Journal of Community & Communication Research
ISSN: 2635-3318
Volume 8, Number 1, June 2023
Accessible at: https://jccr.sccdr.org

SOCIO-ECONOMIC FACTORS INFLUENCING MAIZE STORAGE SYSTEMS BY FARMERS IN IZZI LOCAL GOVERNMENT AREA OF EBONYI STATE NIGERIA

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ABSTRACT

This study analysed the socio-economic factors influencing maize storage by farmers in Izzi Local Government Area, Ebonyi State Nigeria. Multi-stage random sampling technique was used to select the sample size of 96 respondents. Frequency tables, mean scores, and multinomial regression analysis were used to describe and make inferences. The findings revealed that most (32.29%) of the maize farmers were within the age bracket of 30-39 years, and 54.17% of the maize farmers were males. The result on farmers' level of education showed that most of the farmers (39.58%) had secondary education, marital status was 68.75% married, membership to farm group showed that 55.21% did not belong to any group. The average farm experience of the farmers was 12 years, and the average household size was 5 persons. Most of the farmed chose fireplace for storage of maize. The result from multi-nominal regression showed that for the choice of maize storage, rooftop was inversely significant to socio economic variables. The study also confirmed that farmers still faced some challenges such as pest attacks, rodent infestation, inadequate finance. Agrochemicals, especially pesticides should be made more accessible by the government to farmers in the study area, to help reduce the incidence of pest attacks on their storage crops; government in partnership with private sectors should increase extension services to farmers on modern maize storage to decrease post-harvest losses.

Keywords: *Maize storage, Socio-economic factors, Izzi*

INTRODUCTION

Food grain storage is crucial to the economy of sub-Saharan Africa for marketing, consumption, and production. In order to satisfy the demand for a plentiful supply, the grains must be stored throughout the year and gradually released during off-season periods (Adesina *et al.,* 2020). Maize is a principal crop in sub-Saharan Africa (SSA) and accounts for 35% and 42% of the total area and volume of production of cereals in the region (FAOSTAT, 2021). Maize is an important staple crop that serves as a source of food for man as well as livestock and a study by Irojah (2018) has shown that Nigerian farmers store Maize in various indigenous storage structures for the purpose of self-sustenance and household food availability. Because of the traditional nature of storage practices among smallholder farmers, maize is subject to substantial losses during extended farm storage (Adamasu *et al.,* 2022). It is believed that farmers with better economic characteristics are more likely to apply new agricultural practices on their farms (Foguesatto e*t al.,* 2020). The decision to apply agricultural practices such as harvesting, transportation, processing storage and so on of farm crops by farmers in rural areas is strongly influenced by their socioeconomic characteristics as well as their cultural practices (Mogoka *et al.,* 2021). On-farm storage of food crops such as grains and cereals is commonly done at the household level by using traditional storage structures. Okoruwa *et al.* (2018) stated that storage is particularly important if agricultural production is seasonal while demands for agricultural commodities are more evenly spread throughout the year; in these circumstances, there is a need to meet average demand by storing excess average. Post-harvest practices have been there for decades ranging from traditional storage systems to modern ones. According to Adesina *et al.* (2020), traditional storage systems include solarization, open fireplace, open-air/aerial, cribs, storage bags, silos, mud rhombus, and so on.

Farmers in rural areas face challenges in maize storage such as pests and rodents attacking storage facilities which usually cause serious damage to the stored crop, usually one of the most affected crops is maize (Befikadu, 2014). According to Adesina *et al.* (2020), a substantial amount of food grains is damaged after harvesting due to a lack of adequate storage facilities as appropriate storage systems have been a major problem in Nigeria for a long time. The use of modern methods to checkmate postharvest losses to cushion the effect of grain loss during storage is extremely expensive and usually beyond the financial strength of smallholder farmers (Okoruwa *et al.,* 2018). Also, their residual effect is toxic and can cause environmental pollution and health complications. It is against this backdrop that this study examines socio-economic factors influencing maize storage systems in Izzi LGA of Ebonyi State Nigeria. characteristics of the maize farmers; determine the socio-economic factors affecting storage choice by maize farmers and identify the challenge to the selection of storage choice by maize farmers in the study area.

Methodology

Study area

Izzi is a Local Government Area of Ebonyi state. Its administrative headquarters is situated at Iboko town and is in the North-west area of Ebonyi state. It occupies an area of 1,166 Km^2 with a population of about 513, 588 people (NPC, 2006).

Sampling method

The multistage random sampling technique involved; Stage 1: Agbaja, Ezzinyi-magu, Ndieze, and Mgbala- Ukwu towns were randomly selected from the study area, Stage 2: Edukpachi, Isohumiri, Nuofe, Okpoduma; Azuda, Isiege, Oyege, Ndieze; Opaetifia, Amofia, Amorie,

Amaleze; and Anyima, Azuofia, Onuoji, Ndingale communities were respectively selected from randomly selected towns bringing a total of Sixteen (16) communities, Stage 3: Six (6) farmers were selected from each community making a sample size of Ninety six (96) respondents for a detailed study.
Data were collected with the aid of a structured questionnaire administered to the respondents. Data obtained were subjected to statistical analysis using Multinomial Logit regression (Inferential statistics) and Descriptive statistics.

Results and Discussion

A. Socio-economic characteristics of the farmers

Results in Table 1 show that the average age of the respondents was 38 years. This implies that the farmers are still at their productive age. This is in line with the findings of FAO (2012) which reported that the agricultural Age in Africa is between the ages of 30-39 years which was presumed as the period at which farmers are still strong enough to carry out farming activities. The result also shows that most of the respondents (54.17%) were males. This agrees with Diaz *et al*. (2022) who posited that most rural households are headed by males. The majority of the respondents (80.21%) had formal education and 19.79% had no formal education. This implies that the farmers are educated and agree with the report of Emehute *et al.* (2022) which asserted that education is a desirable condition for carrying out agricultural extension services and information transfer which leads to agricultural development. Also, a large proportion (68.75%) of the respondents in the study area were married which implies that the storage of maize is mostly carried out by respondents who are married. This disagrees with a similar study by Takura *et al.* (2021) who posited that the majority of maize farmers are not married.
Furthermore, results revealed that most respondents (55.21%) were not members of any farm group. This implies that most maize farmers do not enjoy information and benefits from joining organizational societies. This agrees with a study by Takura *et al*. (2021) which stated that farmers do not have access to direct information that can aid their development. Also, the result shows that the average farm experience of the respondents was 12 years this implies that farmers are experienced in maize farming which agrees with the study by Agbugba *et al*. (2021) which posited that most maize farmers have been into maize farming for between 9- 12 years. Furthermore, table 1 revealed that the average household size among the respondents is 5 persons which implies a moderate household size among the respondents and agrees with the findings of Agbugba *et al.* (2021) who noted that the majority of the respondents had a household size that ranged from 4- 6. Also, most of the respondents (54.17%) used the fireplace for storage of maize, (13.54%) used sack bags, (8.33%) stored maize in the open field, (6.25%) used baskets to store their maize and (5.21%) stored their maize using local crib which implies that most respondents preferred storing maize in the fireplace which disagrees with a study by Gbadebo *et al.* (2015) which states that cribs were the most used storage structure by Maize farmers.

Table 1: Socioeconomic characteristics of the farmers

Variable	Description	Frequency	Percentage	Mean
Age of respondents (Years)	20-29	23	23.96	
	30-39	31	32.29	38 Years
	40-49	24	25.00	
	50-59	18	18.75	
		96	**100.00**	
Gender	Male	52	54.17	
	Female	44	45.83	
		96	**100.00**	
Educational level	Primary school	16	16.67	
	Secondary school	38	39.58	
	Tertiary school	23	23.96	
	No formal school	19	19.79	
		96	**100.00**	
Marital status	Married	66	68.75	
	Not married	30	31.25	
		96	**100.00**	
Membership to farm group	Yes	43	44.79	
	No	53	55.21	
		96	**100.00**	
Farming experience (Years)	5-10	37	38.54	
	11-16	40	41.66	12 Years
	17-22	15	15.62	
	23-28	4	4.10	
		96	**100.00**	
Household size (Persons)	1 – 3	37	38.54	
	4 – 6	37	38.54	5 Persons
	7– 9	21	21.88	
	10-12	1	1.04	
		96	**100.00**	
Choice of storage	Sack /jute bags	12	12.50	
	On the roof	13	13.54	
	In the open field	8	8.33	
	Fireplace	52	54.17	
	Local crib	5	5.21	
	Basket	6	6.25	
		96	**100.00**	

B. Socio-economic factors affecting maize storage choice.

The result of the multinomial regression in Table 2 shows that the R^2 (Coefficient of Determination) was 0.6155 which indicates that the variables studied had 61.55% fitness of the model used. For this study, the jute bag choice of storage was chosen as the base outcome due to it having a coefficient of zero.

Roof storage showed that cooperative membership was negative and statistically significant at a 10% level of probability while Age was positive and significant at a 1% level of probability and Farming experience was positive and significant at a 1% level of probability. This implies

that being a member of a cooperative society had an inverse relationship to a farmer's choice of rooftop as a method of maize storage while the Age of farmers and farming experience had a direct relationship to farmers using rooftop as a method of maize preservation when compared to the usage of jute bags. This is in line with a study by Gbadebo *et al.* (2015) which states that the age of farmers determines the use of Maize storage structures.

The coefficient for selecting open space as a choice of maize storage showed that cooperative membership was negative and statistically significant at a 10% level of probability while farming experience was positive and significant at a 5% level of probability. This implies that being a member of a cooperative society had an inverse relationship to farmer's choice of Open space as a method of maize storage and farming experience had a direct relationship to farmers using open space as a method of maize storage when compared to the usage of jute bags.

The coefficient for choosing a fireplace showed that age was positive and statistically significant at a 1% level of probability. This implies that there is a direct and positive relationship between the maize farmers' age as regards selecting a fireplace as a choice of storage used by the maize farmers as compared to using jute bags. This is in line with a study by Gbadebo *et al.* (2015) which states that the age of farmers determines the use of Maize storage structures.

The coefficient for choosing the Local crib as a method for storage of maize showed that Household size was positive and statistically significant at a 5% level of probability. This implies that the Household size has a direct relationship to the farmer's choice of the local crib as a method of maize storage compared to a jute bag.

The coefficient for choosing a basket as a choice of storage showed that Age is negative and statistically significant at a 1% level of probability while educational level and marital status were both positive and significant at a 5% level of probability. This implies that Age had an inverse relationship to the farmer's choice of the basket as a method of maize preservation when compared to jute bags while educational level and marital status had a direct relationship to the farmer's choice of the basket as a method of maize storage compared to jute bags. This corroborates with a study by Gbadebo *et al.* (2015) which states that the level of education plays an important role in the use of maize storage structures.

Table 2 Multinomial regression results

Variables	On roof	Open field	Fireplace	Local crib	Basket
Constants	5.379977 (0.53)	-9.869761 (-1.31)	-5.422885 (-0.85)	-10.2269 (-2.08) *	-1.06473 (-0.14)
Age	-3.640777 (-3.22) ***	-0.740614 (-1.32)	0.636302 (1.79) *	-0.746164 (-1.05) **	3.377542 (-3.08) ***
Gender	-1.987249 (-1.55)	0.737319 (0.71)	0.051559 (0.05)	0.821348 (1.02)	1.827306 (1.53)
Education level	-2.006919 (-1.55)	--0.785042 (-1.02)	0.553955 (1.37)	-0.289483 (-1.01)	0.600474 (0.99) **
Marital status	0.640465 (0.76)	0.643279 (1.10)	0.386782 (0.52)	0.714196 (1.12)	2.317751 (2.51) **
Cooperative	-1.226343 (-1.72) *	-0.941676 (-1.71) *	-0.328722 (-0.96)	-0.278997 (-0.68)	0.316097 (0.53)
Farming exp	4.046684 (3.02) ***	3.050452 (2.46) **	0.251418 (0.22)	-1.15419 -(1.32) *	1.596594 (1.49)
Household size	0.915537 (1.33)	0.624442 (0.97)	-0.484622 (-1.09)	-1.692696 (-2.66) **	-0.51954 (0.86)

Log likelihood = -65.469927, Pseudo R^2= 0.6155, LR $chi^2(35)$ = 209.59, Prob > chi^2 = 0.0000,,**and * shows significant at 1%,5% an 10% respectively. The figures in brackets are the Z-values. 1 (Jute Bag) = base outcome.***

C. Challenge to a selection of storage choices by maize farmers

Table 3 reveals that farmers faced various challenges based on percentage; pest attack (89.58%), rodent infestation (84.38%), weather conditions (71.88%), theft (70.83%), rate of inspection (64.58%), and inadequate finance (51.04%) respectively. This implies that the challenges contributed negatively to the farmer's selection of storage choices, thereby reducing maize production in the study area. This finding agrees with that of Ofor and Opara (2009) who stated that rodents, particularly, rats cause extensive damage to maize.

Table 3: Challenge to selecting the choice of the maize storage system.

Challenges	Frequency*	Percentage (%)
Pest attack	86	89.58
Rodent infestation	81	84.38
Inadequate finance	49	51.04
Weather condition	69	71.88
Theft	68	70.83
Rate of Inspection	62	64.58

*Multiple responses recorded

Conclusion.

It was discovered that the farmers had an average age of 38 years, most of them were male, the majority had a formal education with a secondary school education highest level attained by a good number of the respondents, and they have an average farming experience of 12 years. The storage system mostly used by the respondents was the fireplace used for storing Maize in the study area. The respondents' age, household size, educational level, marital status, and farming experience had varied levels of significance to the choice of storage system preferred by the respondents. Despite the benefits derived from the use of maize storage the farmers still faced some challenges such as pest attacks, rodent infestation, inadequate finance, weather conditions, theft, and rate of storage system inspection.

Recommendations.

Based on the findings of the study, the following recommendations were made:

i. Pesticides and Rodenticides should be made available to the farmers at subsidized rates by research institutes and the government to help reduce the incidence of pest and rodent attacks on their storage crops.
ii. Efforts should be made by agricultural policymakers to include conditions of equality in carrying out agricultural activities.
iii. Government in partnership with private sectors should increase extension services to farmer's educating them on modern maize storage to decrease post-harvest losses.
iv. Extension agents should be readily available to maize farmers to educate them on how to store their maize in consideration of the weather condition.
v. Inspection of storage facilities by relevant authorities such as research institutes and government should be strategic and target the safety of the storage method and the stored grains.

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