellers to the regulations and public health ordinance guiding the approval and monitoring of bakeries as a regulated premise.
- Policies that would encourage better, efficient inspection and monitoring of bakeries and bread sellers activities are necessary.
- On the part of the government, non-governmental organizations and food safety concerns, there is a need to orient the public on safe food practices and qualities for bread, who could transmit and influence such practices by the handlers of bread. This is more so considering that the public are the end users of bread and vulnerable to food borne illnesses.
- Soft loans from agricultural and community based banks and organization should also be availed bakeries and bread sellers in order to upgrade their equipments, food hygiene and environment

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Table 5: Hygiene Practices among Bread Bakers and Bread Retailers

Practices	Bakery (N=32)			Retailers (N=96)		
	Always %	Never %	Sometimes %	Always %	Never %	Sometimes %
Use of Apron	68.0	22.0	0.0	30.2	36.4	33.3
Wash Hands before handling	65.0	28.0	6.0	33.3	33.3	33.3
Cut fingers nails	50.0	34.3	15.6	39.5	47.9	12.5
Hand gloves	18.7	56.2	25.0	2.0	38.0	55.0
Head gear	28.1	40.6	31.2	29	52	18.7
Face Mask	25.0	6.0	68.7	NA	NA	NA
Adequate coverage for bread	NA	NA	NA	61.4	36.4	2.0
Adequate Equipment	46.8	31.2	21.0	NA	NA	NA
Bromate usage	37.5	37.5	25.0	NA	NA	NA
Use of foam to clean bread	NA	NA	NA	78.0	0.0	22.0

NA: Not Applicable
Source: Field Survey

Food Safety Environments

Table 6: Environmental Safe Practices among bakeries

Bakery hygiene	Yes	No	Hygiene Frequency	Percentage %	Implication
Closeness to residential area	27	5	5	15.6	Poor
Closeness to any refuse dump	18	14	14	43.75	Poor
Unsanitary drainage	20	12	12	37.5	Poor
Proper refuse disposal	15	17	15	46.875	Poor
Adequate storage space	19	13	19	59.375	Fair
Bushy surrounding	17	15	15	46.87	Poor
Does the bakery has toilet	16	16	16	50	Fair
Toilet close to bakery	18	14	14	43.75	Poor
Adequate portable water	16	16	16	50	Fair
Storage room condition	17	15	17	53.12	Fair
Hand washing Facilities	8	24	8	25	Poor
Equipment cleaning	24	8	24	75	Good
Premise cleaning	28	4	28	87.5	Good

Keys: Less than 50% (<16), between 50-70% (16-22) and 70% and above (>23) were rated as poor, fair and good levels of hygiene respectively.
Source: Field Survey,

Table 7: Food Hygiene Knowledge of Bread Bakers/Sellers

Experience/ knowledge type.....		Responses (%)						Mean	Remarks
		VGE	GE	SE	LE	N			
Purchasing quality and proper quantity of ingredients for bread making	Baker	20.0	44.0	2.0	34.0	0.0	3.50	Above average Above average	
	Bread Sellers/Retailers	33.0	47.0	1.0	19.0	0.0	3.94		
Hazard Analysis and Critical Control Points (HACCP)	Baker	0.0	5.0	15.0	30.0	55.0	1.80	Disagree	
	Bread Sellers/Retailers	0.0	4.0	7.0	25.0	64.0	1.51		
Shelf life and proper storage of bread and ingredients for bread making	Baker	10.0	20.0	65.0	5.0	0.0	3.35	Above average Above average	
	Bread Sellers/Retailers	12.0	29.0	48.0	8.0	3.0	3.39		
Regulations governing food vending in Nigeria	Baker	0.0	5.0	10.0	25.0	60.0	1.60	poor	
	Bread Sellers/Retailers	0.0	4.0	8.0	36.0	52.0	1.64		
Food safety standards in Nigeria	Baker	0.0	5.0	15.0	25.0	55.0	1.70	poor	
	Bread Sellers/Retailers	2.0	9.0	12.0	29.0	48.0	1.88		
Food and Drugs Act	Baker	0.0	0.0	5.0	35.0	60.0	1.45	poor	
	Bread Sellers/Retailers	0.0	0.0	12.0	40.0	48.0	1.64		
Personal cleanliness and hygiene Practices	Baker	40.0	50.0	10.0	0.0	0.0	4.30	Above average Above average	
	Bread Sellers/Retailers	45.0	39.0	16.0	0.0	0.0	4.29		
Food waste/waste management (storage and disposal)	Baker	20.0	50.0	30.0	0.0	0.0	3.90	Above average Above average	
	Bread Sellers/Retailers	30.0	36.0	29.0	5.0	0.0	3.91		
Food/pest and insect management and control	Baker	45.0	30.0	15.0	0.0	0.0	3.90	Above average Above average	
	Bread Sellers/Retailers	34.0	45.0	21.0	5.0	0.0	4.23		
General food handling (processing, packaging and distribution)	Baker	40.0	25.0	35.0	0.0	0.0	4.05	Above average Above average	
	Bread Sellers/Retailers	34.0	38.0	14.0	14.0	0.0	3.92		

Keys: VGE=Very Great Extent, GE= Great Extent, SE= Slight Extent, LE= Little Extent, N=Not Knowledgeable

Source: Field Survey

Table 8: Food Safety Control Agencies

Type of Agency	Bakers (%)	Bread Sellers (%)
Environmental Protection Agency	0	0.0
Local Authority Environmental Health Unit	90	100
Nigeria Health Service	0	0
Food and Drugs Board/Authority like NAFDAC and, NDLEA)	10	0
Total	100	100

Source: Field Survey

Table 9 Frequency of Inspection on Bakery and Bread Sales Premises

Response	Bakers%	Bread Sellers (%)
Quarterly	5.0	19
Twice a year	40	25
Once a year	35	40
Once in two years	0	0.0
Occasionally	20	10
Total	100	100

Source: field survey

Table 10: Bread Bakers/Sellers level of Compliance

Compliance Type		Responses (%)					Mean	Remarks
		VGE	GE	SE	VLE	N		
Prohibition against sale of poor quality food	Baker	17.0	20.0	63.0	0.0	0.0	3.54	Above average
	Bread Seller	36.0	24.0	40.0	0.0	0.0	3.96	Above average
Mandatory fortification of food (bread) with iodised salt	Baker	0.0	10.0	20.0	55.0	15.0	2.25	Poor
	Bread Seller	1.0	19.0	28.0	42.0	20.0	2.69	Poor
Storage and conveyance of bread in a manner that preserves its composition, quality, purity and nutritive properties	Baker	15.0	30.0	55.0	0.0	0.0	3.60	Above average
	Bread Seller	30.0	16.0	54.0	0.0	0.0	3.76	Above average
Preparation, packaging, conveyance and sale of bread under sanitary conditions	Baker	25.0	25.0	50.0	0.0	0.0	3.75	Above average
	Bread Seller	26.0	39.0	35.0	10.0	0.0	4.11	Above average

Source: Field Survey

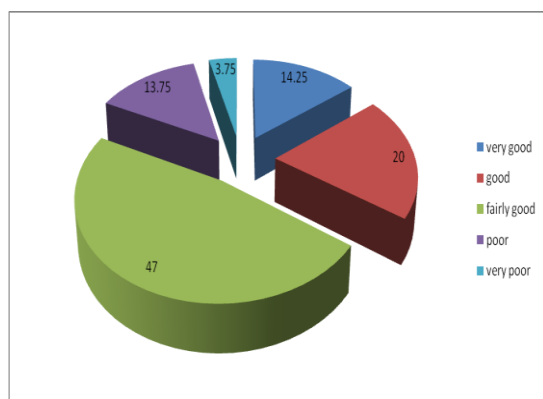


Figure 2: Bakers compliance to food safety Regulations

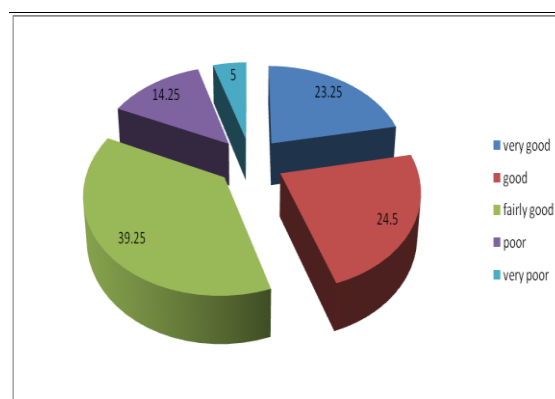


Figure 3: Bread seller compliance to food safety Regulations

Table 11: Constraints to Food Quality

	Bakers			Bread Sellers		
	Frequency	Percentage	Ranking	Frequency	Percentage	Ranking
Inadequate fund	25	25	1 st	56	30	1 st
Education	18	18	2 nd	45	24	2 nd
Knowledge of practices	13	13	3 rd	30	16	3 rd
credit sources	12	12	4 th	22	12	5 th
Bad roads	5	5	8 th	0	0	-
Price of materials	12	12	4 th	-	-	-
Labour availability/cost	8	8	5 th	0	0	-
Location of business	7	7	6 th	21	11	4 th
Others	0	0	-	12	7	6 th

Multiple responses allowed*

Source: Field Survey