



## **ANALYSIS OF DETERMINANTS OF DEMAND AND SUPPLY OF MAIZE IN ANIOCHA NORTH LOCAL GOVERNMENT AREA, DELTA STATE, NIGERIA**

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### **ABSTRACT**

*This study on the analysis of determinants of demand and supply of maize was conducted in Aniocha North Local Government Area, Delta State with particular emphasis on some selected villages in the Local Government. The study covered forty maize producers randomly selected from eight villages from randomly selected two clans in the study area. Frequencies, means percentages and chi-square statistics were employed in the determining the data obtained. Chi-square statistics was used to ascertain whether socio-economic factors are significant determinants of demand and supply of maize in the study area. The result shows that the value of Chi-square calculated (2.45) < chi-square critical value (14.1) at five percent level of significance with degree of freedom of seven as was conducted. This implies that socio-economic characteristics were not significant determinants of demand and supply of maize. The result agrees with the null hypothesis which says that socio-economic characteristics are not significant determinants of demand and supply of maize in the study area. Hence it was accepted.*

**Keywords:** Maize, Demand, Supply, Output, Input, Cost, Income and household

### **Contribution/ Originality**

The study is one of the very few studies which have investigated the determinate of demand and supply of maize in Aniocha South Local Government Area, Delta State, Nigeria.

## **1. INTRODUCTION**

Maize has been a diet for Nigerians for centuries. It started as a subsistence crop and has gradually become more important crop. Maize has now risen to a commercial crop on which many agro-based industries depend on as raw material. The first attempt at Agricultural Research in Nigeria was made in 1899 (Fakorede *et al.*, 1998). Initial Agricultural work in Nigeria was directed at promoting the development of various cash crops including Cocoa, Oil Palm, Cotton and

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Groundnut, for export purposes. The advent of destructive rust diseases known as American rust incited by *Puccinia polysora* which entered West African Countries in 1950, called attention to the importance of maize as Food Crop (Iken and Amusa, 2004).

Maize is mainly utilized for human consumption and form about fifty to seventy percent of the constituents of livestock feed. Nigeria produced one million tons in 1975 and an appreciated quantity is imported annually to supplement the local production. Maize is a staple food and is sometimes grown on a garden scale where it cannot be grown as farm crop (Anyanwu *et al.*, 1979). Maize is an important source of Carbohydrate and if eaten in the mature stage, it provides useful quantities of Vitamin C and the Yellow grain varieties have Vitamin A. It is a source of income and its leaves and stalks contain about thirty percent of the total nutrients in maize plants; hence, it is utilized for pasture. Some maize are cut and fed green to livestock.

### 1.1. Concepts of Demand and Supply

The concepts of demand and supply together make a market. Both concepts must unite in order to provide an adequate explanation of how prices are determined in the perfect competitive market.

Demand is the relation showing the various amounts of a commodity that buyers would be willing and able to buy at alternative price during a specified period of time while all other factors are kept constant. Supply on the other hand is the quantity of commodity that sellers would be willing and able to produce for sale at alternative prices during a specified period of time all other factors are kept constant.

### 1.2. Derivation of Demand of Consumer

The derivation of the demand is based on the axiom of diminishing marginal utility. The marginal utility of commodity X may be depicted by a line with a negative slope:

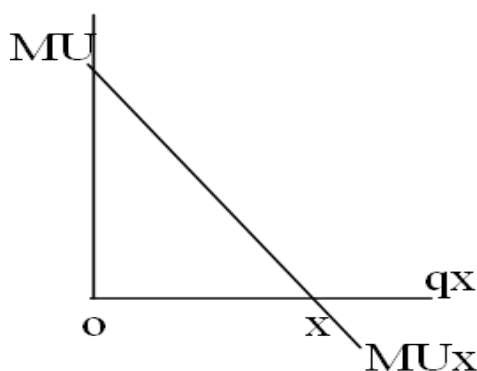


Fig-1.

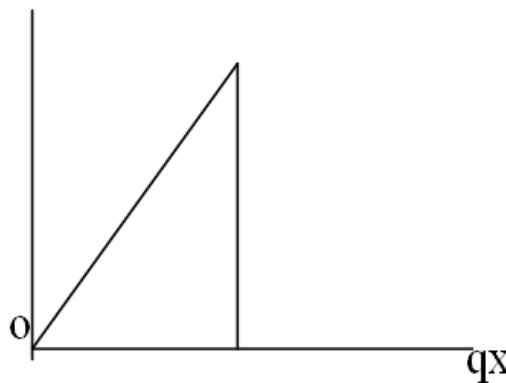


Fig-2.

Geometrically the marginal utility of x is the slope of the total utility function  $U = f(qx)$ . The total utility increases but at a decreasing rate, up to quantity x and then start declining as shown in Fig 2 above. According to the marginal utility of x declines continuously, and becomes negative

beyond quantity  $x$ . if the marginal utility is measured in monetary unit, the demand curve for  $x$  is identical to the positive segment of the marginal utility curve. At  $x$ , the marginal utility is  $MU$ , (figure 3) this is equal to  $P_1$ .

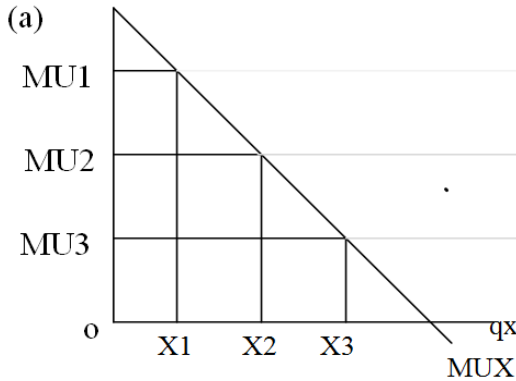


Fig-3.

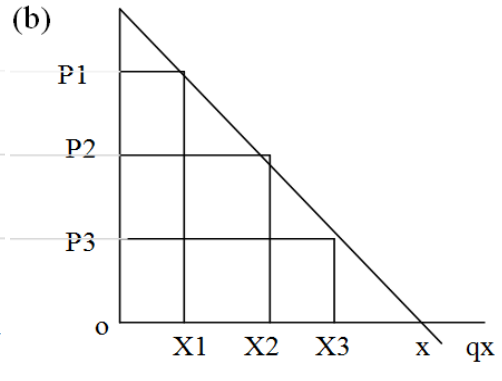


Fig-4.

Hence at  $P_1$  the consumer demands  $X_1$  quantity is  $MU_2$ , which is equal to  $P_2$ . Hence at  $P_2$  the consumer will buy  $X_2$ , and so on. The negative section of the MU curve does not form part of the demand curve, since negative quantities do not make sense in the subject of economics [Koutsoyiannis \(1979\)](#), [Arene \(2008\)](#). The law of demand states that quantity of commodity demanded varies inversely with its price, assuming that other factors that may affect demand remains constant. The most important factors to be considered in demand function are the consumer's income and the price of other related commodities. The term "inversely" means "opposite direction" that is, when price increases, quantity demanded decreases, ceteris paribus.

In the indifferent curve theory, the law of demand is derived from what is known as Slutsky's theorem, which states that the substitution effect of a price change is always negative (relative to the price) if the price increases, the quantity demanded decreases and vice versa. We said earlier that a fall in the price of  $X$  from  $P_1$  to  $P_2$  result to an increase in the quantity demand from  $X_1$  to  $X_2$ . This is the total price effect which may be split into two separate effects: a substitution effect and income effect. The substitution effect is the increase falls, after adjusting income so as to keep the real purchasing power of the consumer the same as before. This adjustment in income is called compensating variation and is shown graphically by a parallel shift of the new budget line until it becomes tangent to the initial indifference curve (Fig 5).

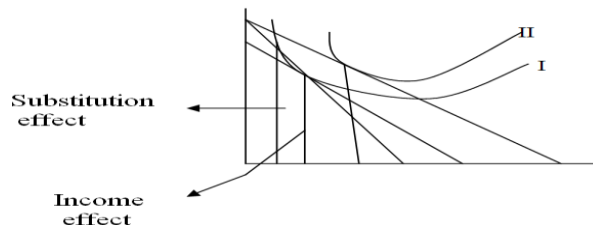


Fig.5

The purpose of the compensating variation is to allow the consumer to remain on the same level of satisfaction as before the change in price occurs (Arene, 2008).

The law of supply states that the quantity of commodity supplied is directly related to its prices, assuming other factors remains constant. It simply means that when prices increases, supply equally increases. According to Spencer in his work – contemporary economics, he stated that a market exist whenever one or more buyers and sellers come together to negotiate for the goods and services and thereby participate in determining their prices. A market can therefore be said to be anywhere on the street corner, on the other side of the world. The market is perfectly competitive in nature because it consist of large numbers of buyers and sellers, so that no one can influence the market price by deciding whether to buy or not and to sell or not to sell.

## 2. METHODOLOGY

The study was conducted in Aniocha North Local Government Area, Delta State, Nigeria. Issele-Uku is the headquarter of the Local Government Area. It has an area of 406 Kilometer Square. The Local Government is subdivided into three Clans which include;

Ezechima, Idumuje and Odiani, corresponding to the fourteen political wards in the Local Government. The communities are: Idumuogo, Ogodor, Ubulubu, Ugboba, Ugbodu, and Ukwu-Nzu for Odiani; Ezi, Issele-Azagba, Issele-Mkpitime, Issele-Uku, Obior, Onicha-Olona, Onicha-Ugbo, Onicha-Uku for Ezechima; Aniofu, Idumuje-Ugboko, and Idumuje-Unor for Idumujes. Each of these communities is engaged in one form of Agriculture or the other. However, the inhabitants of the study area are predominantly farmers who engaged in food crops and backyard Poultry Production as their source of livelihood.

The Local Government is richly endowed with fertile Agricultural land suitable for the growth of various tropical crops and good fodder for domestic animals. Major crops grown by the inhabitants of the study area include: Oil Palm, Rubber, Yam, Maize, Cassava. Others are Mango, Cocoa, Egusi (Melon), Groundnuts, and various vegetables. Pig, Sheep, Goats, Poultry, constitute the major important livestock enterprises (Kaine, 2011). The study area has vast and rich Forestry products which include: Swam, Timber, Bamboo. The Local Government is characterized by low altitude, noticeable hills in some areas. The Coaster belt in the Local Government interlocked with rivulets and streams that formed the Niger Delta. The study area has a tropical climate marked by two distinct seasons: the dry and rainy season. The dry season occurs between November and April while the Rainy season begins in April and lasts till October. There is usually a brief dry spell in August, which is commonly known as August break. From December to February the dry harmattan wind blows over the area. Annual rainfall range in the study area is between 2000mm to 2500mm. Rainfall is usually heaviest in July. The area has a high temperature of 30<sup>0</sup>C (80<sup>0</sup>F). The map of the study area is represented in Fig 6. The soil types are mainly deeply weathered and nutrient deficient, being derived from unconsolidated sediments of sandstones. They are predominantly sandy in nature. Consequently the soil are loose and poorly aggregated as they contain very low level of clay and organic matter contents in the seaward part of the Local

Government where the clayey contents are high. The rainfall temperature and soil characteristics of the area are suitable for the production of maize (International Institute of Tropical Agriculture, 1982); (Onwuemene, 1982).

Multi-stage random sampling was used for this study. First involved the selection of clan. Two Clans out of three Clans in the study area were randomly selected.

The second involved selection of communities. Four communities were randomly selected from each of the two Clans given a total of eight Communities that were used for the study.

The third stage involved selection of respondents (farmers/consumers).

Five farmers/consumers were selected randomly from the list of farmers/consumers in each of the eight communities. A total sample size of forty respondents were interviewed and used for the study.

Primary and Secondary data were used to realize the objectives and to test the hypothesis. The primary source of the data consists of information obtained from the respondents. Secondary data were obtained from published and research documents such as books, academic Journals, bulletin, Periodicals, Conference papers, Seminar, Publications from Ministry of Agriculture and Natural Resources, Government Agencies and Internet.

For the effectiveness of primary data collection; four enumerators, who are able to communicate, read and write in English Language and the local dialects of the respective eight communities were trained and engaged. The enumerators were closely supervised by the researcher. In addition to the use of questionnaire, physical measurements of maize ears and preserved products as well as personal observation were also done. Oral interview was used to augment information sought by the questionnaire. Descriptive statistics such as percentages, frequencies, means, tables. Chi-square statistics were used to achieve objectives of the study.

### 2.1. Chi-Square Test ( $\chi^2$ )

Chi-square test is one of the most popular non-parametric test in statistics. It is also referred to as distribution free test statistic. The terms “distribution free” and non parametric are used to describe the test because unlike other test of hypotheses, it does not depends on some a prior assumptions about the parameters of the population/universe from which samples are drawn. It was developed by Karl Pearson in 1900 and usually denoted by  $X^2$ . It examines the size of the discrepancy between theoretically/expected and empirical/actual observations using the formula below:

$$X^2 = \sum_{i=1}^n \frac{(O-E)^2}{E}$$

Where:

- O = Observed/empirical frequency
- E = Expected/theoretical frequency
- n = Number of cells in the contingency table.

It enables us examine the quality or otherwise of more than two proportions. In order to analyze the determinants of demand and supply of maize in the study area, chi-square statistics was used.

### 3. RESULTS AND DISCUSSION

#### 3.1. Socio-Economic Characteristics of the Respondents

This study examined the socio economic characteristics of the respondents under the variables: ages, gender, marital status, level of education attend, and household size. Table 1 show that the mean age of the respondents was 47 years. The finding also reveals that 52.5 percent of the respondents were above 50 years of age. Forty percent of the respondents were within age bracket of 31-50years while the remaining 7.5 percent were within 21-30 age bracket. The mean age of 47 years revealed that respondents in the study area were relatively young. The mean age of 43 years reported by [Ike and Inoni \(2006\)](#) is however less than the observed mean age of 47 years in this study. The observed mean age of 43years is also less than the 52years age reported by [Ojo and Ajibefun \(2000\)](#), as the average age of food crops farmers in Oyo North of Oyo State. It is equally less than the 48years reported by [Ajibefun \(2002\)](#), as the mean age of cocoa-based Agro-Forestry farmers in Oyo State, Nigeria.

**Gender:** Majority of the respondents (90 percent) were males while the remaining ten percent of the respondents were females (Table 1).

**Marital Status:** A further investigation shows that majority of the respondents (92.5 percent) were married, 2.5 percent were single and five percent were either widow or widower. While none of the respondents are divorced. The analysis of the marital status of the respondents as shown in Table 1 implies that maize production and consumption in the study area is not for married people only.

**Level of Education Attend:** The average year of formal education for the respondents was 6 years. The analysis further reveals that fifty percent of the respondents had no formal education, twenty-five percent of the respondents did not go beyond Primary/JSS III, none of the respondents had Vocational Education while fifteen percent and ten percent attended secondary and tertiary institution respectively. Thus the literacy level of the respondents was relatively high as fifty percent of the respondents acquired formal education. The relevance of literacy level of farmers in agricultural production, productivity and production efficiency has been documented by [Onubuagu and Nnadozie \(2005\)](#). High level of education may likely impact positively on the demand and consumption of maize (Table 1).

**Household Size:** The average household size was 10. Percentage distribution shows that five percent of the respondents have family size of between 5 and 8, thirty percent of the respondents have family size of less than 4, while fifteen percent and fifty percent of the respondents have family size of 9 – 12 and more than 13 respectively. The study on household size was essential as it influences the supply and availability of unpaid labour services, especially where maize production is labour intensive. Similarly, the availability of family labour depends largely on the household

size and its age structure (Ojo and Ajibefun, 2000). Household size can have influence on the household expenditure on food, clothing and shelter. This means that respondents would have the need for external financing outside personal savings to cater for the household needs and other economic activities. On the other hand, a large household size is of great advantage in the provision of cheap labour force for maize production. Large household size can determine the type, nature and level of agricultural activities to be involved.

**Table-1.**Socio-Economic Characteristics of Respondents

Characteristics		Frequency	Percentage	Mean
Age (categories)	20 and below	0	0	
	21 -30	3	7.5	
	31 – 40	8	20	
	41 – 50	8	20	
	51 and above	21	52.5	
Total		40	100	47
Sex	Male	36	90	
	Female	4	10	
Total		40	100	
Marital Status	Single	1	2.5	
	Married	37	92.5	
	Divorced	0	0	
	Widow/Widower	2	5	
Total		40	100	
Education (Categories)	Non	20	50	
	Primary/JSS III	10	25	
	SSCE	6	15	
	Vocational Edu.	0	0	
	Tertiary	4	10	
Total		40	100	6
Household Size (Categories)	4 and below	12	30	
	5 – 8	2	5	
	9 – 12	6	15	
	13 and above	20	50	
Total		40	100	10

\* Multiple responses – some of the respondents indicated that they used more than one.

Source: Field Survey 2013

**Table-2.**Observed Value (0)

Does Socio-economic factors determine your demand and supply of maize?	1	2	3	4	5	6	7	8	9
	Ugbodu	Onicha-Uku	Issele-Uku	Onicha-Ugbo	Issele-Mkpitime	Idumu-Ogo	Ukwu-Nzu	Ugboba	Total
Yes	3	3	2	3	4	3	4	3	25
No	2	2	3	2	1	2	1	2	15
Total	5	5	5	5	5	5	5	5	40

$$\text{Yes} = \frac{25}{40} = 0.625$$

$$\text{No} = \frac{15}{40} = 0.375$$

**Table-3.**Calculated Expected Value

Socio-economic factors	1	2	3	4	5	6	7	8	9
	Ugbodu	Onicha-Uku	Issele-Uku	Onicha-Ugbo	Issele-Mkpitime	Idumu-Ogo	Ukwu-Nzu	Ugboba	Total
Yes	0.625(5) = 3.125	0.625(5) = 3.125	0.625(5) = 3.125	0.625(5) = 3.125	0.625(5) = 3.125	0.625(5) = 3.125	0.625(5) = 3.125	0.625(5) = 3.125	25
									<i>Continue</i>
No	0.375(5) = 1.875	0.375(5) = 1.875	0.375(5) = 1.875	0.375(5) = 1.875	0.375(5) = 1.875	0.375(5) = 1.875	0.375(5) = 1.875	0.375(5) = 1.875	15
Total	5	5	5	5	5	5	5	5	40

Source: Field Survey 2013

**Table-4.**Calculated Chi-Square Statistics Value

Row, Column	O	E	(O - e)	(O - e) <sup>2</sup>	(O - e) <sup>2</sup> /e
1,1	3	3.125	- 0.125	0.015625	0.005
1,2	3	3.125	- 0.125	0.015625	0.005
1,3	2	3.125	- 1.125	1.265625	0.405
1,4	3	3.125	- 0.125	0.015625	0.005
1,5	4	3.125	0.875	0.765625	0.245
1,6	3	3.125	- 0.125	0.015625	0.005
1,7	4	3.125	0.875	0.765625	0.245
1,8	3	3.125	- 0.125	0.015625	0.005
2,1	2	1.875	0.125	0.015625	0.008
2,2	2	1.875	0.125	0.015625	0.008
2,3	3	1.875	1.125	1.265625	0.675
2,4	2	1.875	0.125	0.015625	0.008
2,5	1	1.875	- 0.875	0.765625	0.408
2,6	2	1.875	0.125	0.015625	0.008
2,7	1	1.875	- 0.875	0.765625	0.408
2,8	2	1.875	0.125	0.015625	0.008
Total	40	40			2.451

$$\chi^2 = \sum \left( \frac{(O-e)^2}{e} \right) = 2.451$$

$$\chi^2 \text{ calculated} = 2.451$$

The degree of Freedom for the Chi-Square distribution is  $df = v = (h - 1)(k - 1)$

$$V = (2 - 1)(8 - 1)$$

$$Df = v = 7$$

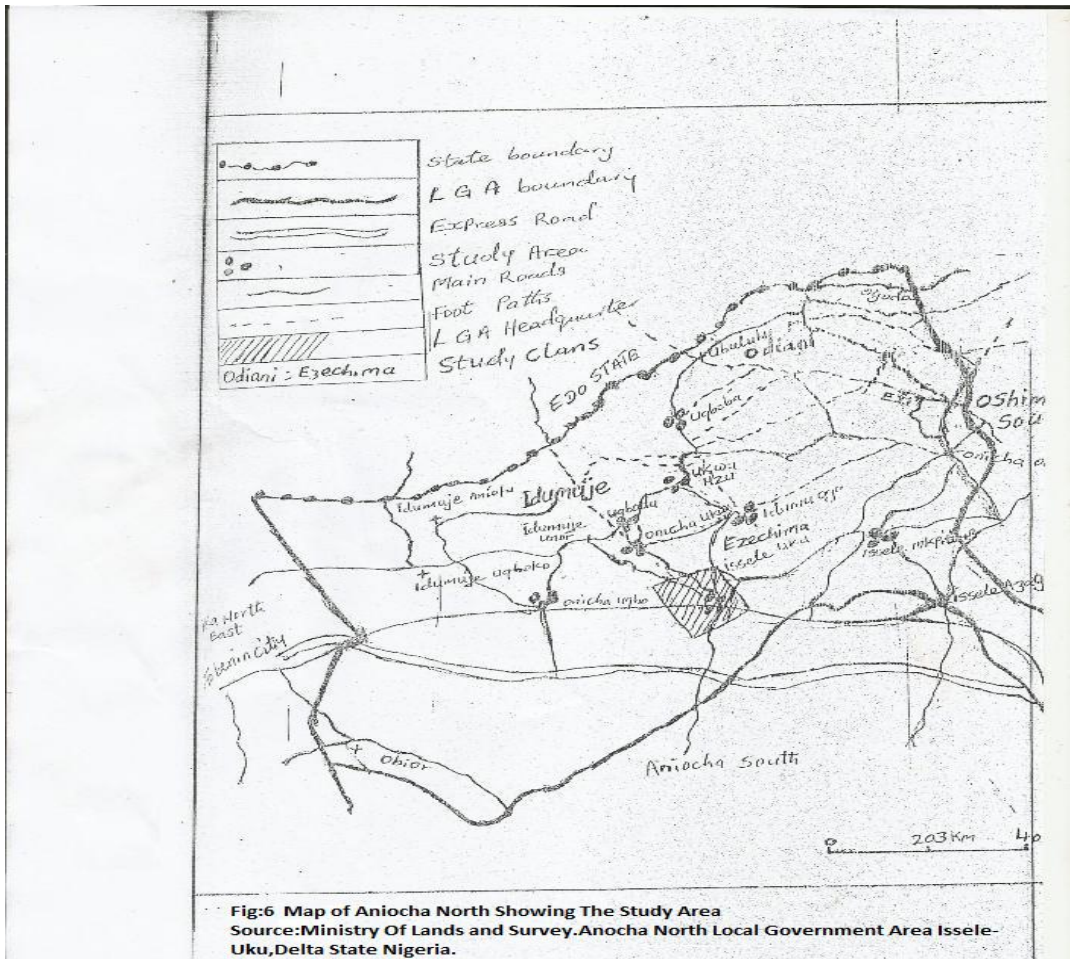
The main objective of Table 2, 3 and 4 was to ascertain whether or not the socio-economic factors are significant determinant of demand and supply of maize in the study area. Test of hypothesis at five percent level of significance with degree of freedom of seven was conducted.



The value of the computed chi-Square in Table 4 was 2.451 while the tabulated Chi-Square was 14.1 at five percent level of significance and degree of freedom 7. The analysis revealed that the computed chi-Square was less than the tabulated Chi-Square. This implies that socio-economic factors were not significant determinants of demand and supply of maize in the study area. This agrees with null hypothesis and hence, was accepted while the alternative hypothesis which states that socio-economic factors are significant determinants of demand and supply of maize in the study area was rejected.

#### 4. CONCLUSION

The analysis of the result shows that fifty five bags (2750kg) of maize were produced annually by each of the respondents and sold at #110,000.00. The result further shows that socio-economic characteristics were not significant determinants of demand and supply of maize in the study area. The null hypothesis was accepted while the alternative hypothesis was rejected in the study.



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