Analysis of the Impact of Nigeria Stored Products Research Institute (NSPRI) on Price Volatility of Maize in Lagos

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Abstract: **This study examined the impact of Nigerian Stored Products Research Institute (NSPRI) on price volatility of maize in Lagos state. The specific objectives of the study were to determine the impact of NSPRI product preservation on price volatility of Maize in Lagos market; to investigate the impact of NSPRI product safety recommendation on price volatility of Maize in Lagos; to ascertain if NSPRI Postharvest activity has impact on price volatility of Maize in Lagos market. The research design was descriptive survey design, the population of the study consisted of intermediaries of maize which include distributors, wholesalers and retailers of maize and maize products in Mile 12 Market area of Lagos. The research instrument was a structured questionnaire. Stratified sampling technique was used to select participants who were active dealers of maize agricultural products. A total sample of 200 maize intermediaries was selected from the entire population of the study and questionnaire administered. One hundred and eighty two (182) copies of the questionnaire were properly completed. Data collected were analyzed using both descriptive and inferential statistical tools. The results obtained led to the study conclusion that there is a strong, positive correlation between NSPRI Product Preservation and Price volatility of Maize in Lagos market; that NSPRI product safety recommendation has significant impact on price volatility of Maize in Lagos; and that there is a positive correlation between NSPRI Postharvest activity and price volatility of maize. The study recommended that NSPRI adoption of simple, effective and appropriate preservation techniques would reduce price of grains and ensure food security in Nigeria and that NSPRI must intensify efforts in improving maize quality and production, amongst others.**

Keywords: **NSPRI, Product Preservation, Price volatility of Maize, product safety recommendation, Postharvest activity, Intermediaries of maize products.**

I. INTRODUCTION

Maize also referred to as Zea-mays is a staple food of great socio-economic importance in Sub-Sahara Africa and the third most important staple food in the world today (Food and Agricultural Organization, 2003). Maize is recognized to be one of the longest ever cultivated food crop in Africa and world over. It is the most important staple crop grown in Southern regions of Nigeria, where about 75% of the country's 800,000ha of maize are located (Paudyal and Poudel, 2001). Maize is the world best adapted crop in Nigeria (Adesiyan, 2015), and also grown in several region of the world. Notably because of maize ability to thrive under different ecological conditions, maize consist of the greater proportion of the grains produced in Nigeria.

There has been a sustained increase in the production of maize output in Nigeria (Adekunle and Nabinta, 2000). Maize is the most important staple food in Nigeria, as such 30% of the crop land has been devoted to small scale maize production in the southwest part of Nigeria under various cropping system, where it has grown to be local 'cash crop' (Ayeni, 1991). Ogunsumi (2005) established that the aggregate effect of growing maize by small scale farmers in Africa can overcome hunger in the households and could double food production in the continent.

On the other hand, Badiane and Shively (1998) analysis of the effect of a price-shock on local markets in Nigeria, originating from the central market show that the maize price level and price volatility prevailing in one local market is to a large extent correlated with the "central market price history", while price observed in the other local markets are more related to local price history, differences in preservation costs explains the difference.

Unexpected price changes are characteristics of price volatility which involved farmers reducing their output supply and investments in productive inputs, as a way of reacting to risk. Price volatility has extended its tentacle to the consumers refer to as the downstream sector, evidence has shown that the effect of price volatility in the global markets is not limited to farm gate (Assefa et al., 2013). Unstable food price co-movement that was experienced during the financial crisis of the 2000s rekindled interest in understanding the driving forces behind volatility and price co-movements across food commodities.

The Nigerian Stored Products Research Institute (NSPRI) was strategically established to conduct research into the storage of agricultural products. To do this, the Institute has set up research and development programmes for the provision of solutions to post-harvest problems in Nigeria and over the years the Institute has developed various technologies

for reducing food losses at various levels (NSPRI, 2019). This strategic plan is an attempt to widen the scope of the impact of the developed technologies, recommendations and protocols at various levels. NSPRI also develop standards for marketing of agricultural commodities in collaboration with other agencies.

Statement of the Problem

Lack of quality infrastructure results directly in high preservation costs which hampers farmers' participation in markets as in Sub-Saharan Africa, while traders from urban areas are discouraged from purchasing food items directly from rural farmers in remote areas (Kisamba, 2005). A relevant concern arises from the subsequent mismatch between supply and demand, namely the probable influence of quality, availability and storage costs on price volatility.

Only a few studies have formally explored theoretically and/or empirically the relationship between price volatility across markets and storage costs (Ayeni, 1991; Adekunle & Nabinta, 2000). Yet, little or none has examined the impact of quality, safety and availability of maize which has been the mission of the Nigerian Stored Products Research Institute on price volatility of maize. Thus, the contribution of study lies in the development of a conceptual model that relates price volatility to quality, safety and availability and to assess its empirical relevance in explaining price volatility differences across markets in Lagos state, Nigeria.

Furthermore, up to this recent time, many researchers have been conducted on price volatility and food commodity prices in the world and even in Sub-Saharan Africa. In Nigeria little was done to find out the ripple effect of price volatility on agricultural commodity. This paper strives to bridge the gap by attempting to measure the volatility of maize prices in Mile 12 market and Kosefe area of Lagos state. On this basis, this research works would investigate the effects of diverse measurement of price volatility.

Objectives of the Study

The aim of this study is to investigate the impact of Nigerian Stored Products Research Institute (NSPRI) on price volatility of maize. However, the specific objectives of this research are to determine the impact of NSPRI product preservation on price volatility of Maize in Lagos market; to investigate the impact of NSPRI product safety recommendation on price volatility of Maize in Lagos; and to ascertain if NSPRI Postharvest activity has impact on price volatility of Maize in Lagos market.

Statement of Hypotheses

Based on the objective of the study, the following hypotheses have been formulated in null form:

H_{o1}: NSPRI product preservation has no significant impact on price volatility of Maize in Lagos market.

H_{o2}: NSPRI product safety recommendation has no significant impact on price volatility of Maize in Lagos.

H_{o3}: NSPRI Postharvest activity has no significant impact on price volatility of Maize in Lagos market.

II. REVIEW OF LITERATURE

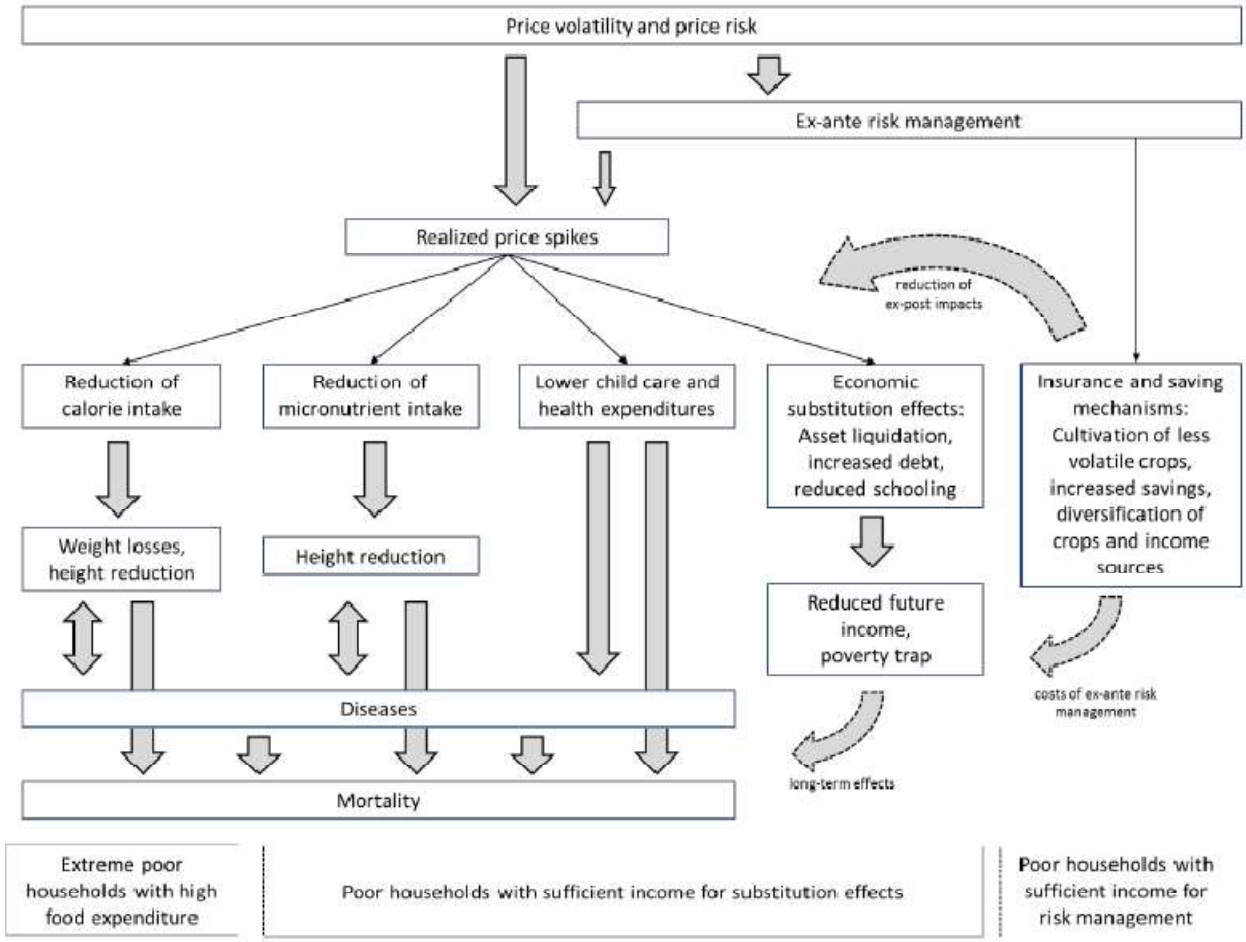
Concept of Price Volatility

Difference in the price of the commodity the day-to-day in percentage is used to measure volatility of products. What defines a volatile market is the degree of variation not the level of prices. Therefore, the price volatility is used to describe price fluctuations of a commodity in the market. Volatility is a result of the underlying supply and demand characteristics of the market, since it follows that price is a function of supply and demand, This implies that high levels of volatility reflect extraordinary characteristics of supply or demand.

Basic energy prices (i.e electricity, heating oil, natural gas) are generally more volatile than prices of other commodities. One reason that energy prices are so volatile is that many consumers are extremely limited in their ability to substitute other fuels when the price of a basic energy fluctuates. Residential customers usually cannot replace their heating system quickly, but in the long run, it may not be economical to do so. When relative prices of foodstuffs change, some consumers can substitute readily between food products, while most do not have that option when it comes to heating their homes.

Volatility provides a measure of price uncertainty in markets. Firms may delay investment when volatility rises and other decisions or increase their risk management activities. The costs associated with such activities tend to increase the costs of supplying and consuming commodities.

Figure 1: Conceptual framework of food price increases and impact on nutritional indicators.



Source: Kalkuhl, M., Kornher, L., Kozicka, M., Boulanger, P. and Torero, M. (2013).

The impact of realized price shocks depends also on ex-ante risk management strategies like increased savings or diversification of income sources that might allow maintaining real income through increased working hours. Wage payment systems in kind are another measure to hedge against price uncertainty. Savings at low or even negative real interest rates, usually tie financial resources that could be invested more profitably. For poor households without access to bank accounts savings are very expensive if domestic inflation is high.

Regarding the impacts of realized price changes, there are strong interdependences between anthropometric channels. For instance in the third channel in Figure 1, even if price increases have no effect on food consumption, only on child care and health expenditures, increased cases of diseases like diarrhea can lead demands influencing price volatility (Gorgens *et al.*, 2012). Thus, it is important to consider multiple indicators and the channels that influence them when studying the empirical link between price changes and anthropometric indicators. Lack of significant relationship between price increases and a specific disease indicator does not imply that price changes had no effect on nutrition and health status. The indicators that focused on coping strategies and food consumption allow drawing a comprehensive picture of the impact of price changes on FNS as different dimensions. Gorgens *et al.*, (2012) concluded that price changes have direct and indirect effects on nutritional status, health, mortality and future wealth.

Measuring volatility and price changes

Volatility captures the idea that prices are fluctuating in a broad sense. Volatility is economists terms usually used to measure frequent short-term fluctuations around a rather stable long-term price or price trend (Hull, 2005). These short-term fluctuations refer usually to daily, weekly or monthly prices. With respect to food and nutrition security, however, less frequent events are of importance: abrupt and unanticipated price changes that prevail for several months until prices stabilize to a 'normal' level. These periods of excessively high or low commodity prices are often associated to crises as they pose a challenge to producers and consumers.

Piot-Lepetit and M'Barek (2011) provide an overview of the set of methods that is available to analyze price volatility of Agricultural Commodity and Price Volatility. Huchet-Bourdon (2011) applied three measures to analyze recent commodity price volatility reporting little difference among them. Figure 2 shows the most common unconditional measures of volatility.

Figure 2. Different measures of unconditional volatility.

Variance of log returns	Coefficient of variation from (annual) mean values $\bar{p}$	Coefficient of variation from trend $\overline{p_t}$
$Vol = Var\left[\log\left(\frac{p_t}{p_{t-1}}\right)\right]$	$Vol = \frac{Var[p_t - \bar{p}]}{\bar{p}^2}$	$Vol = \frac{Var[p_t - \overline{p_t}]}{\overline{p_t}^2}$
Constant time trend of prices does not cause any bias.	Stable time trends lead to a higher volatility measure. Using CPI deflated prices avoids bias due to CPI inflation.	Trend calculated by smoothing filters (i.e. Hodrick-Prescott) or polynomial time-trend regression
Gilbert and Morgan (2010)	Bellemare (2011)	Huchet-Bourdon (2011)

Source: Kalkuhl, M., Kornher, L., Kozicka, M., Boulanger, P. and Torero, M. (2013).

Dynamic models of conditional volatility can provide more accurate measures of price volatility as past shocks and volatility in a market may affect current volatility in the same market. On the other hands, standard unconditional measures of volatility may lead to severe errors in measurement in contrast to dynamic conditional models. Rapsomanikis and Mugera's (2011) work on volatility spillovers from world to domestic markets in Africa and South Asia, is significant to this measurement. Hernandez et al. (2013) analysis of volatility transmission across major futures exchanges, and Gardebroek et al. (2013) work on market interdependence and volatility spillovers across major crops.

The NSPRI mandate on Agricultural Products Preservation

The Nigerian Stored products Research Institute (NSPRI) was established in 1954 to conduct research in all aspect of post harvest handling and storage of all agricultural crops, though it was initially mandated to focus its attention on export crops, at independence it was given the mandate to research also into local food crops via improvement and maintenance of quality of perishable crops (Mgbenka and Mbah, 2016). It has developed the use of the ventilated yam barn for the storage of yam tubers, techniques for preserving fresh cassava roots, development of waxes for the treatment of citrus, and techniques for the production of pineapple, mango, okra, tomato, and pepper etc into more stable forms. Under its mandate of improvement and maintenance of quality of durable crops, it has developed systems for storing grains at domestic and commercial levels. It has developed techniques for maintenance of the quality of grains at warehouse level. Again, it has perfected the inert atmosphere techniques for grain storage.

Under its mandate to improve and maintain the quality of tree crops it has developed techniques for checking mycotoxin and aflatoxin in cashew, cocoa, and also groundnut. It has developed techniques for storing and extending the shelf life of seed potato and ware potato by the use of diffuse light store; this can store seed and ware potato for up to 4-5months. It has developed the cassava stem storage structure for storage of cassava stem, and dryers for meat and fish products (Ogunmola, Obayelu and Akinbode, 2017). It has the mandate to improve capacity building in post harvest technology for artisans in the fabrication of packaging and storage structures, on this, it has advised on problems associated with stored products, it has provided extension services to NGOs on construction and uses of different dryers and trained interested small farm holders on food preservation techniques.

The Institute has identified various factors causing deterioration and losses in agricultural crops after harvest which shorten their shelf life, after many years of research. The methods of eliminating or controlling the effects of these factors on the crops to prolong shelf life have also been thoroughly researched (NSPRI, 2015). The result of NSPRI research has led to the development of structures and technologies suitable for the storage of all categories of food crops at all level of storage for effect preservation. These notable developed technologies are designed for cereals and legumes, roots and tubers, fruits/vegetables, meat and fish among others.

Nigerian Maize Market Structure

There is still considerable gap in the demand and supply of maize in the country. The gap could be reduced through expansion of land for maize production, rotation, mixed cropping and production of the crop under irrigation where possible (Ogunmola, Obayelu and Akinbode, 2017). Domestic demand for maize continues to be largely driven by the evolution of traditional markets (e.g. feed and food markets) as well as by industrial use and the development of alternative uses for maize. Maize demand in the country can be estimated to increase at an average of 3.2 percent per year. Traditionally considered a subsistence crop, maize is now transformed into a commercial crop owing to the demands of the feed and poultry industries.

Adesiyan (2015) iterated that maize producers have become more market oriented and open to the adoption of improved technologies. In the next two decades, the composition of demand for maize will likely change, with feed use of maize increasing more rapidly than food use. As a result of projected faster growth in feed use, the market for yellow maize will expand relative to that for white maize. A lot of the maize produced in the guinea savanna zone of the country is transported to different parts of the country, north, west and east. Despite the determination of the government to double the output of maize and promote export, it has not been possible to export maize in Nigeria and the country continues to rely on importation in an attempt to satisfy industrial demand (Adesiyan, 2015). Due to foreign exchange limitations and competing import demand, however, maize import has declined considerably since 2002. This has further reduced the supply of the commodity in the country.

Theoretical framework

The term "commodity" can refer to a variety of goods that may differ greatly in production or extraction, use as inputs or final goods for the consumer, or storability (from a few days for the banana to centuries for metals). Thus it seems logical to conclude that explanations for the behaviour of markedly different commodities will require different theories. Here, is an overview of two theories of commodity prices: the storage model and the cobweb model.

The storage model

Commodity price behavior theory tends to dominate the storage model. Beginning with writings of Gustafson (1958) and later Williams & Wright (1991) the storage model has a long history. The storage model studies how speculators will engage in commodity transactions based on their expectations of future price changes. Typically, when the actual price is below the level speculators expect to prevail in the next period (namely, the long-term mean of the price adjusted for storage and interest rate costs), speculators will store the commodity in order to sell it at a higher price during the next period. By contrast, when the current price is above the next period's expected value, speculators will not store the commodity. In the case when there are no incentives to store (the so-called stock-out case), price dynamics simply follow the path of the underlying supply shocks. The storage model theory is best suited for commodities which are unpredictable and whose production is easily stored. In regard to the commodity groups analyzed for the current study, the storage model is best suited to describe staple commodities and non-perishable plantation crops.

The "Cobweb" model

This is a compelling model for predicting the prices of livestock products known as the "cobweb model (Prakash, 2011). The storage model asks how exogenous shocks in the supply will be transmitted into price movements. By contrast, the cobweb theory explains that price variations are the results of the behaviour of market participants. Agent's price expectations play a crucial role in the livestock industry, where the lag between producing decision and effective production can be up to 3 years.

While both the cobweb and storage theories model how agents form their expectations, they are based on two fundamentally different assumptions: while the storage model assumes that agent shave rational expectations, adherents of the cobweb model assume that producers have naive expectations (Prakash, 2011). Thus, according to the cobweb model, agents will base their production decision on the prevailing price, even if they know that the next period's price will likely diverge (this explains the term "naive expectations"). When prices are low or high agents' expectations can create variations in price, agents will reduce or increase their production, so that the next period will see opposite high/low prices. Mitra & Boussard (2008) reiterated that even though the model of naive expectations has been deemed improbable and has received little attention in the mainstream literature, it has not been altogether disregarded in the study of agricultural commodity pricing. An area on for continued interest is its ability to generate oscillatory prices, which are considered applicable in describing cattle dynamics. Aadland (2004) noted that aggregate cattle stocks are a peculiar economic time series.

As the other theories mentioned above do not account for such cyclical behaviour, this makes the cobweb model an interesting candidate to help predict cattle prices (Aadland, 2004). Firstly, it should be noted that the theories elucidated thus far consider markets free from government intervention (Prakash, 2011).

Storage model theorists tend to agree that agricultural prices should be stationary (Prakash, 2011). The storage model seeks to show how, in the presence of (independent and identically distributed) supply and a deterministic demand function, commodity storage induces price auto-correlation. But whether this auto-correlation leads to stationarity or non-stationarity (random walk) is not directly predicted by the theory. In an influential article, Deaton & Laroque (1992) investigate how the storage model can replicate the relatively high, but still stationary, auto-correlation found in annual prices of more than 10 commodities. That the prices were found to be stationary appeared justified to the authors: The random walk hypothesis seems very implausible, at least for commodities where the weather plays a major role in price fluctuations; a random walk requires that all fluctuations in price be permanent (Deaton & Laroque, 1992).

Empirical Review of Literature

Despite the various efforts to combat high fluctuations in prices of food commodities in the markets, it has been an economic menace limiting the ability of consumers (processors) to secure supplies and control input costs. Persistency in food price transmission results to contracting

and relatively low percentage of raw commodities in the processed products (Trostle, 2008).

Ogunmola, Obayelu and Akinbode (2017) carried out an analysis of food commodity prices in Nigeria focusing on Volatility and Co-movement. The authors used VAR model to test stationary in food commodity price series, to check on stability condition in the transformed series, to test Granger causality among food price volatility, to analyse impulse response of shock in price of one food commodity to the other food commodities in the model, and to forecast food commodity price volatility in Nigeria. Ogunmola, et al (2017) study revealed that the logged of food commodities price series is stationary at first difference which satisfy stability condition. The Granger causality test explained that there is the presence of bidirectional causality from the price of one food price to the others over the period under study.

As a result, the impulse response analysis explained that the shock to the price of one food commodity exhibit smaller, but significant response and also temporary oscillations in other food commodities and itself (Ogunmola, et al., 2017). Moreover, the impact of this shock on other food creates little or no persistency and that their effects eventually die out. The outcome of this study revealed that forecast of a food commodity can be relatively explained by the past price volatility of the same commodity and that of others. The magnitude of conditional volatility of the selected food commodities shows that the past behaviour of the selected food prices and a constant term influences their prices today and future. The sum of the ARCH and GARCH effects indicates that, the prices are very volatile. This could be attributed to their seasonality in production. Owing to the pronounced fluctuations of the food commodity prices across the years in Nigeria, the study recommends that the government and private bodies should help in facilitating proper storage facilities and infrastructure for the food distribution corporations in Nigeria. Without adequate storage facilities, food prices are more volatile, causing great havoc for both producers and consumers.

Mgbenka and Mbah (2016) develop a model of price formation and transport costs between rural and urban markets in Burkina Faso and also captures the implications for price volatility in rural market to reach this objective. Ndiaye, Maitre d'Hôtel, Le-Cotty, 2015) explore the empirical implications of our conceptual model by using the autoregressive conditional heteroskedasticity (ARCH) model. The results also show that maize-surplus markets and markets bordering Côte d'Ivoire, Ghana and Togo have experienced more volatile prices than maize-deficit and non-bordering markets. Furthermore, we find strong evidence of a seasonal pattern in maize price volatility across Burkinabe markets.

Mgbenka and Mbah (2016) research suggests that policies targeted towards infrastructure development and better regional integration and economic development within the ECOWAS area would reduce maize price volatility. For instance, authorities could support remote markets by linking them through better roads with major consumption centers across the country as well as in neighboring countries. If this done, it will improve the commercialization of agricultural products in remote areas and reduce price volatility across markets in Burkina Faso.

Ogunmola, Obayelu and Akinbode (2017) study found that food insecurity in Nigeria is not solely tied to underproduction (Nigeria produces 8.41%, 1.09%, and 2.85% of global production of roots and tubers, cereal, and legumes respectively). Though there is need to step up production, this is in tune with the assertion of CBN (2001) that the rate of increased food production of 2.5% per annum does not measure up with the annual population growth of 2.8%. Stepping up production is, however, not a panacea or silver bullet for food insecurity in Nigeria, thus, an all encompassing, holistic approach needs to be employed and advantages accruing to this synergy would be gotten. The increased production of rice, cassava, maize, and yam since the 1980s according to Shimada (1999) and Hall (1968) has been extra ordinary high.

III. RESEARCH METHODOLOGY

Research Design

Research design is the blue print, strategy and technique of investigation conceived by the researcher to address research questions and to control variances. For the purpose of this study, descriptive research design is adopted using survey method as component of descriptive research design.

Population of the Study

Population specifies the aggregate of items or persons from which data pertinent to the study were collected. The population of this study is the Intermediaries of maize crop. Therefore, distributors, wholesalers and retailers of maize and maize products in Mile 12 Market and Kosefe area of Lagos consists the population of the study. The population size of maize intermediaries in the selected area in Lagos could not be ascertained but can be estimated by Mile Agricultural products chairman to be about 400 intermediaries.

TABLE 1: POPULATION OF MAIZE AGRICULTURAL PRODUCTS INTERMEDIARIES ARE

S/N	Stratum	Intermediaries
a.	Distributors	102
b.	Wholesalers	142
c.	Retailers	156
	Total	400

Three categories of maize products intermediaries are identified, which include distributors, wholesalers and Retailers.

Sampling Techniques

The population of maize agricultural Products dealers was categorized into Distributors, Wholesalers and Retailers.

Stratified sampling technique was adopted to select participants from different categories of intermediaries for the study.

Sample Size

The sample frame from maize Intermediaries in Mile 12 market and Kosofe area of Lagos were used to select the study sample. The proportionate stratified sampling method was applied to select 200 intermediaries in the selected area of Lagos state. These are dealers who have shown willingness to participate in the research.

Yamane (1967) simplified formula for proportions was applied to calculate the sample size of maize agricultural product Intermediaries.

The simplified formula is:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

n = *Sample Size*
N = *Population of the study*
E = *Precision estimate*

Confidence level is 95% and $\pm$.5% precision estimates.

Therefore:

$$n = \frac{400}{1 + 400(.05)^2}$$

$$n = \frac{400}{2.0}$$

$$n = 200$$

Consequently, the sample size of the study is two hundred (200) intermediaries of agricultural products in Mile 12 market and Kosefe area of Lagos.

Data Collection Instruments

The instruments used for data collection was questionnaire. The questionnaire was designed in two sections, Section A and section B. Section A is structured to gather information relating to the respondents' demographic data such as: gender, working experience, and educational and professional qualifications while section B of the questionnaire requested for the respondents opinion on the core variables of subject of the study.

Method of Data Analysis

The procedures for the analysis of data collected through questionnaires will include the use of simple percentages and frequency distributions. However, simple regression analysis was applied to test the stated hypotheses in this study.

IV. DATA ANALYSIS AND RESULTS

This study investigates the impact of Nigerian Stored Products Research Institute (NSPRI) on Price volatility of maize in Lagos State. It is important to analyze and process the data because raw data do not have any appreciable value unless processed. The analysis of each data precedes the presentation of findings. The data presentation and analysis is based on the data collected from the respondents using questionnaire as research instrument. Out of the total number of 200 copies of questionnaire administered, one hundred and eighty two (182) copies of the questionnaires were returned and adjudged useable. Therefore the analysis of this study is based on the total of one hundred and eighty two copies of questionnaire properly completed and returned.

Demographic Data

TABLE 2: GENDER DISTRIBUTION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	107	58.8	58.8	58.8
	Female	75	41.2	41.2	100.0
	Total	182	100.0	100.0	

Source: Field Survey 2020

Table 2 above shows that 58.8% of the respondents were male, while 41.2% of them were female. This implied that there are more male respondents in the sample than the female. Therefore, data collected can be regarded as balanced and reliable for the purpose of this study.

TABLE 3: AGE DISTRIBUTION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	21 - 30 years	20	11.0	11.0	11.0
	31 - 40 years	55	30.2	30.2	41.2
	41 - 50 years	62	34.0	34.0	75.3
	51 years and above	45	24.7	24.7	100.0
	Total	182	100.0	100.0	

Source: Field Survey 2020

Table 3 indicates that 11.0% of the respondents were 21 – 30 years, 30.2% of them were within the ages of 31 – 40 years, while 34.0% of the respondents were between the ages of 41 – 50 years and 24.7% of them were in the age bracket of 51 years and above. This implied that the bulk of our respondents are between the ages of 31 – 50 years.

TABLE 4: MARITAL STATUS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Single	69	37.9	37.9	37.9
	Married	113	62.1	62.1	100.0
	Total	182	100.0	100.0	

Source: Field Survey 2020

It is observed in Table 4 that 37.9% of the respondents were single and 62.1% of them were married. This shows that the bulk of our respondents were married.

TABLE 5: HIGHEST EDUCATIONAL QUALIFICATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	GCE/SSCE	42	23.1	23.1	23.1
	ND/NCE	46	25.3	25.3	48.4
	HND/First Degree	25	13.7	13.7	62.1
	Master Degree	37	20.3	20.3	82.4
	HND/First Degree & PQ	23	12.6	12.6	95.1
	Master Degree & PQ	9	4.9	4.9	100.0
	Total	182	100.0	100.0	

Source: Field Survey 2020

In the Table 5, 23.1% of the respondents were SSCE/GCE holders, 25.3% of them hold ND/NCE, 13.7% of them have HND/First Degree, 20.3% of the respondents have Masters degree, 12.6% of the respondents hold HND/First Degree & Professional qualification (PQ), while 4.9% were holders of Masters degree and professional qualifications (PQ). This implied that most of our respondents are educated enough to give reasonable responses.

Table 6: Category of Maize Dealers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Maize distributor	35	19.2	19.2	19.2
	Maize Wholesaler	74	40.7	40.7	59.9
	Maize retailer	50	27.5	27.5	87.4
	Maize individual consumers	23	12.6	12.6	100.0
	Total	182	100.0	100.0	

Source: Field Survey 2020

Table 6 shows that 19.2.5% of the respondents were maize distributor, 40.7% of them were maize wholesalers, 27.5% of the respondents were maize retailers, while 12.6% of them were maize individual consumers. The implies that more of maize wholesalers made up of our respondents and are knowledgeable enough to give reasonable response to the subject matter.

The Results

In effort to arrive at the accurate and reliable findings from the data analyzed above, the data must be subjected to a statistical test or mathematical analysis. Regression analysis statistical tool as a method for testing hypotheses was used. Therefore, correlation analysis was used to evaluate whether or not the values that have been empirically obtained differ significantly from those, which would be expected under a certain set of theoretical assumptions. Statistical Package for Social Sciences (SPSS) was used to test the relationship between the variables in the four stated hypotheses.

1. The impact of NSPRI product preservation on price volatility of Maize in Lagos market.

In the null form the hypothesis I, stated that NSPRI product preservation has no significant impact on price volatility of Maize in Lagos market. The hypothesis was tested with the use of Regression analysis statistical tool. The result of the analysis is presented below:

Regression

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.058[a]	.003	-.006	.40270	2.481
a. Predictors: (Constant), NSPRI product preservation					
b. Dependent Variable: Price volatility of Maize					

ANOVA[b]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.058	1	.058	.359	.551[a]
	Residual	17.190	106	.162		
	Total	17.248	107			
a. Predictors: (Constant), NSPRI product preservation						
b. Dependent Variable: Price volatility of Maize						

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.426	.612		7.233	.000
	NSPRI product preservation	.084	.140	.058	-.599	.551
a. Dependent Variable: Price volatility of Maize						

A simple regression was calculated predicting subjects' Price volatility of Maize based on NSPRI product preservation. A significant regression equation was found ($F(1,106) = .359$, $p > .000$), with R^2 of .003. Subjects predicted 'Price volatility of Maize' equal to 4.426 + .084 of NSPRI product preservation. Subjects' average 'Price volatility of Maize' increased .003 for an increase in 'NSPRI product preservation'. This result suggests that there is a positive relationship between NSPRI product preservation and Price volatility of Maize. Therefore, NSPRI product preservation has significant impact on price volatility of Maize in Lagos market.

2. The impact of NSPRI product safety recommendation on price volatility of Maize in Lagos II.

In the null form, the hypothesis II stated that NSPRI product safety recommendation has no significant impact on price volatility of Maize in Lagos. The hypothesis was tested with the use of Regression analysis statistical method. The result of the analysis is presented below:

Regression

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.391[a]	.153	.145	.25768	2.497
a. Predictors: (Constant), NSPRI product safety recommendation					
b. Dependent Variable: Price volatility of Maize in Lagos					

ANOVA[b]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.273	1	1.273	19.172	.000[a]
	Residual	7.038	106	.066		
	Total	8.311	107			

a. Predictors: (Constant), NSPRI product safety recommendation

b. Dependent Variable: price volatility of Maize in Lagos

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.275	.252		13.006	.000
	NSPRI product safety recommendation	.272	.062	.391	4.379	.000

a. Dependent Variable: price volatility of Maize in Lagos

A simple regression was calculated predicting subjects' price volatility of Maize based on NSPRI product safety recommendation. A significant regression equation was found ($F(1,106) = 19.172$, $p > .000$), with R^2 of .153. Subjects predicted 'price volatility of Maize' equal to 3.275 + 0.272 of 'NSPRI product safety recommendation'. Subjects' average 'price volatility of Maize' increased 0.272 for an increase in 'NSPRI product safety recommendation'. This confirms that there is positive relationship between 'NSPRI product safety recommendation and price volatility of Maize. This result confirms that NSPRI product safety recommendation has significant impact on price volatility of Maize in Lagos.

3. NSPRI Postharvest activity has impact on price volatility of Maize in Lagos market.

In the null form, the hypothesis III stated that NSPRI Postharvest activity has no significant impact on price volatility of Maize in Lagos market. The hypothesis was tested with the use of Regression analysis statistical method. The result of the analysis is presented below.

Regression

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.140a	.020	.016	.47574	1.739

a. Predictors: (Constant), NSPRI Postharvest activity

b. Dependent Variable: price volatility of Maize

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.283	1	1.283	5.667	.000[b]
	Residual	64.278	284	.226		
	Total	65.561	285			

a. Predictors: (Constant), NSPRI Postharvest activity
b. Dependent Variable: price volatility of Maize

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.089	.111		36.942	.000
	NSPRI Postharvest activity	.069	.029	.140	2.381	.018

a. Dependent Variable: price volatility of Maize

A simple regression was calculated predicting subjects' price volatility of Maize based on NSPRI Postharvest activity. A significant regression equation was found ($F(1,284) = 5.667$, $p > .000$), with R^2 of 0.020 which implies that only a maximum 2% of the variation in price volatility of Maize could be explained by NSPRI Postharvest activity. Subjects predicted 'price volatility of Maize' equal to 4.089 + 0.069 of 'NSPRI Postharvest activity'. Subjects' average 'price volatility of Maize' increased .069 for an increase in 'NSPRI Postharvest activity'. This confirms that there is positive relationship between 'NSPRI Postharvest activity' and price volatility of Maize. The result establishes that NSPRI Postharvest activity has significant impact on price volatility of Maize in Lagos market.

V. CONCLUSION AND RECOMMENDATIONS

The result of data analysis led to realization that there is a strong, positive correlation between NSPRI Product Preservation and Price volatility of Maize in Lagos market and that NSPRI product preservation has significant impact on price volatility of Maize in Lagos market. There is a positive correlation between NSPRI product safety recommendation and price volatility of Maize. It can be therefore, concluded that NSPRI product safety recommendation has significant impact on price volatility of Maize in Lagos. Analysis data further led to the confirmation that there is a strong positive correlation between NSPRI Postharvest activity and price volatility of maize which was statistically significant. The result confirms that NSPRI postharvest activity has significant impact on price volatility of Maize in Lagos market. Further, the study concludes that both high prices and low prices of maize result in supply and demand adjustments if markets operate normally. The study found that the maize price level and volatility prevailing in Mile 12 market are very much correlated with the NSPRI product safety cost. It becomes imperative that adoption of NSPRI safety recommendation would have positive impact on maize availability across season and therefore reduce price volatility of maize.

Based on the result of this study, we recommend that proper processing operation must be done by NSPRI & maize dealers in Lagos and across the country, since it was found that negligence of safety recommendation results in postharvest loss and increase in price volatility of maize; the institute (NSPRI) should focus on the measures of promoting appropriate preservation technologies like Silo storage, sack, Rhombus, improve crib, ware houses as against the traditional techniques of Hanging, Storage in pots, gourd, calabash, pit, among others in the rural areas in order to reduce product losses and control maize price volatility; NSPRI must intensify efforts in improving maize quality and production since it was found that quality of NSPRI preserved food has significant impact on pricing of maize in the market. NSPRI & maize Intermediaries should instill adequate postharvest treatments to preserve perishable food product to meet consumer demands for constant availability and good quality supply throughout the year, thereby boosting food seasonality and controlling price volatility of maize in the market.

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