THE IMPACT OF NON-FARM INCOME GENERATING ACTIVITIES ON THE FOOD SECURITY STATUS OF RURAL HOUSEHOLDS IN NIGERIA

Jabo Muhammad Sani M,2*, Ismail Mohamed Mansor2, Shamsuddin Mad. Nasir2 and Abdullah Amin Mahir2

*Corresponding Author: Jabo Muhammad Sani M, sani.jabo@yahoo.com

General Household Survey-panel data that adopt the World Bank Living Standard Measurement Survey (LSMS) technique was used to look at the impact of non-farm income generating activities on food security status among the rural household in Nigeria. A nationally representative sample of 3380 rural households was explored in this study. The results of the descriptive statistics showed that 66.64% of the households were engaged in farming as their main occupation. Chi-square analysis and t-test revealed that diversified households were relatively food secure than undiversified at 0.05% level of significance. The propensity score matching technique that takes care of selection bias and probit regression analysis was employed to analyze the impact of participation in non-farm income generating activities on food consumption expenditure and food security. The PSM suggested that diversified households had a high probability of being food secure by 12% than undiversified households.

Keywords: Food security, Non-farm Diversification, Propensity score, Rural household, Nigeria

INTRODUCTION

The food security has become a global issue and that started to gain prominence during the 1974 first World Food Conference. However, food right was recognized since 1948 Universal Declaration of Human Rights (UDHR) and the 1966 Committee on Economic, Social and Cultural Right (CESCR). Later in 1996, Food and Agricultural Organization (FAO), the Rome declaration reaffirmed that access to safe and nutritious food as the right of everyone. Reduction of hungry people to half by 2015 was also declared as United Nations Millennium Development Goal number one. The 1996 world food summit marked a turning point in the global history of food security where 186 countries met in Rome brainstorm on how to tackle the issue of hunger and food insecurity. This underscored the importance of food security to the development agendas of the global community. According to

1 Department of Agricultural Economics, Usmanu Danfodiyo University, Sokoto P.M.B 2346, Sokoto, Nigeria.
2 Department of Agribusiness and Information Systems, Universiti Putra Malaysia, 43400, Serdang, Selangor, Malaysia.

This article can be downloaded from http://www.ijasvm.com/currentissue.php
FAO (2012) reports the African continent is having about 35% of its population malnourished. Furthermore, the UN World Food Program (WFP), reported that 19 out 53 countries of Africa face serious hunger problems as a result of failure of these countries domestic supplies to cater for their domestic needs. This trend of food insecurity in Africa is worrisome as the head counts of food insecure people are actually on increase in Sub-Saharan Africa (SSA).

Sustainable agricultural growth remains one of the viable options for ensuring food security among the smallholder farmers who depend on agriculture and its related businesses for their livelihoods (FAO, 2012). The major step in scaling down the menace of food insecurity lies in the adoption of a science base approach to crop and livestock husbandry by smallholder farmers.

The current debate about the best strategy to achieve reduction in hunger and food insecurity is critical to policy makers and researchers. Some scholars contend that, solution to food insecurity lies exclusively on improving the performance of agriculture through the adoption of science and technologies. Other development economics believed that, hunger and food insecurity are beyond the realms of agriculture, but are rather linked the issue to tackling poverty through generating enough income to access food since the world has enough stock for all people. It is a common believe that, producing more food may not necessarily alleviate hunger due to the fact that, access to food depends to a large extent on the financial ability of the nation or household to access the food. Achieving food security can be influenced by a number of factors such as government trade and food production policies and programs. Income of individuals in a given country could also have significant impact on food security. Sasson (2012) attributed the food insecurity to inadequate food production. Raising the productivity and income-generating capability of small farmers and reinforcing their resilience to shock can often play a key role in cutting the incidence of hunger (FAO/WB/UNU, 2001).

Even though, Nigeria has great agricultural potentials and abundant natural resources for all round development, however, most indicators of the economic well-being are still very low. Food insecurity and poverty are still widespread across different parts of the country. Food insecurity situation in Nigeria is worsening with the passage of time due to the wide gap between the national supply and demand for food. For example the percentage of food insecure households were 18% in 1986, but the figure rose to over 40% in 2005 (Sanusi et al., 2006). NBS (2012) also found that about 35% of households in Nigeria “never had difficulty in satisfying their food needs”, while 34.6 “sometimes had difficulty”. Regional desegregation shows that North-west had 46.6% and North-central 48% never “had difficulty” in food accessibility. Southeast and South-west had 42.9% and 59.9% respectively. Households with only two members never had difficulty at all, while those households with 6 member size had 37% sometimes difficulty (Akinyele, 2009).

INCOME DIVERSIFICATION

Agriculture has undoubtedly become the most important sub-sector in the Nigerian economy next only to petroleum. The sector employs about 70% of the workforce while accounting for slightly more than 40% of Gross Domestic Product, Central Bank of Nigeria and United State Agency for International Development (CBN, 2008; and USAID, 2013). Although still of central to the
household’s income, agriculture on its own is increasingly unable to provide sufficient means of survival and livelihood to rural dwellers especially in sub-Saharan Africa. Even though traditionally, there is a long-held notion that rural income is equated with a farm or agricultural income, it has now become obvious that very few households derive the entire source of their livelihood from agriculture. Ellis (1999) argues that the traditional way of thinking for several years is that increasing output and incomes from agriculture will be a catalyst for growth in other non-agricultural sectors is not tenable now. Smallholder farmers are still looking for diverse opportunities to increase and stabilize their incomes (Chapman and Tripp, 2004). Hence, the rural economy is not solely based only on agriculture, but rather on a diverse array of activities and enterprises (Chapman and Tripp, 2004; and Alobo, 2012). Babatunde (2009) and Ibekwe et al. (2012) reported that, farming households in Northern Nigeria often pursue more than one, sometimes several, different non-agricultural activities simultaneously or at different times throughout the year. Recent evidences suggest that farming alone is unable to income to cater for the entire needs of rural households (Ellis, 1998 and 1999).

Non-farm income generating activities played an important role in breaking the poverty vicious cycle through its income smoothing effects on the rural population and consequently helps to improve the food security status of rural dwellers (Ellis, 1998 and 1999; and Ellis, 2000). Diversification is therefore seen to be associated with desperate struggle for survival in declining economies (Ellis, 1998). Some analyst contends that diversification can sometimes be tailored towards livelihood security under improving economic situations in the case of rural rich. Therefore, this empirical study has supported the hypothesis that income diversification is capable of mitigating the risk in the production process and an effective strategy for income and consumption smoothing. Diversification of income sources is becoming an important means of rising rural household income and cushioning the effects of the risk associated with environmental and climatic changes. It is equally used to mitigate the adverse effects caused by changes in government policies and market related problems such as price, input prices increase and other shocks. Diversification into non-farm activities has recorded a tremendous increase in importance in many developing countries including Nigeria in the past two decades with the share in the total household income ranging from 30% and 50% (Adewunmi, 2011). There is a sizeable body of literature on different aspects of income diversification in rural Nigeria, for example (Babatunde and Qaim, 2010) reported that 65% small-holder farmers households participated in off-farm employment in which 50% of the total income comes from off-farm activities; Adewunmi (2011), found that 94.4% of the households in South-western Nigeria derived their income sources from diversified portfolio of livelihood activities with non-farm activities accounting for 67.1% of the total income; Ahmed (2012) reported 100 of Konduga Local Government Area Borno State, Nigeria derived their income from diversified sources. Going by these statistics, diversification into the non-farm activities of farm households in Nigeria is critical and vital to the general wellbeing of rural dwellers in Nigeria. Most research into income diversification utilizes the household as the unit for empirical investigation (Gajanan et al., 2009).
Largely missing from these literatures, however, is the analysis of the impact of non-farm diversification on the food security status of the rural households at the national level. It is in this context that, this research was conducted to evaluate the impact of non-farm income diversification on the food security status among the rural households in Nigeria using the 2010 GHS-Panel data set.

MATERIALS AND METHODS

Data and Variable Measurement

Analytical Model

Based on the causal inference theory, participation in non-farm income generating activities can be denoted as the (treatment) that the rural households received, and not participating in the activities to be designated as the (control) assign to the other group. Estimation of average annual food consumption expenditure or food security of diversified households is viewed as the evaluation of the treatment effects.

The propensity score is defined as the conditional probability of participating in non-farm income generating activities given pre-participation characteristics:

\[ p \equiv \text{prob}(D_i = 1 | \mathbf{x}_i) \equiv E[D_i \mid \mathbf{x}_i]; F(h(\mathbf{x}_i)) \]  

(1)

where \( D_i = (0, 1) \) is the indicator of participation in non-farm income generating activities, \( \mathbf{x}_i \) is the vector of pre-treatment characteristics, \( E \) is expectation operator, \( F(.) \) stands for normal or logistic cumulative distribution. The propensity score can be predicted with either probit or logit model (Sianesi, 2004; Owusu et al., 2011; and Adebayo et al., 2012). The treatment effects estimated are the Average Treatment Effect (ATE), this estimate the effects of the whole sample, the Average Treatment Effect on Treated (ATT) otherwise known as participation effect and Average Treatment Effects on Untreated (ATU). The parameter of interest is ATT as explained by (Becker and Ichino, 2002). The ATT can be evaluated as:

\[ ATT = E(\mathbf{x}_i \mid D = 1) - E(\mathbf{x}_i \mid D = 0) \]  

(2)

where \( E(\mathbf{x}_i \mid D = 1) \) is the expected gain or increase in food security due to participation in non-farm activity and \( E(\mathbf{x}_i \mid D = 0) \) represents the counterfactuals for non-participating households in non-farm activities.

Data Description of Variables and Descriptive Statistics

Data used in this study was obtained from the recent General Household Survey-panel conducted 2010-2011 by the National Bureau of Statistics (NBS) in collaboration with the Federal Ministry of Agriculture and Rural Development (FMA and RD), the National Food Reserve Agency (NFRA), the Bill and Melinda Gates foundation (BMGF) and World Bank (WB). The (GHS-Panel) is the first round of its kind in Nigeria to collect a long-term panel data based on the World Bank Living Standard Survey on households and their characteristic, welfare, household consumption and multiple agricultural activities. The other six countries where the similar surveys were conducted are mainly in Africa, which include; Ethiopia, Uganda, Tanzania, Malawi, Niger and Mali (National Bureau of Statistics, 2012). The first wave of the GHS-panel was carried out in two visits to the panel households. The post-planting survey visit was carried out in (August-October 2010), it was done after planting season to collect information on land preparation, input and labour utilization. The second round post-harvest visit was conducted (February-April 2011) to collect
information on crop harvesting and cultivation activities and other information related to harvest cycle. The GHS is a national survey that covered the whole 36 states in Nigeria including the Federal Capital Territory (FCT) and Abuja. This study used household micro-panel household-level data from a representative sample of 5000 households to examine the impact of non-farm income generating activities on among the rural households in Nigeria.

RESULTS AND DISCUSSION

Description of Household Characteristics

Table 1 presents the definition of variables used in the analysis and some summary statistics for diversified and non-diversified households respectively. Based on the household’s demographic characteristics, household endowments and community characteristics, some significant differences based on t-test were observed between diversified and non-diversified households. The mean difference for the vector \( X_i \) variables, including outcome variables used in the matching analyses for both participants and non-participants in non-farm income generating activities, alongside with their significant differences were also presented in Table 1. The outcome variable (food security) was found to be statistically different between diversified and non-diversified households at \( p > 0.001 \) level. This means that the food security status of participants and non-participants in NFIGA is different statistically based on their t-ratios. There are also significant differences in non-food expenditure, total expenditure, age of the household heads, Household size, value of livestock holdings and distance to community centres between diversified and non-diversified households.

Diversified households have on the average high food expenditure (₦66142.86) than non-diversified households (₦53212.334) and mean difference of (₦11071.38), this provides evidence that NFIGA has income and consumption smoothing effects on the diversified households in rural Nigeria. The same scenario goes with food security status where diversified households are more food secure than non-diversified by 11%. On the issue of food security situation, Table 1 reveals that diversified households are more food secure than undiversified, this significant difference is quite interesting and it also further supports the difference record earlier. It is expected that the households with high food expenditure are expected to be more food secure than those that spends less on food. This is in agreement with (Hung et al., 2010; and Owusu et al., 2011) who reported diversified households as more food secure in Vietnam and Ghana respectively. At the individual level, diversified household heads are a little bit of a younger than their non-diversified counterparts as indicated by their absolute t-ratios for a test of difference between the years. The result shows that age difference between diversified and non-diversified household heads are statistically significant –4.70. Furthermore, the results as well provide statistical evidence that diversified households have larger household sizes; this is supported by much literature in labour market participation especially in developing countries. The literature argues that, size and structure of households have an influence on the employment decisions and the ability of household’s labour supply in rural non-farm enterprises (Reardon, 1997). In terms of value of livestock holdings diversified household recorded high values. There are no significant statistical differences in farm size between diversified and non-diversified households in rural
Nigeria as indicated by insignificant absolute t-value –0.03, even though diversified households have larger average farm sizes.

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Variable Definition</th>
<th>Diversified N = 1215 (33.43%)</th>
<th>Non-Diversified N = 2409 (66.47%)</th>
<th>Difference in Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment variable</td>
<td>Non-farm income (NFIGA) generating activities 1 participant, 0 otherwise</td>
<td>66142.86</td>
<td>53212.33</td>
<td>55071.38</td>
</tr>
<tr>
<td>Outcome variable (AFE)</td>
<td>Discrete, Average Annual Food Expenditure (₦)</td>
<td>275339.4</td>
<td>221536.20</td>
<td>232248.30</td>
</tr>
<tr>
<td>Totfood</td>
<td>Discrete total Household Food Expenditure (₦)</td>
<td>118817.3</td>
<td>192475.60</td>
<td>83106.95</td>
</tr>
<tr>
<td>Nonfood</td>
<td>Continuous, Total non-food Expenditure (₦)</td>
<td>347183.7</td>
<td>7647619</td>
<td>320683.70</td>
</tr>
<tr>
<td>Totexp</td>
<td>Continuous, Total expenditure food and non-food</td>
<td>0.54</td>
<td>0.4986745</td>
<td>0.43</td>
</tr>
<tr>
<td>Foodsec</td>
<td>Discrete, food security (1 if the household is secure, 0 otherwise)</td>
<td>47.04</td>
<td>13.80</td>
<td>51.74</td>
</tr>
<tr>
<td>Age</td>
<td>Age of household head (in year)</td>
<td>1.81</td>
<td>19.44</td>
<td>1.84</td>
</tr>
<tr>
<td>Farmsize</td>
<td>Continuous, size of the land holding in hectares (ha)</td>
<td>5.85</td>
<td>3.25</td>
<td>5.38</td>
</tr>
<tr>
<td>Hhsize</td>
<td>Continuous, number of people in the household</td>
<td>119199</td>
<td>390011.5</td>
<td>243337.2</td>
</tr>
<tr>
<td>Livevalue</td>
<td>Continuous, total value of livestock owned by household (₦)</td>
<td>17.26</td>
<td>24.46</td>
<td>20.16</td>
</tr>
<tr>
<td>Distance</td>
<td>Continuous, distance to community centre kilometres (km)</td>
<td>1 if household has access to formal credit, 0 otherwise</td>
<td>1 if household has access to remittance, 0 otherwise</td>
<td>If a household head attained level of education up junior school</td>
</tr>
</tbody>
</table>

**Note:** Average household food expenditure in Nigerian Naira Exchange rate: USD = ₦158. 5 in 2012 *Denotes significant at 10%, **Denotes significant at 5% and ***Denotes significant at 1%.

**Source:** Author's Calculation (2014)

Propensity Score Matching Test for Food Security Impact

Before matching diversified and undiversified treatments, the impact of non-farm income generating activities on food security is insignificant. After matching, there is a significant impact of non-farm income generating activities on food security.
The article can be downloaded from http://www.ijasvm.com/currentissue.php

This article can be downloaded from http://www.ijasvm.com/currentissue.php

127
Impact of Non-Farm Diversification on Household Food Security

Table 3 reports the results of the Average Treatment effects on Treated (ATT) of the outcome variable, using propensity score matching techniques. In this study, first a probit regression in which he dependent variable is 1 if the household diversified into non-farm income generating activities, zero otherwise was estimated. The standard errors were calculated using bootstrap replication of each estimate. All the three matching algorithms (nearest neighbour, kernel, and radius) indicated that, ATT estimate is robust. The results for the estimated treatment effect on treated show that there is a significant difference in the ATT impact on the outcome variable (food security) for all the three techniques. Table 3 confirms that, radius matching gives more robust results of about 0.118 increases in the food security status due to participation in non-farm income generating activities. The increase in the food security status could be attributable to increase in income of participating households, which invariably increase the food consumption and hence, the food security level. The results further reveal that, participation in non-farm income generating activity exerts positive and significant influence on the household food security of the rural households. On the contrary, the nearest neighbour matching algorithm shows an evidence of the negative impact of participation in the food security status of the households.

This implies that participation in non-farm activities helped raise household’s income and thereby increasing their probability of being food secure. In specific terms, 12% ATT effects indicate that diversified households have more likelihood of being food secure by 12% over and above the non-diversified who as suggested by radius matching. Therefore, participation in non-farm activities is very crucial in improving the food

<table>
<thead>
<tr>
<th>Matching Method</th>
<th>Treatment</th>
<th>Control</th>
<th>Difference</th>
<th>Std Error</th>
<th>T-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nearest Neighbor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unmatched</td>
<td>0.529177719</td>
<td>0.409584665</td>
<td>0.119593054</td>
<td>0.021916605</td>
<td>5.46***</td>
</tr>
<tr>
<td>AT</td>
<td>0.527925532</td>
<td>0.535904255</td>
<td>−0.007978723</td>
<td>0.032678229</td>
<td>−0.24</td>
</tr>
<tr>
<td>AU</td>
<td>0.410058027</td>
<td>0.429400387</td>
<td>0.01934236</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kernel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unmatched</td>
<td>0.529177719</td>
<td>0.409584665</td>
<td>0.119593054</td>
<td>0.021916605</td>
<td>5.46***</td>
</tr>
<tr>
<td>AT</td>
<td>0.527925532</td>
<td>0.499991467</td>
<td>0.027934064</td>
<td>0.023520432</td>
<td>1.19</td>
</tr>
<tr>
<td>AU</td>
<td>0.410058027</td>
<td>0.445089111</td>
<td>0.035031084</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radius</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unmatched</td>
<td>0.529177719</td>
<td>0.409584665</td>
<td>0.409584665</td>
<td>0.021916605</td>
<td>5.76***</td>
</tr>
<tr>
<td>AT</td>
<td>0.527925532</td>
<td>0.410058027</td>
<td>0.117867505</td>
<td>0.024440195</td>
<td>4.82***</td>
</tr>
<tr>
<td>AU</td>
<td>0.410058027</td>
<td>0.527925532</td>
<td>0.117867505</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: *Denotes significant at 10%, **Denotes significant at 5% and ***Denotes significant at 1%.

Source: Author’s Calculation (2014)
security status of the rural households. This confirms the proposition that diversification in NFIGA has a positive impact on food security (Wanjala and Muradian, 2013). Contrary to a priori, the result of nearest neighbour matching seems to underestimate the impact of participation on food security as can be seen. Since the ATT is negative (−0.0327), it means that diversification in non-farm activities lower the probability of the household being food secure by 3.27% factor (Table 3). This result is consisted with (Babatunde and Qaim, 2010; and Owusu et al., 2011) who based on their study acknowledged the central role of non-farm work on enhancing food security and poverty alleviation in the rural areas of developing countries. Adekoya (2009), Alobo (2009), Hung et al. (2010), Adebayo (2012) and Wanjala and Muradian (2013) also provide abundant evidence that income from non-farm sources are crucial for poverty reduction and food security especially in the African and Asian countries.

CONCLUSION

The study has further shown regardless of location and socioeconomic characteristics almost two third (66.7%) of the households in Nigeria has farming as their primary occupation. However, due to the unavailability of needed inputs such as high quality seeds, organic and mineral fertilizers needed to replenish depleted soils and ineffective marketing and extension systems, the study revealed that this category of households is the most food insecure. Due to the failure of farming to provide the necessary and sufficient sources of livelihood for the people, many households reinforced their income sources through diversification. An assessment of the impact of non-farm diversification on food security revealed that diversification has increased in the food security 0.118 increases in the food security status (12%) in rural Nigeria. Secondly, a significant portion of the households (33.63%) survives on the diverse array of income generating activities that include off-farm and non-farm sectors. Thirdly, diversification among rich households is seen as a means to accumulate more wealth, whilst it is regarded as a survival coping strategy among poor households. Fourthly, the complexities between rural non-farm income generating activities and agriculture, rural infrastructure such as access road and proximity to community centres significantly support non-farm diversification.

Policies directed towards improving access to credit by rural households would not only improve food security, but also encourage investment in the rural non-farm sector. Availability of credit makes it easy for households to invest in business activities and productivity improvement in agriculture through the adoption of improved technologies and purchase of livestock breeding stock. Therefore, government effort in addressing food insecurity should geared towards improving credit accessibility in rural areas through micro-finance and cooperative formation. The issues regarding rural infrastructure, education and gender issues need to be given its right position by the three tiers of Nigerian government.

REFERENCES


