

Does Collective Action Improve Gender Inclusiveness in Agrarian Change? Evidence from Cassava Based Smallholder Households in Nigeria

Temitayo Adenike Adeyemo
Nigeria institute of Social and Economic Research (NISER)
University of Ibadan

Vincent O. Akinyosoye
University of Ibadan

Victor O. Okoruwa
University of Ibadan

Does collective action have an enhancing effect on gender inclusiveness in the agrarian change matrix? This was investigated among 800 cassava-based smallholder households in a cross-sectional survey in Nigeria. Agrarian change was viewed as a function of access to productive resources (land, other assets), processes (Value addition and Nonfarm employment) and outcomes (income) in the study areas. Findings revealed that collective action was able to improve access to resources (land and assets) needed to drive the processes of agrarian change among male and female farmers. The study recommends strengthening institutions for collective action to drive positive and inclusive agrarian changes.

Keywords: collective action, gender inclusiveness, agrarian change, smallholder, Nigeria

INTRODUCTION

Agricultural systems are constantly evolving; forming the basis for shaping global agri-food systems (IFAD, 2015; National Geographic, 2016). These changes have arisen as a result of the evolution of sociological, political, cultural, industrial and technological factors that lead to shifts in the structure, processes and function of agricultural systems (Hazell and Wood, 2007; Galdeano-Gómez et al., 2016). The evolution of agrarian societies in themselves were a response to the food and raw materials needs of societies in the drive for development as witnessed in the industrial ages many developed countries. (Mathias, 2001; Bernstein, 2015). To the extent that agricultural systems have developed from rural societies, agrarian changes may mean inevitable changes in the structure of the rural economy (Cliché, 2011). However, little attention has been given to the many income generating off-farm and non-farm employment opportunities that exist within the rural system (Vatta et al., 2008) including in Nigeria. These other economic activities could be a veritable source of support to the agrarian system, providing input, adding value, giving market access and linking up the agricultural systems to the larger economy (Haggblade et al., 2010).

The Nigerian agricultural system contributes up to 21% of the national GDP in 2017 (World Bank, 2018; Trading Economics, 2018); employing up to 36% of the national workforce (National Bureau of Statistics (NBS), 2010). Although, agriculture contributes a larger percentage of the economy of rural areas, farmers have increasingly begun to seek other means of diversifying their income sources to sustain their living standards, including migration, off farm employment, on-farm employment, value addition (Barret et al., 2001; Babatunde and Qaim, 2009; Oseni et al., 2013). The processes involved in these strategies have become key to the structural changes in labour allocation, resource endowment, production practices and outcomes that have become characteristics of a changing agrarian structure (Saturnino, 2009). The societal power plays, structures, processes and functions that characterize agrarian systems as in most systems are continually evolving with consequent changes in roles of the people, and the outcomes that emerge from their economic and political decision-making processes (Rodriguez et al., 2016). These processes have been shown to be powerful change agents to the traditional agrarian systems (Durmont et al., 2016), leading to the body of research questioning a steady de-agrarianisation of rural economies. The extent of agrarian transformation in many cases also differ with defined gender roles and institutional framework to give direction to the changes (Haggblade et al., 2010).

One of the means of developing enabling institutions to guide agrarian transformation is through collective action (Fabusoro and Sodiya, 2011; Gyau et al., 2014). By definition, collective action involves the arrangement of peoples in bringing together similar ideas for the utilization of public goods, channeling of resources and management of productive outcomes (Adger, 2003; Doss and Meinzen-Dick, 2015; Bosc, 2018). Although collective actions may be both formal and informal, the most common means of collective actions have been based on informal arrangement between and among individuals for the common good. Collective actions may be alternative means to market and state-owned institutions and could be a more viable means of information flow, innovation development and sustainable agricultural systems (Meinzen-Dick et al., 2005). These collective actions could be in the form of pressure groups advocating and working towards a more equal redistribution of resources; and access to assets that aid growth and processes of growth (Evans and Nambair, 2013). According to (Durmont et al., 2016), the influence of institutions through collective action in driving agrarian change involves changing values, preferences, and opportunities for members. However, as with the case of resource endowment and distribution, collective actions do not serve gendered role equally. This is further aggravated by existing culture and norms that define roles and limit access to resources and opportunities (Badejo et al, 2017), which have been the bane of many agricultural interventions and drive for agrarian change among women in Africa (Doss et al., 2014). The importance of collective action may be in making the processes of agrarian change more inclusive (Bosc, 2018). This study is thus an attempt to explore the influence of collective action in driving changes in agrarian processes and outcomes using a gender lens.

Incorporating gender dimensions in policy interventions are important as far as sustaining positive growth in a society, including an agrarian society. On a global scale, agriculture has always had a place for women, so that women make up to 70% of agricultural workers (Satyavathi, et al., 2010); and in Nigeria, they are involved in major agricultural activities (Rahman, 2008; Odurukwe et al, 2010). However, female farmers have also been shown to be deprived of productive assets over the years, with negative consequences for their productivity, labour mobility and sustenance (Mahmud et al., 2017). Consequently, access to physical, social, financial, and human resources are limited (Fischer and Qaim, 2014a). Within the household and community, women's power of negotiation is low, further engendering inequality (Doss and Meinzen-Dick, 2015). Policy decisions that make all-encompassing interventions may be inappropriate without proper focus on relevant groups within the society, hence the need for a gender analysis of agrarian transformation. This study is thus an attempt to examine the differences in accessing the process of change and outcomes along gender dimensions in agrarian societies in Nigeria.

Agricultural transformation in Nigeria has largely been explored with regards to large changes in highly complex situations of production and price levels, export led agriculture, food supply and food security (Oseni and Winters, 2009; Liverpool-Tasie et al., 2011; and World Bank, 2012). There is however limited empirical literature on the structure and processes of agrarian changes at the smallholder level. This is important since the majority of the agricultural production in the country is smallholder led

(FAO, 2018); and policy drives have begun to target smallholders to encourage commercialization (FMARD, 2015). Also, the dynamics of gender roles and institutions (such as collective actions) that come to play in agrarian transformation (Angeles and Hill, 2009) have been sparsely studied in the Nigerian context. Situating these changes within the domestic food demand and supply interaction in the country is important in crafting appropriate policy drives for a sustainable agricultural system and national development (Doss, 2018). This study is thus an attempt to strengthen the empirical literature in this regards by exploring the processes of agrarian change in terms of value addition and non-farm employment through the intervening structure of collective action and gender roles among farming households in Nigeria.

The foregoing are the premises upon which this research is based leading to the following research questions: what is the agrarian structure that drives transformation among agricultural households? To what extent have agricultural households transformed their livelihood processes? Are there differences in the decision to change livelihood processes between male and female farmers? What is the role of collective action in agrarian transformation? How has collective actions helped transfer the benefits of agrarian transformation along gender dimensions?

MATERIALS AND METHODS

Study Area

The study was carried out in three states in Nigeria. The respondents in this survey were cassava actors; hence the sample was selected from states with high level of cassava production, processing marketing and consumption activities (Ezedinma, 2007). These states are Edo, Ogun and Kwara states; which correspond to the Forest (Edo and Ogun state) and Guinea savanna (Kwara state) zones of Nigeria.

Sampling Procedure

The study employed a multistage sampling procedure, where the first stage purposively selected states with high cassava-based activities. In the second stage, the states were stratified into Agricultural Development Zones (ADZs), which are administrative strata for monitoring of Nigeria's agricultural activities. In the third stage, Blocks, (Corresponding to Local government Areas- LGAs) were randomly selected from the ADZs, proportionate to the size of the ADZs. Thereafter, cells were also randomly selected proportionate to the size of the blocks. At the fifth stage, was a random selection of cassava farming households proportionate to the size of the cells. A total of 900 structured questionnaires were administered; however, 800 questionnaires were usable for the analysis in this study.

Variable Measurements

In this study, agrarian change was visualized as a function of three variables-Structure, Processes and Outcomes. The structure refers to resources available to drive the process of agrarian change. The endowment of these resources differs among farming households and especially among male and female farmers based on existing societal structure (culture, politics, religion and organizations). The variables representing the structure of agrarian change are land area (ha) and ownership of other physical and productive assets. The ownership of other assets was used to generate an asset index using a principal component analysis (PCA); after which asset quintiles were generated. The asset classes were used in the analysis.

The processes were the actual changes in production system and labour allocations within the farming households. The agrarian change processes are hinged on the review of value systems and preferences among the farmers with regards to the resources available and the expected outcomes in terms of livelihood. The variables used for this includes whether the farming household were involved in value addition (Yes=1; No=0) and whether they were engaged in non-farm employment (Yes=1; No=0).

The outcome of agrarian change was measured with variables of monthly farm income (₦) and non-farm income (₦). The total household income (₦) was the sum of the farm and non-farm income for the household.

Data Analysis

Descriptive analysis were the main tools for obtaining the results for objectives 1 and 2; while Objective 3 was analysed with a binary logit regression model.

Estimating the Effect of Collective Action and Gender on Farming Households' Decision on Agrarian Change

The decision to engage in the process of agrarian change was analysed with a logit model. The logit model is based on a cumulative distribution function and used to model decision making among economic decision process. The logit model examine the probability of occurrence of an economic decision as a function of a set of latent variables. The logit model shows that:

$$P(Y_{i=m}) = 1/1 + e^{-z} \quad (1)$$

$$P/1 - P = e^z \quad (2)$$

P is the probability of occurrence of the dependent variable Y_i equal to a certain value, m . consequently, $1-P$ is the probability of failure of the occurrence.

Z is the vector of predictor variables and can be said to be a linear combination of the conversion factors; e is the base of natural logarithm. Assume, $\sigma = P/1 - P$, then σ is the odds of occurrence of the decision modeled; in this case, the odds of

- i. Value addition (0=No; 1= Yes) and
- ii. Non-farm employment (0= No; 1=Yes).

Also, assume that Z is a linear function of the predictor variables, it is given as:

$$Z = \alpha_0 + \beta_i X_i + \gamma_i C_i + \delta_i I_i \quad (3)$$

where X_i is the vector of socioeconomic and enterprise characteristics of farming household; C_i is the variable that measure collective action; and I_i is the measure of interaction of collective action on other variables. Also, α , β , λ and δ are parameters to be estimated

The predictor variables used in this study include:

$X1$: Age in years

$X2$: Age squared

$X3$: Educational level of farmer (0=non-formal; 1=formal)

$X4$: Marital status of farmer (0=single; 1=married)

$X5$: Land area cultivated (Ha)

$X6$: Proportion of land allocated to cassava

$X7$: Gender of the farming household head (0= Female; 1=Male)

$X8$: Access to credit (0=no; 1=yes)

$X9$: Access to improved cassava variety (0=no; 1=yes)

$X10$: Number of years of farming experience (years)

$X11$: Household size (number)

$X12$: Does farming household have savings (0=no; 1=yes)

$X13$: Agro-ecological zone (1=forest zone; 2=guinea savanna zone)

$X14$: Asset Class¹ (1=Poorest; 2= Poor; 3=Middle class; 4=Rich; 5=Richest)

$C1$: Collective action- CA (Membership of social group) (nonCA=0; CA=1)

$I1$: CA*Gender of household head

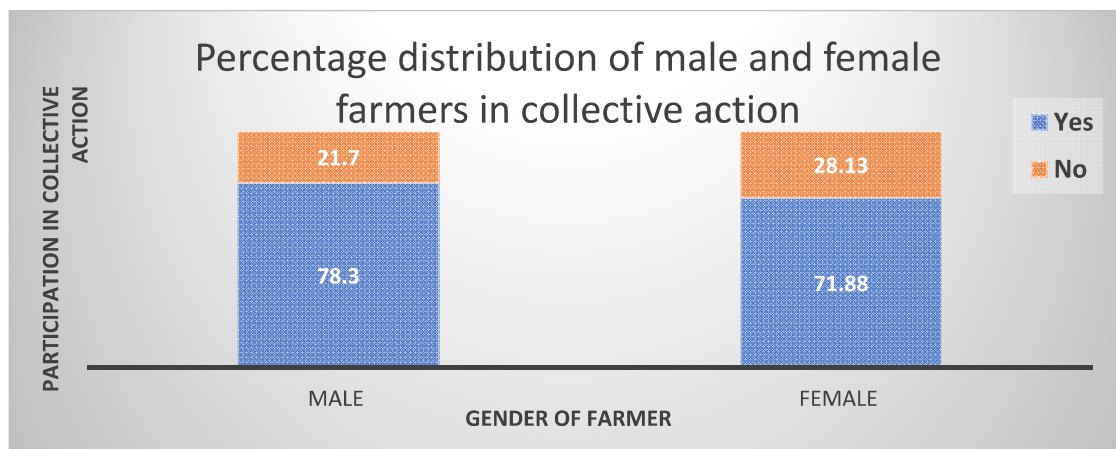
RESULTS

This section presents the summary of cassava farming households' characteristics by the sex of the household head. It also presents the results of the analysis of the objectives of this study.

Distribution of Male and Female Farmers by Participation in Collective Action

The participation of male and female heads of farming households in collective action is presented in figure 1. The result shows that males had higher participation in collective actions (78%) than female farmers (72%).

FIGURE 1
DISTRIBUTION OF MALE AND FEMALE HEADS OF FARMING HOUSEHOLDS BY PARTICIPATION IN COLLECTIVE ACTION



Description of Farming Household Level Characteristics by Participation in Collective Action (CA) and Gender of Household Head

The description of farming household characteristics shows the mean age of the farmers as 51 years; while for those participating in collective action were 51.6 years and 48.3 years for male and female farmers respectively. For non-participants in collective action, the age range was around 51 years for both male and female farmers. Average household size was approximately 7 members, with female headed farming households at about 6 persons. Years of farming experience among female farmers were 18 years and 20 years for CA and nonCA as compared to male farmers at 24 years and 23 years for CA and nonCA respectively. The proportion of land allocated to cassava was approximately 0.6 across all groups.

TABLE 1
SUMMARY OF FARMING HOUSEHOLD CHARACTERISTICS BY GENDER OF
HOUSEHOLD HEAD

Collective Action						
Variable	CA		nonCA		All (n=800)	Difference test (chi ²)
Variable/Gender	male(n=451)	female (n=161)	Male (125)	Female (63)		
Age (years)	51.64(9.25)	48.29(9.94)	51.34(10.02)	50.62(10.07)	50.84(0.341)	3.84***
Household size	6.88(2.29)	5.70 (1.95)	7.47(3.25)	5.59(2.06)	6.64(0.087)	7.12***
Years of farming experience	24.49(12.09)	17.92(11.41)	23.14(11.71)	19.84(9.03)	22.593(0.422)	6.26***
Land area cultivated (ha)	2.58(0.62)	2.26(0.74)	2.46(0.68)	1.73(0.83)	2.431(0.025)	8.106***
Proportion of land for cassava	0.51(0.24)	0.60(0.28)	0.57(0.26)	0.55(0.25)	0.54(0.26)	
Educational level (%)						
Formal	73.39	74.53	74.40	65.08	73.13	0.247
Non Formal	26.61	25.47	25.60	34.92	26.88	
Marital Status (% married)	95.79	64.60	92.00	35.51	85.88	140.14***
Access to credit (%)	55.43	56.52	20.80	4.76	46.25	0.129
Household saving (%)	78.27	78.26	56.80	33.33	71.38	5.035***
Asset Class						
Poorest	24.39	19.25	26.40	44.44	19.75	48.577***
Poor	24.61	11.18	26.40	31.75	18.13	
Middle Class	18.63	11.18	26.40	12.70	17.88	
Rich	18.63	31.06	8.80	7.94	23.38	
Richest	13.75	27.33	12.00	3.17	20.88	

Note: figures in parentheses represent 'standard deviations'; ***, ** are significance at p<0.01 and p<0.05 respectively

About 73% of the farmers had formal education; distributed as 73% and 75% for male and female CA farmers respectively and 74% and 65% for male and female nonCA farmers respectively. The majority of the males were married regardless of participation in CA; while 66% and 36% of the female CA and nonCA participants respectively were married. This distribution implies that participation in social capital as a form of CA in rural Nigeria gives preference to married individuals, especially female. Access to credit was generally low (about 46%), however CA meant that about 55% and 57% of the male and female farmers has access to credit. Ability to save was also found to increase with participation in CA; with about 78% of the farmers reporting household savings. A lower percentage of the female farmers (33%) could save outside CA when compared to 57% of nonCA males involved in savings. With respect to asset ownership, the distribution shows that CA increases asset ownership in general.

Structures That Drive Agrarian Transformation in Nigeria

In this study, land and other productive assets were used as the structural resource base for agrarian change in the Nigerian agricultural system. The distribution is presented in Table 1 and Figures 2 and 3. Land area cultivated was 2.5 ha on the average with male CA farmers and female CA farmers cultivating 2.6 ha and 2.3 ha, respectively. The nonCA male farmers and nonCA female farmers cultivated 2.5 ha and 1.7 ha respectively. When CA as an intervening variable was considered, it shows that although

farmers with CA participation still had a larger land area cultivated than female farmers; female farmers in CA had higher land are cultivated than nonCA male farmers. Based on the asset grouping, the findings showed that CA increased the proportion of farmers in wealthier classes (13.7% and 31%; and 18.6% and 27.3% for male and female farmers in the rich and richest groups respectively).

FIGURE 2
LAND AREA CULTIVATED BY MALE AND FEMALE FARM HOUSEHOLD HEADS BY PARTICIPATION IN COLLECTIVE ACTION

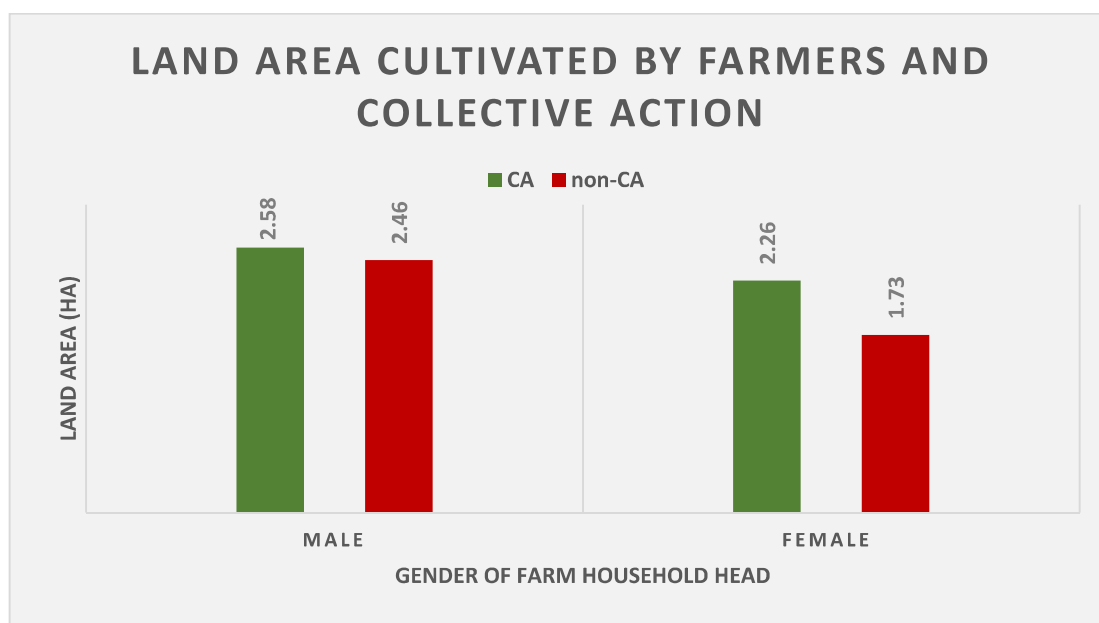
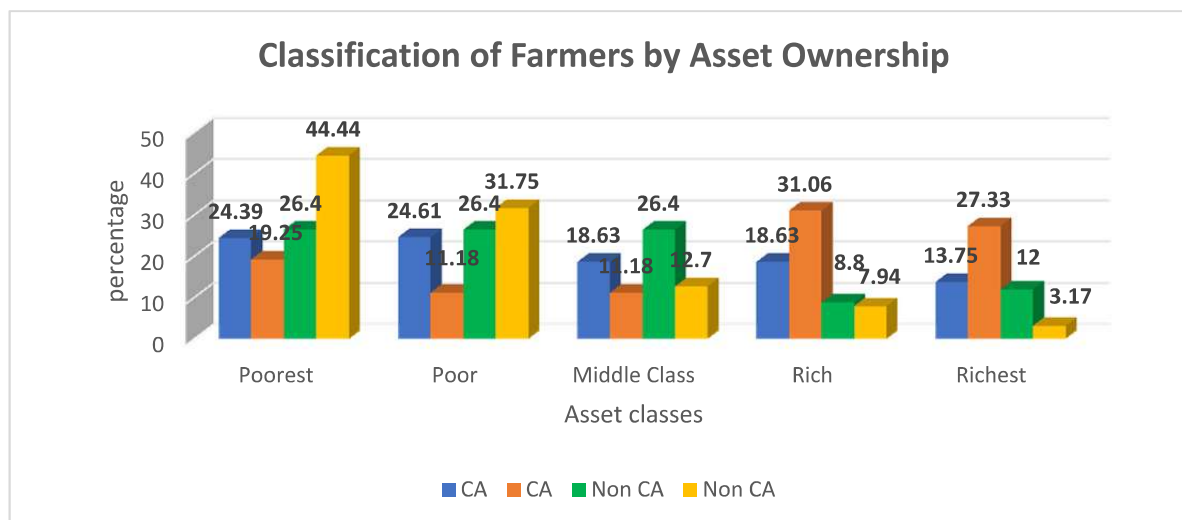


FIGURE 3
DISTRIBUTION OF MALE AND FEMALE FARM HOUSEHOLD HEADS BY ASSET CLASSES ACROSS PARTICIPATION IN COLLECTIVE ACTION

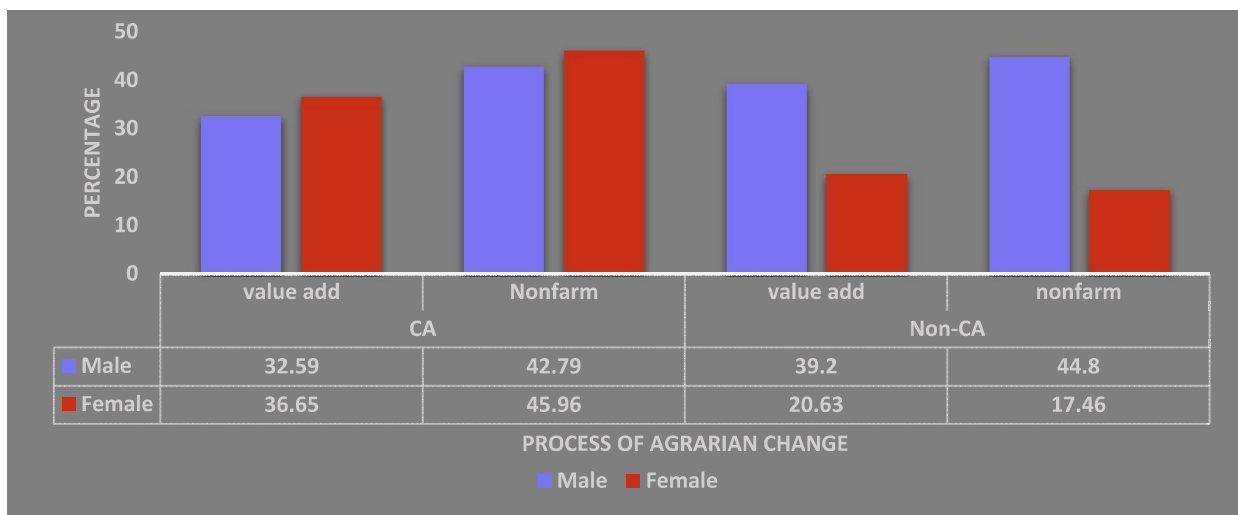


Process of Agrarian Transformation: Value Addition and Non-Farm Employment

We explore two main variables that signal a process of agrarian change within an agricultural community- value addition and nonfarm employment. Figure 4 presents the proportion of male and female farming households who are involved in the two agrarian change processes explored in this study.

The graph shows that collective action increased the proportion of female farmers who added value to their cassava produce (36%), than male farmers who participated in CA (33%). This is in contract to the 39% and 21% percentage of male and female farmer, respectively who added value without the benefit of collective action. A similar direction was evidenced for the proportion of male and female farmers involved in nonfarm employment at about 43% and 45% respectively for those involved in collective action again this differs from the 45% and 17% of male and female farmers in nonfarm employment without collective action.

**FIGURE 4
GENDER DIFFERENCES IN EXTENT OF VALUE ADDITION AND NON-FARM EMPLOYMENT AMONG FARMING HOUSEHOLD SIN NIGERIA ACROSS PARTICIPATION IN COLLECTIVE ACTION**



Effect of Collective Action on Process of Agrarian Change for Male and Female Farming Headed Households

A logit model was fitted to examine the factors that determine decision of the farming households to engage in value addition and non-farm employment as processes of agrarian change. Specifically, the analysis was interested in knowing the effect of collective action and gender in the decision to add value and engage in nonfarm employment among the respondents. The results are presented in Table 2. The log likelihood of the two models were significant at $p < 0.01$; showing the fit of the model. The marginal effects of each model were also estimated, however, there is no marginal effect for the interaction terms; hence we discuss the coefficient of the regression.

Decision on Value Addition

With respect to the decision process to add value among the cassava farmers; the result shows that collective action increased the probability of the decision to add value within the farmer’s cassava system. Also, with respect to the gender of household heads; the results showed that male farmers were more likely to add value than female farmers. However, when the variables of collective action and gender were interacted; the results showed that collective action empowered female farming heads to engage in value addition.

Contrary to many studies on farming innovations, the results revealed that older farmers had higher likelihood of engaging in value addition. This may be a function of the ‘U’ shape life cycle curve; where older farmers have more years of experience and may thus leverage that to shift from conventional farming. The coefficient of the proportion of land allocated to cassava was found to increase the likelihood of value addition. Also, farming household heads in the ‘richest’ asset quintile were more likely to engage in value addition than the lower asset classes. This suggests that the more productive assets available to the farmer, the more they are likely to make use of such to add value. However, increase in land area cultivated was found to reduce the likelihood of value addition among the farming households.

Decision on Nonfarm Employment

The results show that collective action increased non-farm employment among male and female farmers. This suggests that social capital through peer pressure and community help groups led to formation of new economic behaviours. The results also show that male farmers had a higher tendency to seek out nonfarm employment than female farmers. Interaction between collective action and gender of farmer shows that collective action was able to increase the probability of female farmers engaging in nonfarm employment.

Being a married farmer was found to reduce the probability of nonfarm employment by 0.01, probably because of family ties and responsibilities which have been construed as a higher calling for women in the African culture (Raidimi, 2014). Also, years of experience reduces the probability of the farmers taking up nonfarm employment. On the one hand, this may be the result of age; for which older farmers are less likely to have the energy to diversify into non-farm employment. The results also show that farming household with savings and those with productive assets that put them in the rich class were also found to have a higher propensity to undertake nonfarm employment.

TABLE 2
ESTIMATES OF DETERMINANTS OF AGRARIAN PROCESSES AMONG FARMING HOUSEHOLDS

Variables	Value Addition		Non-Farm Employment	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Collective action (CA)	0.995*** (0.438)	0.037 (0.045)	1.308*** (0.394)	0.051 (0.048)
Gender of household head	1.103*** (0.450)	0.048 (0.045)	1.507*** (0.407)	0.082* (0.047)
Age	-0.203 (0.088)	-0.041 (0.018)	0.099 (0.076)	0.024 (0.018)
Age squared	1.094** (0.547)	0.222** (0.111)	-0.061 (0.473)	-0.148 (0.115)
Household size	-0.035 (0.040)	-0.007 (0.008)	0.009 (0.035)	0.002 (0.008)
Years of farming experience	0.0453** (0.010)	0.008*** (0.002)	-0.019*** (0.008)	-0.005** (0.002)
Land area	-0.251* (0.134)	-0.051* (0.027)	-0.167 (0.116)	-0.041 (0.028)
Proportion of land to cassava	4.682*** (0.454)	0.951*** (0.085)	-0.292 (0.189)	-0.071 (0.075)

Variables	Value Addition		Non-Farm Employment	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Access to improved variety	-0.273 (0.205)	-0.073 (0.045)	00.234 (0.178)	00.056 (0.042)
Access to credit	0.134 (0.196)	0.027 (0.040)	-0.158 (0.168)	-0.038 (0.041)
Educational level	0.178 (0.210)	0.035 (0.041)	0.294 (0.189)	0.070 (0.044)
Marital status	0.335 (0.299)	0.064 (0.054)	-0.446* (0.246)	-0.111((0.061)
Household savings	-0.391* (0.212)	-0.082* (0.046)	0.343* (0.186)	0.082* (0.044)
Asset class				
Poor	0.184 (0.277)	0.034 (0.052)	-0.151 (0.236)	-0.035 (0.055)
Middle class	0.325 (0.297)	0.063 (0.057)	0.099 (0.253)	0.024 (0.060)
Rich	0.0334 (0.300)	0.064 (0.058)	0.480* (0.255)	0.118** (0.062)
Richest	0.579** (0.286)	0.118** (0.058)	0.342 (0.352)	0.083 (0.061)
Agro-ecological zone	-0.679*** (0.218)	-0.129*** (0.038)	0.485*** (0.181)	0.119*** (0.044)
CA*Gender	-1.126*** (0.485)		-1.520*** (0.437)	
Observations	800	800	800	800
Log likelihood	-412.685		-514.081	
F stat	194.89***		58.99***	
Pseudo R ²	0.191		0.054	

Note: ***, ** and * represent significance at $p < 0.01$, $p < 0.05$ and $p < 0.1$, respectively; Figures in parentheses are standard errors

Outcomes of Agrarian Change in Nigeria

The outcome of the nexus of structure (resource endowment) and processes (value addition and non-farm employment) on the welfare outcome (monthly farm income, non-farm income, and total household income) of the cassava farming households are presented in Table 3.

Female farmers had higher farm income than their male counterparts whether or not they were in CA. Farm income of female farmers was ₦57,991.44 (USD156.58) and ₦57,182.99 (USD154.39) for CA and nonCA respectively. This was higher than male farmers' farm income of ₦56,307.78 (USD152.03) and ₦51,345.89 (USD 138.64) for CA and nonCA, respectively. However, male farmers had higher non-farm income of ₦9,195.25 (USD 24.83) and ₦8,902.72 (USD 24.04) for CA and nonCA respectively. Total income of female CA members was ₦66,792.51 (USD 180.34), while for the male it was ₦65,503.23 (USD 176.86). On the other hand, total income for nonCA male and female was ₦60,248.61 (USD 162.67) and ₦59,976.64 (USD 161.94), respectively.

TABLE 3
DISTRIBUTION OF OUTCOME OF AGRARIAN TRANSFORMATION BY GENDER OF THE HOUSEHOLD HEADS (MONTHLY INCOME)

Income distribution (N)=	Collective Action			
	CA		nonCA	
	Male	Female	Male	Female
Farm income	56, 307.78 (20, 788.09)	57, 991.44 (20, 907.80)	51, 345.89 (19, 867.09)	57, 182.99 (23675.25)
Non-Farm income	9,195.25 (14, 216.11)	8,801.07 (13573.07)	8, 902.72 (13850.17)	2, 793.65 (9, 258.23)
Total Household income	65,503.23 (24,777.15)	66, 792.51 (24,434.64)	60, 248.61 (23, 590.92)	59, 976.64 (23, 869.03)

Figures in parentheses are standard deviations

DISCUSSION

The description of farmer characteristics across collective action and gender class showed significant variations. The analysis shows that male farmers had greater opportunity to participate in collective action in the Nigerian agricultural system. This is corroborated by the study of Bosc, (2018) who showed that collective action is also dependent on ownership of some productive resources which may be usually not available to rural and agricultural based women. Moreover, positive characteristics that improved livelihood options such as education, access to credit, and savings and asset accumulation generally showed better outcomes with CA. Female farmers who would otherwise have had low outcomes had better results when CA was involved (Coppock and Desta, 2013).

Literature suggests that agrarian changes take place within the structure of resource endowment and its distribution within the community (Fischer and Qaim, 2012b), for which smallholder have reported limited access (Tambo and Abdoulaye, 2012). Access to these resources determines the extent and direction of agrarian changes for farmers. Loison, (2015) also shows that entry into non-farm labour market may be made possible with greater asset control which may be increased with access to CA. Our results show that CA increased resource endowment across the gender groups. This supports findings that collective action as a change institution is able to increase opportunity and drive equality in resource endowment among community members (Doss et al., 2014). It is noteworthy that CA participation increases the proportion of land area cultivated by female farmers as well as asset rich females more than males. Hence, asset ownership was assumed as an important structure that drives agrarian change, especially among women (Johnson et al. 2016).

The processes of agrarian change explored in this study were Value addition and non-farm employment which is observed for a large proportion of the farmers. This is a reflection of the extent of farming families' adaptive capacity in the face of changing agricultural systems. Agrarian change to some form of de-agrarianisation, with lower dependence on primary agricultural production as a source of livelihood of farming households (Ponte, 2001). Our results are a pointer to the gradual shift from sole crop production to higher order agricultural activities (Value addition) and income diversification (Non-farm employment). However, there is a need for proper redirecting of these processes in order to maintain the supply of domestic food within the economy. The corollary would be that smallholder farmers would be less dependent on the soil for generating household income as an adaptive capacity to agricultural vulnerabilities. The results support literature that the proportion of male farmers that are involved in agricultural value addition and non-farm employment are usually higher than their female counterparts (Cliche, 2011; Oseni et al, 2013). However, literature has also shown and supports our findings that

collective action is a means of empowering women in their livelihood activities (Baden, 2013; Bosc, 2018).

The result of the decision for value addition among the farmers showed that male farmers had better opportunities for value addition. This may be related to the fact that male farmers had access to more productive resources that could drive value adding activities within their farming systems (Quisumbing and Pandolfelli, 2010). As a standalone variable and when interacted with gender, collective action was shown as important in driving positive processes within a society. This buttresses the point that collective action is important in the adoption of innovation and best practices in agricultural systems (Gyau et al., 2014). Also, CA is shown as important in empowering women at household and community levels to invest and engage in higher level income generating activities (Baden, (2013; Mudege et al., (2015; Annes and Wright, 2016 and Lecoutere, 2017).

The effect of age on value addition may suggest the need for older farmers to divest from more strenuous primary production and leverage on experiences and market network to build in value addition into their production systems. (Ainembabazi and Mugisha, 2014). The effect of having more resources allocated to cassava is intuitively acceptable, since a larger allocation of land may mean higher productivity and hence higher likelihood to have cassava roots that could be processed or marketed (Kehinde and Aboaba, 2016). However, larger land area without commensurate input and technology would serve as a constraint and thus negatively influence value addition (Diirro et al., 2018).

Overall, the effect of collective action working through gender on the outcome of agrarian change processes are interesting. This finding was corroborated by the studies of Owoo and Naude, (2014) using Ethiopia and Nigeria as case studies. Also, the higher probability of male farmers in non-farm employment decision implies higher level of labour mobility of male farmers in Nigeria based on cultural norms. Female members are less likely to be able to leave the home front, considering they are engaged in both productive and reproductive duties within the households (Costa and Rijkers, 2011). Again, the interaction of collective action and gender shows that CA is key to developing female farmers' agency in seeking other forms of livelihood as found by Cliché, (2011) in a study of women farmers in Ghana. The positive effect of savings on non-farm employment may imply the use of savings and consequent asset accumulation to create opportunities in nonfarm activities for income diversification (Loison, 2015; Asfaw et al., 2017).

An interesting finding can be deduced from the distribution of income between male and female cassava farming households. While female farmers had higher income from their cassava farming activities; male farmers had higher income from nonfarm employment. This could be a pointer to the changing labour structure within the agrarian system. Male members of the community have increasingly been reported to seek nonfarm employment to augment the relatively inadequate farm income while women are usually limited in terms of labour mobility as a result of cultural, economic and educational constraints (Jost et al., 2016). It is also noted that the household monthly income becomes similar between male and female farming households despite the differences in their type of main and/or secondary employment. This is a pointer to the fact that the rural economy may still return an acceptable standard of living when the actors are able to diversify income sources (Bezu et al., 2012).

The effect of CA was an increase in the monthly incomes, especially of female farmers. However, collective action has also been found to increase productivity and commercialization of agricultural systems (Shiferaw et al, 2011; Fischer and Qaim, 2012b; IFAD, 2015). Moreover, collective action did not return significant difference in the income distributions of male and female farmers. This suggests that the effect of collective action is more obvious in driving processes of change within the society for an evening out of outcomes among members in the society (Fischer and Qaim, 2012a and b; Bosc, 2018).

CONCLUSION

The evolving agrarian system in Nigeria has led to changes in the labour allocation and outcomes among farming households. This study examined the structure, processes and outcomes of agrarian transformation among cassava farmers in Nigeria within a system of collective action using a gender

disaggregation. In general, finding revealed differences in resource endowment between male and female farmers, favouring the male. Processes of agrarian change in terms of value addition and nonfarm employment opportunities were also skewed towards male farmers. However, collective action was found to increase the opportunities given to female farmers in terms of resource control (land and other assets) as well as in allocating labour and investment in value addition and nonfarm employment.

The study concludes that collective action is an important variable in driving the processes of agrarian change in the Nigerian agricultural system. Moreover, collective action was found to empower female farmers and even out the access to resources and processes of agrarian change within their societies. This has consequences for a positive agrarian evolution and the development of policy and interventions to direct it.

The importance of collective action through social group membership was prominent in the study; hence we recommend efforts to support and promote the development of social groups/farmer organizations especially for female farmers in order to empower them in the process of agrarian transformation. This institutional development could be through building the capacity of the group and its members so that they can better advocate group interest and improve their power of bargain in market access.

Also, the extent of resource endowment was found to direct the agrarian process of value additions for both male and female farmers. This brings to fore the need for a review of the land ownership system in Nigeria. We recommend a more egalitarian system with respect to access to and control of land in Nigeria for sustained agricultural and economic development.

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ENDNOTE

1. The asset classes were obtained by subjecting households' assets through a Principal Component Analysis.

REFERENCES

- Adger, W. N. (2003). Social capital, collective action, and adaptation to climate change. *Economic Geography*, 79(4), 387-404.
- Ainembabazi, J.H., & Mugisha, J. (2014). The role of farming experience on the adoption of agricultural technologies: Evidence from smallholder farmers in Uganda. *Journal of Development Studies*, 50(5), 666-679.
- Angeles, L. C., & Hill, K. (2009). The gender dimension of the agrarian transition: women, men and livelihood diversification in two peri-urban farming communities in the Philippines. *Gender, Place and Culture*, 16(5), 609-629.
- Annes, A., & Wright, W. (2016). Value-added agriculture: a context for the empowerment of French women farmers? *Review of Agricultural, Food and Environmental Studies*, 97(3), 185-201.
- Asfaw, A., Simane, B., Hassen, A., & Bantider, A. (2017). Determinants of non-farm livelihood diversification: evidence from rainfed-dependent smallholder farmers in northcentral Ethiopia (Woleka sub-basin). *Development Studies Research*, 4(1), 22-36.

- Babatunde, R. O., & Qaim, M. (2009). Patterns of income diversification in rural Nigeria: determinants and impacts. *Quarterly Journal of International Agriculture*, 48(4), 305.
- Badejo, A. F., Majekodunmi, A. O., Kingsley, P., Smith, J., & Welburn, S. C. (2017). The impact of self-help groups on pastoral women's empowerment and agency: A study in Nigeria. *Pastoralism*, 7(1), 28.
- Baden, S. (2013). Women's Collective Action: Unlocking the potential of agricultural markets. *Oxfam International Research Report*, No 7.
- Barrett, C. B., Reardon, T., & Webb, P. (2001). Nonfarm income diversification and household livelihood strategies in rural Africa: concepts, dynamics, and policy implications. *Food Policy*, 26(4), 315-331.
- Bernstein, H. (2015). Some reflections on agrarian change in China. *Journal of Agrarian Change*, 15(3), 454-477.
- Bezu, S., Barrett, C., & Holden, S. (2012). Does the nonfarm economy offer pathways for upward mobility? Evidence from a panel data study in Ethiopia. *World Development*, 40(8), 1634-1646.
- Borras, S. M., Jr. (2009). Agrarian change and peasant studies: changes, continuities and challenges – an introduction. *The Journal of Peasant Studies*, 36(1), 5-31. DOI: 10.1080/03066150902820297
- Bosc, P. M. (2018, September). *Empowering through collective action*. IFAD Research Series 29. ISBN 978-92-9072-855-9
- Cliche, G. (2011, September). Rural women's empowerment in nonfarm employment issues for ICT initiatives and territorial policies in Latin America. In *Expert Group Meeting—Enabling Rural Women's Economic Empowerment: Institutions, Opportunities and Participation*. Accra (Ghana).
- Coppock, D., & Desta, S. 2013. Collective action, innovation, and wealth generation among settled pastoral women in northern Kenya. *Rangeland Ecology & Management*, 66(1), 95-105.
- Costa, R., & Rijkers B. (2011). *Gender and rural non-farm entrepreneurship*. World Development Report, 2012. Background Paper. The World Bank, Washington DC.
- Diirro, G. M., Seymour, G., Kassie, M., Muricho, G., & Muriithi, B. (2018). Women's empowerment in agriculture and agricultural productivity: Evidence from rural maize farmer households in Western Kenya. *PloS One*, 13(5), e0197995.
- Doss, C. R. (2018). Women and agricultural productivity: Reframing the Issues. *Development Policy Review*, 36(1), 35-50.
- Doss, C., & Meinzen-Dick, R. (2015). Collective action within the household: Insights from natural resource management. *World Development*, 74, 171-183.
- Doss, C., Deere, C., Oduro, A., & Swaminathan, H. (2014). The gender asset and wealth gaps. *Development*, 57(3-4), 400-409.
- Durmont, A., Vanloqueren, G., Stassart, P., & Baret, P. (2016). Clarifying the socioeconomic dimensions of agroecology: Between principles and practices. *Agroecology and Sustainable Food Systems*, 40(1), 24-47. DOI:10.1080/21683565.2015.1089967
- Evans, A., & Nambiar, D. (2013). *Collective action and women's agency: A Background Paper*. Women's Voice, Agency, & Participation Research Series 2013 No.4. The World Bank, Washington DC.
- Ezedinma C., Lemchi J., Okechukwu R., Ogbe F., Akoroda M., Sanni L., . . . & Dixon, A.G.O. (2007). Status of Cassava Production in South East and South South Nigeria- A Baseline Report, 2004. *International Institute of Tropical Agriculture (IITA)*, p.54. Ibadan, Nigeria.
- Fabusoro, E., & Sodiya, C. I. (2011). Institutions for collective action among settled fulani agro-pastoralists in Southwest Nigeria. *Journal of Agricultural Education and Extension*, 17(1), 53-68.
- Federal Ministry of Agriculture and Rural Development (FMARD). (2015). ATA- Nigeria. Retrieved March 13, 2019, from <https://fmard.gov.ng/ata-nigeria/>
- Fischer, E., & Qaim, M. (2012a). Gender, agricultural commercialization, and collective action in Kenya. *Food Security*, 4(3), 441-453.
- Fischer, E., & Qaim, M. (2012b). Linking smallholders to markets: determinants and impacts of farmer collective action in Kenya. *World Development*, 40(6), 1255-1268.

- Food and Agricultural Organization (FAO). (2018). *Nigeria at Glance*. Retrieved March 26, 2019, from www.fao.org
- Galdeano-Gómez, E., Pérez-Mesa, J. C., & Godoy-Durán, Á. (2016). The social dimension as a driver of sustainable development: The case of family farms in southeast Spain. *Sustainability Science*, 11(2), 349-362.
- Gyau, A., Franzel, S., Chiatoh, M., Nimino, G., & Owusu, K. (2014). Collective action to improve market access for smallholder producers of agroforestry products: key lessons learned with insights from Cameroon's experience. *Current Opinion in Environmental Sustainability*, 6, 68-72.
- Haggblade, S., Hazell, P., & Reardon T. (2010). The Rural Non-Farm Economy: Prospect for Growth and Poverty Reduction. *World Development*, 38(10), 1429-1441. DOI: 10.1016/j.worlddev.2009.06.008
- Hazell, P., & Wood, S. (2007). Drivers of change in global agriculture. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 363(1491), 495-515.
- International Fund for Agricultural Development (IFAD). (2015, January). *Sustainable Inclusion of Smallholders in Agricultural Value Chains*. Scaling Up Note. Rome, Italy.
- Johnson, N. L., Kovarik, C., Meinzen-Dick, R., Njuki, J., & Quisumbing, A. (2016). Gender, assets, and agricultural development: Lessons from eight projects. *World Development*, 83, 295-311.
- Jost, C., Kyazze, F., Naab, J., Neelormi, S., Kinyangi, J., Zougmore, R., . . . & Kristjanson, P. (2016). Understanding gender dimensions of agriculture and climate change in smallholder farming communities. *Climate and Development*, 8(2), 133-144. DOI: 10.1080/17565529.2015.1050978
- Kehinde, A. L., & Aboaba, K. O. (2016, September). Analysis of value addition in the processing of cassava tubers to “garri” among cottage level processors in southwestern Nigeria. In *International Conference of the African Association of Agricultural Economists*. Addis Ababa, Ethiopia.
- Lecoutere, E. (2017). The impact of agricultural co-operatives on women’s empowerment: Evidence from Uganda. *Journal of Co-operative Organization and Management*, 5(1), 14-27.
- Liverpool-Tasie, L. S., Kuku, O., & Ajibola, A. (2011). Review of literature on agricultural productivity, social capital and food security in Nigeria. *NSSP Working Paper 21*. Washington, D.C.: International Food Policy Research Institute (IFPRI). Retrieved from <http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/126846>
- Loison, S. A. (2015). Rural livelihood diversification in Sub-Saharan Africa: A literature review. *The Journal of Development Studies*, 51(9), 1125-1138. DOI:10.1080/00220388.2015.1046445
- Mahmud, M., Otsuka, K., Sawada, Y., Tanaka, M., & Tanaka, T. (2017). *Women Empowerment in Bangladesh: Household decisions under development of non-farm sectors and microfinance institutions*. JICA-RI Working Paper. JICA Research Institute.
- Mathias, P. (2001). *The First Industrial Nation: The Economic History of Britain 1700–1914* (Second Edition). Routledge, Taylor and Francis.
- Meinzen-Dick R., Pandolfelli L., Dohrn, S., & Athens, J. (2005). Gender and Collective Action: A Conceptual Framework for Analysis. In *International research workshop on gender and collective action* (pp. 17-21).
- Mudege, N. N., Nyekanyeka, T., Kapalasa, E., Chevo, T., & Demo, P. (2015). Understanding Collective Action and Women's Empowerment in Potato Farmer Groups in Ntcheu and Dedza in Malawi. *Journal of Rural Studies*, 42, 91-101.
- National Bureau of Statistics (NBS). (2010). *National Manpower Stock and Employment Generation Survey. Household and Microenterprise (Informal Sector)*.
- National Geographic. (2016). *The Development of Agriculture*. Archived from the Original. Retrieved February 23, 2019.
- Odurukwe, S. N., Matthews-Njoku, E. C., & Ejiogu-Okereke, N. (2006). Impacts of the women-in-agriculture (WIA) extension programme on women's lives; implications for subsistence agricultural production of women in Imo State, Nigeria. *Livestock Research for Rural Development*, 18(2), 47-61.

- Oseni, G., & Winters, P. (2009). Rural nonfarm activities and agricultural crop production in Nigeria. *Agricultural Economics*, 40(2), 189-201.
- Oseni, G., Goldstein, M., & Utah, A. (2013). Gender Dimensions in Nigerian Agriculture. *Africa Region Gender Practice Policy Brief*, No. 6. World Bank, Washington, DC. © World Bank. Retrieved from <https://openknowledge.worldbank.org/handle/10986/25459> License: CC BY 3.0 IGO.”
- Owoo, N., & Naudé W. (2014). Non-Farm Enterprise Productivity and Spatial Autocorrelation in Rural Africa: Evidence from Ethiopia and Nigeria. *IZA Discussion Papers*, No. 8295. Institute for the Study of Labor (IZA), Bonn.
- Ponte, S. (2001). Trapped in decline? Reassessing agrarian change and economic diversification on the Uluguru Mountains, Tanzania. *The Journal of Modern African Studies*, 39(1), 81-100.
- Quisumbing, A. R., & Pandolfelli, L. (2010). Promising approaches to address the needs of poor female farmers: Resources, constraints, and interventions. *World Development*, 38(4), 581-592.
- Rahman, S. A. (2008). Women's involvement in agriculture in northern and southern Kaduna State, Nigeria. *Journal of Gender Studies*, 17(1), 17-26.
- Raidimi, E. N. (2014). The roles and activities of women in the six selected agricultural projects in Thulamela Local Municipality of Vhembe District Municipality in the Limpopo Province. *South African Journal of Agricultural Extension*, 42(2), 10-23.
- Rodriguez, J. O., Pillai, V. K., & Ferreira, M. R. 2016. The impact of women's agency and autonomy on their decision-making capacity in Nuevo Leon, Mexico. *Acta Universitaria*, 26(5), 70-78.
- Satyavathi, C. T., Bharadwaj, C., & Brahmanand, P. S. 2010. Role of farm women in agriculture: Lessons learned. *Gender, Technology and Development*, 14(3), 441-449.
- Shiferaw, B., Hellin, J., & Muricho, G. 2011. Improving market access and agricultural productivity growth in Africa: what role for producer organizations and collective action institutions? *Food Security*, 3(4), 475-489.
- Tambo, J. A., & Abdoulaye, T. 2012. Climate change and agricultural technology adoption: the case of drought tolerant maize in rural Nigeria. *Mitigation and Adaptation Strategies for Global Change*, 17(3), 277-292.
- Trading Economics. (2018). *Nigeria GDP from Agriculture*. Retrieved March 20, 2019, from www.Tradingeconomics.com
- Vatta, K., Garg, B. R., & Sidhu, M. S. (2008). Rural employment and income: the inter-household variations in Punjab. *Agricultural Economics Research Review*, 21(347-2016-16698), 201.
- World Bank. (2012). *Agricultural Development Projects in Nigeria*. The World Bank Independent Evaluation Group.