

SOCIAL CAPITAL DIMENSIONS AND FOOD SECURITY AMONG FARMING HOUSEHOLDS IN OGUN STATE, NIGERIA

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ABSTRACT: Despite an annual 2.5% growth in food production in Nigeria, food insecurity at the national and household level is dismal and on the increase from 18% in 1986 to 40% in 2005. With several studies on social capital and welfare in Nigeria, there is a dearth of information on the role that social capital plays in mitigating food insecurity. This study examined effects of social capital on food security among farming households in Odeda LGA of Ogun state, Nigeria. A multistage sampling technique was used to select 116 households in the study area in 2010. Data analysis was done using descriptive statistics and Probit regression. 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 19% while food insecure households fell short of calorie requirements by 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 0.3482 and 0.1367 respectively. Disaggregation of social capital into its dimensions shows that cash contribution positively and significantly affects food security of farming households. Consistent with our a priori, households with higher levels of social capital are less likely to experience food insecurity.

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INTRODUCTION

Achievement of food security for all remains a huge challenge for several developing countries like Nigeria. Food is a basic necessity of life. The importance of food at the household level cannot be overemphasized. Food accounts for a substantial part of a typical Nigerian household budget and it has been established that the quantity and quality of food consumed by households affect their health and economic well being (Adesimi and Ladipo, 1979). 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 in Sub-Saharan Africa (FAO, 2009) and in Nigeria, an estimated 8 percent of the 140million strong population was estimated to be undernourished in the 2004-2006 period (FAO, 2009). Among the development problems facing Nigeria, food insecurity ranks topmost. The level of food insecurity has steadily been on the increase since the 1980s and in spite of the Millennium Development Goal target to eradicate

extreme poverty and hunger and halve the incidence of extreme hunger between 1990 and 2015 (FAO, 2006), less than 5 years to the target year, available statistics still cast doubt on whether this goal could be achieved by 2015.

Food security “exists when all people, at all times, have physical, economic, and social access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (FAO, 1996/2001). The basic minimum level of nutrient requirement has been determined by the Food and Agricultural Organization to be 2450 kcal of energy per capita intake of which if consumed otherwise results in a state of malnutrition (FAO, 2007). Food security at both the national and household level is dismal and in Nigeria, the percentage of food insecure households was reported to be 18 percent in 1986 and 40 percent in 2005 (Sanusi *et al.*, 2006). It then becomes imperative that Nigeria urgently takes action to cope with immediate needs for food and build a stronger food system that can respond to future

challenges. At the household level, food security implies adequate access to food over time. Food access is a function of the physical, social, and policy environment which determine how effectively households are able to use their resources to meet their food security objectives, however, a number of factors such as income, educational level, and household sizes are known to affect household food security as they directly affect economic access and the sustenance of such access.

In Nigeria, the production of food has not increased at the rate that can meet up with the food demand of the increasing population (Ojo, 2003). While food production increases annually at the rate of 2.5 percent, food demand increases annually at a rate of more than 3.5 percent due to high rate of annual population growth of 2.83 percent (NBS, 1996). The apparent disparity between the rate of food production and demand for food in Nigeria has led to a food demand-supply gap, leading to a widening gap between the food available and the total food requirement and hence posing a threat to national food security. The problem of food and nutrition security in Nigeria has not been adequately and critically analyzed, despite various approaches at addressing the challenge. The enormous amount of fund spent in attempting to assure the food security of Nigerians without success calls for a fundamental review of the past approaches and achievements to see what lessons can be learned to re-strategize and develop an approach that will ensure that better progress is made towards achieving the first Millennium Development Goal. An examination of social capital may offer insights into ways to decrease the prevalence of food insecurity and hunger in Nigeria, especially amongst rural settings.

Social capital has been found to have major impact on the income and welfare of the poor by improving the outcome of activities that affect them. It improves the efficiency of rural development programs by increasing agricultural productivity, facilitation, the management of common resources making rural trading more profitable, and improving access of households to water, sanitation, credit and education in rural and urban areas (Narayan, 2002). Social capital refers to the institutions, relationships and norms that shape the quality and quantity of a society's social interactions. It is the glue that holds a society together. According to Coleman (1988), social capital can take on three forms: firstly, obligations and expectations which depend on the trustworthiness of the social environment, secondly, the capacity of information to flow through the social structure in order to provide a basis for action and thirdly, the presence of norms accompanied by effective sanctions. Socialcapitalresearch.com defines social capital as "the

value of social networks, bonding similar people and bridging between diverse people, with norms of reciprocity." Thus social capital has three main dimensions: Bonding social capital referring to strong family ties, bridging social capital referring to weak ties among friends and acquaintances and more formal ties linking members of voluntary organizations. There is growing empirical evidence that social capital has the potential to mitigate food insecurity in many developing countries. 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 & Onyango-Ouma, 2009). Social capital is built during interactions for social, economic, cultural and religious reasons and the main assumption is that networks built through these interactions have measurable benefits to participating individuals and will lead directly or indirectly to improved welfare (food security). Putnam (2000) argues that social capital has "forceful, even quantifiable effects on different aspects of our lives such as enhanced economic achievement through increased trust and lower transaction costs (Fukuyama, 1995) and improved child welfare (Cote and Healy, 2001). The cumulative result of the research indicates that the well connected are more likely to be "housed, healthy, fed, hired and happy" (Woolcock, 2001). Also, growing opportunity requires an expanding stock of capital. Following from this, is the need to complement acquisition of natural, physical and human capital 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. In current literature however, there has been very little emphasis on the role that social networks play in mitigating food insecurity in Nigeria. Furthermore, there is little empirical information on the relationship between various dimensions of social capital and food security status of households. Consequently, this study therefore empirically determined the effects of social capital on food security status at the household level using farming households in Odeda LGA in Abeokuta, Ogun State-Nigeria.

Literature Review

The basic idea of "social capital" is that one's family, friends, and associates constitute an important asset 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. The level of participation and involvement within a group signifies the investment being made by individuals, an investment into themselves and their community. By contributing to a group, the social capital of households as a whole can appreciate while individuals continue to build trust, develop relationships and networks with other members and this may contribute to a higher quality and level of life satisfaction (Bryant and Norris, 2002). Kawachi *et al.* (1999) argues 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 borrow 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. Food security at the national and global level tends to focus on the supply side of the food equation. The question often raised is: is there enough food (dietary energy) available? But availability does not assure access, and enough calories do not assure a healthy and nutritional diet hence, distribution of the available food is critical and if food security is to be a measure of household or individual welfare, it has to address access.

Thus 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 neighbours or schoolmates. Bridging social capital refers to relationships among people and groups of people who are fundamentally different in 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).

In this study, the Social Capital is therefore viewed as membership in local level institutions, regular meeting attendance, volunteering, entertaining, or active participation in group activities as well as through methods of mutual assistance that are inherent in a given society, representing a sustainable and long-lasting system, woven into the social fabric of the people. People's entitlement to food is assured during various crises through this mechanism.

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. Odeda LGA was purposively selected and six villages (two each from each of the three sub zones of the study area -Odeda, Ilugun and Opeji) were chosen from which 116 respondents were selected randomly.

Descriptive Statistics

Descriptive tools such as frequency counts, mean and standard deviations, 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

Based on the food security line and recommended daily calorie requirement, the food security index was computed using the Cost of Calorie function (proposed by Greer and Thorbecke, 1986). This method was used because of its simplicity. Households whose daily per capita calorie intake is up to 2450 kcal were regarded as food secure while those below 2450 kcal were regarded as food insecure households (FAO, 2007).

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

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:

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

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

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.

Determinants of Food Security

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:

$$Y^* = X'\beta + \varepsilon,$$

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

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

Where

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

X = Vector of explanatory variables;

β = Probit coefficients;

μ_1 = Random error

Probit regression model was used to estimate the food security status of households as a function of some independent variables/determinants.

The determinants/explanatory variables included in the model are:

X_1 = Household size (number);

X_2 = Age of household head (years)

X_3 = Gender

X_4 = Education Level

X_5 = Years of Farming Experience

X_6 = Income (₦)

X_7 = Marital Status

X_8 = Social Capital Index

RESULTS AND DISCUSSION

Household Characteristics and Social Capital Dimensions

As presented in Table 1, 94.8 percent of respondents are below 60 years of age hence in their economic active age. Attendance at meetings shows that on the average, households attend two out of every four meetings but attendance rate is highest for respondents between 51 and 60 years of age who have a meeting attendance index of 83.27%. It was observed that membership diversity, meeting attendance and cash contribution increased with years of formal education. The highest representation of cash contribution to various associations is within the age group of 51 and 60 years. Male household heads in the study area attend more association meetings than their female counter part; however, female heads had a higher average annual cash contribution of (₦19964.71) than males who contribute ₦16038.38 on the average yearly.

Table1: Description of Social Capital across Socio-economic variables of the Respondents

Variables (Household Head)	Frequency	Membership Density Index	Heterogeneity Index (%)	Meeting Attendance Index (%)	Cash Contribution (₦)	Labor Contribution (manday)	Decision Making Index (%)
Age (years)							
≤ 30	18 (15.5)*	2.78 (1.66)	46.13 (21.94)	72.37 (35.595)	13744.44 (17458.77)	5.44 (17.96)	35.19 (33.28)
31-40	39 (33.6)*	3.13 (1.61)	41.88 (20.76)	74.70 (21.87)	16312.82 (25903.17)	3.69 (6.79)	37.61 (28.54)
41-50	28 (24.1)*	4.79 (2.66)	54.65 (19.89)	83.27 (20.19)	24607.14 (27846.10)	5.86 (10.98)	51.19 (29.72)
51-60	25 (21.6)*	5.20 (5.50)	54.06 (31.56)	57.89 (38.90)	10432.00 (13756.41)	0.32 (0.95)	23.33 (31.55)
>60	6 (5.2)*	1.00 (0.00)	25.25 (1.56)	71.35 (39.94)	15633.33 (12500.51)	0.00 (0.00)	25.00 (13.94)
Gender							
Male	17 (14.7)*	3.00 (1.73)	44.56 (20.69)	56.20 (39.61)	19964.71 (17796.94)	3.53 (9.96)	37.25 (23.96)
Female	99 (85.3)*	3.95 (3.44)	47.87 (24.52)	75.43 (27.35)	16038.38 (23592.69)	3.58 (9.84)	36.70 (32.03)
Household size							
1-4	16(13.8)*	2.75(1.69)	36.17 (23.48)	64.53 (33.62)	13337.50 (13312.99)	4.38 (7.27)	25.00 (19.25)
4-8	70(60.3)*	3.44(2.22)	47.88(23.17)	75.05 (27.77)	19925.71 (26500.55)	4.43 (11.53)	40.24 (30.49)
9-12	27 (23.3)*	5.00 (5.26)	52.53 (26.15)	72.97 (31.69)	6777.78 (9146.22)	1.11 (5.77)	33.95 (37.41)
13-16	3 (2.6)*	7.33 (2.89)	49.49 (4.63)	55.56 (50.92)	45333.33 (16165.81)	1.33 (1.15)	44.44 (9.62)
Educational level							
No formal	41 (35.3)*	3.51 (2.65)	45.09 (27.91)	60.51 (39.60)	12360.98 (16871.23)	2.54 (6.93)	34.96 (32.02)
Primary	54 (46.6)*	3.80 (3.74)	46.02 (22.32)	76.54 (22.35)	11096.30 (12585.75)	4.44 (11.81)	32.72 (30.02)
Secondary	19 (16.4)*	4.42 (3.24)	54.07 (18.71)	85.82 (14.63)	30463.16 (25983.42)	3.68 (9.55)	49.12 (29.12)
Tertiary	2 (1.7)*	4.50 (0.71)	68.18 (2.14)	89.02 (7.45)	121200.00 (0.00)	0.00 (0.00)	66.67 (0.00)

Figures in parenthesis are percentages

Dimensions of Social Capital in Odeda

Table 2a presents the social capital dimensions of the sampled households. In terms of meeting attendance, results show that an average of 72.61 % attendance by respondents and households contribute on the average ₦16,613.79 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.

Table 2a: 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	200.00	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

Some dimensions of cognitive social capital (Table 2b) found among the respondents showed that most households (89.7 percent) could count on their neighbours for some form of help in times of

emergencies while 96.6 percent had at least one close friend who could be relied on in cases of emergency.

Table 2b: Variables of Social Network, Social Support and Social Interaction

No. of close friends	Frequency	Percent
0	4	3.4
1-5	89	76.7
6-10	21	18.1
11-15	2	1.7
Total	116	100.0
Count on neighbors	Frequency	Percent
Yes	104	89.7
No	12	10.3
Total	116	100

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 (₦2,155.74 per month per person). Annually, this is equivalent to ₦25,034.4 per year per person. Results (Table 3) showed that 45 percent of the sampled households were able to meet the recommended daily per capita calorie requirement of 2450Kilocalories hence were food secure. About 55 percent 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 percent, while the Shortfall Index shows that the food insecure households fell short of the recommended calorie intake by 28 percent.

Table 3: 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

Probit Model: Social Capital Dimensions and Household Food security

Unlike the basic model 1 that excludes the social capital indices; the inclusion of six social capital indices in the model 2 increases the pseudo R^2 from 0.2675 to 0.3029 (Table 4). Primary exogenous

variables such as education, income of household head, and household size were statistically significant. The pseudo R^2 slightly increased in the model with the inclusion additive social capital indices suggesting that social capital plays a significant role in explaining variations in household food security status. A relative good performance is also recorded with multiplicative social capital index (Model 3).

Marginal effects of Social Capital on Household Food Security (Model 3)**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) which state that social capital has positive influence on welfare and is an important factor in improving the quality of life of households.

Table 4: Probit Result of effects of Social Capital on Food Security

	Basic Model 1	With Additive Social Capital Variables Model 2	With Multiplicative Social Capital. Model 3	Marginal Effects for (Model 3)
Age of Household Head	-0.0574 (0.69)	-0.0817 (0.90)	-0.0453 (0.53)	-0.0735
Squared Age	0.0002 (0.28)	0.0004 (0.50)	0.0000 (0.11)	0.0001
Sex of Household Head	0.4629 (1.02)	0.5272 (1.06)	0.5257 (1.14)	0.9349
Education	-0.0925 (2.63)***	-0.1387 (2.90)***	-0.0854 (2.35)***	-0.146 4
Marital Status	0.4800 (0.60)	-0.0424 (0.04)	0.6597 (0.79)	1.2929
Household size	-0.2131 (3.67)***	-0.2147 (3.34)***	-0.2026 (3.41)***	-0.3482
Farming Experience	-0.0148 (1.00)	-0.0156 (1.01)	-0.0134 (0.90)	-0.0213
Income	0.0000 (2.79)***	0.0000 (2.81)***	0.0000 (2.84)***	0.0000
Social Capital Index	-	-	-0.0056 (0.75)	-0.0124
Heterogeneity Index	-	-0.0081 (0.93)	-	
Meeting Attendance	-	0.0005 (0.08)	-	
Cash Contribution	-	0.0000 (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	116	
Pseudo R^2	0.2675	0.3029	0.2710	
Log likelihood	58.4420	55.6151	58.1608	
Constant	2.6368	4.1204	2.2643	

Figures in parenthesis are t values

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

CONCLUSION

The study shows that 45 percent of the sampled households in the study area were food secure while 55 percent of the households were food insecure. Hence, more farming households in the study area are food insecure than those that are food secure. Social capital is significant at 10 percent level and positively related to household food security status. Household food security decreases with increasing household size. The level of education of household heads was a significant and negative determinant of households' food security status, suggesting that a household with a well educated household head may not necessarily be food secure. The study concludes that social capital has positive influence on household food security and is an

important factor in improving the quality of life of farming households.

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