



Influence of knowledge and practice towards adoption of improved pearl millet varieties among farmers in Northeastern Nigeria

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ABSTRACT

This study determines the influence of knowledge and practice towards adoption of improved pearl millet varieties among farmers in North-eastern Nigeria. Multistage sampling techniques was used in selecting (459) respondents. Primary data were collected through questionnaire and analyzed using descriptive, correlation and regression model. Result on the levels of knowledge, practices and adoption level indicated high level. Correlation results revealed that independent factors knowledge and practice had positive correlation towards Adoption at ($p < 0.001$) level. Regression results revealed that, knowledge and practice contributed significantly towards adoption of improved Pearl millet among farmers. Thus, Practice was considered the highest factor due to $\beta = 0.493$. Hence, adjusted R² value of 0.366 indicates that, knowledge and practice contribute 36.6% of variance on adoption. Thus, the study suggests that, farmers be encouraged towards developing positive knowledge and practice in the cultivation of improved pearl millet and the need for relevant areas of improvement by policy makers.

Keywords: Adoption, Improved pearl millet, Farmers, Knowledge, Practice

INTRODUCTION

Agriculture remains the fundamental tool for economic growth, poverty reduction and enhancing food security especially in developing countries like, Nigeria (World Bank, 2010; Benjamin et al. 2013). In Africa, majority of the farming population are small scale farmers, with a small portion of land on average of not than 2 hectares of land. As such, agriculture remain Africa's guaranteed system for growing wide range of economies and creating jobs for over 70% of the populace (Alliance for Green Revolution in Africa, (AGRA, 2017). Nigeria is one of the major Pearl Millet producing countries with an average annual production of 4.8 million tons USDA, (2015), ranking second globally after India. Among the cereal food crops produced in Nigeria, millet is ranked third after maize and sorghum. Indeed, "Lubadde et al. (2015) opined that, research and development interventions resulting to higher uptake of modern Pearl millet varieties by farmers may likely lead to increase in income, food security and welfare of the farmers. Based on this, pearl millet production improvement programme in Nigeria is concerned with higher yield for human food. A recent report by International Crops Research Institute for semi-Arid Tropics "ICRISAT (2017) revealed that, Nigeria recorded over 150% productivity gain from the package of improved practices on Pearl millet.

Nigeria's Pearl millet production is mostly carried out in

North-eastern Nigeria. Though, the productivity is often below the anticipated production, because of low level of adoption on the improved technologies by farmers; resulting from untimely knowledge of the technology by the farmer, which distress farmers level of practice on the improved technologies. Undoubtedly, farmers in North-eastern region are also faced with numerous challenges ranging from high poverty level as reported by Millennium Development Goals "MDGs, (2015) and other forms of socio-economic, physiological and psychological devastation "(Gaya et al. 2012). These and other unidentified factors have contributed significantly to the low food production and consequently food insecurity and malnutrition with the effect more noticeable on women and children in the region. This was aggravated by the recent armed insurgency which had displaced more than 3 million persons across Nigeria, especially, North-east of which 80% are women and children. Hence, over 300,000 people were equally rendered as refugees in the neighbouring countries (Leshie and Henry, 2016)

These situations among others create the need for a humanitarian response and research to recommend ways of alleviating food production, food security and poverty through adoption of improved farming technologies especially of pearl millet. Hence, this research majorly intended to determine how adoption is influenced by independent

factors knowledge and practice among pearl millet farmers in North eastern Nigeria.

Adoption as the name implied therefore, is a decision to make full use of an innovation or technology as the best course of action available (Rogers, 1995). More so, "Rogers, (2006); Odoemenem and Obinne, (2010) highlighted that, innovations that are profit oriented are readily adopted by farmers. Indeed, Knowledge as a predictor variable in this research, refers to the consciousness, awareness, or thought such as realities, evidence, descriptions, or services, which is learned through practice or teaching, by perceiving, discovering, or learning. Accordingly, Hoque et al. (2016) viewed farmers' knowledge as the ability to co-ordinate and re-shape a wide range of socio-technical evolutionary factors within specific localities and systems towards anticipated outcomes. Hence, Farmers' level of knowledge is measured as high, moderate and low level. While, Practice in this research is also seen "as a production method or techniques utilized to produce the insured crop and allow it to make normal progress towards maturity and produce at least the yield used to determine the production guarantee (USDA, 2014)

However, Improved Pearl millet technology as the subject of this research is that type of cereal variety, which has a higher yielding capacity that mature earlier (60 to 70 days as against 70 to 100 days for traditional varieties). They are resistant to Striga spp, draught, pest and diseases. They respond optimally to fertilizer and other management practices. More importantly the grain size is larger while the panicle is more compact. With all these qualities; yet, farmers' adoption level seems to be very low in the study area. Hence, farmers continue to use the traditional local varieties whose yield is low. Thus, the research investigates farmers' level of knowledge and practice towards adoption of improved pearl millet technologies; It also determine the relationship between predictors "knowledge, practice with adoption" and identify the most contributing predictors for adoption.

MATERIAL AND METHODS

This study was conducted in North Eastern Nigeria. The land area is about 241,076 km (26% of National totals) occupying an arable land of about 7.9 million hectares with an average farm size around about 1.59 hectares. The average annual rainfall is about 1500 mm and may be as low as 500 mm. Hence, the weather is often, dry and hot within the year (Gwary et al. 2011). The population of the zone is estimated at 26,263,866 persons as at 2016 by (National Bureau of Statistics Estimates NBS, 2016). The region is bounded by the North Central and North-West zones of the country while, the international borders are with Cameroon, Chad Republic and Republic of Niger.

The climate favours the production of a wide variety of crops, which include legumes (groundnuts and beans); cereals (maize, millet, sorghum and rice), solanaceous crops (peppers, tomato, garden eggs). The zone also provides large livestock market. The states of North-Eastern Nigeria are known for their rich fishing activities and mineral

deposits. The area is composed of diverse ethnic groups with majority been Fulani and Hausa (Gwary et al. 2011). This study used descriptive correlational design as very little is known regarding knowledge and practices among farmers on the improved pearl millet varieties North-eastern Nigeria. Hence, the study used multistage procedure. First, three States (Bauchi, Borno and Yobe) were purposively selected based on their higher participation in pearl millet production in the region. The second stage was random selection of three Local Government Areas that participate in Pearl millet production from each of the selected States. The third stage involved randomization of two communities from each of the selected Local Government Area. In the fourth stage, a ready made table of Krejcie and Morgan (1970) was used in obtaining 459 pearl millet farmers who were randomly selected from the communities. Primary data were collected in the year 2018 through questionnaire. A total of 459 structured questionnaires were distributed across the study area, out of which 430 were returned. Hence, (442) were duly answered and had complete valid cases and therefore a sample of (442) was used for data analysis in this study. Descriptive statistics such as means, standard deviation and percentages, correlation and regression model were used in analyzing the data.

RESULTS AND DISCUSSION

Farmers level of knowledge, practice and adoption of improved pearl millet technologies

This section captures results on the level of knowledge, practice and adoption level of respondents on the improved pearl millet technologies popularize to them by the stakeholders in the study area. Thus, the result is however presented below.

Farmers level of knowledge

From Table 1 below, which showed respondents level of Knowledge on the improved pearl millet in the study area, which confirmed that, majority of farmers had high level of knowledge with a frequency of 405, representing 91.6%, where a mean score 4.30 was recorded. The result further revealed that, the second category of respondents recorded moderate level with a frequency count of 33 representing 7.5% of respondents. while, the remaining ones had low level of knowledge with a frequency of 4 representing 0.91% of respondents as computed in Table 1 below.

Table 1: Farmers Level of knowledge

Level	Frequency	Percentage %
Low (1.00-2.66)	4	0.91
Moderate (2.67-3.99)	33	7.5
High (4.00-5.00)	405	91.6

Farmers level of practice

From Table 2 below which showed result on farmers' level of practice on the improved pearl millet technology. The findings revealed that, majority of the respondents recorded high level of practices with a frequency count of 235 representing 53.2 of respondent where a mean score of 3.71 which was recorded on the level of practice. Followed by respondents

that were categorized as having moderate level of practices with a frequency count of 188 representing 42.5% of respondents while, the few respondents, fall within low level of practice on the improved pearl millet technologies with a frequency of 19 representing 4.3 of respondents as captured in Table 2 below.

Table 2: Farmers Level of Practice

Level	Frequency	Percentage %
Low (1.00-2.66)	19	4.3
Moderate (2.67-3.99)	188	42.5
High (4.00-5.00)	235	53.2

Farmers level of adoption

From Table 3 below, farmers' level of adoption on the improved pearl millet technology and the outcome revealed that, the adoption level of respondents on the improved pearl millet technology recorded high level with a frequency count of 285 representing 64.5% of respondents where a mean score of 4.20 was recorded. followed by respondents that falls within the moderate level of adoption with a frequency count of 129 representing 29.2% of respondents while, the least category falls into low level of adoption with a frequency of 28 representing 6.3% of respondents. This implies that, majority of practicing pearl millet farmers in North-eastern Nigeria have adopted improved pearl millet technologies as captured in Table 3 below.

Table 3: Farmers Level of Adoption

Level	Frequency	Percentage %
Low (1.00-2.66)	28	6.3
Moderate (2.67-3.99)	129	29.2
High (4.00-5.00)	285	64.5

Relationship between independent factors knowledge, practice towards adoption

From Table 4 below, results of the correlational analysis revealed that, all independent factors knowledge and practice had positive correlation with Adoption at (p<0.01) level of probability. Hence, independent factors knowledge and practice recorded moderate correlation. From the results, relationship of the variables with Adoption was (r=0.469, p=000) and (r=0.578, p=000) for knowledge and practice as seen in Table 4 below.

Table 4: Relationship between independent factors Knowl-

edge and practice towards Adoption.

	Variables	X1	X2	Y
X1	Knowledge	1		
X2	Practice	0.578	0.145	
Y	Adoption	0.469	0.117	1
	Significant	0	0.14	
	Mean	4.3	3.44	4.02
	Standard Deviation	0.73	0.29	0.73

Determining the most influential independent factors among knowledge and practice which contribute most towards adoption

This study used regression model to determine the most influential independent factors with a higher beta value, which contribute most to the dependent variable adoption of the improved varieties of pearl millet in North-eastern Nigeria. Thus, the model consists of three independent variables which were analyzed namely; knowledge (X1), Practice (X2). Therefore, the prediction equation is as follows:

$$Y=b_0+b_1(X_1)+b_2(X_2)+e_i$$

Where: Y=Adoption, b0=Constant, b1-2=Estimates (regression coefficients), X1=Knowledge, X2=Practice, e=Error.

The proposed hypothesis to test, which examines the validity of the model, was expressed below:

$$H_0: Y=\beta_0+e_i$$

$$H_A: Y=b_0+b_1 \times 1+b_2 \times 2+e_i$$

From Table 5, the regression analysis revealed that, the independent factors knowledge and practice contributed significantly to adoption of improved Pearl millet varieties among farmers and thus, knowledge had a (Beta=0.283, p=000) and practice Beta=0.493, p=000). Hence, Adjusted R2 value was 0.366 which indicates that, knowledge and practice contributes 36.6% of variance on adoption. Thus, based on the data of the estimated coefficient for respondent performance outcome; Practice and knowledge were highly significant with adoption with a t-value of 0.000. The highest Beta value was 0.493 which was obtained from practice. Hence, practice was found to be the highest contributing independent factor towards adoption behaviour of improved pearl millet in Northeastern Nigeria as portrayed below:

Table 5: Determining the most Influential variable that contribute most towards adoption among farmers

	Predictors	Unstandardized Coefficients		Standardized Coefficients		Sig.
		B	Std. Error	Beta	T	
Y	Constant	0.812	0.375		2.162	0.031
X1	Knowledge	0.283	0.068	0.193	.4.145	0
X2	Practice	0.493	0.049	0.473	10.159	0
R=0.609, R2=0.371, Adj. R2=0.366, Std. Error of the Estimate=0.584						

$Y=.812+0.493(\text{Practices})+0.283(\text{Knowledge})+e^*$ Increase in 1 unit of practices, will therefore increase the DV by 0.493

CONCLUSION

From the results presented, findings on level of knowledge and practice as well as adoption level of farmers have

clearly shown that, the higher the level of the independent factors, the greater the success in the uptake of improved pearl millet technology and subsequent adoption among farmers. Indeed, result on farmer's level of knowledge on the improved pearl millet technology revealed that, majority of pearl millet farmers had high level of knowledge. These results were in line with previous findings by Gupta and Bhat, (2018) Kassahun and Mekonen, (2017) Elizabeth, (2016) Rajiv et al., (2016) Wang et al., (2015), Regine et al., (2016) Quina et al (2014) and Parveen, (2010) who found that, high level of knowledge is a determining factor influencing an outcome variable. Also, descriptive analysis further revealed that, more than half of pearl millet farmers recorded high level of practice. The results conclude that, pearl millet practicing farmers in North-eastern Nigeria had high level of practice. These findings were in line with the findings of Aromolaran et al., (2017) and Yadav et al., (2013) which suggested that, higher level of practice may result into change in adoption behaviour by respondents. In addition, result on farmer's level of adoption was also shown in this study and the outcome revealed that, more than half of the practicing pearl millet farmers recorded high level of adoption. These findings were in agreement with the findings of Olatidoye et al. (2017); Issa et al., (2016), Audrey (2014), Yadav et al. (2013) Awotide et al. (2013), Abebaw and Haile, (2013) Amare et al. (2012), Kafle and Shah, (2012) which confirmed that, respondents recorded high level of adoption. Thus, the overall result on level of knowledge, attitude, practice and adoption level obtained in this study were in line with earlier findings of Meijer et al (2015). Similar studies were also carried out and reported by Elizabeth, (2016) Yu Hu, et al. (2016); Wang et al., (2015) which indicated that, high level of knowledge, attitude and practice are determining factor that influence the dependent variable.

However, findings on relationship between independent factors "knowledge and practice" and the dependent variable adoption were investigated. Results revealed that, there was a direct, positive relationship between knowledge and adoption, which was supported by the earlier findings of Quina et al., (2014), Askarian et al. (2013) and Azman et al. (2013). Hence, correlation coefficient value of ($r=0.469$, $p=0.000$) on knowledge also supported this outcome. More so, direct, positive and significant relationship was also found between farmer's practices and adoption. This relationship was also supported by correlation coefficient for practice ($r=0.578$, $p=0.000$) and the previous findings of Aromolaran et al. (2017); (Elizabeth, 2016); Yu Hu et al. (2016); Yadav et al., (2013) and Adedotun et al. (2010).

In addition, the findings from the regression analysis of this study revealed that, the independent factors knowledge and practice contributed significantly to adoption of improved Pearl millet technology. Thus, Practice was considered as the most contributing independent factor influencing adoption due to its higher Beta value of (0.493). More so, Adjusted R² value was 0.366 which indicates that, knowledge and practice contributes 36.6% of variance on adoption.

Conclusively, from the results presented above, farmers level of knowledge, practice and adoption all recorded

high. The findings also, indicate that all independent variables had positive correlation with Adoption at ($p<0.01$) level of probability. The results further revealed that, knowledge and practices contributed more to adoption. Hence, practice had the highest contribution to farmers adoption with a Beta value of (0.493). Thus, the study suggests that farmers should be encouraged towards developing more knowledge and practices in the cultivation of improved pearl millet varieties in the study area and other pearl millet producing states in Nigeria. More extension agents should also be deployed, to intensify awareness creation in the use of improved pearl millet technology and the need for other relevant areas of improvements.

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