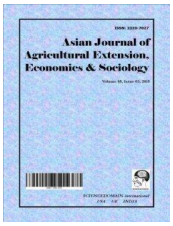

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Constraints to the Adoption of Improved Cassava Varieties among Rural Farmers in Imo State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Authors RNN and PCU designed the study, wrote the protocol and supervised the work. Author PCU performed the statistical analysis and managed the analyses of the study. Authors PCU, RNN and AOA wrote the first draft of the manuscript. Authors PCU and AOA managed the literature searches and edited the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

The paper analyzed constraints to the adoption of improved cassava varieties among rural cassava farmers in Imo state, Nigeria. Specifically, it analyzed the sources of information on improved cassava varieties, identified improved cassava varieties planted, determined level of adoption of the improved varieties and identified constraints to the adoption of improved cassava varieties in the state. Multistage sampling technique was used to select a sample of 120 farmers. Data were elicited from the farmers with the aid of structured questionnaire and interview schedule and were analyzed using frequency counts, percentages, mean, and bar charts. Results revealed that majority (92.7%) of the farmers obtained information on improved cassava varieties from farmers' groups. It also revealed that NR 8082 (91.3%), NR 8083 (76.7%) and TMU 30572 (76.7%) varieties were the most planted. The result further showed that NR 8082 (63.6%), TMS 30572 (57.6%) and

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NR 8083 (55.0%) cassava varieties were adopted. Inadequate credit facility (M = 4.65), inadequate information (M = 4.47), land tenure system (M = 4.24) and poor government support (M = 4.11) constituted constraints to adoption of improved cassava varieties in the study area. It was recommended that innovative measures should be introduced to enhance the capability of agricultural extension service to carry out its responsibilities, particularly in enhancing adoption of improved cassava varieties in the study area.

Keywords: Constraints; adoption; improved cassava varieties; rural farmers; Imo state, Nigeria.

1. INTRODUCTION

Cassava (*Manihot esculenta*) is a major food crop in sub-Saharan Africa. It is primarily a root crop, but the leaves and shoots, which are relatively high in protein, are also often eaten. The roots are an important calorie provider of which over half of the more than 200 million people in sub-Saharan Africa (SSA) get more than half of their calories from foods made from cassava roots. Its value further lies in its ability to grow in sub-optimal conditions, for example, drought and low soil fertility, conditions which are encountered in parts of Africa Manyong et al. [1]. Cassava is also becoming a major source of income for smallholder farmers [2] and of raw materials for local industries [3,4].

Cassava has several uses which range from the provision of food to industrial uses. PIND [5] noted that it is an important staple and the third most consumed crop in Nigeria. Similarly, Manyong et al. [1] added that during times of social and political unrest when people are forced to farm on marginal lands, cassava has proven to be an invaluable food security crop where it can be processed in several forms. Industrially, cassava is used in the production of plywood, starch, alcohol and livestock feed [5].

In 1993, Africa produced about 88 million tons of cassava (about 55% of the world's cassava) and is projected to be more than double in 2020 Scott et al. [6]. Trends in cassava production indicate a steady growth over time. For example, growth rates of 2.55% between 1961 and 1975 and 2.7% between 1976 and 1998 were recorded in all of Africa. West Africa, which is a major cassava growing region, recorded a growth rate of 4.45% between 1978 and 1998 (FAO [7]). According to Manyong et al. [1] about two-thirds of the increase was as a result of the expansion of the area cultivated, the remaining one-third was the result of increased yields from new improved varieties. Improved varieties can have yields nearly 1.5 times higher than the local varieties Manyong et al. [1].

Following the growing recognition of the contributions of cassava to socio-economic development, the Nigerian government has placed emphasis on its production. An example is the Nigeria's presidential initiative on increased cassava production and export programme (ICPEP) inaugurated in 2002. According to FAO [8] the programme aims at creating job for millions of Nigerians, increasing cassava production up to 50 million tons by 2015 and supporting its export among others.

The realization of full potentials of cassava in socio-economic development will not be possible without the large scale adoption of improved cassava technologies by farmers especially those at the grassroots who constitute the bulk of the producers. Studies have reported a growth in cassava production in the West Africa region Manyong et al. [1]. However, Nsoanaya and Nenna [9] argue that the cassava sub-sector is yet to record any significant growth and hence has remained unable to solve the prevailing food crisis in the country. Certainly, some constraints would have hampered the realization of the potentials expected of cassava production in the country, and this could be linked to the level of adoption of improved cassava varieties. Amao and Awoyemi [10] observed that the adoption of improved cassava varieties at the local farm level in Nigeria is still slow and according to them this could be attributed to such factors as unfamiliarity with some of the varieties and unavailability of planting materials.

It is against this backdrop that the following research questions are being asked: which improved cassava varieties are available in the study area? What is the extent of adoption of the improved cassava varieties available in the study area? And what are the constraints to the adoption of improved cassava varieties in the study area?

2. OBJECTIVES OF THE STUDY

The main objective of the study is to identify the constraints to the adoption of improved cassava

varieties in Imo state, Nigeria. Specifically, the study sought to:

1. Identify the sources of improved cassava varieties;
2. Identify the various improved cassava varieties planted in the area;
3. Determine the level of adoption of improved cassava varieties; and
4. Identify factors that constrain the adoption of improved cassava varieties in the study area.

3. METHODOLOGY

The study was carried out in Imo Nigeria. It lies within latitude 4º45'N and 7º15'N and longitude 6º50'E and 7º25'E and covers an area of about 5100 square kilometers (www.imostate.gov.ng). It comprises 27 local government areas and is bounded in the east by Abia state, in the north by Anambra state, on the west by Delta state and River Niger and the south by Rivers State. The population of the state stands at 4.8 million people and the population density varies at 230 persons per square kilometer in Oguta/Egbema areas to about 1,400 persons per square kilometer in Mbaise, Mbano and Mbaitoli areas (Federal Republic of Nigeria Official Gazette [11]).

Rainfall distribution is bimodal with peaks in August and September. Rainy season begins in March and lasts till October. Variation in annual rainfall is between 1990 mm - 2200 mm. temperature is uniform in the state with mean annual temperature of about 20ºC. The annual relative humidity is 75%. The state lies within the rainforest agro ecological zone of Nigeria. The major economic activity of the people is farming which confirms the predominance of rural communities in the state. Major crops grown include cassava, maize, yam, obeche, iroko, rubber, oil palms etc (www.imostate.gov.ng).

The population for the study comprised all rural cassava farmers in the state. Multistage sampling technique was used for the selection of sample. The first stage comprised the purposive selection of two LGAs – Oguta and Ohaji / Egbema – considering the high involvement of the people in cassava production. The second stage comprised the selection of three autonomous communities from each of the two LGAs using simple random sampling technique. The third stage comprised the selection of four villages from each of the six autonomous communities selected, using simple random sampling technique to give a total of 24 villages. The fourth and final stage was the selection of five farmers from each of the 24 villages using simple random sampling technique to give a total of 120 farmers.

Both primary and secondary data were used for the study. Primary data were elicited from the respondents with the aid of structured questionnaire and interview. The available cassava varieties were determined by providing a list of the various improved cassava varieties obtained from literature, Ministry of Agriculture and the Agricultural Development Programme. The farmers were asked to indicate the ones available to them. Their responses were recorded and expressed in percentages.

The level of adoption of the various improved cassava varieties was determined by providing a list of the various improved cassava varieties and the farmers were asked to indicate whether they adopted or not and their responses converted to percentage. Factors constraining the adoption of improved cassava varieties were identified by listing all the possible factors that could constrain the adoption of improved cassava varieties obtained from literature and personal observation and the farmers were asked to indicate the ones that apply to them. Their responses were recorded on a 5-point likert scale of 5 = Strongly Agreed, 4 = Agreed, 3 = Disagreed, 2 = Strongly Disagreed and 1 = Undecided; the mean was determined by adding the values of the scales and divided by the number of scales to get 3.0 which served as the cut off mark. Data were analyzed using descriptive statistical tools such as mean statistics, percentage counts, frequency and bar charts.

4. RESULTS AND DISCUSSION

4.1 Sources of Improved Cassava Varieties

Data in Fig. 1 show that majority (92.7%) of the farmers obtained improved cassava varieties through farmers' groups. It further reveals that friends / neighbours (53.6%) and radio / T.V (43.6%) were other significant sources of improved cassava varieties in the study area. However, minority (19.00%) of the farmers obtained improved cassava varieties through extension agents. This result confirms the rising importance of farmers' groups in the dissemination of improved agricultural

technologies. According to Akinnagbe and Ajayi [12] farmers' groups play vital roles in agricultural development in developing countries. Such roles include access to credit, facilitation of savings and reduction of public-sector extension costs [13].

The result also highlighted the relevance of Information Communication Technologies (ICTs) in technology transfer especially the traditional ICTs (radio and t.v). ICTs because of their potentials such as speed and ability to reach a large audience irrespective of location at the same time have been used extensively in disseminating information on agricultural technologies. Furthermore, radio and television because of their relatively low cost and ubiquity in rural areas and their ability to disseminate agricultural information in local languages have been very useful in technology transfer. According to World Bank [14] radio and other ICTs like mobile phones have been used in reaching out to farmers.

4.2 Improved Cassava Varieties Planted in the Area

Data in Fig. 2 show that NR 8082 cassava (91.3%) was the most planted improved cassava variety in the study area followed by NR 8083 (76.7%), TMU 30572 (71.8%), TMU 419 (68.0%), Pro-Vitamin A (34.0%) and TMS 4(2) 1425 (20.4%). The figure further reveals that TMS 30110 (13.6%), TMS 30001 (12.6%) and TMU 30555 (11.7%) cassava varieties were the least planted in the study area. The relatively low planting of some cassava varieties by farmers in the area could be due to the unfamiliarity of the farmers with them or lack of the planting materials. It could also be that they do not possess desirable characteristics or that they are relatively new in the area thus making the farmers to plant a little of them just to try out their desirability. According to World Bank [15] the availability of planting materials influences the rate of planting a particular crop.

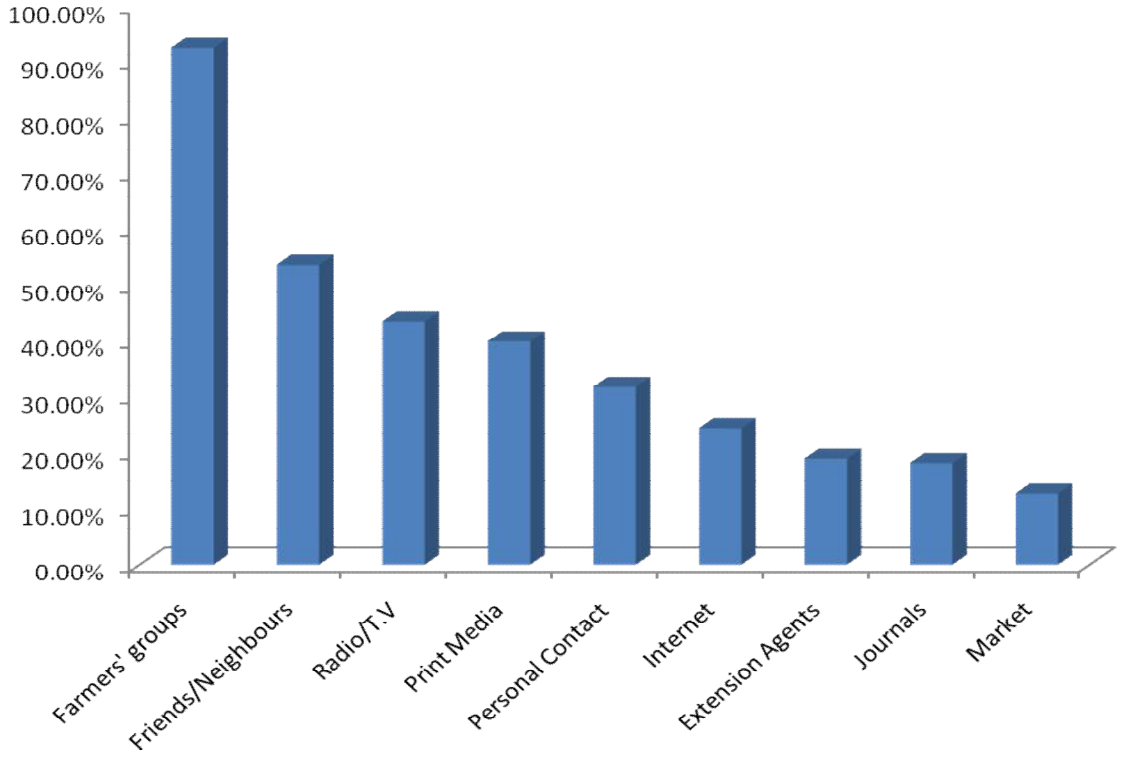

Fig. 1. A bar chart showing percentage distribution of sources of information on improved cassava varieties in the study area

Source: Field Survey Data, 2014

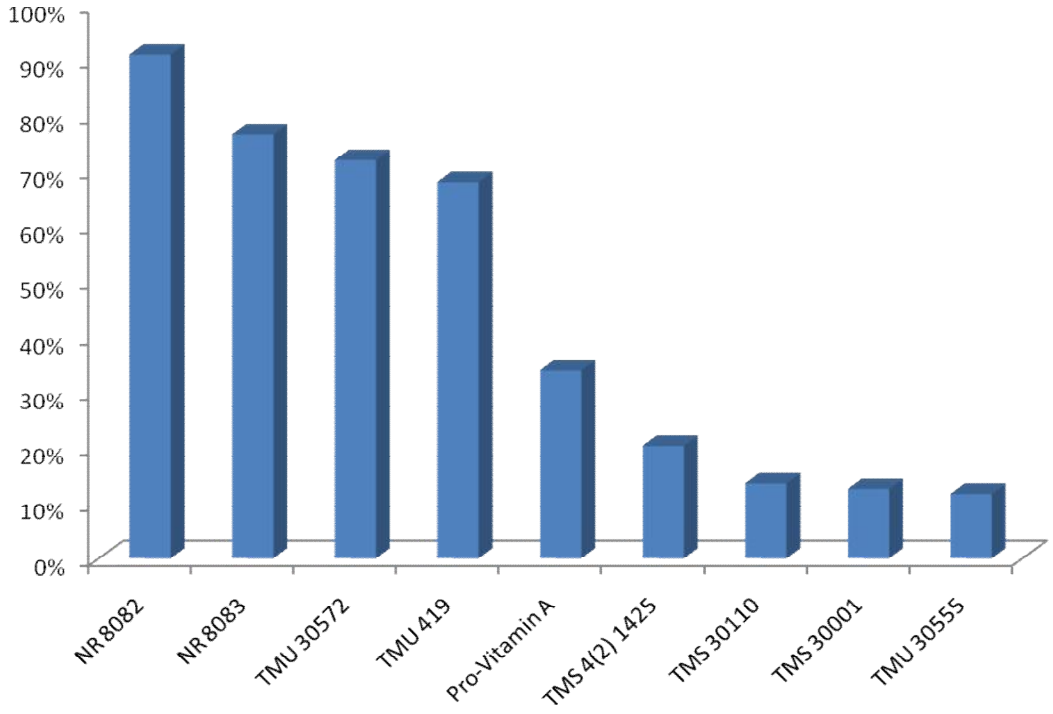

Fig. 2. A bar chart showing percentage distribution of farmers according to availability of improved cassava varieties

Source: Field Survey Data, 2014

4.3 Level of Adoption of Improved Cassava Varieties

Data in Table 1 show that majority (63.6%) of the farmers adopted NR 8082 cassava variety followed by 57.6% for TMS 30572 and 55.0% for NR 8083 variety. This result implies that the adoption of improved cassava varieties in the study area is impressive to an extent since out of the nine varieties planted in the study area three have been adopted. Unfamiliarity with improved cassava varieties, unavailability of planting materials and relatively unknown processing qualities by local farmers could have hindered the adoption of the other varieties [14]. Similarly, Agwu and Anyaeche [16] noted that farmers' adoption of improved cassava varieties could be determined by the extent to which they possess desirable qualities. Such qualities could include high yield, enhanced shelf life, ease of harvest, coloured of peeled tuber, early maturity, pests and disease resistance and ability to suppress weeds. Thus, varieties that are not desirable to farmers might not be adopted.

Table 1. Percentage distribution of farmers according to the level of adoption of improved cassava varieties

Cassava varieties	F (n = 120)	%
NR	63.6	53.0
TMS 30572	57.6	40.0
NR 8083	55.0	45.8
TMS 419	36.6	30.5
Pro-Vitamin	15.8	13.2
TMS 4(2)1425	9.2	7.7
TMS 30555	7.5	6.3
TMS 30110	5.8	4.8
TMS 30001	4.2	3.5

Source: Field Survey Data, 2014

4.4 Constraints to the Adoption of Improved Cassava Varieties

Data in Table 2 show that inadequate credit facility (M = 4.65, SD = 1.39), inadequate information on availability and use (M = 4.47, SD = 1.41), land tenure system (M = 4.24, SD = 1.32), poor government support (M = 4.11, SD = 1.43), low extension coverage (M = 3.94, SD =

1.36), inadequate market information (M = 3.56, SD = 1.67) and high technical involvement (M = 3.03, SD = 1.28) were perceived as barriers to the adoption of improved cassava varieties in the study area.

The availability of credit is essential to the adoption of innovation and enhancement of productivity. Ani [17] noted that agricultural production is capital intensive and farmers in developing countries like Nigeria need to inject money into it. Credit makes it easy for farmers to use new machines, improved seeds and livestock breeds, fertilizer and even extension services. He however observed that women small-holder farmers in Africa face many obstacles in obtaining loans than their male counterparts owing to such reasons as lack of information on the availability of loans, lack of collateral and low literacy level.

Inadequate information on availability of innovations could limit their adoption by farmers. According to Oni [18] various technologies for increasing agricultural production have been developed and imported into the country but lack of awareness on such technologies by farmers have hindered their adoption. Madukwe [19] however observed that the link between extension and research in Nigeria has remained weak. This might shut extension out from having information on improved technologies and thus not relaying any such information to farmers.

Land is a very crucial resource so long as agricultural production is involved. Women farmers who dominate the production of food crops in Africa [17] have had their production potentials hampered due to land-related issues. Some cultures prohibit the ownership of land by women. A study conducted by Olawoye [20] found out that most women who had a land obtained them from their husbands. Ani [17] argued that most times, the lands obtained by women are marginal and infertile and could hardly support good harvest. Ownership affects land use, farming systems and adoption of technologies [18].

Poor government support has been identified as among the major problems hindering technology adoption in Nigeria. Attitude of the Nigerian government towards agriculture has been observed to be dismally poor since the discovery of petroleum in the country. The government has failed to support agriculture reasonably. Such failures include the non-enactment of favourable agricultural policies, poor funding of extension services, and poor development of infrastructure and so on. Oni [18] reported that the non-subsidization of agricultural inputs such as fertilizer, herbicides and pesticides has raised serious concerns. He further maintained that allocation of agricultural inputs to various states usually do not get to the end-users on time. The availability of other inputs, extension service and infrastructure complement the adoption of improved cassava varieties. So in their absence or availability in a little quantity, the adoption of improved cassava varieties might be hindered.

The poor performance of extension service as among the hindrances to the adoption of innovations in developing countries has been identified. Davis [21] mentioned limited budget as one of the contributory factors to the failure of extension service in sub-Saharan Africa. Limited budget will restrain public extension organizations from undertaking some activities like staff recruitment and training. Training is necessary for manpower development in the extension service [18]. Training serves as a motivation for staff. A staff that is adequately trained will be more fulfilled in doing that job unlike one that is not. This situation will lead some staff deserting their job for more fulfilling ones. Madukwe [20] observed that the rate at which staff resign is high in the extension service as a result of inadequate incentives.

The unfamiliarity of an innovation with the targeted adopters might hamper its adoption [10]. Cassava is perceived more as a food crop and as such its production is dominated by women who reside in rural areas. However, majority of rural farmers lack adequate access to education, social interaction, credit facilities and extension services. New technologies need the intervention of extension agents to make them known and understandable by rural farmers. Moreover, some improved technologies require the application of other inputs to be effective. However, the lack of some facilities such as credit would hinder farmers from affording these complementary inputs and eventually preventing the adoption of the technology. However the results are in line with the findings of a study by Nsoanya and Nenna [9] that high cost of inputs and unavailability of market are the constraints to the adoption of improved cassava varieties.

Table 2. Distribution of respondents according to constraints to adoption of improved cassava varieties

Barriers	M	S.D
Inadequate credit facility	4.65*	1.39
Inadequate information on	4.47*	1.41
Land tenure system	4.24*	1.32
Poor government support	4.11*	1.43
Low extension coverage	3.94*	1.36
Inadequate market information	3.56*	1.67
High technical involvement	3.03*	1.28
Inadequate storage facility	2.97	2.22
Inadequate processing facility	2.81	1.19
High demands for	2.81	1.47
High risks/uncertainties	2.66	1.71
Does not do well in local	2.61	1.73
Cultural bias	2.50	1.11

Source: Field Survey Data, 2014

5. CONCLUSION AND RECOMMENDATIONS

The importance of cassava as an important food crop and industrial raw material has continued to grow in Nigeria. However, some factors still militate against the adoption of improved cassava varieties. This situation has constituted a setback to the realization of the target of making cassava a major contributor to the overall GDP of the country. Based on the findings of the study, it is therefore recommended that:

1. Rural farmers should be encouraged by the extension agency to belong to farmers' groups such as cooperatives so as to increase their access to extension services. This will also enable them enjoy other benefits accruable from such groups such as starting up savings, obtaining loans / credits and getting agricultural services at reduced prices.
2. The efficiency of the extension service should be enhanced. This can be achieved through the recruitment of more extension staff, especially field staff and organization of routine training for all cadres of extension staff. There is also the need to introduce innovative extension delivery methods (such as the use of ICTs) so as to enhance the timely dissemination of agricultural innovations. This would promote extension coverage.
3. The government and other relevant agencies should provide loans and credit facilities targeting rural farmers. This might involve the revival of the moribund Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB) to facilitate access to loans by rural farmers.
4. Existing agricultural policies should be reviewed. Similarly, policies and issues affecting land ownership should as well be reviewed so as to promote access to land by smallholder farmers.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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