ANALYSIS OF FACTORS INFLUENCING ADOPTION OF QUALITY PROTEIN MAIZE (QPM) BY FARMERS IN BILLIRI LOCAL GOVERNMENT AREA OF GOMBE STATE, NIGERIA.

Tata, L. A[a]., Sani, M. H[b], A.A.Ibrahim[c], Iroegbute U.K[a] and [a]Akeweta, J. N.

[a] Department of Agricultural Economics and Extension, Federal University of Kashere, Gombe, Nigeria.

[b] Department of Agricultural Economics and Extension, Abubakar Tafawa Balewa University, Bauchi

[c] Department of Agricultural Extension, University of Maiduguri.

*Corresponding Author: e-mail: libnahtata@gmail.com +2348024690008

ABSRTACT

The study was to analyze the factors influencing farmers' adoption of quality protein maize farmers in Billiri LGA Gombe state. The study area was purposively selected to represent farmers who are actively engaged in quality protein maize production. Structured questionnaires were used to collect data from 105 respondents. Descriptive statistics and regression analysis were used to analyze the data. The result revealed that the respondents were mostly (32.4%) educated. Men had the highest percentage of 86.7% and majorities (78.1%) of them were into farming as their occupation. Sassakawa Global played a major (53.3%) role in disseminating agricultural technologies and served as the major (60%) source of awareness. Most (67.7%) of the respondents were 40 years and above who were mostly (64.8%) small scale farmers with majority (61%) owning 0.5-3 Ha of land largely (77.1%) through inheritance. The study revealed a significant relationship between education (3.37%) and yield of QPM harvested. This shows that decision of adopting QPM was as a result of more yield harvested; the result therefore indicates that it is positive. The highest (90%) constraints identified were in taste, colour, kernel and value (preference factor), credit facilities and ineffective market with a mean average (42.08%). It is therefore recommended that provision of more improved maize seeds, improved and adequate credit facilities and effective markets should be made available through associations, financial institutions, government and non-governmental organizations.

Keywords: Quality, Sassakawa, Small-scale, Adoption, Constraints.

INTRODUCTION

Agriculture is the foundation upon which the economic stability of a nation can be built. Food can only be sufficient for the nation only if farmers are being informed and trained with adequate modern techniques for large scale production through efficient extension service (Daluba, 2013). For farmers to respond positively to new ideas, they must be properly educated on how best to apply the ideas on the farm.

Maize (*Zea mays* L.) is a staple food for large population groups around the world particularly in developing countries. Maize is major source of carbohydrate, protein, vitamins and minerals which provides major source of calories in Nigeria, thus offering to meet African's food needs (Ado and Abdullahi, 2010). Its low nutritional value with respect to protein quality has prompted agriculturist, nutritionists and policy makers to develop ways of improving its protein quality to produce a good quality variety known as Quality Protein Maize (Abdullahi *et al.*, 2012).

Awareness is not the same as knowledge, though, knowledge requires awareness. For any adoption of a new technology to be successful, farmers must not only know about it but also follow the recommendations provided. The Sasakawa Global 2000 effort in research and extension of quality protein maize resulted in the registration and release of Sammaz 14 (QPM) (Ado *et al.*, 2005) The introduction and dissemination of the quality protein maize by Sasakawa Global 2000 through the state Agricultural Development Programmes

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(ADPs) made great strides in providing maize with better nutrition to the poor rural families who cannot afford meat and egg in their daily diet. The main objective of SG2000 is to accelerate the adoption of improved modern food crop production technologies by small scale farmers. Farmers are supported with field demonstrations; testing of improved food crop, water harvesting and conservation tillage (Miko *et al.,* 2001). Quality protein maize grain is a biofortified, non-transgenic food that provides improved protein quality to consumers. It looks and tastes like normal maize but contains a naturally occurring mutant gene that increases the amount of two amino acids (lysine and tryptophan) necessary for protein synthesis in humans (Pixley *et al.,* 2011). The seeds should be introduced to the remote areas where malnutrition rates are high. Extension is a weak instrument when it stands alone but can be powerful if combined with price incentives, input supply, credit, seed multiplication among many others. The major crops grown and consumed in the study area is maize and quality protein maize being an improved variety has shown to be adaptable to the soil having its identified sites spread across all wards. This has prompted the reason for this research to be conducted in Billiri Local Government Area as the case study area.

MATERIALS AND METHODS
The Study Area

The study was conducted in Billiri Local Government Area (LGA) of Gombe State, Nigeria. Billiri Local Government Area is located in the s outhern part of Gombe State, situated in Guinea savanna ecological zone of Nigeria. The estimated Land area has about 737 km^2, 285 sq miles and a population of 202,144 inhabitants (National Population Commission-NPC, 2006).

It is bounded in the north by Akko LGA, south by Kaltungo and Shongom LGA, east by Balanga and in the west by Alkaleri LGA of Bauchi State (Ministry of Land and Survey, 2003). The vegetation is characterized by shrubs interspersed with *Acacia, baobab* and fruit trees like mangoes, guava and banana.

Agriculture is the main occupation comprising farming, hunting, processing, gathering, fish farming and rearing. The crops grown are categorized into Food crops and Cash crops. Food crops are maize, cowpea, rice, millet, sorghum millet, sweet potatoes, cassava, leafy vegetables and market garden plants (GSADP, 2008).

Sampling Procedure and Sample Size

A sample size of 105 QPM farmers were randomly selected and used for the study. The study area comprise of ten wards. Ten (10) farmers were selected from each of the nine (9) wards (Bare, Banganje North, Banganje South, Billiri North, Billiri South, Kalmai, Tanglang, Todi and Tudu Kwaya) and fifteen (15) farmers were selected from Tal ward making a total of 105 QPM farmers. Random sampling technique was used to give the respondents equal chance of being chosen.

Method of Data Collection

Primary and secondary data were used in this study. Primary data used were obtained using structured questionnaires. The secondary data were gathered from publications of Sasakawa Global 2001, Agricultural development programme (ADP, Billiri LGA), National Agricultural Seed Council (NASC), Ministry of Lands and Survey, Association of Maize Farmers in Nigeria (MAAN, Billiri branch), journals, internets and agriculture related organizations.

Analytical Techniques

Descriptive statistics such as percentages, frequencies, mean and regression were used to assess the socio-economic characteristics of quality protein maize farmers and the constraints faced by these farmers. Data were also analyzed using regression to determine the effects of some

variables on the dependent variable y (adoption).

RESULTS AND DISCUSSION
Age distribution of the respondents

Age is one of the important determinants of human reasoning, decision making and responsibilities. Age is measured in years and it represents the physical and mental development of an individual. The age distribution has to do with the age range of the respondents involved in the study. The result in Table 1 showed that majority (67.6%) of the respondents were within the age of 40 years and above. This indicated that most of the farmers are middle aged implying economically active age in the production.

Sex distribution of the respondents

Sex refers to the biological form of human being a male or female. The result in Table 1 indicated that 86.7% of the respondents were male. This is an indication that Quality protein maize production in the study area was mostly undertaken and dominated by male. This is in agreement with Yisa *et al.* (2010) which states that more males were found to be engaged in farming activities than their female counterpart because of its labour intensive nature. It also showed that men are easily contacted by disseminators because their movements are not restricted thereby having the chance of being aware of improved technologies faster than the women .

Marital status of the respondents

Marital status means living singly or a matrimonial relationship involving the respondents whether they are married, divorced or widowed. Furthermore, Table 1 also reveals that majority (95.2%) of the respondents were married. This indicated that married people are largely responsible for the welfare of family and day to day activities. According to Okoye *et al.* (2004) married families' responsibilities must be reflected on farming activities.. The study

further indicated that because married people are highly respected in the society, they were mostly contacted through house to house visit, cooperative group meetings by extension agents who passed down the information on improved agricultural technologies which created the awareness on quality protein maize.

Household size of the respondents

Household size refers to the number of persons per household for each of the respondents. Household size is determined by the head of the family, wives, children and relations living with the family. The result in Table 1 revealed the largest (72.4%) household size of the respondents in the study area had between 9 persons and above. The study showed that the relatively large household size reduced the labour demand of the respondents. This goes with the findings of Okoye *et al.* (2004) that farmers with a fairly large household size may employ family labour to reduce cost of production from the use of hired labour.

Education level of the respondents

The level of education of an individual affects his productivity by enhancing his ability to obtain analyze information relevant to his production activities. Table 1 also showed that majority (32.4%) of the respondents attended secondary school. This indicated that most of the respondents were literate, which means they can read and write which made them to easily understand and communicate with their source. This finding is in agreement with Okoye *et al.* (2004) and Ajibefun and Aderinola (2004) that educated farmers are more receptive to improved farming techniques than farmers with low level of education or without education.

Occupation distribution of the respondents

Occupation is the source of livelihood of respondents. The primary occupation refers to the major occupation the

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respondents are engaged in as a source of livelihood. The result in Table 1 showed that the highest numbers (78.1%) of respondents were engaged in farming. This indicated that the respondents spend most of their time farming which makes it the main source of livelihood in the study area. According to Mark (2011) and Abdullahi *et al.* (2012), agriculture is the major occupation for self reliance and income generation in the Nigeria's rural areas.

Distribution of respondents according to years of experience

Experience means practical involvement in an activity. The respondents' years of experience in QPM cultivation refer to the number of years the respondents were engaged in farming activities. The results in Table 1 revealed that majority (84.8%) of the respondent had 15 years and above showing how long they have been cultivating QPM. Yisa *et al.* (2010) observed that years of experience in farming are related with farmers' ability to process and use information relevant to their needs. Hassan and Nhemachena (2008) pointed that, it is faming experience that matters most than the age of farmer when it comes to adoption of improved practices.

Distribution of respondents according to scale of farming

The scale of farming refers to level at which the respondents operate their farming activities as whether it is peasant, small or large scale. From the results in Table 1, most (64.8%) of the respondents operated on small scale indicating that farmers in the study area have moved from using traditional methods to modern agriculture by embracing new technologies have resulted to improved and increased production.

Farm size distribution of the respondents

Farm size refers to actual size of the respondents' farm used for the cultivation of QPM. The basis for the size of farm belonging

to the respondents in this study was measured according to what the farmer has for peasant, subsistence and large scale farming. It indicated that majority (61%) of the respondents had between 0.5-3 hectares (ha) of land and also showed that most of the respondents are small scale farmers who usually depend on the use of energy and crude implements for production activities. Studies according to Daneji (2006), Ibrahim *et al.* (2012) reported that small scale farmers are farmers who cultivates less than 5 ha of land thereby making those farmers producing at subsistence level.

Distribution of the respondents according to land ownership

Land ownership refers to different categories of acquiring a land by the respondents of this study which can be done through inheritance, rent donation or purchase. Based on the results shown in Table 1, majority (77.1%) of the respondents inherited the land used for their farming activities. Going back to respondents according to gender, because men were found to be the majority, it is an implication that male children are normally and traditionally given inheritance to the family's property and land is one of most important so as to subsequently use it to provide food for his own family.

Respondents' source of awareness

A great deal is required to diffuse the new varieties and new management techniques to farmers for sustainable production. This study showed that the village extension agents, Sasakawa Global and others constituting relatives, friends and neighbours were the different source through which information are disseminated to the rural farmers. Table 2 revealed that the majority (60%) of the respondents got their information especially on QPM production from Sasakawa Global 2000. This showed that the Sasakawa Global 2000 plays a vital role in disseminating information on

improved technologies to farmers especially in the rural areas.

Distribution to Respondents

Seed distribution refers to different ways through which the respondents acquire or get seed for their production activities.

Seeds industries provide more and a wide variety of Improved maize seeds to farmers at affordable prices in good time. Results in Table 2 showed that most (53.3%) of the respondents in the study area get improved Seeds from sasakawa Global 2000.

Table 1: Distribution of the respondents according to socio-economic characteristics

Variables	Frequency	%	Mean
Age (years):			
18 – 27	2	1.92	
28 – 39	32	30.5	35
40 and above	71	67.6	
Total	105	100	
Sex:			
Male	91	86.7	
Female	14	13.3	
Total	105	100	
Marital status:			
Married	100	95.2	
Single	2	1.9	
Others (widowed/divorced)	3	2.9	
Total	105	100	
Household size:			
1 – 4	6	5.7	
5 – 8	23	21.9	
9 and above	76	72.4	
Total	105	100	
Education level:			
Primary	18	17.1	
Secondary	34	32.4	
Tertiary	28	26.7	

Religious knowledge	12	11.4
Adult education	13	12.4
Total	105	100

Occupation:

Farming	82	78.1
Business	4	3.8
Civil servant	19	18.1
Total		

Farming experience (years):

5 – 10	3	2.9
11 – 15	13	12.4
16 and above	89	84.8
Total	105	100

Scale of farming

Peasant	25	23.8
Small-scale	68	64.8
Large-scale	12	11.4
Total	105	100

Farm size (ha):

0.5 – 3.0	64	61
3.1 – 5.0	31	29.5
5.1 and above	10	9.5
Total	105	100

Land ownership:

Inheritance	81	77.1
Renting	15	14.3
Purchase	9	8.6
Total	105	100

Source: Field Survey, 2014

Effect of socio-economic characteristics on adoption rate of QPM farmers

The result in Table 2 shows that educational level and number of QPM bags harvested were significantly related to the rate of adoption by QPM farmers. The Educational status showed that the more farmers are educated the more their level of understanding and acceptance of the improved technologies. The result showed that the level of education and number of bags of quality protein maize harvested were the important determinants found to be significantly QPM adoption. The coefficient of education (X_4) which is 0.478 at 5% level of significance is an indication of positive impact on farmers. The coefficient of number of QPM bags harvested (X_{12}) was 0.961 at 5% level of significance; positively related with the rate of adoption of QPM.

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Table 2: Effect of socio-economic characteristics on rate of adoption of QPM

Variables	Coefficient	T-value
Constant	-7.865	3.129**
X_1 (Age)	-0.024	0.069
X_2 (Sex)	-0.121	-0.251
X_3 (Marital status)	0.536	1.063
X_4 (Education level)	0.478	3.371**
X_5 (Farming experience)	0.167	0.444
X_6 (Farm size)	-0.350	-1.262
X_7 (Household size)	0.197	0.671
X_8 (Land ownership)	-0.248	0.137
X_9 (Level of awareness of QPM)	0.114	0.137
X_{10} (Sources of awareness)	0.139	1.011
X_{11} (Contact with sources)	0.126	0.609
X_{12} (No. of QPM bags harvested)	0.961	2.910**
X_{13} (Labour types)	-0.324	-1.362
R^2	0.300	
R^2 adjusted	0.200	
F- ratio	2.996**	
Std. Error	1.62821	

Source: Field survey, 2014.   ** = significant at 5%.

Constraints Faced by the Respondents Using QPM

The constraint was measured on a three point scale of high constraint (1), low constraint (2) and not a constraint (3) meaning how respondents were affected Very Seriously, Seriously and Not Seriously respectively. The result in Table 3 showed that inadequate improved seed, credit facilities, ineffective market and preference factors having the highest mean(42.08). This revealed that certain attributes identified as Very Serious may be the reasons for influencing farmers' decisions that do not adopt improved innovation in Nigeria (Awotide *et al.,* 2010).

Table 3: Distribution of the respondents according to degree of constraints

Variable	Very Serious	Serious	Not Serious
Inadequate improved seed	46 (43.8)	32 (30.5)	27 (25.7)
Inadequate credit facilities	85 (81)	8 (7.6)	12(11.4)
Inadequate number of visits by source	38 (36.1)	45 (42.9)	22 (21)
High cost of production	24(22.9)	72 (68.6)	9 (8.5)
Low productivity due to losses		12 (11.4)	93 (88.6)
Ineffective market	59 (56.2)	10 (9.5)	36 (34.3)
Farm inputs	7 (6.6)	55 (52.4)	43 (41)
Preference factors (colour, taste, kernel)	95 (90)	10 (9.5)	
Mean (average)	42.08	29.05	28.81

Source:Field Survey,2014.

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