

Effects of social capital on food security of farming households in Ogun state, Nigeria

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Abstract

This study examined the effects of social capital on household food security among farmers in Odeda LGA of Ogun state, Nigeria. A multistage sampling technique was used to obtain data from 116 farming households in the study area in 2010. Data analysis was done using descriptive statistics and Probit model. The food security line was ₦ 2,155.74 per month per adult equivalent. Based on this, 45% of the total sampled households were food secure while 55% were food insecure. Food secure households exceeded the calorie requirements by average of 19% while food insecure households fell short of calorie requirements by average of 28%. A unit increase in social capital ($p < 0.01$) increases the probability of household to be food secure by 0.0991 while a unit increase in household size ($p < 0.01$) and level of education of household head ($p < 0.01$) decreases the probability of household to be food secure by 0.4095 and 0.1367 respectively. Participation in a socio-economic group is motivated by perceived benefits such as access to material incentives and capacity building opportunities available to members as well as mutual trust among members. Dimensions of cognitive social capital found among respondents revealed that most households (89.7%) had people to assist with childcare in emergencies and 96.6% had at least one close friend who could be relied on in cases of emergency. Consistent with apriori expectation, social capital contributes to household food security. Social capital was truly exogenous to household food security with no reverse causality.

Keywords: Social Capital, Food Security, Farming Households.

INTRODUCTION

Meeting the food needs of families in sub-Saharan Africa is a serious challenge. Several factors have combined to restrict access to food for many in developing countries and hunger in sub-Saharan Africa is as persistent as it is widespread (FAO, 2006). Of the estimated 923 million undernourished people in the world, about 200 million of them are in Sub-Saharan Africa (FAO, 2009). In Nigeria, an estimated 8 percent of the 140 million population was estimated to be undernourished in the 2004-2006 period (FAO, 2009) and less than 5 years to the target year; available statistics still cast doubt on whether the MDG of eradicating extreme hunger and poverty could be achieved by 2015. Adequate food intake (quantity and quality) is a key for healthy and productive life and the importance of food is shown in the fact that it accounts for a substantial part of a typical Nigerian household budget. The basic minimum level of nutrient requirement has been determined by the World Health Organization (WHO) and the Food and Agricultural Organization (FAO) to be 65 grammes of protein and 2450 kcal of energy per capita intake, of which if consumed otherwise, results in a state of malnutrition.

Although 70 percent of Nigerians live in rural areas, there is a dearth of national surveys providing datasets for the analysis of food and nutrition security in rural Nigeria. Though there have been a number of individual and institutional efforts and attempts at generating databases on food and nutrition security for Nigeria, these efforts are hampered by inadequate funds to implement large-scale surveys. Many of the datasets for food and nutrition security are not disaggregated to the household level, which constrains the full analysis of the situation, thus creating a gap in any analysis of the household and individual levels. This gap

needs to be filled to make progress in improving the food and nutrition security situation of rural dwellers in Nigeria.

There is growing empirical evidence that social capital contributes significantly to sustainable development and welfare. Growing opportunity requires an expanding stock of capital. The traditional composition of natural capital, physical or produced capital, and human capital needs to be broadened to include social capital. Social capital is widely seen as a resource that facilitates cooperation within or between groups of people. It can emerge in relationships in many areas of life, such as those involving friends and families, school communities, ethnic, religious and community groups, occupational groupings, firms, governments and other institutions. According to Narayan and Pritchett (1997), social capital is pervasive and can generate benefits in a subtle range as well as more visible ways. Following from this, is the need to complement acquisition of human capital and establishment of physical infrastructure with social capital. Social capital has the power to mitigate shocks to income and food supplies in times of crises. Generally, the severity of the shock to income and food supplies and what coping strategies families may choose to utilize to cope with the shock may depend primarily on the strength of the social networks they have access to.

Food security at the household level is ultimately a balance between availability and access, and in this regard complementary food security policies that increase the probability of food access by the vulnerable groups (in this case of rural households) are necessary. Although economic development is the long-term solution to Africa's challenge on hunger and poverty, this will take time. It follows therefore that African nations have to pursue policies and strategies that promote long-

term growth while at the same time offering short-term safety nets for the poorest of the poor. Since the majority of Nigerians (70 percent) live in rural areas, an analysis of the food and nutrition security situation of rural dwellers provides a clear picture of what needs to be done to address immediate needs and to build a stronger food system that can respond to future challenges. One factor that has been found to have the potential to mitigate food insecurity in many developing country settings is social capital. In times of financial hardship, food shortages, unreliable rainfall or severe illnesses, various studies in Africa have shown that the social capital that people have access to make a big difference in their abilities to surmount these adverse events (Mtika, 2001; Muga and Onyango-Ouma, 2009). Numerous studies have shown associations between social capital and positive health outcomes (Kawachi *et al*, 1998) and decreased crime rates (Sampson *et al*, 1997): but very few to our knowledge have examined potential relationships between social capital and food security especially in Nigeria.

Consequently, this study empirically determined the effects of social capital on food security status at the household level using farming households in Odeda LGA, Abeokuta and contributed to the growing literature on social capital and welfare, providing an indication of what policy recommendation is necessary to improve the standard of living of Nigerians. Arising from the forgoing, pertinent questions answered in this study included: What is the food security status of farming households in the study area i.e. are the farming households' food secure? What is the extent/depth of food security among the respondent households? What are the prevailing social networks in the area and what is the relationship between social capital and food security status of the households?

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

Intuitively, the basic idea of "social capital" is that one's family, friends, and associates constitute an important asset, one that can be called upon in a crisis, enjoyed for its own sake, and/or leveraged for material gain. Social capital is an important collective resource people draw on in pursuit of well-being. Conversely, the absence of social ties can have an equally important impact. Communities endowed with a diverse stock of social networks and civic associations will be in a stronger position to confront poverty and vulnerability (Moser, 1996; Narayan, 1997), resolve disputes (Varshney 1999), and/or take advantage of new opportunities (Isham *et al*, 2002). The level of participation and involvement within a group signifies the investment being made by individuals, an investment into themselves and their community.

Kawachi *et al* (1999) argued that social capital can increase the likelihood of access to

various forms of social support during times of need. At the household level, households that know and trust their neighbors may be more likely to request for food, or reciprocate with childcare responsibilities. These seemingly trivial favours could conceivably make a large difference in terms of access to food, especially for low-income households. Households may have similarly limited financial or food resources, but households with higher levels of social capital are less likely to experience hunger.

Scholars identified three kinds of social capital: bonding, bridging, and linking. Bonding social capital refers to relationships among members of a group or network who see themselves as relatively equal, for example, immediate family, close friends and neighbors or schoolmates. Bridging social capital refers to relationships among people and groups of people who are fundamentally different such as age, socio-economic status, race/ethnicity, or education. Linking social capital represents the extent to which individuals build relationships with the institutions and people who have relative power over them (e.g., to provide access to services or jobs) thus enabling them to leverage a far wider range of resources than was previously available to them (Woolcock, 2001).

METHODOLOGY

The study was carried out in Odeda LGA, Ogun State and data for the study were collected in 2010. Respondents were selected using multistage sampling technique. Six villages (two from each of the three sub zones of the study area -Odeda, Ilugun and Opeji) were chosen from which 116 farming households were selected randomly.

Descriptive Statistics: Descriptive tools such as frequency counts, mean and standard deviations, and percentages were used to analyze food security status by socio-economic variables of respondents. In addition, food security and surplus indices were constructed.

Food Security Index: The food security index was computed using the Cost of Calorie function (proposed by Greer and Thorbecke, 1986) based on the food security line and recommended daily calorie requirement. This method was used because of its simplicity. According to the FAO's recommended daily requirement (FAO, 2007), households whose daily per capita calorie intake was up to 2450 kcal were regarded as food secure while those below 2450 kcal were regarded as food insecure households. The following equations provide an explanation towards estimation of the index:

$$\ln X = a + bC \dots\dots\dots (i)$$

Where

X = Food Expenditure (₦)

C = Calorie Consumption (kcal)

$$Z = e^{(a+bL)} \dots\dots\dots (ii)$$

Where

Z = Cost of minimum recommended energy level (₦); Food security line for the study area

L = Recommended daily energy level (2450 kcal)

a = Intercept

b = Coefficient of Calorie Consumption

e = A mathematical constant (2.71828)

A household whose average cost of daily calorie consumption is equal to or more than Z is said to be food secure while any household with average cost of daily calorie consumption is lower than Z is said to be food insecure.

Surplus/Shortfall Index: The Index is given as:

$$P = \frac{1}{N} \sum_{j=1}^m G_j \dots\dots\dots(iii)$$

$$G_j = (X_j - L)/L \dots\dots\dots (iv)$$

Where

P = Surplus/Shortfall Index;

L = Recommended daily per capita requirements (2450Kcal.);

G_j = Calorie deficiency faced by household_j;

X_j = Per capita food consumption available to household_j;

N = Number of households that are food secure (for Surplus index) or food insecure (for Shortfall index).

This index measured the extent to which households were food secure or insecure.

Social Capital Variables: The aggregate social capital index was obtained via a multiplicative index of the three social capital dimensions (density of association, heterogeneity and participation in decision making) and normalized to a maximum value of 100 (Grootaert 1999).

Density of Membership: is captured by summing up the membership of associations by individuals in the household.

Meeting Attendance Index: is obtained by summing up the attendance of household members at meetings and relating it to the number of scheduled meetings by the associations they belong to. This value is then multiplied by 100.

Cash Contribution: is obtained by adding up the total cash contributed to the various associations the household belong to.

Labor Contribution: is the number of days that household members belonging to associations claimed to have worked for their associations.

Decision Making Index: is obtained by summation of the subjective responses of households on their rating in the participation in the decision making of the three most important institutions to them. The response is averaged across the three groups and multiplied by 100 for the household.

Heterogeneity Index: is an aggregation of responses of each household to questions on the diversity of members of the three most important institutions to the household. Questions are answered on whether members live in the same

neighborhood, are same kin group, same occupation, same religion, same gender, same age group and same occupation. For each of the factors, a yes response was coded 0 and a no response was coded 1 and a maximum score of 11 for each association represents the highest level of heterogeneity.

Probit Model: Probit model constrains the estimated probabilities to be between 0 and 1 and relaxes the constraint that the effect of the independent variable is constant across different predicted values of the dependent variable. This is normally experienced with the Linear Probability Model (LPM) (Sebopetji and Belete, 2009). The probit model assumes that while we only observe the values of 0 and 1 for the variable Y, there is a latent, unobserved continuous variable Y* that determines the value of Y. The other advantages of the probit model include believable error term distribution as well as realistic probabilities (Nagler, 1994). We assume that Y* can be specified as follows:

$$Y^* = X' \beta + \varepsilon, \dots\dots\dots (v)$$

where $\varepsilon \sim N(0, 1)$. Then Y can be viewed as an indicator for whether this latent variable is positive:

$$Y = I_{\{Y^* > 0\}} = \begin{cases} 1 & \text{if } Y^* > 0 \text{ i.e. } -\varepsilon < X' \beta, \\ 0 & \text{otherwise.} \end{cases}$$

$$\dots\dots\dots(vi)$$

Where

Y =Vector of dependent variable (1 for food secure households; 0 for food insecure households);

X =Vector of explanatory variables;

β =Probit coefficients;

μ₁ =Random error

The explanatory variables included in the model are:

X₁ = Household size (number);

X₂ = Age of household head (years)

X₃ = Gender

X₄ = Education Level

X₅ = Years of Farming Experience

X₆ = Income (₦)

X₇ = Marital Status

X₈ = Aggregate Social Capital Index

RESULTS AND DISCUSSION

Socioeconomic characteristics:

Findings show that majority of the household heads were still within the active working age. An average farming household head in Odeda is 51.13 years and most of the respondents are between 41 – 50 years. The level of educational attainment shows that the respondents have on the average 5.1 years of formal education (primary) which is less than the nine years of basic education under the Universal Basic Education Program in Nigeria. Average household size stands at seven and there are households with as many as 16 members in the area. Household size is an important determinant

of the household's expenditure on food and large household size could be a threat to food security. In terms of family composition, there were more male headed households than female headed households in the study area. Income wise, households earn about ₦20, 306 per month from farming while those with secondary occupations earn about ₦6099 monthly from various secondary occupations.

Dimensions of Social Capital in Odeda: Table 1 presents the social capital dimensions of the sampled households. In terms of meeting attendance, results show an average of 72.61%

attendance by respondents and households contribute on the average ₦16,613.79 (± ₦2.32) yearly as cash contribution to their respective associations. Participation in decision making shows good level of activity with a 73.56 % participation index on the average. The heterogeneity level indicates low level (47.39 %) of diversity of membership of associations. The result of the study shows that 9 out of every 10 respondents (93.10%) are members of at least one local level institution.

Table 1: Household activity in associations

Social Capital Dimensions	Minimum	Maximum	Mean	Standard Deviation
Meeting Attendance (%)	0.00	100.00	72.61	30.04
Heterogeneity Index (%)	0.00	84.85	47.39	23.94
Participation in Decision Making (%)	0.00	100.00	73.56	61.78
Cash Contribution Index (₦)	0.00	121,200.00	16,613.79	22811.64
Labor Contribution Index	0.00	76.00	3.57	9.81

Depth of Food Security among the Respondents: Based on the recommended daily energy levels of 2450Kilocalories (FAO, 2007), the food security line for farming households in the study area was estimated at ₦ 69.54 per day per person (equivalent to ₦ 2,155.74 per month per person and ₦ 25,034.4 per person annually). Results showed that that only 45% of the sampled households were able to meet the recommended

daily per capita calorie requirement of 2450Kilocalories (Table 2). About 55% of the households were food insecure, subsisting on less than the recommended daily per capita calorie requirement of 2450Kilocalories. The Surplus Index (P) shows that the food secure households exceeded the calorie requirements by 19%, while the Shortfall Index shows that the food insecure households fell short of the recommended calorie intake by 28%.

Table 2: Food Security Indices

Variables	Value
Cost of Calorie equation	$\ln X = a+bC$
Constant	4.239
Slope coefficient	1.2×10^{-6}
Recommended daily Energy levels	2450Kcal
Food Security line Z: Cost of minimum energy requirements per Adult Equivalent	₦ 69.54 per day ₦ 2,155.74 per month ₦ 25,034.4 per year
Head count ratio (H)	0.55 (for food insecure households) 0.45 (for food secure households)
Percentage households:	
Food secure households	45%
Food insecure households	55%
Surplus Index	0.19
Shortfall Index	0.28

Distribution of Food Security Status by Socioeconomic Characteristics: Results show that the food security of households decreases progressively with increase in the household head's age (Table 3). This result is in line with studies by Babatunde *et al* (2007) who found out that the older the household head, the lower the probability that the household would be food secure. Meanwhile, (83%) of the households with the household head of less than thirty years of age were food secure. This is probably because most household heads at this

age have a small household size; hence the few members of household have access to enough food. It was also observed that 43.4% of the male headed households were food secure while 52.9% of the female headed households were food secure showing a higher proportion of food secure households among female headed households than male headed households. This is in line with earlier studies on the gender component to food security, studies shows that fathers and mothers spend resources differently, and children are more likely to

be insecure when the father controls the resources needed for purchasing food (Muga and Onyango-Ouma, 2009). The Table also shows that food security incidence decreases with increase in household size, age of household head and increases as household income, social capital increase. The result agrees with Babatunde *et al.* (2007), who

found that as household size increases, the probability of food security decreases most likely because large household size implies more people to feed by almost the same resources and all things being equal, higher income increases household access to food

Table 3: Distribution of food security status by socio-economic characteristics of respondents

Variables	Variables	Percentage of food secure households	Percentage of food insecure households
Age of household head (years)	≤ 30	5(83.3)	1(16.7)
	31-40	10(55.6)	8(44.4)
	41-50	20(51.3)	19(48.7)
	51-60	13(46.4)	15(53.6)
	>60	4(16.0)	21(84.0)
Gender of household Head	Male	9(43.4)	56(56.6)
	Female	43(52.9)	8(47.1)
Household size	1-4	12(75.0)	4(25.0)
	4-8	35(50.0)	35(50.0)
	9-12	4(14.8)	23(85.2)
	13-16	1(33.3)	2(66.7)
Monthly income of Household head (₦)	≤ 10,000	5(25)	15(75.0)
	10,001-20,000	31(49.2)	32(50.8)
	20001-30,000	9(34.6)	17(65.4)
	30,001-40,000	1(100)	0(0.0)
	40,001-50,000	3(100)	0(0.0)
	50,001-60,000	0(0.0)	0(0.0)
	60,001-70,000	1(100)	0(0.0)
Educational level of household head	>70,000	2(100)	0(0.0)
	No formal	17(41.5)	24(58.5)
	Primary	26(48.1)	28(51.9)
	Secondary	7(36.8)	12(63.2)
	Tertiary	2(100)	0 (0.0)

Figures in parenthesis are percentages

Probit Model: Table 4a presents the effect of social capital dimensions on household food security status. Additive social capital indices were used to determine the effect of social capital on household food security. Primary exogenous variables such as age, education, income of household head, and household size were

statistically significant. Results also show that inclusion of the six social capital indices improved the performance of the model. This is observed with increase in the pseudo R^2 . This new model has a better explanatory power as reflected in the pseudo R^2 of 0.3014.

Table 4a: Probit result of effects of social capital on food security

Variables	Basic Model	With Additive Social Capital Variables
Age of Household Head	-0.0574 (0.69)	-0.0817 (0.90)
Squared Age	0.0002 (0.28)	0.0004 (0.50)
Sex of Household Head	0.4629 (1.02)	0.5272 (1.06)
Education	-0.0925 (2.63)***	-0.1387 (2.90)***
Marital Status	0.4800 (0.60)	-0.0424 (0.04)
Household size	-0.2131 (3.67)***	-0.2147 (3.34)***
Farming Experience	-0.0148 (1.00)	-0.0156 (1.01)
Income	0.0000 (2.79)***	0.0045 (2.81)***
Heterogeneity Index	-	-0.0081 (0.93)
Meeting Attendance	-	0.0005 (0.08)
Cash Contribution	-	0.0045 (1.90)**
Labor Contribution	-	0.0035 (0.19)
Decision Making Index	-	-0.0020 (0.71)
Membership Index	-	0.0433 (0.69)
Number of Observation	116	116
Pseudo R ²	0.2675	0.3029
Log likelihood	58.4420	55.6151
Constant	2.6368	4.1204

Figures in parenthesis are t values

*** significant at 1%, ** significant at 5%, * significant at 10%

Disaggregation of social capital into its components showed that household cash contribution was significant at 5 percent level and positively related to household food security. Thus a unit change in household cash contribution will increase household's probability to be food secure by 0.0045.

Endogeneity Effects of Social Capital on Household Food Security: This study tested for the existence of causality effect with the aid of an instrumental variable. The choice of the model was to remove the possible endogeneity effects of social capital indices as noted in several similar studies like Olayemi (1998), Okunmadewa *et al* (2007), Yusuf (2008), among others. Social capital was therefore instrumented for using trust. The result is presented in table 4b below. Evident in the table is the improvement in the coefficient of the aggregate

social capital index with the use of trust. Further, the instrumental variable method leads to a higher coefficient (0.0442) for the social capital index when social capital was not instrumented for. Also, the coefficient is statistically significant with the use of the instrumental variable thus, we infer the absence of significant reverse causality and the exogeneity of social capital is therefore inferred. A unit increase in the level social capital leads to a 4.4 percent increase in food security. This result is in line with Narayan and Pritchett (1997), Grootaert (1999), Okunmadewa *et al* (2007), Yusuf (2008) and Aker (2005). The result of the equation with instrumental variable shows that exogenous variables such as age, age square, education, marital status, household size and social capital are statistically significant in determining the food security status of the farming households.

Table 4b: Result of the Instrumental Variable (2SLS) estimation of effects of social Capital on food security.

Variables	Without Instrumental Variable	Marginal Effect	With Instrumental Variable	Marginal Effect
Age	-0.0453 (0.53)	-0.0735	-0.1324 (2.00) **	0.0544
Age Square	0.0000 (0.11)	0.0001	0.0012 (1.84) *	-0.0009
Sex	0.5257 (1.14)	0.9349	-0.2382 (0.61)	0.4654
Level of Education	-0.0854 (2.35) ***	-0.146 4	-0.1064 (3.71) ***	-0.1367
Marital Status	0.6597 (0.79)	1.2929	-1.1964 (1.72) *	1.0271
Household size	-0.2026 (3.411) ***	-0.3482	-0.1628 (3.01) ***	-0.4095
Farming Experience	-0.0134 (0.90)	-0.0213	-0.0155 (1.33)	-0.0346
Income	0.0012 (2.84) ***	0.0034	0.0045 (1.07)	0.0023
Social Capital Index	-0.0056 (0.75)	-0.0124	0.0442 (5.98) ***	0.0991
Sample size	116		116	
pseudo R ²	0.2710		-	
Log Likelihood	58.1608		-556.3519	
Wald Chi ²	-		98.13	
Constant	2.2643		4.3288	

Figures in parenthesis are t values, *** significant at 1%, ** significant at 5%, * significant at 10%

Household size: Household size was a significant determinant of food security of respondent households with a marginal value of 0.35. This means that a one percent increase in household size will reduce the probability of household to be food secure by 35 %. This result is expected because increase in the household size implies that more people are eating from the same resources, hence, the household members may have less food to go round when compared with a smaller household size. The result is in line with the findings of Olayemi (1998).

Level of Education of household head: According to studies by Agbola, (2004) and Babatunde *et al* (2007), level of education of the household heads has significant effect on the probability of households to be food secure. Findings revealed that the level of education of household heads was a significant and negative determinant of households' food security status. A unit increase in the level of education of household head will reduce the probability of household to be food secure by 0.15. This suggests that a household with a well-educated household head may not necessarily be food secure.

Income: Results show that income of household heads is a significant and positive determinant of households' food security status. A unit increase in the level of income of household head will increase the probability of household to be food secure by 0.0000864. This result is in line with studies by Babatunde *et al* (2007) who found out that the higher the household head's income, the higher the probability that the household would be food secure. This was as expected because all things being equal, higher income increases households' economic access to food.

Social Capital: Findings also confirm that social capital is significant and positively associated with household food security status at 10 percent level with a marginal value of 0.0991 hence, a percentage increase in trust level of respondents will increase the household's probability to be food secure by 9.9 %. Households with higher levels of social capital are less likely to experience hunger. This is in line with other studies (Yusuf 2008; Okunmadewa *et al* 2005; Kawachi *et al* 1999, Rose 2000; Mtika, 2001; Muga & Onyango-Ouma, 2009) that discovered that social capital has positive influence on welfare and is an important factor in improving the quality of life of households.

Age of household head: A unit increase in the age of household head will reduce the probability of household to be food secure by 5.4%. This could be attributed to the fact that the productivity of old household head will decline as they are ageing thereby impacting on their food security status. This result is in consonance with Agbola (2004) who claimed that increase in age decreases food security.

Marital Status: Marital status is significantly and negatively related to food security. This is most likely because married respondents have larger household sizes than single or unmarried respondents.

CONCLUSION

The study shows that 45% of the sampled households in the study area were food secure while 55% of the households were food insecure. Factors that influence food security among the farming households are household size, age, education of household head, income and social capital. Social capital is significantly and positively related to household food security status. The test for reverse causality between social capital and household food security with the aid of instrumental variable estimation technique indicates a direct effect of social capital on food security. This implies the absence of significant reverse causality. The exogeneity of social capital is thus inferred. The study thus concludes that overall, social capital improves food security of farming households and is an important factor in improving the quality of life of households.

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