



Implementing the Adoption of Agricultural Technology by Women for Food Consumption, and Productivity in Households in Rural Nigeria

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The Context

The adoption of agricultural technology, which includes the adoption of herbicides, pesticides, and inorganic fertilizers by smallholder farmers has been a major tactic used in issues that focus on rural and agricultural development. It can be argued that these technologies are means adopted to improve the output of farmers' productivity. Yet, little or nothing is done to improve agricultural technologies especially in rural Nigeria. Evidence suggests an element of gender inequality in the adoption of such technology by farmers. Female farmers in Nigeria, especially those in the rural areas, are less likely to adopt some of these improved technologies compared to men because of their inability to access the technologies.

There is, therefore, a rising momentum in policies that are targeted at improving the rate of agricultural technology adoption by farmers, especially women in rural Africa. In the ECOWAS sub-region, there are structures set up to improve agricultural technology adoption, such as the West Africa Fertilizer Programme (WAFP) that is focused on improving agricultural productivity through distribution of high quality and affordable fertilizers to most constrained farmers. In recent years, Nigeria has implemented an agricultural promotion policy that targets agricultural sector sustainability and rural development by 2020. While this ambitious policy is targeted at enhancing the adoption of agricultural technology among farmers, there is limited attention on women in rural Nigeria.

The problem

Available statistics on the nutrition outcome in Nigeria are staggering. Nigeria ranks 96/113, disaggregated as 101, 100, and 77 for affordability, availability, and quality and safety, respectively in the Global Food Security Index – GFSI (GFSI, 2018). There is, therefore, need for policies to be targeted at addressing this situation by encouraging coping mechanisms in the form of agricultural technology adoption, especially among women who participate more in this sector but have low access to agricultural input (World Bank, 2018). The adoption of agricultural input will immensely reduce the tendency of households headed by females to be susceptible to chronic food insecurity and increased rural ‘suffering’. Despite these, it is yet unknown the gender dynamics of the extent to which the adoption of these technologies has impacted food productivity and consumption.

Background

Although approximately 80% of the agricultural production in most African countries comes from smallholder farmers who are mostly rural women, they do not have access to some of these agricultural inputs (Mugede, 2013). The low rate of adoption of agricultural technology, particularly among women, can be potentially traced to poor finance, lack of access, and lack of knowledge of farmers regarding these technologies (Ellis et al., 2007).

In Nigeria, the agricultural sector contributes about 39.2% of the country’s GDP and employs about 60% of the labour force (NBS, 2013; Oseni, Goldstein, and Utah, 2013). Women constitute nearly half of this agricultural population and are mainly engaged in smallholder activities or subsistence agriculture. In addition to being responsible for taking care of small ruminants, and poultry, women are also in charge of marketing agricultural products and livestock by-products. More importantly, the extent of the coping mechanisms of these rural smallholders when confronted with adverse environmental and farm conditions such as pest and weed infestation complicates farm

processes for rural women considering the high poverty rate and low use of modern agricultural technology, which affects productivity from year to year (World Bank, 2014).

This challenge is, however, severe for women whose active participation in agricultural activities is affected due to several obstacles. Key among these obstacles is excessive workload and social constraints that result in gender-based discrimination, and poor access to agricultural input compared to their male counterparts. In Nigeria, for instance, male plot managers are more likely than female plot managers to use fertilizer inputs (42% and 19%, respectively), and herbicide (26% and 6%). The combined effects of these climate and gender-based social constrain make women more prone to food insecurity, poor health, and poor well-being in Nigeria (Oseni, Goldstein, and Utah, 2013).

As part of effort to address the mentioned challenges, the Nigerian Government together with foreign donors such as the United Nations Development Programme (UNDP) has rolled out some agricultural interventions to improve agricultural output in rural areas through projects and programmes that are gender sensitive. Among the numerous initiatives are the Agriculture Development Programme, Agricultural Credit Guarantee Scheme, Rural Electrification Scheme, National Agricultural Land Development Authority, Strategic Grains Reserves Programmes, and Rural Banking Programme, which are directed at improving the agricultural sector in Nigeria. Of all these initiatives, the FADAMA project stands out as a typical example that creates opportunities for Women through domestic, social, and productive investments.

The implication of these interventions on the overall well-being of the household will be more effectual while it is gender inclusive (Christiaensen and Demery, 2018). Women, especially in rural Nigeria, participate actively in agricultural activities through smallholding activities, contract farming, and outgrower schemes, among others. Despite their participation, they earn less than their male counterparts in most aspect (Olayinka, 2013), and are actively engaged in the non-paid labour allocation within the household, which includes home keeping, childcare, and food preparation. Therefore, those input-related interventions by the Government, if it is highly sensitive to inclusive participation, especially in considering female, will have significant implication on household poverty, food nutrition and consumption, and even productivity for the female households in rural Nigeria.

Findings/results

The data for the study on which this policy brief is based are sourced from the World Bank's Living Standards Measurement Study (LSMS) - Integrated Household Survey for Nigeria. The LSMS data is a rich nationally representative survey that contains about 5,000 households from different states of Nigeria for two seasons – post-planting and post-harvest. This study relies on the latest wave of the survey to reduce measurement

errors that could arise from changes in the gender of the household head status that is evident across different waves of the data. In summary, the 2018/2019-survey period of the LSMS data was used for this study. The survey covers different crop categories that are grown by the households and detailed information about the farmlands of the household.

The food consumption is measured using two indicators. The first is the total household food consumption per capita (i.e. total value of food consumption in local currency unit (Naira) divided by household size). The second is food diversity index, which captures the household's food access and caloric availability associated with improved birth weight and child anthropometric status, hemoglobin concentration and reduced risk of mortality from cardiovascular disease (Bhargava, Bouis and Scrimshaw, 2001; Rao et al., 2001; Pangaribowo, Gerber and Torero, 2013). This variable is therefore computed based on the 12 food categories proposed by Swindale and Bilinsky (2006) in Kennedy, Ballard and Dop (2013), as the summation of the household 7-day recall of the consumption of the following food items: cereals, white tubers and roots, vegetables, fruits, meat, eggs, fish and other seafood, legume nuts and seeds, milk and milk products, oils and fats, sweets, spices, condiments, and beverages².

Here, the agricultural technology adoption is conceptualized to mean the transition of agricultural activities from the traditional process to modern induced processes that are in two forms: transition from the use of traditional tools of farming (like hoes, cutlasses, and wheelbarrows) to more mechanized tools (like mechanized irrigation, tractors), and from traditional crop production inducement inputs (like the use of animal dungs) to green revolution processes like the use of hybrid seedlings, high yielding seeds, synthetic fertilizers, and pesticides, of which the later transition is limited for use in rural Nigeria.

One important finding is that, across the categories of food consumption, the effect of agricultural production due to household's adoption of the technologies is relatively higher for pesticide than that of herbicide and inorganic fertilizer. This finding implies that agricultural development interventions such as distribution of inputs to households with the ultimate objective of improving their food consumption would have to prioritize those interventions that yield relatively higher effects while considering other intervening factors for women farmers in rural Nigeria.

Considering the results, the adoption of agricultural technology by women improves food consumption of the household. Indeed, at percent level of statistical significance, a female-headed household that adopts herbicide usage for its farm production has an increase in dietary diversity score. Compared to the mean dietary diversity score,

2 The 12-food categories is a good indication of household economic access to food compared to an alternative measure that considers only 9-food categories, which reflects the probability of micronutrient adequacy (Kennedy, Ballard, and Dop 2013).

this increase is about 8%, implying that female-headed household at the mean dietary diversity seen at an increase in its food consumption with an additional increase in the rate of productivity. Furthermore, with increased rate of productivity that arises from pesticide use and the use of inorganic fertilizer, households at the mean dietary diversity rate record 9% increase in dietary diversity. The results for food consumption using logarithm value of the amount that is spent on food consumption show similar positive effects from increased productivity due to households' adoption of agricultural technology. For example, a typical household at the mean food expenditure (log form) value is likely to see a 3% increase in this variable, with a percent increase in productivity from the adoption of herbicides. Likewise, household at mean food consumption shows a 3% increase in expenditure on food consumption with an additional increase in productivity due to households' utilization of pesticide and inorganic fertilizer.

Like the results for the female-headed households are the estimates that show positive effect of agriculture productivity due to male-headed households' adoption of agricultural technologies. However, what is very conspicuous from the results is that the magnitude of the effect of productivity due to agricultural technology adoption is relatively higher within female-headed households than their male counterparts. This observation suggests that female farmers could be equally productive as male farmers when given the necessary support. It can also be inferred from these results that since females are mostly the ones responsible for household food production, any policy targeted at improving household consumption is likely to benefit female-headed households more than male-headed households. The direct and indirect effects of agriculture technology turned positive, particularly for the dietary diversity scores. It is also observed from both tables that herbicide use has relatively higher and more significant (direct) effect on the food consumption indicators compared to the effect of pesticide use. This suggests that household food consumption is not only defined by its diversity but also the security of the food, which is defined as "assured access by all household members at all times to enough food for an active, healthy life" as noted by Anderson (1990).

Policy implication/recommendations

Decrease in the adoption of agricultural technology by women may continue to pose a threat to food consumption, nutrition outcomes and productivity in rural Nigeria. More attention needs to be paid to agricultural technology adoption as a viable option to improve the food security, income and the welfare of mostly rural households whose livelihoods largely depend on their agricultural activities. However, by virtue of the socio-cultural configuration in Nigeria, policies mostly designed to achieve these objectives tend to be gender neutral regardless of the ample evidence that women are as equally productive as men when offered equal agricultural development support. Such

policies also fail to take into consideration the unequal gender distribution of income and household consumption expenditure, which work to the disadvantage of women.

The Nigerian Government and the Ministry of Agriculture should consider gender mainstreaming in designing policies aimed at providing support for agricultural development, particularly in rural areas. Such policies should not only focus on the inequality between men and women but also consider the inequality among the same gender in terms of the locations (urban and rural areas) in Nigeria.

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