

Sustained Adoption of Improved Cassava Varieties and Food Security in Nigeria: Implication for Rural Development

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Abstract

Cassava is a dominant component in crop mixtures across sub-Saharan Africa and particularly in Southern Nigeria. It is a common and preferred food security crop especially among smallholder farmers because of its capacity to tolerate drought and low soil fertility; as well as ability to thrive with minimum external inputs among other factors. As a staple food among a large population in sub-Saharan Africa, it has attracted several research efforts in order to attain the improved varieties' status. Accordingly, farmers have been encouraged to adopt the improved cassava varieties in order to increase productivity. Studies have shown farmers' initial willingness to experiment with the improved cassava varieties but so far, continuous uptake and diffusion has not been achieved. This study examines factors affecting the sustained adoption of improved cassava varieties by smallholder farmers in Oboro clan, Ikwuano L.G.A., Abia State, Nigeria. Data was obtained mostly from primary sources. A strategic random sampling procedure was used to select 150 smallholder cassava farmers from 10 communities of Oboro clan, Abia State. Using descriptive statistics, findings support a low intensity and un-sustained adoption of improved cassava varieties in the study area.

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Background to the Study

The food shortages already experienced in many parts of the world over the past two decades call for effective, articulated and integrated programmes towards sustainable food productivity by agriculture and food stakeholders in Nigeria, if mass starvation is to be averted. According to the Global Food Security Index (GFSI) (2020), among the 113 countries assessed, Nigeria maintains the 97 positions with 41.3 score based on indices of affordability, availability, quality and safety. This report is a pointer to Nigeria's food insecurity status. The condition of food insecurity has been noticed in Nigeria as well as other African countries where growing population pressure, combined with climate change, presents a global challenge associated with social and economic costs (Oparinde, Abdoulaye, Manyong, Birol, Asare-Marfo, Kulakow, and Ilona, 2016).

Also, Metu, Okeyika and Maduka (2016), observed that as the population increases, the country's demand for food increases, while the ability to produce food diminishes. This is because pressures from the growing population in various forms including land use, fuel use, etc., add to the concomitant effect of desertification, climate change and erosion to negatively impact on the already diminishing resources and further threatens food production. The situation is a reason that nations all over the world need to step up strategies on how best to sustainably improve agricultural production so as to match the per capita needs of the population.

Fortunately, sub-Sahara Africa possesses cassava as one of its food staples, which with sustained production can, to a large extent, place the region on a food security status. As averred in Manyong, Dixon, Makinde, Bokanga, and Whyte (2000), Cassava is the second most important staple food in Africa after maize, and it is consumed by more than 200 million people in Africa south of the Sahara. The development and introduction of improved cassava varieties in Nigeria therefore was envisaged to be a major strategy for transforming the cassava industry and ensuring an all-time availability of its composite food derivatives as a food security intervention along the value chain and aimed at enhancing the wellbeing of Nigeria's rural as well as urban populations (Dixon and Semakula, 2008).

This intervention was initiated considering the assumption that agricultural productivity growth will continue to be minimal until cost effective yield increasing technologies to meet the needs of an increasing population are developed and communicated to the people through public enlightenment. Food insecurity arises as a result of deficiencies in three aspects: food availability, food access and food adequacy (Agwu and Anyaeche, 2007).

As in every forward-looking society, the looming threat of food insecurity in Nigeria informed the action plan of the agriculture sector and other stake-holders including research institutions and donor organizations to seek for innovative ways for an all-season increase in productivity of common staple crops and ensure availability, accessibility and adequacy. According to Metu *et al* (2016), Food availability involves productivity and other factors in the food supply chain while Food accessibility concerns

the capacity for food procurement which is hinged on economic and physical pre-conditions. The economic condition depends on one's income; the price of food and the purchasing power of the people, while the physical condition depends on availability and quality of infrastructure including Land, needed for the production and distribution of food. Within this context also, food adequacy reflects the impact of food intake and utilization on the population.

This concern about the dwindling food productivity against increasing population in Nigeria informed the decision of stake-holders to push for policy change toward the use of improved crop varieties, not only for increased production but shortening maturation periods. The idea of improved crops varieties and their uptake by farmers in Nigeria therefore was conceived to contain unprecedented food insecurity, as the intervention was designed to make food both available and accessible to the population.

In recent times, Stake-holder's interest in Nigeria (including the Federal Ministry of Agriculture, Food and Agricultural Organisation, and other relevant partners and research institutions) have shifted from mere acceptance by farmers to experiment with modern agricultural technologies; to intensity and sustained adoption, especially with regard to the continuous uptake and diffusion of improved cassava varieties. In addition, policy interest has risen around constraints to adoption and the impact of improved cassava varieties on commodity production, poverty, and input use (Uduji and Okolo-Obasi, 2018). Therefore, the issue of whether or not there is a sustained adoption of these technologies constitutes the major consideration of this paper.

Several studies in Nigeria including Ikpi, Gebremeskel, Hahn, Ezumah and Ekpere (1986), Udensi, Tarawali, Favour, Asumugha, Ezedinma, Okoye, Okarter, Ilona, Okechukwu and Dixon (2011) and Apu and Nwachukwu (2011) have attempted to address this and other issues since the 1980s, but a comprehensive solution seems elusive as there is a persistence of intermittent adoption, and in some cases total adoption apathy among farmers in different regions of the country. This study which was conducted at the onset of 2021/2022 planting season aims at evaluating the improved cassava varieties adoption intensity and the challenges of sustained adoption in Nigeria.

In order to achieve this, the following research questions were addressed;

1. What is the level of smallholder farmers' acceptance to experiment with improved agricultural technologies in the study area?
2. What is the level of uptake and diffusion consistency after first adoption of improved cassava varieties among smallholder farmers in the study area?
3. What are the identified challenges against continuous uptake and diffusion of improved cassava varieties in the study area?

Assessing the intensity as well as the expected impact of sustained adoption of improved cassava varieties can assist with setting priorities, providing feedback to the research institutions and scientists, guiding government policy makers and those involved in

technology transfer to improve on technological provisions that can stimulate sustained adoption and food productivity, ensure food security, quicken poverty reduction in farming communities while enhancing rural community and environmental development.

Theoretical Framework

The theoretical framework is based on the Malthusian theory of population growth. Thomas Malthus (1798), warned that global population would exceed the earth's capacity to grow food since population grows in exponential progression while food production grows in arithmetical progression. Despite having been largely criticised, this theory seems true in many regions of the world, particularly developing countries including Nigeria, and remained relevant in the discourse regarding agricultural technology, increased food production and rural development. Malthus' argument was a warning against rapid population increase especially such as witnessed among the poor because he described the poor as breeding rapidly and depriving the rest of the population of food. In the Nigeria situation, the pressure from population explosion has caused current production of food to be far below the population requirement. Food distribution therefore constitute a major food security challenge, and with the onset of Covid-19 pandemic aggravating the condition already worsened by the activities of insurgency, banditry, herders-farmers' clashes among others, Nigeria is already sinking in the food crises trap.

A random sampling procedure was used in selecting 150 smallholder cassava farmers from 10 communities of Oboro clan in Ikwuano Local Government Area of Abia State. These communities include; Ntalakwu, Ngoro, Nnono, Isiala, Ekebedi, Amawom, Umuokwo, Amaoba, Umuriagha and Umugbalu. Using descriptive statistics, findings support a low intensity and unsustainable adoption of improved cassava varieties in the study area. Oboro is one of the four clans that constitute Ikwuano Local Government Area of Abia State. The choice of the study area was informed by the adjacent location of the National Root Crop Research Institute, Umudike, to this area and the perceived influence of the institution toward improved cassava varieties uptake and diffusion in the area.

History of Production, Diffusion and Uptake of Improved Cassava Varieties in Nigeria

It has been observed that genetic research level investment in Nigeria occurred in 1977 when high-yielding mosaic resistant varieties of Tropical Manioc Selection (TMS 50395, 63397, 30555, 4(2)1425, and 30572) were released by International Institute of Tropical Agriculture (IITA) with the aim of improving the productivity of cassava-producing farming households in Nigeria (Uduji and Okolo-Obasi, 2018). The Collaborative Study of Cassava in Africa (COSCA) reported that progress was made as improved cassava varieties were found to yield significantly more than local varieties in sub-humid areas under both inter-cropping and mono-cropping management practices (Nweke, Ugwu and Dixon (1996).

As argued in Nweke and Akorhe (2002), adoption of improved agricultural technology offers opportunity to increase production and income, thereby reducing food insecurity. However the averral in Eze, Ibekwe, Onoh and Nwajiuba(2008) points to the fact that this depends on a range of personal, social, cultural and economic factors as well as on the characteristics of the innovation itself. In adopting a new technology, farmers often follow a process where they may adopt a new technology in parts of their land first and then adjust in later years based on what they learn from the earlier partial adoption. However, they would never adopt an innovation if outputs are not increased from given resources, and/or if inputs are not decreased for a given output (Prokopy, Floress, Klotthor and Baumgart, 2008).

Agwu and Anyaeché (2007); Nwakor, Ifenkwe, Okoye, Onummadu, Anyaegbunam, Ekedo and Onyia (2011), Apu and Nwachukwu (2011) have all reported high adoption rate of improved cassava varieties in various parts of Nigeria since its inchoate roll out. According to Dixon, and Ssemakula (2008), with close and strategic collaborations between the International Institute of Tropical Agriculture (IITA), the International Center for Tropical Agriculture (CIAT), and National Agricultural Research Programmes, about 59 early-bulking, disease-resistant, and high-yielding cassava varieties have been officially released since 1977.

Studies on improved cassava varieties adoption in Nigeria have shown that farmers who are more likely to adopt a higher number of the improved cassava varieties are male, educated, and have better access to input supply and extension services (Omonona, Oni and Uwagboe, 2006). A few studies also include that the males are those supporting a household (Adeoye, Olaore, Aliu, Adeoye, (2012); Nnadi and Akwiwu, 2008).

Studies on improved cassava varieties adoption in Nigeria have also shown differences in results based on study areas and sampling design as well as adoption intensity. For instance, Akoroda, Gebremeskel, and Oyinla (1989) reported an adoption intensity of about 63 percent in Oyo State in 1985, while Ikpi et al. (1986) reported an adoption intensity of about 25 percent in the same state in 1986. Ikpi (1988), however, reported that land area allocated to improved cassava varieties kept increasing at an annual rate of 16.5 percent in the southwestern region. It has been reported that improved cassava varieties were found to yield significantly more than local varieties in sub-humid areas under both inter-cropping and mono-cropping management practices (Nweke *et al* 1996).

According to report, the Collaborative Study of Cassava in Africa (COSCA) was conducted in 65 villages and 195 farm units across all of Nigeria's agro-ecological zones (Nweke *et al*, 1996). This collaborative study represents the first effort to systematically evaluate cassava adoption nationally in Nigeria. In 1989, COSCA reported an adoption rate of about 60 percent for improved varieties across cassava producing areas in Nigeria (Nweke *et al*, 1996). By the late 1980s, the TMS diffusion in Nigeria had become an African success story par excellence. The TMS varieties were grown in both the forest and the savanna zones of Nigeria. The TMS 30572 variety was reported to be the most popular,

especially among farmers who process it as garri for sale in urban markets (Nweke *et al*, 1996)). A positive policy environment and enhanced extension services, among other factors, influenced this adoption success (Nweke *et al*, 1996)). Despite this seemingly success story, the question of sustained adoption is not answered.

Agricultural Technologies, Food Security and Rural Development

It has earlier been asserted that the development and introduction of improved cassava varieties in Nigeria was envisaged to be a major strategy for transforming the cassava industry and ensuring an all-time availability of its composite food derivatives as a food security intervention along the value chain and aimed at enhancing the wellbeing of Nigeria's rural as well as urban populations (Dixon and Semakula 2008).

This intervention becomes all the more relevant with the growing initiative for agricultural productivity through cost effective yield increasing technologies to meet the needs of an increasing population.

Sustained adoption of improved cassava varieties should expectedly lead to increased food productivity, food security and rural development through strategic transformation in the agricultural value chain. One of the basic tasks in rural development therefore, is to decrease the famine that exists in about 70 percent of the rural population, and to make sufficient and healthy food available (Ukpong-Umo, 2014). Fortunately, cassava root can be processed into other level products including, Gari, Fofu, Flour, pellets, chips and starch, none of which is without positive economic impact.

For a proper rural development to be entrenched, a social process must evolve, and viewed in the economic sense is seen as the process of assuring a progressive improvement in economic security of people in rural areas. Rural development is the progressive activity or positive social change that takes place in the rural environment, which itself is a factor in curbing rural out-labour migration. It may generally refer to the process of improving the quality of life and economic well-being of people living in relatively isolated and sparsely populated areas. It is a strategy that tries to obtain an improved productivity, higher socio-economic equality and ambition, and stability in social and economic development of the ruralites (Ukpong-Umo, 2014).

Since the rural area is where agriculture and food production thrive for the sustenance of both the rural and urban population, an intervention to boost food production and enhance food security while ensuring an integrated and sustainable development is imperative. Therefore, in attempting to solve the problems of food production in Nigeria, attention must be given to agriculture and on developing the rural communities. This is important considering the role of primary production in rural economies including; employment generation, income generation, foreign exchange earnings, production of food and fibre, provision of raw materials for agro-industries, etc.

Sustainable rural development is vital to the economic, social and environmental viability of nations. As averred in Ukpong-Umo (2014), it is essential for poverty eradication since global poverty is overwhelmingly rural. The opposite of food insecurity is food security and is said to exist when all people, at all times have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (Davies, 2009). This includes people in both rural and urban settings.

Findings and Discussions

Table 1: Adoption frequency from the year 2000 - 2020

Number of Respondents	Adoption period	Number of years	Adoption status	Per cent (%)
120	2000-2005	6	consecutive	80.0
15	2006-2010	5	Intermittent	10.0
10	2011-2015	5	Intermittent	6.7
05	2016-2020	5	Intermittent	3.3
Total = 150		21		100

About 80 per cent of respondents were consistent up takers only within the first five years of initial introduction of improved cassava varieties (which were supplied to them free by agricultural extension agents). The number of adopters experience a shrink in subsequent years in terms of adoption intensity and acres of land cultivated. In the last five years (2016-2021) less than 3.3% of total number of respondents used the improved varieties.

It is apparent from the study that farmers evolved the attitude of intermittent adoption of improved cassava varieties irrespective of educational attainment, gender and other statuses. Most of them posited low output due to watery paste, selective soil to yield effect and Quick decay on maturation effect as reasons for adoption discontinuities.

Challenges to Sustained Adoption of Improved Varieties of Cassava stem

Several factors were identified as potential causes for improved cassava varieties' adoption discontinuities in the area and these include; Low output per Kg due to watery paste; quick decay on maturation effect; selective soil to yield effect; perceived effect of genetic mutation of plants on humans and selective fertilizer effect as well as inability to procure improved varieties

Summary

There are adoption discontinuities even among hitherto high adoption intensity farmers. It is likely that the high adoption rate as hitherto reported in some studies were recorded because such studies were conducted among beneficiaries of a programme that directly received improved cassava varieties during their initial dissemination. Poorer farmers for instance, may have stopped using improved materials in later years since cultivation of improved varieties requires more agro-inputs than traditional varieties.

Conclusion

The development and introduction of improved cassava varieties in Nigeria was envisaged to be a major strategy for transforming the cassava industry and ensure an all-time availability of its composite food derivatives as a food security intervention along the value chain and aimed at enhancing the wellbeing of Nigeria's populations, both rural and urban.

This intervention becomes all the more relevant with the growing initiative for agricultural productivity through cost effective yield increasing technologies to meet the needs of an increasing population. Sustained adoption of improved cassava varieties should expectedly lead to increased food productivity, food availability, food affordability and food security as well as overall rural development through strategic transformation in the agricultural value chain. However, findings from the study show that irrespective of the intervention (through the procurement of improved cassava varieties), food is still unavailable, unaccessable and unaffordable with subsequent sustained food insecurity.

The above deduction is drawn from the responses given by most respondents who attributed the adoption discontinuity of improved cassava varieties to high water content, resulting to watery paste, which in-turn lead to low output per kg of finished products including gari and fofo. Other reasons deduced for adoption discontinuities of improved cassava varieties include quick decay on maturation effect; selective soil to yield effect; perceived effect of genetic mutation of plants on humans; dearth and selective fertilizer effect.

The deduction that many farmers in the study area seem to have been deterred from fully and continuously adopting the existing improved cassava varieties is an indication that government and major stakeholders' investment in this direction would have failed. This situation calls for a swift government response so that the huge resources earlier invested may not be wasted, and the teeming population salvaged from sinking lower in the food insecurity trap.

From the above, there is evident of low adoption intensity of improved cassava varieties in the study area. These farmers are seen to have returned to the traditional and land race varieties which they claim are better than the improved varieties, not only because of its rising capacity and increased output, but for its comparative capacity to thrive better in terms of tolerating drought, low soil fertility and minimal external inputs. Farmers intermittently make use of the improved cassava stems as substitutes whenever they could not find what they call "good Land race/ traditional varieties".

Recommendations

First, a reasonable size of the rural workforce should be maintained in the rural areas for agrarian occupations. This can be achieved if government give priority attention to rural development so as to improve rural economies, with consideration to the following objectives; balancing of rural income with that of the urban by providing rural industries;

provision of easy access to basic farm inputs, adequate budgetary allocations to agriculture sector in order to enable more research into further content improvement of the already improved cassava varieties, enunciation of appropriate policies to strengthen the food crop sub-sector and peasant farmers' education.

Again, gender dimensions in the adoption of improved cassava have not received significant attention. Therefore, as a matter of urgency, a gender differentiated dissemination and adoption strategies should be applied in order to promote sustained adoption since women have unique roles along the cassava value chain in Nigeria.

References

- Adeoye, B.K., Olaore, Y., Aliu, B. & Adeoye, A.O. (2012). Family size, Income and Marriage types as Predictors of Healthy Living. A case study of families in Ogun State, Nigeria. *Greeber Journal of Social Sciences*, 2(6), 191-196.
- Agwu, A. E. & Anyaeche, C. L. (2007). Adoption of improved cassava varieties in six rural communities in Anambra State, Nigeria. *African Journal of Biotechnology*, 6(2), 89-98.
- Ajala, A. O., Ogunjimi, S. I. & Farinde, A. J. (2012). Assessing the Effectiveness of Improved Cassava Production Technologies among Cassava Farmers in Osun State, Nigeria. *Journal of Agricultural Research* 1(7), 281-288.
- Akoroda, M. O., Gebremeskel, T., & Oyinla. A. E. (1989). Impact of IITA Cassava Varieties in Oyo State, Nigeria, 1976-1985. *Tropical Agriculture*, 66(2), 113-120.
- Apu, U., & Nwachukwu. I. (2011). Effect of Adoption of Improved Cassava Varieties on Farmers' Income in Abia State, Nigeria. *Journal of Agriculture and Social Research*, 11(2), 155-160.
- Davis, A. E. (2009). Food security initiatives in Nigeria: prospects and challenges. *Journal of Sustainable Development in Africa*, 11(1), 186-202. Clarion University of Pennsylvania.
- Dixon, A. G., & Ssemakula, G. (2008). Prospects for Cassava Breeding in Sub-Saharan Africa in the Next Decade. *Journal of Food, Agriculture & Environment*, 6(3-4), 256-262.
- Eze, C. Ibekwe, U., Onoh, P., & Nwajiuba, C (2008). Determinants of Adoption of Improved Cassava Production Technologies Among Farmers in Enugu State, Nigeria. *Journal of Agricultural Extension* 2(1), 37-44.
- Global Food Security Index (2020). Retrieved from www.impact.economist.com.

- Ikpi, A. E., Gebremeskel, T., Hahn, N. D., Ezumah, H. & Ekpere J. A. (1986). Cassava – A Crop for Household Food Security. A 1986 Situation Analysis for Oyo Local Government Area- Nigeria. IITA-UNICEF Collaborative Program on Promotion of Household Food Production and Nutrition, Socio-economic unit, IITA.
- Malthus, T.R. (1798). An Essay on the Principle of Population. London. J. Johnson Publishers
- Manyong, V., A. Dixon, K. Makinde, M. Bokanga, & Whyte, J. (2000). The Contribution of IITA-Improved Cassava to Food Security in Sub-Saharan Africa: An Impact Study. *International Institute of Tropical Agriculture*.
- Metu, A., Okeyika, K. & Maduka, O. (2016). Achieving Sustainable Food Security in Nigeria: Challenges and Way Forward. *3rd International Conference on African Development Issues*. Department of Economics, Nnamdi Azikiwe University, Awka, Nigeria.
- Nnadi, F.N. & Akwiwu, C.D (2008). Determinants of Youths' Participation in Rural Agriculture in Imo State, Nigeria. *Journal of Applied Sciences* 8(2), 328-333
- Nwakor, F. N., Ifenkwe, G. E., Okoye, B. C., Onummadu, F. N., Anyaegbunam, H. N., Ekedo, T. O. & Onyia, C. E. (2011). Socio-Economic Factors Affecting Adoption of Improved Cassava Varieties among Farmers in Abia State. *Journal of Agriculture and Social Research*, 11(1), 63–71.
- Nweke, F. I., Ugwu, B. O., & Dixon, A. G. (1996). *Spread and Performance of Improved Cassava Varieties in Nigeria*. Collaborative Study of Cassava in Africa (COSCA) Working Paper No. 15, Resource and Crop Management Division. Ibadan, Nigeria: International Institute of Tropical Agriculture.
- Nweke, F., & Akorhe, A. (2002). *Adoption Behaviour of Farmers Towards Yam mini sets Technology in Imo State, Nigeria*. A paper presented at the 25th Annual Conference of Agricultural Science Society of Nigeria on September, 5-7. Federal University of Technology, Owerri.
- Omonona, B. T., Oni, O. A. & Uwagboe, A. O. (2006). Adoption of Improved Cassava Varieties and Its Welfare Impact on Rural Farming Households in Edo State, Nigeria. *Journal of Agricultural and Food Information*, 7(1), 39–55.
- Oparinde, A., Abdoulaye, T., Manyong, V. Birol, E., Asare-Marfo, D., Kulakow, P. & Ilona, P. (March, 2016). A Technical Review of Modern Cassava Technology Adoption in Nigeria (1985–2013): Trends, Challenges, and Opportunities. Retrieved from HarvestPlus website: [https://www.gatesopenres-182674%20\(1\)](https://www.gatesopenres-182674%20(1)).

- Prokopy, L.S., Floress, K., Klotthor, W. & Baumgart, G. (2008). Determinants of Agricultural best practices adoption: Evidence from the Literature. *Journal of Soil and Water Conservation*, 63(5), 300–311
- Udensi, U. E, Tarawali, G., Favour, E. U., Asumugha, G., Ezedinma, C. Okoye, B. C., Okarter, C., Ilona, P., Okechukwu, R., and Dixon, A. (2011). Adoption of Selected Improved Cassava Varieties among Smallholder Farmers in South-Eastern Nigeria. *Journal of Food, Agriculture & Environment*, 9(1), 329–335.
- Uduji, J.I. & Okolo-Obasi, E.N. (2018). Adoption of improved crop varieties by involving farmers in the e-wallet programme in Nigeria. *Journal of crop Improvement*, 32(5).
- Ukpong-Umo, R. (2014). Cooperative societies, rural development and the self-help process. A paper presentation during the end of year ceremonies of Rumoumasi Multipurpose Cooperative Society Ltd., Port Harcourt on 18th December, 2014