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FACTORS INFLUENCING FARMERS' ADOPTION OF IMPROVED TECHNOLOGIES IN MAIZE PRODUCTION IN KUJE AREA COUNCIL OF FCT-ABUJA, NIGERIA

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ABSTRACT

The purpose of this investigation was to examine the factors influencing farmers' adoption of improved technology for maize production in Kuje Area Council of the Federal Capital Territory, Nigeria. Respondents were selected using multiple stage sampling approaches, and a well-structured questionnaire was employed to gather the primary data. Descriptive statistics and multiple linear regression analysis were used to actualize the objectives of the study. The demographics of the respondents showed that 81.8% of the rice farmers were men while 77.3% of them were married. The average household size of the respondents was 7.41 while the average age of respondents was 43.81 years, and this implies that a larger category of the respondents are still within the productive active age and can effectively engage in farming activities. Meanwhile, the average year of farming experience of the respondents was 11.77 years. Also, most (52%) of them had at least a primary school education, their average farm size was 1.54 hectares while the average income of the farmers was N55545.91. The findings showed that fellow farmers and friends and family members were the primary sources of knowledge about maize producing technology. The production technology with the highest level of adoption is early harvesting of matured crops. The regression analysis elucidated that educational level, membership of cooperatives and farm size significantly influenced the level of adoption of improved production technologies. It was recommended that creative ways should be developed by extension agents to make vital information available to farmers.

KEYWORDS

Adoption, production, technologies, maize, farmers

INTRODUCTION

Rice (Oryza sativum L.) and maize are the second and third most significant cereal crops in the world, respectively, after wheat (Triticum aestivum L.) (Muhammad *et al.*, 2015). The crop is mostly farmed for its grain, which is used to make nourishment for humans and also grown extensively in the temperate, tropical and sub-tropical regions of the planet.The crop plant is versatile, easy to process, readily digested, high-yielding and costs less than other cereals, of which a vast percentage of nations with acceptable climatic conditions currently cultivate it since it flourishes best in a warm climate. Worldwide production of maize is 1.134 million tons, with the largest producer, the United States, producing 42%. Africa produces 6.5% and the largest African producer is Nigeria with nearly 8 million tons, followed by South Africa (IITA 2017).

Many methods of preparing and consuming maize exist, and they differ from location to zone or from one cultural minority to another and it has over 500 uses, e.g maize grains can be made into a paste by boiling or roasting (‘eko’), *‘abado’*, and or as popcorn, which is consumed throughout West Africa. It is simply identified as "elekute" in Nigeria and "kenke" in Ghana. Despite the utilization of new technology, Nigeria's maize output has not been adequate to fulfill industrial demands, needs for food and livestock, and other purposes (Olaniyan, 2015). According to (Sennuga and Fadiji, 2020), Improved agricultural technology continue to be a crucial element of efforts in developing nations to increase crop output, increase food availability, and enhance soil quality in order to lower food insecurity. Improved Technologies are a gathering of principles for on-farm production and off-farm-production processes, targeted at delivering safe, healthy and non-food agricultural products, while considering, social, economic and environmental sustainability (FAO 2010; Sennuga, *et al.*, 2020). Improved technologies such as crop and soil management, modern irrigation practices, certified seed, integrated pest management, degraded land restoration, integrated fertilizer management and conservation agriculture etc. (FAO 2010; Sennuga, *et al.*, 2020). In developing countries, most of these improved technologies are useful to smallholder farmers, but are challenged in several ways, which makes the technology crucial for developmental efforts. In developing countries, 70% of maize farmers still employ conventional methods, which often result in extremely poor crop yields since the native varieties they use have low potential yields, maize is only planted in a few regions during the rainy season and under irrigation, and there is little fertilizer and insect control (Sennuga, *et al.*, 2020).

However, few of the difficulties in producing maize in Nigeria could also include ineffective diffusion of innovations and low or non-adoption rate of recommended technologies by farmers. Typically, farmers will embrace a technology if it meets the following criteria: it is straightforward, advantageous from a comparison standpoint, compatible with current planting techniques, readily accessible, and reasonably priced (Olaniyan, 2015). One of the resources use for agricultural production is technology, the acceptance of a group or an individual to use a new product or practice is referred to as technology adoption. According to (Rogers, 2013, Cheteni *et al*. 2014; Sennuga and Oyewole, 2020), the process of adopting any new idea or agricultural practices does not occur at once but rather passes through mental process that comprises five different stages namely; awareness, interest, evaluation, trial and adoption stages. Improved Agricultural technology consists of diverse elements that might have an impact farmers adoption decisions. The adoption of more advanced agricultural technology and farm size has been found to be positively correlated in several studies (Mwangi and Kariuki, 2015). Also, (Sennuga, *et al.*, 2020) state that adoption of agricultural technology depends on a range of factors which include among others: human factors, social factor, cultural/religious factor, economic factor, education levels, household size, access to information, utilization of social networks and among others. Subsequent research found that the expensive cost of

more advanced agricultural technology has discouraged farmers from embracing it. In addition, farmers' access to pertinent agricultural information helps lessen ambiguity of technological performance, which changes their judgment over time (Kinyangi, 2014, Sennuga *et al.,* 2020). In order to better understand the factors influencing farmers' adoption of improved technology for maize production, this study will focus on such issues.

Objectives of the Study

The broad objective of the study is to analyze factors influencing farmers' adoption of improved technologies in maize production in Kuje Area Council of Federal Capital Territory (FCT) of Nigeria.

The specific objectives of the study are to:

i. describe the socio-economic characteristics of the farmers in the study area.
ii. examine level of adoption of improved technologies in maize production by farmers in the study area.
iii. determine the factors influencing farmers' adoption of improved technologies in maize production in the study area.
iv. identify the constraints to adoption of improved technologies in maize production by farmers in the study area.

LITERATURE REVIEW

Origin and History of Maize

Maize (*Zea mays*) seems to be derived from the word 'mahiz' of Taino language of the Caribbean islands, which became 'maiz' in Spanish (Oxford English Dictionary 2015) Based on this common name, Linnaeus included the name as species in the botanical classification of Zea. Maize is also popularly known as 'corn' in English-speaking countries.

In some countries, 'corn' means the 'local staple', while in some others it is utilized for any 'cereal'. Teosinte is a yearly cultivated crop indigenous to Mexico; maize is a domesticated variant of it. Teosinte is a short, bushy plant, while corn has one tall stem with numerous leaves, whereas teosinte is a short, bushy plant (Bello *et al*., 2022). At several locations in New Mexico and Arizona, maize was originally grown in what is now the United States around 2100 BC.

Bello *et al*., (2022), The spread of maize got underway. When it was introduced to various cultures, new uses were developed, and new types were selected to perform better in those preparations. The majority of pre-Columbian North American, Mesoamerican, South American, and Caribbean societies relied heavily on maize as their main food source. The harvesting of maize, its significance in religion and spirituality, and the means by which it influenced their food all strengthened Mesoamerican culture in some way. The identity of the Mesoamericans was shaped by it.Maize is a versatile crop that can be grown in a variety of agro-ecological zones and is now grown in the majority of countries with suitable climatic conditions. It produces a high yield, is simple to process, is easily digested, and is less expensive than other cereals. Maize does best in a warm climate. According to IITA (2017) global production of maize is 1.134 million tons, with the largest producer, the United States, producing 42%. Africa produces 6.5% and the largest African producer is Nigeria with nearly 8 million tons, followed by South Africa.

Status of Maize Farmers in Nigeria

Nigeria is now the top producer of maize in Africa and the tenth-largest producer worldwide. The sixteenth century saw the introduction of maize (Zea Mays L) to Nigeria and it has moved from subsistence farming to commercialization (IITA, 2017).

In the small-scale farming systems of the Nigerian farmer, maize plays a significant role. According to custom, it is commonly produced along with other crops, such as grains or even legumes. It is, with the exception of early millet, the first grain to be harvested during any given season, alleviating the typical food shortage that is felt during such times of the year. Second, farmers who have excess early harvests of maize sell it off for a profit. The money they get from this sale is then spent on agricultural inputs like fertilizer, which is applied to late-planted maize or other crops, or it is used to hire more workers from outside the family (Adeyemi, et al,. 2023).

According to estimates, 70% of farmers are smallholders, accounting for 90% of all agricultural output. As a result of their level of income, volume of production, farmland expansion, market outlets, and financial dependence, these farmers are subject to operating and decision-making constraints that are driven by economics (Cadini and Angelucci, 2013).

Iken, and Amusa, (2014) in their research work revealed that in Nigeria, the vast majority of participants in agriculture production are small-scale farmers. The most effective way to satisfy the nation's food demands, according to him, is for small-scale farmers to embrace better technologies. Adoption refers to the stage in which a technology is selected for use by an individual. According to Koutsouris (2018), the terms "adoption" and "diffusion of technology" refer to the spread of a certain technology among farmers through time as well as the choice to use or not utilize it. According to Rogers (1995), adoption is the choice to utilize technology to its fullest extent as the most advantageous course of action. Every innovation adoption is a multi-step process that takes time to accomplish. First-time users can choose to keep using the new technology or stop. Farmers, geographical locations, and a technology's specific characteristics all affect how long it takes to be adopted. Loevinsohn *et al.*, (2013) Also defines defines adoption as process of integrating a new technology into current practices. This process is typically preceded by a time of "trying" and some measure of adaption.

Factors Influencing Adoption of Improved Maize farming in Nigeria

According to Fadare.*et al.*, (2014), In their investigation into the factors influencing small-scale farmers' use of enhanced cereal crop production technology in Nigeria, the intensity of extension communications, volume and use of credit, cooperative participation, all of which are institutional in essence, were discovered to be the most significant variables influencing the adoption of improved cereal crop production technologies. Regardless of the fact that the adoption of agricultural agricultural innovations such as improved crop varieties and other related technologies like fertilizer, herbicides, and pesticides has significantly increased the production of food (cereal), the sub-Saharan African region has seen a steep rise in agricultural productivity resulting from the adoption of agricultural technology (Aluko et al., 2021).The capacity of the area's conventional agricultural techniques to feed the burgeoning population is a rising source of worry, particularly in Nigeria, which has the highest prevalence of poverty, food insecurity, and malnutrition in the region. Nigeria also has the continent's biggest population.

Adebayo (2022), argues that factors which are faced by farmers differ from culture to culture and nation to nation. In patriarchal civilizations like Nigeria, Afghanistan, and others, for instance, there are no autonomous land rights.

Land ownership in Nigeria is being mostly influenced by the customary laws. People get land from their predecessors and ancestors. Furthermore, there is gender and age biasness in land ownership. Over the past decades in Nigeria, men have always been given preference when it comes to land ownership over women. This has then resulted into older men having access to land and for agricultural production while women and youth remained with no or little portions of land. Given the age biasness on who should be given land, youths are exempted from land allocation or inherit land unless they are married or when their parents die (FAO, 2013).

Fadare.*et al.,* (2014), indicated that the adoption of enhanced maize technology was shown to be substantially correlated with household size, degree of education, agricultural experience, availability to financing, and return rate of improved maize varieties. Age, marital status, educational attainment, and prior farming experience were found to have an impact on farmers' adoption of better crop techniques, so according to Komolafe et al. (2014). Also, it was discovered that the marital status, level of education, and size of the household of the maize farmers all had a substantial impact on the adoption of improved maize varieties. (Umar *et al.*, 2014). Age, sex, education level, farm size, and interaction with extension personnel were discovered to be strongly correlated with farmers' adoption of improved maize production technology (Bawa and Ani, 2014; Adangara et al., 2022).

THEORETICAL FRAMEWORK

The following theories are relevant to the study.

Theory of Reasoned Action (TRA):

This study on factors influencing farmers acceptance of better technology in maize production is guided by the Theory of Reasoned Action (TRA). This theory was postulated by Fishbein and Ajzen (1967). The theory focuses on identifying the factors underlying the formation and change of behavioral intent (Kimaru *et al.,* 2015). This theory seeks to clarify how attitudes, actions taken by people, and acceptance relate to one another. A farmer's decision to accept a unique practice is dependent on the outcome the individual expects will come out as a result of accepting that particular practice (Rogers, 2003). The hypothesis was predicated on the supposition that people typically act rationally, that they examine the information at hand when making decisions and that they may or may not contemplate the repercussions of their actions. A farmer's intention to accept or reject a particular practice is the immediate determinant of what they are supposed to get from the activity (Fishbein and Ajzen, 1975).

The theory enabled the researcher to ascertain the gap between the behaviors of farmers and their actual attitudes in the acceptance of improved technologies in maize production. Also, it helped in determining the sensitive connection between the behavior, actions acceptance and attitudes of farmers on the adoption of improved technologies in maize farming. When farmers are aware and informed about appropriate or improved agricultural practices, this has an impact on how they decide whether to implement the methods in their farming operations. Farmers can get informed about agriculture through access to information, training by village extension agents and also by their own experiences in agricultural activities.

According to Kimaru *et al., (2015)* TRA, is a model for prediction of behavioral intention that can be employed to predict farmers' intentions towards agricultural innovations. The ideas found within the theory of reasoned action have to do with an individual's basic motivation to engage in agricultural activities. When a person performs a behavior in a routine manner, they form a habit; that is, if the farmers continue in agricultural practices, it will make farming activities less difficult for

them. Farmers will engage in maize production, if the outcome for adopting the practices in their maize production will benefit them.

Adoption - Diffusion theory

According to Mcharo, (2013), adoption – diffusion theory is useful in maize farming as it predicts how and at what rate a technology will be adopted by farmers in their farming activities. Additionally, by using the theory, the Village Extension Agents (VEAs) could assist farmers to develop a receptive mind, thereby adopting the improved technologies in maize production to boost maize productivity which will lead to decrement of poverty as well as food insecurity. Adeola, (2019), stated that a farmer's decision to accept a new technology is a complicated one that is influenced by many different considerations. Why someone would choose to accept one technology while rejecting another is a crucial subject in the analysis of the future of technology adoption. Thus, user acceptability in relation to that of this research refers to the farmer's readiness to use the technology. Regarding the aforementioned, attention is concentrated on determining the degree to which farmers are utilizing newer technology as well as the variables that affect their decision-making process. Conversely, It is unclear that a single factor explanation could explain why certain farmers would choose to accept or reject a technology, though, because to the wise range issue.

Adoption is a multi-step procedure, thus it takes time to be finished. When farmers use the enhanced technology, maize production may be productive and efficient. (Aphunu and Otoikhian 2011). While adoption deals with psychological processes in the stead of physical ones, it is comparable to diffusion in that regard.

Diffusion Theory

Everest Rogers, who developed this theory, described diffusion as the phenomenon by which ideas are disseminated among farmers over time through certain routes, is to credit for this definition. According to this hypothesis, new farming methods will first be accepted by a certain set of farmers before spreading to other farmers within the social structure. The main goal of diffusion research is to determine the degree to which improved technologies are adopted in maize production, such as planting improved varieties of maize, using recommended fertilizer, testing the viability of the seeds prior to planting, and choosing an appropriate site to increase maize productivity, raise standards of living, and decrease poverty in order to better improve food security (Ezike et al. 2022).

CONCEPTUAL FRAMEWORK

The diagram below (*Figure 2.1*) identifies the factors that have the tendency to influence farmers' adoption of improved technologies in maize production in Federal Capital Territory, Nigeria. In the context of this study, the independent variables include; age, sex, marital status, educational level, farming experience, land acquisition, farm size, etc. which have the tendency to influence the adoption of improved technologies in maize production which are the dependent variables: planting of improved varieties of maize, selection of disease-free planting materials, selection of an appropriate site for maize production, seed germination before planting, monoculture for optimum yield, use of appropriate weed control technologies to avoid weed competition e.g spraying of herbicide, farm monitoring, uprooting and destruction of diseased plants, carryout soil test before cultivation of crops, follow soil test result and recommendations for fertilizer application, etc.

This give the expected outcome which are the benefit of the adoption of improved technologies in maize production such as: To boost maize productivity thereby increasing maize grain yield in the resear [illegible] living of farmers and impro

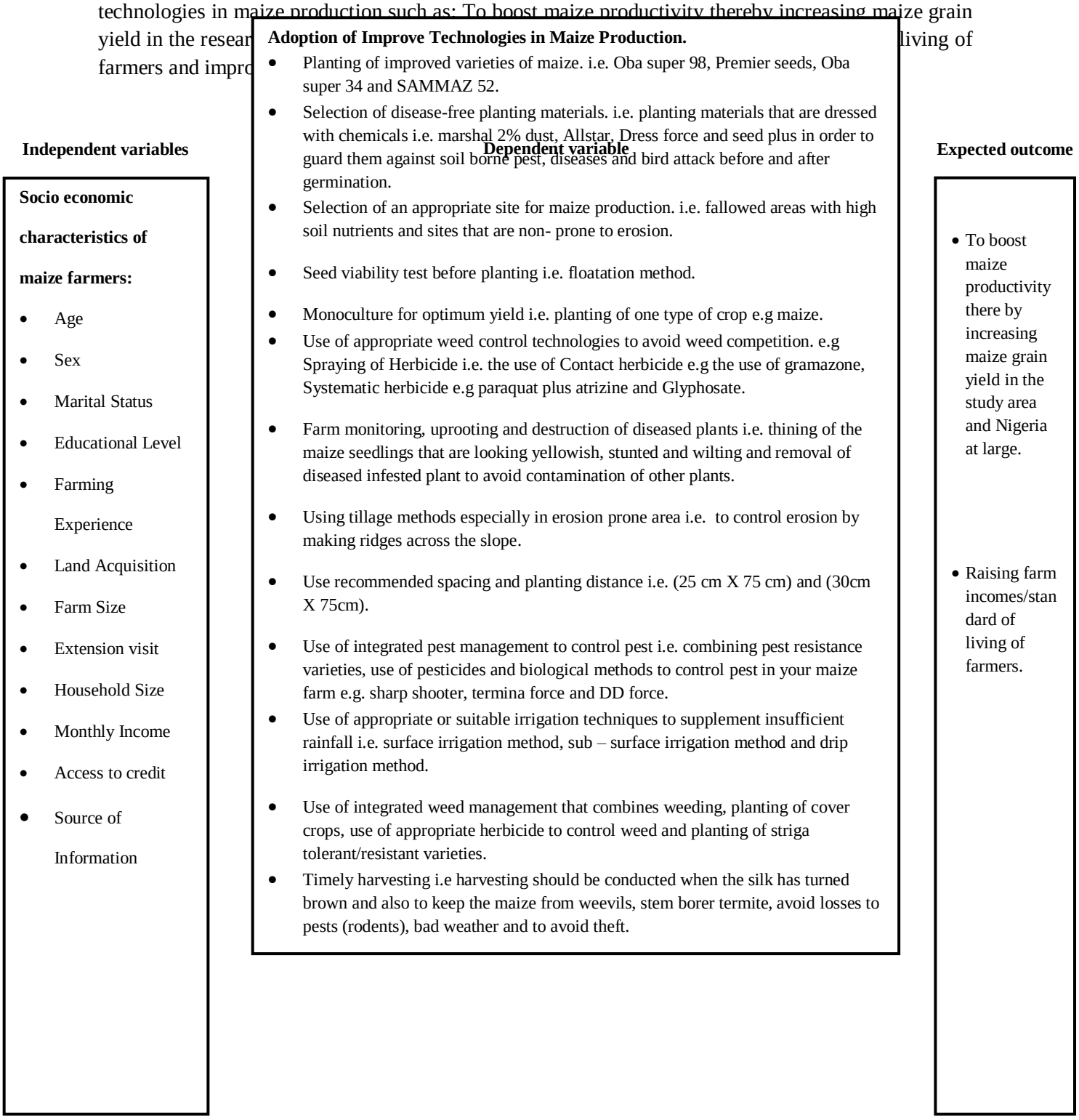

Figure 2.1: A schema showing the factors that influences farmers' adoption of improved technologies in maize production.

Source: Author's conception. 2023.

MATERIALS AND METHODS

The Study Area

This study was conducted in ADP/Zones of Abuja, the Federal Capital Territory (FCT) of Nigeria. Nigeria is a country in West Africa, bordering Niger in the north, Chad in the northeast, Cameroon in the east and Benin in the west. Its coast in the south is located on the Gulf of Guinea in the Atlantic Ocean. The federation comprises 36 states and Federal Capital Territory, where the capital, Abuja, is located (Nigeria Constitution, 2015).

Abuja is situated between latitudes 8°25' and 9°25' north and longitudes 6°45' and 7°45' east of the equator. The study area is located in the Savannah area, where the climate is mild, the indigenous inhabitants of Abuja are the Gbagyi (Gwari) as the dominant language, Bassa, Gwandara, Gade, Ganagana and Koro. The major stable crops grown in the area includes; cassava, yam, sweet potato, sorghum, maize, millet, onions, tomatoes, pepper, rice, groundnut, cowpea, etc. The Federal Capital Territory has a landmass of approximately 7,315 km^2. Currently, there are six local councils operating in the area, including: Abaji, Abuja Municipal, Gwagwalada, Kuje, Bwari and Kwali. It has an estimated population of 1,408,239 persons according to 2006 population census but has grown to 2,245,000 in 2010 (Wikipedia, 2011).

Population, Sampling Techniques and Samples Size.

The target population for this study are maize farmers in FCT. The research work was conducted in ADP zones of FCT, Abuja. There are six zones of Agricultural Development Projects (ADPs) in Abuja; namely: Abuja Municipal Area Council (AMAC), Gwagwalada, Kuje, Abaji, Kwali and Bwari. The six zones are stratified into 26 blocks and 131 cells. Kuje Area Council was purposively selected out of the six zones of Agricultural Development Projects, this is because majority of the populace in this zone are farmers and are peculiarly known for maize production. A multi-stage random sampling technique was employed to select 200 respondents for the study. Data were collected with the assistance of structured questionnaire.

Method of Data Collection

The study used both primary and secondary data. Primary data were gathered using a well-structured questionnaire that was approved by field agents for the FCT-ADP and specialists from the University of Abuja's Department of Agricultural Extension and Rural Sociology. After validation, the questionnaires were put to use by the researcher with the assistance of FCT-ADP trained enumerators. Secondary data were obtained from Literatures and Library.

Data Analysis

Descriptive statistics that include frequency count, mean, standard deviation and percentage was used to achieve objective (i), (ii) and (iv), Multiple regression was used to achieve objective (iii) and Mean Score was used to analyses the level of adoption in the study. The level of adoption of the respondents was measured using a 3-point scale and mean score. The 3-point scale are described as: Low Adoption (LA) = 1; Adopted but Discontinue (AD) = 2; High Adoption (HA) = 3. The mean score of the respondents based on 3-point scale was computed in this way: 3+2+1=6. Hence, 6/3 = 2 cut off point, which will determine whether or not there was high level of adoption or not.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of the Farmers in the Study Area

The result in Table1 revealed that most (81.8%) of the respondents were male while the remaining 18.2% were female. It also revealed that 77.3% of the farmers were married, while the rest of the respondents were single, widowed or divorced. This suggests that married individuals focus their

efforts on maize growing, likely to feed their families. This result is comparable to that of Umar et al. (2014) who discovered that most farmers were married. The household distribution of the respondents in Table 1 showed that the average household size of the respondents was 7.41. it revealed majority 43.4% of the respondent farmers had 6-10 persons in their household, 18.2% of the respondent farmers had 11 and above members in their household while 38.4% of the respondents had 1-5 persons in their household The study agrees with Sodjinou *et al*. (2015).

The maize farmers' age was 43.81 years on average, and this clarifies that a higher percentage of the respondents are still within the productive active age and can effectively engage in farming activities. The productivity of farmers can be considerably impacted by age. The average year of farming experience is 11.77 years. A farmer with extensive farming expertise has a higher tendency to possess the capacity to allocate resources wisely. This result corroborates with the study of Komolafe *et al*. (2014) who unravelled that the longer the farming experience among farmers, that greater experience of a farmer will also lead to better knowledge of spatial variability on the field and more accurate assessment of the benefits of adoption.

Table 1 went ahead in revealing that most (52%) of the farmers completed primary school, 27% had secondary school education while 16% of them had primary education. The result revealed that only 5% of the respondents had zero formal education. This outcome contradicts Jamilu et al (2014).'s conclusion that maize farmers have low levels of schooling. The average farm size of the respondents is 1.54 hectares. This finding corroborates that of Jamilu *et al*. (2014) who found that maize farmers operate on small scale. The average income of the farmers was ₦55545.91. Since they have the financial means to take advantage of agricultural advances in order to maximize profit, respondents with access to credit facilities are more likely to use enhanced technology to increase their maize output. The finding is in tally with that of Jamilu *et al.* (2014) that if credit is offered under the right circumstances, properly handled production credit may speed up the adoption of better technology by farmers who would rather be unable to use it, hence fostering rapid growth in agricultural development.

Table 1: Socio-Economic Characteristics of the Farmers in the Study Area

Socio Economic Variables	Frequency	Percent (%)	Mean
Gender			
Male	162	81.8	
Female	36	18.2	
Marital status			
Single	26	13.4	
Married	150	77.3	
Divorced	6	3.1	
Widowed	12	6.2	
Household size			
1-5	76	38.4	
6-10	86	43.4	7.41
11 and above	50	18.2	
Age (years)			
30 and less	28	14.3	
31-40	64	32.6	
41-50	48	24.5	43.81
51-60	52	16.4	

61 and above	34	12.2	
Educational Level			
No formal school	10	5	
Primary education	104	52	
Secondary education	54	27	
Post secondary education	32	16	
Farming Experience			
1-10	144	58.6	
11-20	60	30.3	11.77
21-30	20	10.1	
31 and above	2	1	
Farm Size			
Less than 1 ha	20	10.1	
1-2.9	168	84.8	1.54
3 and above	10	5.1	
Income			
25000 and less	50	25.5	
26000-50000	74	37.8	55545.91
51000-75000	22	11.2	
76000-100000	24	12.2	
100000 and above	26	13.3	

Field data analysis, 2023

Level of Adoption of Improved Technologies in Maize Production by Farmers in the Study Area

Presented in Table 2 is the result of the level of adoption of improved technologies among maize farmers in the study area. The timely harvesting of maize was the method that farmers most frequently utilized, according to the mean score of respondents, which was 3.00. This is held true with the findings of Famakinwa and Adisa (2020), who found that farmers adopted timely crop harvesting to a certain extent. A high degree of integrated weed control adoption was also seen, with a mean score of 2.95, while the mean score for choosing an optimal location for maize production was 2.91. Other improved maize production technologies with high level of adoption among the respondents were planting of improved varieties of maize (2.89), selection of disease-free planting materials (2.89), use of integrated pest management (2.89) and using tillage methods especially in erosion prone area (2.88). The result however revealed that the technology with the least level of adoption among maize farmers in the study area was Use of appropriate or suitable irrigation techniques with a mean score of 1.42. This is most likely caused by the fact that irrigated farming requires more money than agriculture supported by rain..

Table 2: Level of Adoption of Improved Technologies in Maize Production by Farmers in the Study Area

Improved Technology	Mean score	Decision Rule
Planting of improved varieties of maize	2.89	Accepted
Selection of disease-free planting materials	2.89	Accepted
Selection of an appropriate site for maize	2.91	Accepted

production		
Seed viability test before planting	1.73	Rejected
Monoculture for optimum yield	2.33	Accepted
Use of appropriate weed control technologies	2.28	Accepted
Farm monitoring, uprooting and destruction of diseased plants	2.45	Accepted
Using tillage methods especially in erosion prone area	2.88	Accepted
Use recommended spacing and planting distance	1.75	Rejected
Use of integrated pest management	2.89	Accepted
Use of appropriate or suitable irrigation techniques	1.42	Rejected
Use of integrated weed management	2.95	Accepted
Timely harvesting	3.00	Accepted

Field data analysis, 2023
Mean score less than 2 = low level of adoption; mean score of 2 and above = high level of adoption

Factors Influencing Farmers' Adoption of Improved Technologies in Maize Production in the Study Area

Table 3 shows the result of the regression analysis on the factors influencing farmers' adoption of improved technologies in maize production. The result shows that R^2 has a value of 0.441 which means that 44.1% of the variations in the dependent variable can be predicted by the independent variable. The f-statistic is 1.861 and significant at 10% probability. It follows from this that the model was correctly stated and the independent variables correctly predict the dependent variable. The finding further reveals that farm size and educational attainment were all significant at 5% probability levels, whereas cooperative membership was significant at 10% probability levels.

A farmer's adoption of more advanced production technology will rise as their degree of formal education rises, which is why education is positive and significant at a 5% probability level. A unit increase in the education of the respondents will lead to a 0.006 increment in the adoption of production technologies. This proffers an assumption that farmers will eventually adopt these technologies as they get more exposed to improved methods to conduct their farming activities as they pursue more formal schooling.

This suggests that as the cooperative society's membership grows, so does the likelihood that farmers will embrace new farming methods. This is consistent with claims made by Deji (2017) that belonging to a cooperative group increases the likelihood that farmers will embrace agricultural technology.

Farm size is positive and significant at 5% probability level. This elucidates that the vaster the farmland a farmer acquires and cultivates, the more likely they are to adopt technologies that will give optimal productivity. Land is the primary factor of agricultural production. So, if a farmer has more farmlands to cultivate, this likely going to positively affect his production decisions because the more land he has access to, the more careful they are to effectively manage their resource.

Table 3: Factors Influencing Farmers' Adoption of Improved Technologies in Maize Production in the Study Area

Model	Unstandardized Coefficients B	Std. Error	T-value	p-value
(Constant)	.889	.064	13.944	.000
Age	.000	.001	.184	.855
Gender	.035	.033	1.047	.297
Marital status	.005	.016	.322	.748
Education	.006	.002	-2.439	.016*
Farming Exp	-.001	.002	-.550	.584
Coop	.032	.017	1.900	.060**
Farm size	.047	.023	2.095	.038*
Household size	-.004	.005	-.820	.414
Income	1.595E-007	.000	.475	.636
Credit	-.005	.018	-.291	.771

*significant at 5%

**significant at 10%

R^2 = 0.441, f-statistic = 1.861 and significant at 10%

Field data analysis, 2023

Constraints to Adoption of Improved Technologies in Maize Production by Farmers in the Study Area

Presented in Table 4 is the result for constraints to adoption of improved technologies in maize production by farmers in the study area. The result reveals that "inadequate market information" and "unavailability of soil testing facilities" were the biggest constraints experienced by the farmers in the study area according to 99% of the responses. Also, 98% of the responses indicated that "Insufficient information on improved technologies for maize production", "inadequate resources and technical knowledge to implement the recommendations of agronomic research", "inadequate

finance", "high cost of labour", "transportation problems", "high cost of inputs", "incidence of droughts" among others were major constraints they are faced with in adopting improved maize production technologies. This agrees with Amaechi and Ossai-Onah (2015) in his study that unrestricted access to relevant, accurate and timely agricultural information through the proper channels will enable farmers to make appropriate decisions that will again lead into agricultural development. However, 95% of the respondents attested that there was poor extension service or contact with extension agents.

Table 5: Constraints to Adoption of Improved Technologies in Maize Production by Farmers in the Study Area

Constraint	Frequency*	Percentage
Inadequate information about improved technologies for maize production	196	98.0
Low extension contact/services	190	95.0
Ignorant about the idea of soil test	194	97.0
Inadequate resources and technical knowledge to implement the recommendations of agronomic research	196	98.0
Inadequate finance	196	98.0
High cost of labour	196	98.0
Transportation problems	196	98.0
High cost of inputs e.g. fertilizer, Herbicide and Pesticide	196	98.0
Incidence of drought	196	98.0
Poor/low maize price at the farm gate	194	97.0
Poor soil fertility	196	98.0
Inadequate modern farm implements and machinery	196	98.0
Incidence of flooding	194	97.0
Inadequate crop insurance for maize farmers	196	98.0
Clashes between farmers and herdsmen	196	98.0
Unavailability of improved seed varieties	196	98.0
Risk and uncertainties of price and rainfall	196	98.0
Inadequate market information	198	99.0

Inadequate improved cottage processing facilities	196	98.0
Unavailability of soil testing facilities	198	99.0

Field data analysis, 2023 **Multiple responses allowed*

Conclusion and Recommendation

This study analyzed the factors influencing farmers' adoption of improved technologies in maize production in Kuje Area Council of Federal Capital Territory (FCT) of Nigeria and based on the results obtained from the study, the following conclusions were reached. The majority of farmers were men who were married and had big households. The farmers were middle aged and literate, which means that many of them are well positioned to be aware, understand and adopt improved production technologies.

More over half of the farmers had access to extension agents, but the majority of them obtained their agricultural knowledge through friends, family, and other farmers. Farmers in the research region have largely embraced most of the increased productivity technology. We derive the conclusion from the study that a person's educational level, their participation in a cooperative, and the size of their farm all have a big impact on how much technology they embrace.

Based on the findings, the following recommendation was made:

1. Creative ways should be established by extension agents to make vital information, such as information on market, improved planting materials, and access to inputs, available to farmers

2. Some constraints were discovered to be impeding on the adoption of improved technologies in maize production in the study areas, these ranges from; unavailability of improved seeds varieties, high cost of inputs, inadequate information on improved technologies for maize production", "inadequate resources and technical knowledge to implement the recommendations of agronomic research", "inadequate finance", "high cost of labour", "transportation problems", "high cost of inputs", "incidence of droughts" among others. The study therefore recommends that, extension agents should liaise with the seed producing companies and agencies e.g., National Seed Company, Institute of Agricultural Research (IAR) in Zaria to make the improved maize varieties available for farmers on time for the purpose of ensuring their adoption which will increase their production output. There should be regular extension visit by the village extension agents to the targeted farmers to enable them have access to adequate and timely information on new technologies and techniques which will facilitates the adoption of those improved technologiesthat were not fully adopted by the respondents which potentially result to significant yield increase in their maize production. Also, government and non-governmental organizations (NGOs) should also help to provide necessary modern farm implements/machinery to boost maize production of the farmers. in the study areas.

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