SOCIO-ECONOMIC CHARACTERISTICS OF QUALITY PROTEIN MAIZE (QPM) FARMERS IN KADUNA STATE, NIGERIA

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ABSTRACT
The study examined the socio-economic characteristics of farmers of Quality Protein Maize (QPM) in Kaduna State, Nigeria. Multistage sampling technique was used to collect primary data from 380 respondents from four Agricultural Zones using structured questionnaire through survey. Data collected were analyzed using descriptive statistics. The findings revealed that 67.63% of the respondents were males, 81.84% were married with a mean household size of 8 people, 63.40% were primarily farmers by occupation with 66.84% having a mean quality protein maize farming experience of 19 years. Majority (92.63%) had access to extension services, 53.16% accessed credit facility with 96.05% and 93.42% having relations and friends as their major sources of credit respectively. About 79.21% of the respondents had one form of formal education or the other with 78.80% of the respondents belonging to cooperative associations. The result also revealed that 60% of the respondents acquired their farmland through inheritance and cultivate an average farm size of 2.0 ha. 98.95% and 92.11% sourced their labour from cooperative (Gaiya) and family respectively, while 68.42% were into mixed cropping system of production. All (100.00%) the respondents were aware of quality protein maize. About 59% obtained information on quality protein maize from extension agents. It was concluded that males dominate the QPM production and obtained information from extension service delivery system. The researchers recommended that extension officers should encourage the farmers to form functional cooperative associations to access government credit facilities in order to meet up with the high demand of inputs and to increase the cultivation of quality protein maize as a cheap sources of protein.
Keywords: analysis, socio-economics, characteristics, quality protein, maize farmers

INTRODUCTION
Maize (*Zea mays* L.), has emerged as one of the most important food crops, feed and industrial raw materials in most parts of the world. Maize alone contributes over 20% of the total calories in human diets in 21 countries, and over 30% in 12 countries that are home to a total of more than 310 million people (Aman *et al.*, 2016 and TAAS, 2015). In Nigeria, maize is a very important cereal crop and is the most widely cultivated

crop with cultivation from the wet forest zone to the dry ecology of the Sudan savanna (Mbuya *et al.*, 2011 and FOASTAT, 2008). Maize, a preferred staple food for over 900 million poor consumers, 120-140 million poor farm families and about one third of malnourished children (CIMMYT, 2010). The importance of protein for growth, maintenance and protection of the body need not be over emphasized. This is because both adequacy of protein quantity and quality in the diet are sure way of guaranteeing all the needed essential amino acids. Protein–energy malnutrition is widely present in developing countries such as Nigeria and might result in stunting and wasting if not averted. Studies (Ran *et al.* 2003; Stephenson *et al.* 2010; Omoyeni, 2015) revealed that in Nigeria, low-cost foods rich in good-quality protein are scant which makes it difficult to meet protein and amino acid requirements.

To reduce malnutrition which can result in stunting and wasting among children and adult, the growing of quality protein maize (QPM) that produces 70% to 100% more lysine and tryptophan than ordinary modern and traditional varieties of tropical maize is of outmost importance. This increases the protein content in maize to as high as 18% (close to double) the quantity of protein in normal maize (Liliane *et al.*, 2017). Quality protein maize (QPM) as reported by Okolo (2012) and Kehinde *et al.* (2012) offers an equivalent of 90% of the nutritional value of skimmed milk, the standard for adequate nutrition value. It contains higher protein levels of 14-15% as against 8% contained in the traditional maize varieties. Also, it contains an average of 4.0g of lysine per 100g of protein, as against 2.96g of lysine per 100g of protein for normal maize. Tryptophan content also increased from 0.61g per 100g of protein for normal maize to 1.67g per 100g of protein in the QPM (Okolo, 2011; Kehinde *et al.* 2012). This according to Mbuya *et al* (2011) is because millions of people in the world particularly in developing countries of Sub-Saharan Africa derive part of their protein and daily calorie requirements from maize. It is against the above background that this study sought to analyze the socio-economic characteristics of Quality Protein Maize farmers in Kaduna State, Nigeria.

Objectives of the Study

i. To identify the socio-economic characteristics of the Quality Protein Maize (QPM) farmers in the study area.

ii. To analyze the production characteristics of the Quality Protein Maize (QPM) farmers in the study area.

METHODOLOGY

The study area

The study was conducted in Kaduna State, Nigeria located between latitudes 9° 00' and 11° 32' North of the Equator and longitudes 6° 05' and 8°38' East of the Greenwich Meridian. The State is within the northwest geopolitical zone of Nigeria with the highest level of poverty in the country (World Bank programmes for results financing report (WBPRF, 2017; NMDGs, 2015; NMICS, 2011). Kaduna State experiences a tropical continental climate with two distinct seasonal climates characterized by constant dry and rainy seasons. The wet season begins in April/May and ends in October, with most rainfall in the Southern part of the state. The average annual rainfall and humidity are 1,272.5 mm and 56.64%; respectively while minimum and maximum temperatures are 15.1° and 35.18° Celsius respectively. This climatic conditions favours the production of maize that place the state as one of the leading maize producers accounting for 22% of the country's (Nigeria) maize, dominated by wet season planting (Early Generation Seed Country Study (EGSCS, 2016; World Bank (2017).

Kaduna State projected population is 8,446,417 with a land mass of 48,473.2 Km² (NPC, 2006) with about 80% of the population engaged in peasant farming for food crops that includes maize, cowpeas, guinea corn, millet, yam, cocoyam and cash crops such as ginger, cotton, tobacco, groundnut and soybeans grown in commercial quantities. The state shares common borders with Zamfara, Katsina, Niger, Kano, Bauchi, Nasarawa, Plateau States, and the Federal Capital Territory (Figure1).
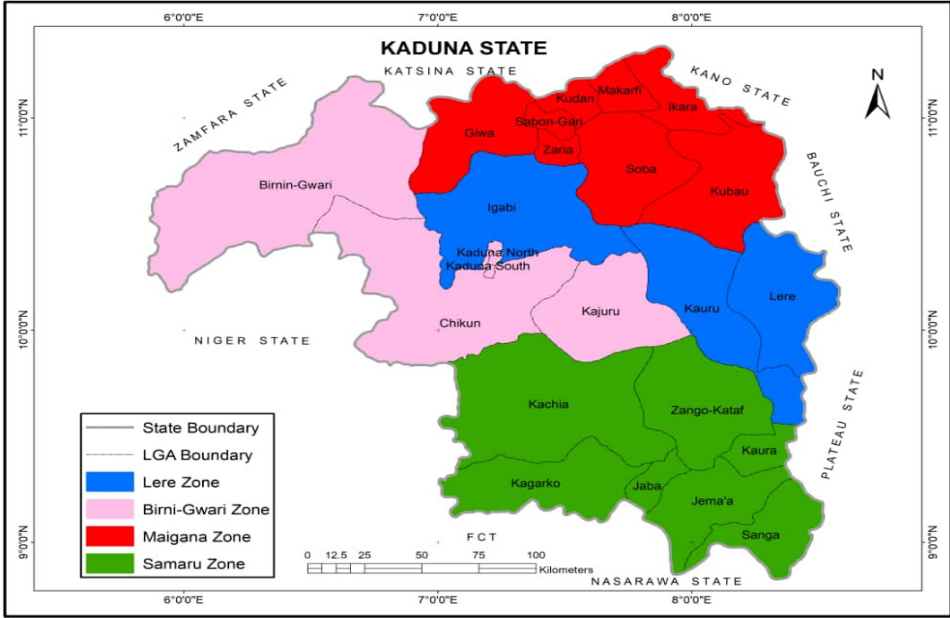
Figure 1: Map of Kaduna State showing the four agricultural zones
Source: Kaduna State Ministry of Land and Survey (KMLS, 2019)
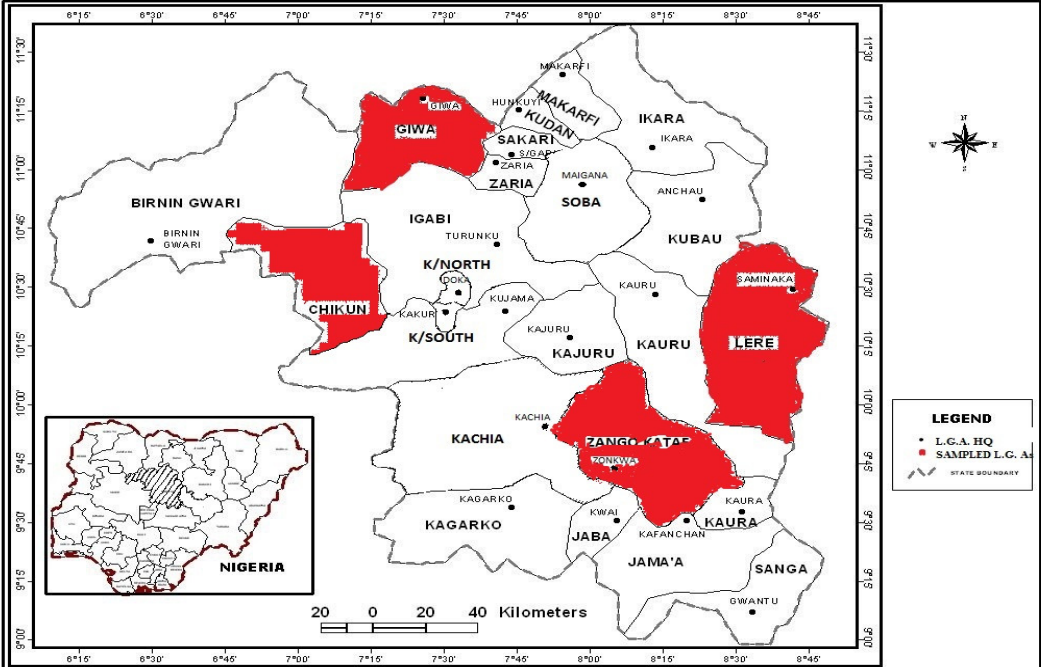
Figure 2: Map of Kaduna State showing the sample Local Government Areas
Source: Kaduna State Ministry of Land and Survey (KMLS, 2019)

Sources and Type of Data

Data for the study was generated from primary and secondary sources. The primary source was quantitatively driven through questionnaire administered to randomly and purposively selected QPM farmers with the help of village extension agents of the Kaduna State Agricultural Development Agency (KADA).

Sampling Technique

Multi-stage random sampling technique was employed to select sample size for this study. Firstly, four (4) Extension blocks each representing a Local Government Area (LGA) from the forty (40) in the State based on the concentration of maize farmer who cultivate QPM varieties from the four Agricultural Development Agency in Kaduna State were purposively selected. Secondly, forty-three (43) cells were randomly selected from the two hundred and eighteen (218) cells in the four agricultural zones proportionately (representing 20% of cells in QPM producing extension blocks in the four agricultural zones). The respondents were selected at 14 percent from the sampling frame of those communities for effective representation of the total population. The sampling frame was the list of QPM farmers compiled during the reconnaissance surveye (Table 1). A sample size of 380 QPM farmers were selected using snowball sampling technique from a sample frame of 2712 registered QPM farmers in the selected communities in the third stage to elicit farm level data for the analysis.

Method of Data Analysis

The analytical tools employed for data analysis to achieve the objective of the study was descriptive statistics.

RESULT AND DISCUSSION

The results in Table 1 showed that quality protein maize production was dominated by male producers constituting 67.63% and 58.16% of the respondent aged above 40 years with a mean age of 41 years indicating that the farmers were still active and dynamic enough to undertake farming. The findings collaborate that of Mignouna *et al.* (2011) who reported that gender affects technology adoption since the head of the household is the primary decision maker with men having more access to

and control over key production resources than the women as a result of socio-cultural values and norms. Similarly, Lavison (2013) and Obisesan (2014) revealed that more men were into farming than women. Similarly, the finding in this work agrees with the findings of Tata *et al.* (2018) who in a study in Biliri Local Government Area of Bauchi State on the analysis of factors influencing the adoption of QPM reported that majority of the farmers were within the age range of 40years and above. So also Sani *et al.* (2015) in their study on the analysis of factors influencing maize farmers output using fertilizer in Bauchi reported that majority of the farmers were within the age bracket of 31-40 years. On the other hand, Issa *et al.* (2016) in a study in Ikara Local Government Area of Kaduna State on the analysis of the socio-economic factors influencing farmers' adoption of improved maize production practices reported that most of the farmers were between the ages of 25 and 35years.

The result in table 1 indicated that 81.84% of the respondents were married. The implication of the finding is that marital status determines household size since married farmers tend to have a larger household size and hence, the availability of family labour which constitute the cheapest form of labour in most rural areas of Nigeria. The findings of his study agree with the findings of Abdullahi *et al.* (2015) who reported in their study on the determinants of adoption of recommended Sorghum (Samorg17) production practices in two selected states of Nigeria that more than 50%of the studied farmers were married. Table 2 also revealed the analysis of the result of the household size. The findings revealed that majority (72.40%) of the respondents had household size that ranged from 1 – 10 persons with an average of 8 persons per household. This finding supported the findings of Manza *et al.* (2015) who reported a mean household size of 8 persons per household for maize farmers in Zango-Kataf Local Government Area of Kaduna State. The findings imply that additional labour would be needed to work on the farm especially where the farm size is large hence a measure of labour availability. It has been reported that household size determines adoption process because larger households have the capacity to relax labour constraints required for the introduction of new technology (Mignouna *et al.* 2011). On the average, the respondents had 19years of farming experience—an indication that they had enough farming experience to enhance quality protein maize

production and its attendant risk where possible. Similarly, their relative middle age goes to show that the respondents have the energy to cope with the rigors of QPM production and also willingness to experiment with newly introduced production practices.

The findings revealed that 29.74% of the respondents attained secondary education while 28.42% and 21.08% of the respondents attained tertiary and primary education respectively (Table 1). Only 20.79% had no any form of education in the study area. The implication of this finding is that over 79% of the respondents in the study area had some form of formal education and therefore can take better decisions as regard the acceptance of innovation. This finding corroborates that of Manza *et al.* (2015) who reported that maize farmers in Kaduna State were fairly educated and had at most primary education. Similarly, the findings agree with that of Ndaghu *et al.* (2015) who on the socio-economic factors affecting adoption of early maturing maize varieties by small scale farmers in Safana LGA of Katsina State, Nigeria reported that a large number of the respondents had formal education which increased their ability to assess, interpret, and process information about a new technology, enhancing farmers' managerial skills and efficient use of agricultural inputs. Educational attainment of farmers is very important in agricultural operation because it does not only raise agricultural productivity but also enhances farmers' ability to understand and evaluate information on new techniques and processes. It is assumed that the longer the number of years spent in school by the respondents, the more likelihood that QPM would be adopted everything being equal. This may be due to the fact that farmers with better education are likely to be more exposed to advancement in technology and as such be more willing to adopt any technological innovation that will improve their productivity.

The results also revealed that majority of the respondents were predominantly farmers constituting 63.40% by primary occupation. The implication is that agriculture is proving to be the major means of livelihood of the common man considering the high food insecurity challenges bedeviling the country and the failure of other sectors of the economy to meet the demand of the populace. This then means that any intervention by government at all levels as it relates to agriculture is not

out of place. This finding agrees with that of Yakubu *et al.* (2015) who in a study in Kaduna State, Nigeria, on the determinants of adoption of recommended maize production practices among men, women and youth reported that agriculture is the primary occupation of the respondents. The result in Table 1 further showed that over half of the sample (53.16%) had accessed credit with only 46.84% of the respondents who had not accessed credit. Agricultural credit to a farmer is an empowerment tool for greater productivity particularly to resource poor farmers of rural Nigeria who are operating small scale farming. It is believed that farmers' access to credit assist them in reducing their risks, raise productivity, obtain high returns on investments, increase income and improve quality of their lives and that of their dependents. Amount of credit available to the farmers will lead to adoption of modern technology. Agbamu *et al.* (1996), reported that credit is a vital element to agricultural transformation. It contributes to the farmers' social welfare, enhances production, and helps in capital formation and sustainability of income. Where credit is not available to the farmer, the resultant effects include, low productivity, inability to adopt recommended practices, poor marketing and distribution arrangement. The result in Table 1 also indicated that 96.05% of the respondents sourced their credits from relations while 93.95% and 93.42% from government and friends respectively. Those respondents that sourced their credit from bank, cooperative association and savings from previous harvest constituted 89.47%, 89.21% and 75.00% respectively.

The result in Table 1 shows that majority (78.70%) of the respondents are into cooperative association, with only 21.30% not belonging to the cooperative association. The findings corroborate that of Audu *et al.* (2009) reporting on the socio-economic characteristics and resource use in maize production among farmers in Nigeria, observed that most of the farmers belong to one form of cooperative society. Ndaghu *et al.* (2015) also reported that majority of both adopters and non-adopters belong to farmers' cooperative society. Co-operative farmers are an association of like-minded farmers with the sole aim of pooling their resources together for agricultural production. Membership is voluntary and the idea is to help each other since they all individually have very limited resources to start with.

The results presented in Table 1 shows that 92.63% of the respondent had access to extension services while 7.37% had no extension service access. This indicated that majority of the respondent had access to extension services. Adoption of innovations is influenced by members of social groups, this is because it a general belief that when some members of a group adopted an innovation, others will often follow due to the observed outcome. This is the major principle in adoption – diffusion theory. Extension agents have a great role in influencing the diffusion process. Farmers like to find out which new farm practices they should adopt and which they should not. Extension agents are trained to deal with behavioural changes among farmers and are in position to analyze farmers' situation and guide them in his decision making process.

Table 1: Socio-economic characteristics of respondents

Variable	Description	Frequency	Percentage	Mean
Gender				
	Male	257	67.63	
	Female	123	32.37	
Age				
	1-20	3	.79	
	21-40	156	41.05	41
	Above 41	221	58.16	
Educational Level				
	No School	79	20.79	
	Primary School	80	21.05	
	Secondary School	113	29.74	
	Tertiary Institution	108	28.42	
Marital status				
	Single	33	8.68	
	Married	311	81.84	
	Divorce	15	3.95	
	Separated	5	1.32	
	Widow/Widower	16	4.21	
Occupation				
	Farming	241	63.40	
	Civil Servant	70	18.40	
	Business	35	9.20	
	Handwork	34	8.90	
Household Size				
	1-10	275	72.40	

	11-20	96	25.30	8
	Above 21	9	2.40	
Farming Experience				
	1-20	246	64.70	19
	21-40	74	19.50	
	Above 40	60	15.80	
Access to Extension services				
	Yes	252	92.63	
	No	28	7.37	
Access to Credit				
	Yes	202	53.16	
	No	178	46.84	
Credit Source **				
	Relations	365	96.05	
	Government Loan	357	93.95	
	Friends	355	93.42	
	Bank loan	340	89.47	
	Cooperative society	339	89.21	
	Savings from previous harvest	285	75.00	
Cooperative Membership				
	Yes	299	78.80	
	No	81	21.30	
Total		380	100.00	

Source: Field survey (2019)   Multiple Responses **

Respondents' Production Activities

The analysis in Table 2 represent the method respondents acquire land for cultivation. The result revealed that majority (60.00%) of the respondents inherited the land for cultivation of maize while 40% of the respondents attested to acquiring their land for cultivation through other methods. This finding is in line with that of Audu *et al.* (2009) who in a study on the economic study of socio-economic characteristics and resource use in maize production among farmers in Nigeria found out that their major method of acquiring farmlands was by inheritance and that they owned and operated small scale farms. The result on table 2 also showed that 62.63% of the respondents cultivated a total farm size range of 1-2 hectares of land while 38.68% had 1.5-2.4 hectare of their farm land used for maize production. The mean farm size of the respondent in the study area was 2ha. This implies that maize production in the study area

was engaged by small-scale farmers. This finding is in agreement with that of Ugwuja *et al.* (2011) who in their study on socio-economic characteristics of farmers as correlates of fertilizer demand in Ekiti State, Southwest Nigeria: Implications for Agricultural Extension is that the small farm size warrant the adoption of innovations that can be tried on small size to avert risk. The result in Table 2 further revealed that the respondent used the cooperative labour (98.95%) for farming while the family labour accounted for 92.11% followed by hired labour (68.87% and those who used both family and hired labour constituted 39.47%). The finding is supported by the findings of Audu *et al.* (2009) who reported in their study on the economic study of socio-economic characteristics and resource use in maize production among farmers in Nigeria that all the farmers used personal savings to run their farms and mostly use family labour as their farming activities. The implication of this finding is that in a typical rural Nigeria, due to inadequacy of capital in the form of credit farmers organized themselves into farming groups according to age to assist themselves in running the farming activities during the cropping seasons. This goes to further support the principles of cooperation responding to extension principles and ideals.

The result in table 2 still revealed that majority (68.42%) of the respondents have been into mixed cropping where farmer plant more than one crop in the same plot owing to the advantages of the cropping system: ensuring against failure of the main crop, maximization of land and judicious of inputs like fertilizer and labour among others. 31.58% accounted for the respondents that were into sole cropping in the study area. The result further revealed that 42.63% of the respondents planted Sammaz 14 while 37.90% planted Sammaz 17. The rest of the respondents that planted both the two varieties and those that could not precisely say which variety they planted for 11.84% and 7.63% respectively. This imply that Quality Protein Maize (QPM) has been into production in the study area hence the possibility of adoption of the variety.

Table 2: Production activities of respondents

Variable	Description	Frequency	Percentage	Mean
Land acquisition				
	Inheritance	228	60.00	
	Gift	12	3.16	
	Purchase	56	14.74	
	Leasehold	84	22.11	
Farm Size(ha)				
	<1	84	22.12	
	1-2	200	52.63	2
	3-4	76	20.00	
	>4	20	5.26	
Cropping System				
	Mono-cropping	120	31.58	
	Mixed cropping	260	68.42	
QPM Variety				
	Sammaz 14	162	42.63	
	Sammaz 17	144	37.90	
	Both	45	11.84	
	I don't know	29	7.63	
Labour Source**				
	Cooperative (Gaiya)	376	98.95	
	Family labour	350	92.11	
	Hired labour	261	68.68	
	Family/Hired labour	150	39.47	
Total		380	100.00	

Source: Field survey (2019)   Multiple Responses **

Respondent's Awareness of QPM Sources of Information

The result in Table 3 revealed that all (100%) the respondents were aware of the existence of QPM variety. Awareness is the first stage in any adoption process, without which the rest of stage in the adoption process cannot stand. The importance of awareness in technology adoption cannot be overemphasized. These finding corroborates that of Acheampong *et al.* (2018) who reported that majority of the respondents were aware of most technologies through extension workers. The result in Table 4 further revealed that 59% of the respondents got their information on QPM from extension service. The highest accessibility of QPM information from extension services could probably be due to favourable extension approaches used by the ADP personnel to extend proven agricultural technologies/innovations to farming households in

the study area. This finding shared the same view with Uwandu *et al.* (2018) who in their study on utilization of agricultural information sources and adoption of animal and crop technologies among farming households in Imo State, Nigeria reported that respondents highly access agricultural information from ADP. It is therefore not out of place to conclude that extension service is an adequate means of transferring information to farmers. This is because access to extension services helps to spread information about new agricultural technology leading to adoption.

Table 3: Respondents QPM awareness and sources of information

Variable	Frequency	Percentage
Awarenes		
Yes	380	100.00
No	0	0.00
Sources of information		
Extension agents	123	32.37
NGO	5	1.32
Research institutes	40	10.53
Media (Radio/TV)	24	6.32
Fellow QPM farmer	60	15.80
Field days	100	26.32
Friends	28	7.40
Total	**380**	**100.00**

Source: Field Survey (2019)

CONCLUSION
The study concluded that males dominate the QPM production and obtained information from extension service delivery system and majority of the respondents attested to accessing credit facilities and mostly from Government and friends. Most farmers in the study area were members of cooperative association.

RECOMMENDATION
It was recommended that extension officers should encourage the farmers to form functional cooperative associations to access government credit facilities so as meet up with the high demand inputs and that farmers be

encouraged to increase the cultivation of quality protein maize as it is cheap alternative source of protein compared to other sources.

REFERENCES

Abdullahi, A. Y., Akinola, M. O., Akpoko, J. G., Jamilu, A. A., Sambo, I. J., Issa, F. O. and Haruna, S. K. (2015). Determinants of Adoption of Recommended Sorghum (Samsorg 17) Production Practices by Farmers in Two Selected States of Nigeria. Book of Abstract of the 20th Annual National Conference of Agricultural Extension Society of Nigeria (AESON) held at the National Agricultural Extension Research and Liason Services (NAERLS) ABU, Zariaon the 11th -15th May, Pp 42.

Acheampong, P. P.; Amengor, N. E.; Nimo-Wiredu, A.; Adogoba, D.; Frimpong, B. N.; Haleegoah, J. and Adu-Appiah, A. (2018). Does Awareness Influence Adoption of Agricultural Technologies? The Case of Improved Sweet Potato Varieties in Ghana. A paper presented at the 2[nd]Ghana Association of Agricultural Economists (GAAE) Conference held on the 9th – 11th August 2018 on the theme: Ghana's Agriculture, Food security and Job creation, Kwame Nkrumah University of Science and Technology (KNUST) Kumasi

Agbamu, J. U. (1996). Analysis of Farmers' Characteristics in Relation to Adoption of Soil Management Practices in Ikorodu Area of Nigeria. *Japanese journal of Tropical Agriculture,* 39 (4):213 –223.

Aman, J., Bantte, K., Alemaw, S. and Tolera, B. (2016). Evaluation of Quality Protein Maize Hybrids at Jimma, Western-Ethiopia. *Journal of Forensic Anthropology,* 1(1): 26 – 34.

Audu, S. I.; Otitolaiye, L. O. and Adejoh, S. O. (2009). Economic study of socio-economic characteristics and resource use in maize production among farmers in Nigeria. *Nigeria Agricultural Journal,* 4 (1-2): 180 – 186.

Food and Agriculture Organization Statistics (FAOSTAT) (2008). Data Base: Available online at http://faostat.fao.org/site/567/(accessed on 31 July, 2018).

International Maize and Wheat Improvement Centre (CIMMYT) (2010). Maize Doctor: Parts of the Maize Plant, International Maize and Wheat Improvement Centre available online at

http://maizedoctor.cimmyt.org/index.php?option=com_content&task=view&id=8

Issa, F. O., Kagbu, J. H. and Abdulkadir, S. A. (2016). Analysis of Socio-economic Factors Influencing Farmers'Adoption of Improved Maize production Practices in Ikara Local Government Area of Kaduna State, Nigeria. *Agro-search*, 16(2): 15 – 24.

Kaduna State Ministry of Land and Survey (KMLS, 2019)

Kehinde, F.T., Olukosi, J. O., Ala, A. L., Maikasuwa, M. A. and Odunsi, A.A. (2012). Determination of the level of resource-use efficiency inQuality Protein Maize (QPM) production in Kaduna State, Nigeria.*International Journal of Applied Agricultural and Agricultural Research,* 8 (1): 24 – 30.

Lavison, R. (2013). Factors Influencing the Adoption of Organic Fertilizers in Vegetable Production in Accra, Gahna. M.Sc. Thesis. University of Ghana, Legon, Ghana

Liliane, N. T., Charles S. M., Eddy, L. M., NoWoïn, N. and Vernon, G. (2017).Breeding for Quality Protein Maize (QPM) Varieties: A Review.*Agronomy Journal,* 7 (80): 3 – 16.

Manza, E. A. G., Bivan, G. M., Makarau, S. B., Garba, A. O. and Magaji, Y. T. (2015). Technical Efficiency Analysis of Maize Production in Zangon-Kataf Local Government Area of Kaduna State, *Nigeria. Nigerian Journal of Agricultural Development Economics,* 5 (2): 121 – 129.

Mbuya, K., Nkongolo, K. K. and Kalonji-Mbiya, A. (2011). Nutritional Analysis of QPM varieties selected for Agronomic characteristics in Breeding Programme. *International Journal of Plant Breedind and Genetics,* 5: 317 – 327.

Mignouna, D. B., Manyong, V. M., Rusike, J., Mutabazi, K. D. S. and Senkondo, E.M.(2011).Determinants of adopting imazapyr resistant maize technology and its impact on household income in Western Kenya.*AgBioForum,* 14(3): 158 – 163.

National Population Commission (NPC) (2016). Nigeria population. Available online at: https://www.citypopulationaccessed 8th August, 2018.

Ndaghu, N. N., Abdulsalam, Z., Rahman, S. A. and Abdoulaye, T. (2015). Socio-economic Factors Affecting adoption of Early Maturing Maize Varieties by Small Scale farmers in Safana Local

Government Area of Katsina State, Nigeria.*Journal of Development and Economics,* 7(8): 274 – 282.

Nigeria Early Generation Seed Study Country Report (NEGSSC), August, 2016

Nigeria Early Generation Seed Study Country Report (NEGSSC), August, 2016

Nigeria Millennium Development Goals (NMDGs) (2015); End-Point Report, Office of the Senior Special Assistant to the President on the United Nations Millennium Development Goals, Pp 5.

Nigeria Multiple Indicator Cluster Survey (NMICS) (2011). National Bureau of Statistics,

UNICEF,2013.https://micssurveysprod.s3.amazonaws.com/MICS4/West%20and%20Central%20Africa/Nigeria/2011/Final/Nigeria%202011%20MICS. English.pdf

Obisesan, A. (2014). Gender Differences in Technology Adoption and Welfare Impact among Nigerian Farming Households, MPRA Paper No. 58920

Okolo T. O. (2012). Quality protein maize seed programme in Nigeria. In: Olaniyi, O. A. and Adewale, J. G. (eds). Information on Maize Production among Rural Youth: A solution for Sustainable Food Security in Nigeria. Prodeedings of the National Quality Maize Protein Workshop, ABU, Zaria, Library Philos Practicals (e-J), 4(3): 25 – 31.

Omoyeni A. O. (2015). Amino Acid Composition of Ten Commonly Eaten Indigenous Leafy Vegetables of South-West Nigeria. *Journal of Nutrition and Health.*10.12691/jnh-3-1-3

Ran H, Hassett DJ, Lau GW. Human targets of Pseudomonas aeruginosa pyocyanin. Proc Natl Acad Sci U S A. 2003 Nov 25; 100(24):14315-20. doi: 10.1073/pnas.2332354100. Epub 2003 Nov 6. PMID: 14605211; PMCID: PMC283589.

Sani, M. H., Danwanka, H. A. and Ma'ule, U. M. (2015). Analysis of Factors Influencing Maize Output of Farmers Using Fertilizers in Bauchi State, Nigeria. Proceedings of the 29th Annual National Cnference of Farm Management Association of Nigeria (FAMAN) held on the 23rd - 26th November, 2015 at the General Studies Auditorium, Federal University of Dutse, Jigawa State, Nigeria, Pp6.

Stephenson, J., Barton, B., Carrington, G., Gnoth, D., Lawson, R. & Thorsnes, P. (2010). Energy cultures: A framework for understanding energy behaviours. Energy Policy, 38(10), 6120-6129.https://hdl.handle.net/10289/4096 . Accessed 28/02/2020

Trust for Advancement of Agricultural Sciences (TAAS, 2015). Up Scaling Quality Protein Maize for Nutritional Security Indian Agricultural Research Institute, Pusa Campus, New Delhi-110012, India.

Tata, L. A., Sani, M. H., Ibrahim, A. A., Iroegbute, U.K. and Akeweta, J. N. (2018). Analysis of Factors Influencing Adoption of Quality Protein Maize (QPM) by Farmers in Billiri Local Government Area of Gombe State, Nigeria.*Journal of Agriculture, Food Security and Sustainable Environment,* 1 (1): 3635 – 3547.

Ugwuja, V.C.,Adesope, O.M., Odeyemi, T.J., Matthews-Njoku, E.C., Olatunji , S.O., Ifeanyi-Obi, C.C. and Nwakwasi,R. (2011). Socio-economic Characteristics of Farmers as Correlates of Fertilizer Demand in Ekiti State, Southwest Nigeria: Implications for Agricultural Extension

Uwandu, C. N., Thomas, K. A. and Okoro, C. M. (2018). Utilization of Agricultural Information Sources and Adoption of Animal and Crop Technologies among Farming Households in Imo State, Nigeria. *Journal of Agricultural Extension,*22(1):143 – 155.

World Bank (2017). Federal Republic of Nigeria, World Bank Program-for-Results Financing, Kaduna State Economic Transformation (p161998) Environment and Social Systems Assessment (ESSA), Pp 20.

Yakubu, L. L., Akpoko, J. G., Atala, T. K., Ahmed, B. and Omokore, D. F. (2015). Factors Influencing the Adoption of Recommended Maize Production Practices Among Men, Women and Youth in Kaduna State, Nigeria. Book of Abstract of the 20th Annual National Conference of Agricultural Extension Society of Nigeria (AESON) held on the 11th -15th May, 2015at the National Agricultural Extension Research and Liason Services (NAERLS) ABU, Zaria, Pp 63. P