Case study

ANALYSIS OF DETERMINANTS OF DEMAND FOR RICE IN SOKOTO NORTH LOCAL GOVERNMENT AREA, SOKOTO STATE

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ABSTRACT

The research work analysed the determinants of demand for rice in Sokoto North Local government Area of Sokoto state, Nigeria. Primary data were sourced using quota sampling technique to select 120 respondents from the study area with the aid of questionnaires. Statistical Package for Social Sciences (SPSS) was used to analyse the data. The use of tables, percentages and frequency counts form parts of the descriptive statistics while the inferential statistics include ordinary least square (OLS) multiple regression analysis. The results of regression have shown price of rice, household size and income of household to be statistically significant at 1%, 5% and 1% level respectively. The prices of substitute commodities were not significant. The demand for rice was found to be price inelastic; the income elasticity was positive and elastic, making rice a normal good. However, cross price elasticity with substitute commodities were not significant. Income of household being elastic affected the demand for rice in the area than price of rice. The study concluded that the statistically significant variables were responsible for the demand for rice in the study area. It finally recommended domestic production and milling of rice and value addition be encouraged with a view to discouraging importation of rice, saving foreign exchange and improving consumers' real income among others.

Keywords: Demand, Determinants, Rice, Elasticity, Sokoto North

1. Introduction

The strategic position rice occupies among the staple foods has made major rice producing countries of the world including China and India to focus more on new rice varieties in order to guarantee Asia's food security and to support the economic development of the region. The rice producing countries of Africa such as Nigeria, Cameroon, Cote d'Ivoire, Gambia and Guinea are not left out in the quest to improve their rice production for the same purposes. However, the increase in the demand for rice during the past three decades has resulted in massive importation of rice by African countries because the quantity produced by these countries is not enough to meet local demands. (Oteng and Anna, 1996). Also, according to Food and Agricultural Organization (FAO, 2011), Nigeria has been assessed to have raised rice imports by 300,000 to 2.2 Million tons making it second largest importer of rice next to Philippines.

WARDA report of 2007 similarly, has shown that the country is among the 10 major rice importers in Africa, the country consumes 6.8 metric tons annually out of which it produces 4.2 metric tons. The per capita consumption of rice for Nigeria has rapidly increased from 5kg in the 1960s to 25kg in the 1990s and presently, its per capita is 30kg. The gap of 2.6 metric tons of rice is imported yearly which is more than one third of total consumption (Odularu, 2010).

Rice has become a strategic commodity in majority of African countries and it constitutes a major diet and a source of energy for the teaming population. It has witnessed consistent increase in demand for the past three decades and its importance evident in the strategic food security

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planning policies of many African countries. This has the potential of further complicating the food security situation in Sub-Saharan Africa. The measures taken by many African countries include adoption of new and improved varieties through area expansion and extension so as to increase their production capacities (WARDA, 2007). Rice consumption has outweighed it production globally, resulting to high demand and leading to high prices of rice in the world market. It is against this background that the study attempts to empirically analyse the determinants of Demand for rice in Sokoto North Local Government Area of Sokoto State.

1.1 *Objective of the Study*

The major objective of the study is to find out the factors that affect demand for rice in Sokoto North Local Government Area of Sokoto state. Its specific objectives are:

1. To establish the effect of change in price of rice on its demand in the study area.

2. To investigate the effect of change in household income on the demand for rice in Sokoto North.

3. To determine the effect of household size on the demand for rice in the area.

4. To find out the effect of change in the prices of substitute commodities on the demand for rice in the area.

2. Review of Literatures

2.1 *Description of Rice*

Rice belongs to the class called cereal and the family *poaceae*. It botanical name is *Oryza* and the common types are *Oryza sativa* and *Oryza glaberrima* (Kassali, Kareem, Oluwasola and

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Ohegbulm 2010). According to Ephraim, Frank, Samson and Timothy (2020), Rice is an energy giving food and contains nutrients such as vitamins, minerals and secondary metabolites. The dietary minerals contained in rice are Calcium (Ca), Iron (Fe), Magnesium (Mg), Phosphorus (P), Potassium (K), Manganese (Mn) and Selenium (Se) (Bagirathy in Ephraim, Frank, Samson and Timothy 2020) Rice can also be classified into two types according to water requirements. These are the upland rice which does not need much water and can thrive well on hillsides and on fields and the wet land rice which is the major rice cultivated in the world and it requires much water to survive up to about 1200mm to 1600mm evenly distributed throughout it growing period (Ekeleme, Kamara, Omoigu, Tegbaara, Mshelia and Onyibe 2008). This amount of rainfall is not obtainable in some parts of Nigeria. So rice is grown in areas where rainfall is limited through irrigation practices, flooded areas, fadama and valleys.

Rice can be grown in almost all types of soil and is planted from May to June in the savannah zone and April to May in the rain forest zone (Ekeleme *et al*, 2008). With the breakthrough in the development of new rice for Africa (NERICA), there are varieties of upland rice according to their maturity period available to farmers. These include faro 1, 40, 45, 54, 55 (NERICA 1) maturing from 90-100 days and 56 (NERICA 2), faro 48, 49 53 etc., maturing between 100 to 120 days while faro 25 is late maturing at 120 days and NERICA L41 and NERICA L42 for low land rice maturing between 110 to 120 days (www.warda.org).

However, two types of rice are considered in this study. The local rice after harvest is crudely processed and made available for consumption. The parboiling process is poor, contains odour due to slight fermentation, stone particles and mineral and vegetable contamination which gives it low quality (Bamidele, byomi and Esther 2010). The second is the imported rice, well

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parboiled and refined without odour, stone particles or any unwanted mineral deposits. It is processed outside the shore of Nigeria and imported into the country. Some of the varieties of imported rice are; Vikor, IRS Thai parboiled rice, Massi, Mama Africa, Peacock, Captain, PJS, Elephant, Crystal rice, Cap rice, Stallion rice, tomato to mention but a few.

2.2 *Profile of Rice Production in Nigeria and Role of Government*

Rice is a plant that is universally cultivated all over the world and Nigeria is not an exception. It is cultivated in virtually all agro-ecological zones of Nigeria i.e. the mangrove and swampy forest of the coast and the dry zone of the Sahel located in the North. The hectares of land used for rice production in the country have increased from mere 150,000 hectares in the 1960s to 1.8 million hectares in 2005 (UNEP, 2005). The rain fed lowland rice is predominant and it is cultivated by nearly 50% of the rice growing areas in Nigeria; 30% cultivate the rain fed upland rice; 16% cultivate the high yielding irrigated systems and the remaining 4% by other production systems (UNEP, 2005). In year 2000, out of about 25 million hectares of land cultivated for various food crops, 6.37% was used for rice farming. The average national yield during this period was 1.47 tons per hectare (Akpokodje, Fedric and Olaf 2001). Significant improvement in rice production in Nigeria was recorded in 1980 when output increased to 1 million tons while area cultivated and yield rose to 550 thousand hectares and 1.98 tons per hectare respectively. In 1990, while output for rice increased, the yield declined, suggesting extensive cultivation of the commodity (Akpokodje *et al*, 2001).

Rice production in Nigeria has increased by 93% per annum in the 1970s due to expansion in rice farmland up to 7.9% per annum but, to a lesser extent through yield increase of 1.4% per annum. However, the increased production was not sufficient to meet up with the increase

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demand and so importation was the option to cover the shortfall. Importation stood at 300,000 metric tons in 1995 and about 1,000,000 metric tons in 2001. These imports are procured on the world market and represent a substantial cash outlay for the Nigerian economy (Akande 2000).

With the expansion in rice production and the increase in growing areas, the yield was still very low which may be due to disease, poor seedlings and other factors. The government has promoted the adoption of hybrid rice that are disease resistant, high yielding, early maturing and high protein content. Nigeria being the highest rice producer in West Africa aims to boost rice production by making sure 3 million hectares is under cultivation by 2007. Despite all these measures the country still relies on massive importation of rice. It was anticipated that Nigeria will continue to import rice for some time due to the fact that it imports one-third of its total rice supply (Omotola and Ikechukwu, 2006). The potential land area for the production of rice according to recent report, was estimated at 4.6 t0 4.9 million hectares. Only 1.7 million hectares of the estimated land is presently used for rice production and 25% of the 1.7 million hectares is used for rain fed upland rice (Oikeh, Nwilene and Ogunbiade 2012).

Successive governments in Nigeria have over the years introduced various programs and projects with a view to boosting rice production in Nigeria. This was intended to addressing the increasing gaps between demand and supply so as to make the country more self-sufficient in rice. Some of these policy programs include the Federal Rice Research Station (FRRS) in 1970, National Accelerated Food Production Project (NAFPP) in 1972, and National Cereal Research Institute (NCRI) in 1974. Also established were the National Seed Service (NSS) with the assistance of the Food and Agricultural Organisation (FAO) in 1975 and Operation Feed the Nation (OFN) in 1976. Other important government programmes like River Basin Development

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Authority (RDBA), Agricultural Development Project (ADP), the National Grains Production Programmes (NGPP), the Structural Adjustment Programmes (SAP) and the presidential initiative on Increase Rice Production, Processing and Export (Bamidele *et al*, 2010). Despite all these policies, programs and projects rice consumption and its demand in the country have out grown its domestic production leading to persistent increase in the importation of the commodity. The persistent rise in demand for rice in Nigeria has been attributed to factors such as growth in income, urbanisation and the associated expansion of fast food restaurants (Kassali *et al*, 2010).

The Nigerian government came up with a policy which was intended to completely ban importation of rice in the country by 2015, but yet importation of the product rose to 3 million tones between 2012 to 2013 as revealed by the United State department for agriculture (Tarwase and Yuguda 2014). The major reason for this is that the projected increase in rice production was not met and so there was shortage of supply over demand for the product hence the need to import.

Despite the rice development programs like National Cereal Research institute (NCRI) in 1974, National Seed Service (NSS) in 1975, Operation Feed the Nation (OFN) in 976, the River Basin Development Authority (RBDA) in 1970 and Agricultural Development Project (ADP) in the 80s, the country could not meet up with its yearly rice consumption. In order to close the gap between supply and demand, there is the need to import to make for the shortfall in supply (Akpokoje, Lancon and Orlaf 2003).

2.3 *Concept of Demand*

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In ordinary sense, the word demand refers to 'claim or request, a desire to possess because of need'. In economic sense it means more than the desire for or need for, a commodity. A person may wish to have a yacht and may also have the money for the price but, unless the desire is strong enough to induce him to part with his money in exchange for the yacht, it does not constitute demand at the given price in economic sense''. A person may have great need for a new coat but the money he has at that particular time may not be enough to pay for the price. So he cannot make a demand for the coat. The individual can only effectively demand a commodity when his desire is backed with the ability and willingness to pay the price. For this reason demand becomes 'the quantity of a commodity purchased or expected to be purchased'. When demand is to be defined, the price must be stated because demand will be different at different price level. The market in which the sales were made must be stated and finally, the time of the sales must be specified. Considering these three conditions, demand was defined as ''the amount of a commodity purchased at a given price, in a given market area over a stated period of time'' (Alfred, McArthur and Loveridge, 1975 P.93). This definition of demand is in extreme and is differentiated from others with the third condition. In fact, most of the definitions of demand today do not consider market or place of transaction as important. The same commodity you buy in Sokoto at a given price sells at different prices in other parts of Nigeria. So it is a very important factor to consider when we explain the concept of demand.

You have wanted or demanded many things in life and everyone does. In economic term however, the concept of demand means more than simply wanting something. For demand, is ''the amount of a good or service that a consumer is willing and able to buy at various possible prices during a given time period''. Quantity demanded is a slightly different concept that describes the amount of a good or service that a consumer is willing and able to buy at each

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particular price during a given time period (Pennington, 1999, P.51). The definition of demand above contains two important conditions. First, the consumer must be willing and able to buy the good or service. In other words, the person must not only want the commodity but also have the means to pay for it. The second condition is the demand for the product must be examined for a specific time period.

Suppose one is ready to give up a lot of money for something, his demand for that thing is high. If on the other hand he is not ready to give up any money for something, then he has no demand for it. One cannot influence any society's choices through the market process just by wanting something, unless he is able and willing to spend some money to buy something, he wants won't have any effect. Demand is ''propensity to buy and it is an if…..then concept. It does not mean how much of it people are buying. It only means how much of it people would be buying if…. If what? If the price happened to be $5, $10, $30 etc. So demand in economics means the ability and willingness or the readiness to buy''. Demand thus is the functional relationship between price which might exist and various quantities people would buy (Bowden, 1986, P.6&63)

As noted earlier, demand does not mean the same thing as need or want. We are looking for the forces that determine price and the strength of the desire for something will not in itself have any influence on the price. Only when desire is supported by the ability and willingness to pay the price does it become an effective demand and have an influence in the market. Demand in economics means effective demand and may be defined as ''the quantity of the commodity which will be demanded at any given price over some given period of time'' (Stanlake and Grant, 1999, P.113).

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Demand may also be defined as the schedule or a curve that shows the various amounts of a product that the consumers are willing and able to purchase at each of a series of possible prices during a specified period of time. In order for demand to be meaningful, the quantity demanded at each price must be related to a specific period say a day, a week, a month or a year. It will not make sense to say a consumer will buy10 bottles of Coke at N60 per bottle. We rather say he/she will buy 10 bottles of Coke per week at N60 per bottle. Unless a specific time period is stated, we do not know whether the demand for the product is large or small (McConnel and Brue, 2002). One important thing mentioned in the definition is series of possible prices during a specified period. This means that the consumers have choice of different prices at a given time according to quality. You may need or want a Honda car that cost N1m but, because you don't have up to that amount, you may go for another Honda car that cost less.

People want lots of things, they demand much less than they want because demand means a willingness and ability to pay. Unless you are willing and able to pay for a commodity, you may want it, but you don't demand it. One may want a Ferrari but not demanding it. If you really want a Ferrari and willing to have it, you will mortgage everything; increase your work hour to have money for it. So if you want to make your demand for a commodity an effective one, you should be able to show determination and ability to pay (Colander, 2006).

How many six pack of Pepsi will people buy each month if the price is N3? What if the price is N2? What if it is N4? The answers reveal the relationship between the price of Pepsi and the quantity purchased. Such a relationship is called the demand for Pepsi. Demand indicates how much of a good consumers are both willing and able to buy at each possible price during a given period, other things remaining constant. Because demand pertains to a specific period say a day,

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a week or a month, think of demand as the planned rate of purchase per period at each possible price. Emphasis is made on willingness and ability to pay because you may be able to buy a new Harley-Davidson for N5, 000 because you can afford one, but you may not be willing to buy one if Motorcycle does not interest you (McEachen, 2006). McEachen talked of planned rate of purchase. Individual consumer plans for what to buy by preparing a scale of preference and allocate his resources according to his income before coming to the market.

‘‘Demand is also viewed as the desire to consume at certain price, not needs or wants that can be measured in some social or biological ways’’. This definition explains that the concept of needs is reserved for policy makers and political decision making. In addition, for these needs and wants to be demands, they must be viewed as what people actually will do when confronted with different sets of prices. Needs and wants are just wishes and dreams but, demand is about planned expenditure backed up by purchasing power (Amacher and Ulbrich, 1986, P.46).

Demand is defined as the quantity of a good buyers which to purchase at each conceivable price. Demand is not just a particular quantity, such as six bars of chocolate but rather a full description of the quantity of chocolate the buyer would purchase at each and every price which might be charged (Begg, Fischer and Dornbusch, 2000). For demand to be made the buyers must be wishing or willing to make a purchase and with full description of the quantity they want at the prevailing market price and doing that they must ensure that the quantities are in good condition and in compliance with their descriptions before payment.

Demand thus expresses a desire as well as the ability to pay for goods and services. Demand is neither in itself a physical need nor desire; rather it is the willingness to trade things of value as goods, money and labour for variable amounts of goods and services. The degree of variation in

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the demand for goods and services is determined by price and that lead us to the law of demand. The higher the price of a commodity, the lower the demand and the lower the price, the higher the demand. It also refers to the quantity of a product desired by buyers. The quantity demanded thus, is the amount of the commodity consumers are willing to buy at certain price. The relationship between the quantity demanded and the price is called the demand relationship.

Theory of demand is meant to determine the various factors affecting demand. The main assumption is that the market demand is having negative relationship with price and so, price is seen as the determinant of demand for commodities. Determinant is a multivariate relationship which is determined by many factors at the same time. Some of the factors that affect the demand for a particular product are its own price, consumers' income, price of other commodities, consumers' tastes, income distribution, total population, consumer's wealth, credit availability, government policy, past levels of demand, and past levels of income. But the traditional theory of demand chose to concentrate on four of the determinants of demand, the price of the commodity, other prices, income and taste (Koutsoyiannis, 1983)

The Neo-classical demand analysis explained demand in terms of utility, that is the satisfying power of a commodity. A commodity may be frivolous, injurious or even pernicious, but if it satisfies economic want it possesses utility (Jhigan, 2008). This is based on taste and satisfaction, that is the consumers are interested in buying a commodity if they are comfortable with the taste and derive satisfaction from its consumption.

Demand therefore can be described as a relationship between two variables, price and quantity demanded holding all other factors that affect demand constant. The ordinary demand function of a consumer, also sometimes known as the Marshallian demand function, is the quantity of a

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commodity that he/she will buy as a function of commodity prices and his/her income. This demand function is derived from the analysis of utility maximization (Henderson and Quandt, 2007). The definition is based on willingness to make a purchase and also on utility of the product. The consumers must be willing to buy at the prevailing price and putting into consideration the satisfaction they will get from consuming the commodity. The demand function thus included the commodity price, price of other goods, the income of the consumer and household size holding other factors affecting demand constant

Demand is a phenomenon that is attached to everyday activities of human race. It is a concept that describes the possession of that part of human desires, needs or wants at a particular point in time and has to do with the willingness and ability of the person making this decision. There are various views on the definition of demand by different authors even though similar in most cases. 'The quantity demanded of any good or service is the amount that the consumer plans to buy during a given time period at a particular price' (Michael, 1989. P.69). Michael further explains that the quantity demanded may not necessarily be the same as the actual quantity bought because sometimes the amount demanded is greater than the amount available. In this case, the quantity bought is less than the quantity demanded. The quantity demanded is the amount per unit of time. Demand thus refers to the entire relationship between the quantity demanded and the price of a good and it is illustrated by the demand curve and schedule.

2.4 *Theoretical Framework and Determinants of Demand*

The idea of this research is hinged on the theory of consumer behaviour analyses. It explains how a consumer tends to make his budget considering the limited money income and how he can allocate this income among available goods and services in order to maximize his/her

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satisfaction. This study will enable us to know how consumer demand responds to income with respect to rice. According to the neoclassical economic theory of consumer behaviour, consumer is faced with market determined prices of various commodities and the consumer having only a known and fixed income, it is the price that helps the consumer to allocate his/her resources to the various goods and services.

Based on the neoclassical theory, the quantity of a commodity that a consumer will buy depends on the price of the commodity and the income of the consumer. The demand for commodities by consumers is never constant. It changes with time due to a number of factors. It either increases or decreases based on the nature of changes in the factors affecting it. When we talk of determinants of demand, we mean the factors affecting demand. The major determinants of demand as viewed by most authors in economics are; real income, population, taste, role of government and the role of producer (Livesey, 1977).

A change in demand signifies a change in one or more of the factors (other than the price of the product) which determine demand. These other factors include; disposable real income, pattern of distribution of income, price of other goods, taste and fashion, advertising, availability of credit and population (Stanlake and Grant, 1999). According to Livesey (1977) government can change the pattern of demand for certain goods and services. The government may act as consumer in the market by purchasing certain goods to resell at a later time. During this waiting time period, it may raise money through taxation thereby affecting the pattern of private demand. He also considers the role of the producers as one of the factor determining demand. When new substitute products are introduced and the prices are less, it will reduce the demand for the existing products.

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The idea was extended to complementary goods, introduction of new production processes and impact of international trade. When goods are imported into the country, because of peoples belief that product from overseas are authentic, attention are being directed toward foreign goods. This will reduce the demand for the locally made product. This is exactly what is happening in the rice industry in Nigeria today. Another idea of the determinants of demand is that apart from product own price factors such as population, income, people taste and expectation about future price or income tend to influence demand. When people suspect a future rise in price of a commodity, they buy more of the product.

The role of government as emphasized by Livesey (1977) is very important in the analysis of the determinants of demand for rice in Nigeria. The Nigerian government during famine may order for importation of major food items like rice and others. It might also decide to ban importation at any other time when it considers the negative effects. The activities of government influence demand in both ways. What needs to be done is to take pre-emptive as well as proactive measures rather than when the situation is around the corner.

3.0 Research Methods

3.1 *Area of Study*

The study was conducted in Sokoto North Local Government area of Sokoto state. It is located between latitude 13^0 to 3^0 N and longitude 5^0 to 14^0 E with a land mass of 51 square kilometres and a population of 233,012 (2006 census figures). It belongs to the Sudan savannah zone with a dry land and climate dominated by harmattan wind blowing Sahara dust over the land. Its annual average temperature is 28.3^0 C and its highest recorded temperature is 47.2^0 C which is the

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highest in Nigeria. The soil is sandy at the top and clayey below and it is alluvial at the flood plain with rainfall between 500mm and 1300mm (Sokoto North Local Government 2011).

The major agricultural produce of the local government are millet, rice, maize, beans and groundnut. Others are onion, garlic, carrot and vegetables such as spinach, lettuce and pepper. Majority of the farm produce are cultivated in the flood plain which retains water for reasonable period of time during the dry season.

The history of Sokoto North dated back to 1908 when Sultan Muhammadu Bello established the ancient city of Sakwato, named it the administrative capital of the Sokoto caliphate. In 1973 Sokoto became the capital of the defunct North Western state. It also served as the headquarters of the then Sokoto native authority. The former Sokoto state was created in 1975 by Murtala administration with Sokoto town as the capital. The state retained its status after the creation of Kebbi and Zamfara states out of the former Sokoto state (Sokoto North Local Government, 2011).

Sokoto local government was also created by the Murtala's administration in 1976, as one of the pioneering local governments in the federation. Formally, it comprised of Kware and Wamako local governments, which were later carved out of the Sokoto local government. After Sokoto south was created in 1996 out of what remained as Sokoto local government by the Abacha's government, it was renamed to what is now called Sokoto North Local Government. The local government is located at the centre of Sokoto state mapping and shares border with Kware local government (North east), Sokoto south (South) and Wamako in the west (Sokoto North Local Government, 2011).

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The major tribes of the area are Hausa and Fulani. There are other Nigerian tribes that are residents in the local government including foreign nationals residing in the eleven wards of the area. Islam is the major religion, with Hausa language as widely spoken. The major occupations of the people of the area include Trading, Farming, Labour services and crafts. The cultural practices in the area are peaceful coexistence, hospitality, respect for elders, observation of some of the predominant religions and social-cultural ceremonies e.g. marriage/naming ceremonies and annual Sallah festivities (Sokoto North Local Government, 2011)

Historical monuments found in the local government include among others, the Sultan palace, Hubbaren Shehu (Shehu's thumb), Usmanu Danfodiyo and Sultan Bello Mosques. The people of Sokoto north local government take pride in their contribution to the peaceful coexistence, historical and political development of Nigeria (Sokoto North Local Government, 2011).

3.2 *Sampling*

A total of 120 respondents were selected from the survey conducted between October and December 2012 with the use of questionnaires. These respondents fall into different category of income group namely; the low income, middle income and the high income group. The study area was divided into twelve sub areas. These areas are Kofa Taramniya, Kofa Rini, Kanwuri area, Kofa Marke, Gida Dawa area, Kofa Kware, Gida Haki area, Makera Asada area, Kofa Dundaye, Kofa Kade, Runji Sambo area and Gidan Dare area. Quota sampling technique was used to allocate 10 respondents to each area.

3.3 *Analytical Techniques*

Tables, percentages and frequency counts were used to analyse data while ordinary least square multiple regression was use to run the data. The multiple regression model was used to ascertain

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the magnitude of the impact of the independent variables (price of rice, household income, household size and prices of substitutes) on the dependent variable (demand for rice). The regression model applied to the analysis of data was adopted from Kassali et al and it is given in its implicit form as:

$Y = f(X_1, X_2, X_3, X_4, X_5, U_t)$ ---------- (1)

Where Y= the demand for rice or the quantity of rice bought per month.

X_1 = the average monthly price of rice (Naira/kg).

X_2 = the monthly income of respondents (Naira)

X_3 = the size of household.

X_4 = Monthly price of Beans (Naira/kg)

X_5 = Monthly price of Spaghetti (Naira/kg)

U_t = the error term.

The explicit double or log-linear model made possible the estimation of the model parameters as well as the elasticity of demand for rice with respect to the explanatory variables. It is given as:

$\ln Y = b_o + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5$ ---------- (2)

b_1, b_2, b_3, b_4 and b_5 are the parameters of the model. They measure the effect of the changes in the independent variables on Y (demand for rice). They also represent the partial elasticity of Y (demand for rice) with respect to the independent variables.

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3.4 *Priori Expectation*

Previous knowledge of the laws of demand has shown the nature of the relationships between demand for a particular commodity and the factors affecting it. It is expected that a negative relationship exist between rice own price and its demand. i.e. as the price of rice increases the quantity demanded decreases. Both household income and household size are expected to be positively related to demand for rice. As both variables increases, demand for rice should also increase especially for income if rice is a normal good. A positive relationship is expected to exist between price of rice and prices of other goods particularly substitute commodities. As the price of substitute goods rise, demand for rice should rise too.

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4.0 Results and Discussion

4.1 *Analysis of Determinants of Demand for Rice*

Table 1: ***Summary of Regression Results-Testing for the Determinants of Demand for Rice***

Independent Variable	Coefficient	T-value
Constant	6.540***	7.075
	(0.924)	
Price of rice	-0.911***	-5.194
	(0.175)	
Household Income	0.143**	2.412
	(0.059)	
Household Size	0.619***	9.722
	(0.064)	
Price of Beans	0.011	0.489
	(0.022)	
Price of Spaghetti	-0.006	-0.305
	(0.019)	

$R^2 = 0.607$; $F = 35.226$***

*: Significant at 10%, **: Significant at 5%, ***: Significant at 1%

The figures in parentheses are the Standard Errors.

Source: Data Analysis, December, 2012.

Table 1. shows the summary of Ordinary Least Square (OLS) regression result. The coefficient of determination $R^2 = 0.607$, implying that about 61% of the variations in the dependent variable (Demand for rice) is explained by the explanatory variables (price of rice, household income and

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size and price of substitutes like beans and spaghetti). The F-statistic was found to be 35.226 and it is statistically significant at 1% level, which is an indication that the model is adequate.

From Table 1, it can be seen that the coefficient of price of rice is significantly at 1%, though negative indicating that the lower the price of rice the higher its demand and vice versa. There is a positive relationship between the coefficient of income of households and the demand for rice, implying that as income increases, so is the demand for rice. The estimated value of the coefficient of income is significant at 5% level.

Household size as seen from table 1 is positively related to the demand for rice indicating that as the household's size increases the demand for rice increases. The value of the coefficient of household size is significant at 1%. This leads us to conclude that household's size positively affect the demand for rice. This justifies the positive relationship that exists between population and the demand for a commodity.

Finally, table 1 shows that the price of beans as one of the substitutes though, positive but not significant is an indication that it has no significant influence on the dependent variable (Demand for rice). The same thing goes for the price of spaghetti, only that a negative relationship exists between the price of spaghetti and the demand for rice. The price of spaghetti is also not significant in influencing the demand for rice in the area.

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4.1.1 Analysis of Elasticity of Demand for Rice

Table 2: ***Price, Income and Cross Elasticity of Demand for Rice***

Type of Elasticity	Elasticity

Price Elasticity	-0.911
Income Elasticity	0.143
Cross-Price Elasticity with Beans	0.011
Cross-Price Elasticity with Spaghetti	-0.060

Source: Data Analysis, December, 2012.

From table 2, the price elasticity for rice is (-0.911) negative but less than 1 in absolute term. This means that the demand for rice in the study area is price inelastic, signifying that the demand for rice in the area respond less to change in price. The people will not forego the consumption of rice even if the price increases. The negative relationship means that as price increases, the demand for rice will fall less than proportionately the rise in price and people in the area will shift little of their demand for rice to substitute goods and vice versa. The income elasticity is (0.143) positive but less than 1. The positive relationship implies that as income of the respondents increases so their demands for rice. This led us to conclude that rice is a normal good.

The cross-price elasticity with beans is (0.011) positive but less than 1. This makes it a true substitute for rice since its price is positively (though, not significant) related to the demand for rice. As it price increases the demand for rice also rises. The cross-price elasticity of demand for spaghetti is (-0.060) negative but less than 1 in absolute term though, not significant. It is not a true substitute for rice because, as its price increases the demand for rice decreases as connoted by the negative sign.

4.2 *Conclusion*

From the foregoing inferential results, the following conclusions are drawn for the study:

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That rice owns price is one of those factors that determine the demand for rice in the area but in the negative direction. In other words there is a negative relationship between the price of rice and its demand. The income of households has significant and considerable influence on the demand for rice. There is a positive relationship between income of households and the demand for rice. Hence, we conclude that income of households contributes to determining the demand for rice in the study area.

Household size was also found to be significant and positively related to the demand for rice. Since it has significant influence on the demand for rice, we conclude that it is among those variables that determine the demand for rice in the area. The price of beans was found to be positively related to the demand for rice but not significant. This means that it has no influence on the demand for rice. Conclusively, we say that the relationship between the price of beans and the demand for rice is not a genuine one and so, it does not influence the demand for rice in the area. The last variable being the price of spaghetti is negatively related to the demand for rice but not statistically significant which implies that it has no influence on the demand for rice.

The price elasticity of demand for rice in the area was found to be inelastic and rice regarded as normal good due to the positive relationship between income and the demand for rice. The cross-price elasticity with beans was positive which makes it a true substitute to rice though, not significant. The cross-price elasticity with spaghetti was negative; we concluded that spaghetti is not a true substitute to rice

From descriptive statistics one could see that the less educated (7.5%) are those that fall in the low income group that made the choices of local rice. This research recommends the government to establish a local rice production and milling plant to process and improve the quality of the

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vast locally cultivated rice in the area. This measure will create employment; generate income and wealth and sufficient and quality rice for the people of the area. On a large scale, it would generate revenue for the government, reduces importation and resultant balance of payment.

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