

An Analysis of Socio-Economic Characteristics and Food Security Situation among Semi-Urban Households: A Case Study of Biu and Bama Local Government Areas in Borno State, Nigeria

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Abstract

The paper analyzed the socio-economic characteristics and food security situation among semi-urban households in Biu and Bama Local Government Areas in Borno State, Nigeria. Well structured questionnaire were used to source information from 198 randomly selected households. Descriptive statistics, Cost-of-Calorie Function (COC) and Logit model were used to analyze the data. The study revealed that mean age of respondents was 45 years and they spent an average of 8 years in formal education. Also, mean monthly income level was about ₦40,000 and assets base was at an average of ₦194,000. The food security line was found to be ₦66.17 per day per adult equivalent and 44% of the households were food secure. Significant and positive variables in explaining the variation in food security status include education, farm size, income, contacts with extension agents, cooperative membership, family labour, assets, farm enterprise, farming experience and food diversity. Child dependency ratio and gender though significant, negatively influence food security. Results also showed that crop production, monthly wages and petty trading were the major sources of income in the study area. The study, therefore recommended improvement of wage earning capacity, more income diversification opportunities and increased awareness to family planning facilities were proffered.

Keywords: Food security, Determinant, Socio-economic characteristics, Income generation and Semi-urban households.

1. Introduction

Food security, which came to limelight in the mid-1990s, can be defined as the success of local livelihoods to guarantee access to sufficient food at the household level (Devereux and Maxwell, 2001). The failure of early solutions to the problem of food insecurity in the 1970s and 1980s was largely attributed to technological bias, stressing production rather than equitable distribution, access, affordability, and utilization. Since then, it has become clear that food security revolves around complex issues that encompass a wide range of interrelated environmental, economic, social, and political factors. Addressing food security, therefore, requires an integrated approach and challenges many regions' ability to address food security adequately (Vogel and Smith, 2002).

Food security issues have continued to attract special interest in the 2000's. This concept was given general definitions in the time past but in recent times, there has been a divergence of ideas on what food security really means. According to World Bank (1986), food security was defined as access by all people at all times to enough food for active and healthy life. The committee on World Food Security defined it as physical and economic access to adequate food by all household members without undue risk of losing the access. The definition adopted at the FAO in 1996 and reconfirmed in 2002, accepted the USAID's concept which has three key elements viz: food availability, food access and food utilization. However, a fourth concept is increasingly becoming accepted namely "the risk that disrupt anyone of the first three factors". Therefore, there are four major elements of food security. They are food availability, food access, food utilization and not loosing such access.

As shown in Figure 1, households' economic and social resources, livelihood activities and management activities contribute to the level of food security. The socio-economic factors include age, income, farm size, household size, farming experience, level of education and sex of respondents. Also, total value of assets, expenditure on food, access to credit and extension agents, child dependency ratio, hired labour, family labour and diet diversity of households are important factors. Furthermore, a livelihood comprise of the capabilities, access (stores, resources, claims and assets), and activities required for a means of living: a livelihood is said to be sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation. Livelihood can be made up of a range of on-farm and off-farm activities that together provide a variety of procurement strategies for food and cash (Care, 2002). The management activities involve the organization and effective utilization of the livelihood opportunities available to the households to meet basic needs. The four major elements of food security ultimately influence the nutritional status of households irrespective of their location, physical and economic endowments etc.

In a study of food security in Nigeria, Olayemi (1998) categorized factors affecting food security at the household level into supply-side factors, demand-side factors and stability of access to food. Household food and non-food production variability represents the supply factors while household economic asset, household income variability and quality of human capital within the households represent the demand factors. The degree of producer and consumer price variability, household food storage and inventory practices represent the stability of access to food. These factors positively affect the level of food security in the study area. In addition, Goni (2005) examined food security in the Lake Chad Area of Borno State, Nigeria. He reported that factors influencing household food security positively include stock of home produced food and number of income earners in the household. This implies that these factors increase the incidence of food security in the study area. The household size positively influenced the availability of manpower needed in the farm which in turn increased the stock of own-produced food. Increased income also invariably increased economic access to food. Furthermore, studies (Amaza *et al.* 2008, Oluyole *et al.*, 2009, Ala *et al.* 2010 and Ahmed *et al.* 2014) have shown that some socio-economic characteristics such as household income, educational status, farm size, access to credit, household enterprise, cooperative membership and farming experience influence the food security in those households.

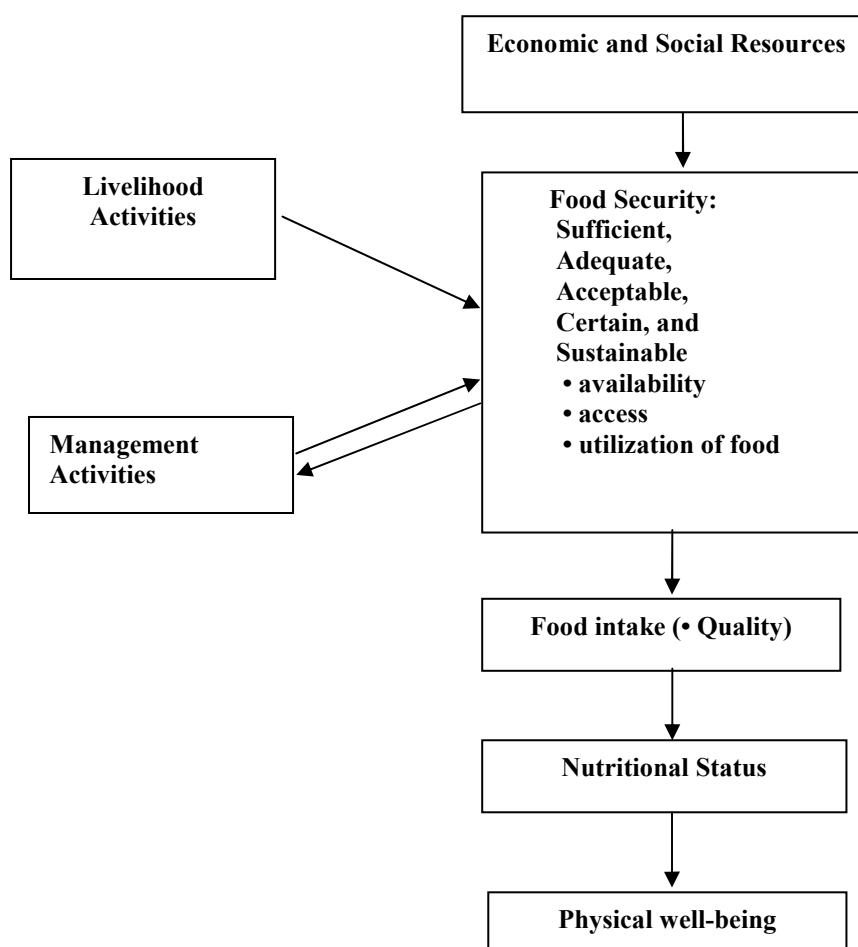


Figure 1: Conceptual Framework on Food Security
 Source: FANTA (2000)

Although availability of food is a precondition of its access, the emphasis in the concept of food security lies on access to food. In most cases, food at the household level is made available through own-farm operations and/or by purchasing the food from the market. Households however, may lack resources in making sufficient claim to food. Consequently, the incomes of most families are not adequate for the basic sustenance of life. This study was therefore designed to measure the food security status of households in selected semi-urban Local Government Areas in Borno State, Nigeria. The specific objectives examined the socio-economic characteristics of respondents; examined households' main sources of income; measured the food security status of households; and examined the determinants of food security status of respondents in the study area.

The study was conducted in Borno State located in the North-eastern part of Nigeria. It lies between

latitudes 12° 00N and 14° 00 N and longitudes 10° 00 E and 14° 00 E. Within the north-east, the State shares borders with Adamawa State to the south, Yobe State to the west, and Gombe State to the southwest. It also shares International borders with the Republic of Niger to the north, Chad to the north-east and Cameroon to the East. The state has an area of 75,540 km² and 27 Local Government Areas spread over four major agro-ecological zones. Agriculture is the main stay of the State's economy. The major crops cultivated in the State are millet, sorghum, maize, groundnut, wheat, cowpea, soybeans (which has become a major crop in southern Borno in recent years) and vegetables (onions, pepper, tomatoes, garden eggs and other leafy vegetables). The major livestock reared in the State are cattle, camel, sheep and goats (Kwaghe, 2006). Households in Biu and Bama are predominantly farmers, petty traders and civil servants.

2. Research Approach

2.1 Sampling Technique

Multistage sampling technique was employed for this study. The first stage involved the purposive selection of Biu and Bama Local Government Areas (LGAs). The selected LGAs represent the major semi-urban settlements in Borno State. In the second stage, random sampling technique was used in selecting three wards from each of the two semi-urban LGAs who engaged mainly in agricultural production, agro-processing and marketing giving a total of six wards. The three wards in Biu were Miringa, Buratai and Mandafumwa while the three wards in Bama were Nguro soye, Gulumba and Woloji. The third stage involved the random selection of 35 semi-urban households from each of the six wards giving rise to 210 households. However, only data from 198 farming households in the semi-urban area were analyzed as others were discarded for inconsistency or incompleteness.

2.2 Analytical Techniques

2.2.1 Descriptive statistics was used to examine the socio-economic characteristics of respondents.

2.2.2 Inferential statistics the cost-of-calories (COC), proposed by Greer and Thorbecke (1986) was used to estimate the food security line. This method has been applied by several studies (Makinde 2000; Babatunde *et al.* 2007; FAO, 2009; Oluyole 2009) whose main focus was on food security. A household whose daily per capita calorie intake is up to 2260 Kcal was regarded as food secure and those below 2260 Kcal were recognized as regarded as food insecure.

Calorie adequacy was estimated by dividing the estimated calorie supply for the households by the household size adjusted for adult equivalence using the consumption factor for age-sex categories. The food security line is given as:

$$\ln X = a + bC \quad (1)$$

Where:

X = adult equivalent food expenditure (in Naira) and

C = actual calorie consumption per adult equivalent of a household (in kilocal).

The calorie content of the recommended minimum daily nutrients level (L) 2260Kcal was used to determine the food security line S using the equation:

$$S = e(a+bL) \quad (2)$$

Where: S = cost of buying the minimum calorie intake (food security line);

a = Intercept;

b = Coefficient of the calorie consumption;

L = FAO recommended minimum daily energy (calorie) level.

2.2.3 Logit Model

Empirical model for the determinants of food security

A Logit model was used to examine the determinants of households' food security which was specified as:

$$Y_i = g(I_i) \quad (3)$$

$$I_i = b_0 + \sum_{j=1}^m b_j X_{ji} \quad (4)$$

Where:

Y_i is the observed response for the i th observation (i.e., the binary variable, $Y_i = 1$ for a food secure household and $Y_i = 0$ for a food insecure household); I_i is an underlying and unobserved stimulus index for the i th observation for each household; if $I_i > I_i^*$ the household is observed to be food secure, if $I_i < I_i^*$ the household is observed to be food insecure; g is the functional relationship between the field observations (Y_i); (I_i^*) the stimulus index determines the probability of being food secure; and (I_i) the stimulus index determines the probability of being food insecure. The empirical model used for determining factors that influenced food security status among low-income households in Maiduguri was specified as:

$$I_i = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + b_{11}X_{11} + b_{12}X_{12} + b_{13}X_{13} + b_{14}X_{14} + b_{15}X_{15} + b_{16}X_{16} + e \quad (5)$$

where:

P_i = the probability of an i^{th} household being food secure stands for dummy, X_1 = Age of household head (AGE) in years; X_2 = Income of household (HHINC) in Naira; X_3 = Farm size of a household (FARMSZ) in hectares; X_4 = Household size (HHSZ); X_5 = Farming experience (FARMEXP) in years; X_6 = Co-operative membership; (COOP) $D = 1$, if yes; $D = 0$, otherwise; X_7 = Level of education (EDUC) in years; X_8 = Sex of household head (SEX) $D = 1$ for male, $D = 0$ for female; X_9 = Household assets (HHAST) in Naira; X_{10} = Household production enterprise (FARMENT); $D = 1$, if yes; $D = 0$, otherwise; X_{11} = Household head's access to credit facilities (CREDIT) $D=1$ if yes, otherwise $D = 0$; X_{12} = Child dependency ratio (CDR); X_{13} = Household head's access to extension agents (EXTAG) $D=1$ if yes, otherwise $D=0$; X_{14} = Hired Labour (HLAB) in manday; X_{15} = Family Labour (FLAB) in manday; and X_{16} = Diet Diversity (DD) in HDDS scores $D = 1$, high diet diversity (6-12); $D = 0$, low diet diversity (0-5). b_0 = constant; and e = error term.

3. Results and Discussion

3.1 The socio-economic characteristics of respondents in the semi-urban settlements are presented in Table 1. The results showed that respondents spent an average of eight years in formal education and had mean age of 45 years. This implies that majority of the respondents are educated and in their economic active years to support the rigors of food production and general livelihood sustenance. The households had an average of 7 persons per households. This shows that the households' size is moderate. The mean farm size and farming experience of two hectares and 14 years respectively shows that households are actively involved in farming. The mean income for the respondents was about ₦40,000.00. Mean cost of hired labour of ₦9,502 is relatively higher than that of family

Table 1: Socio-economic Characteristics of Respondents in Semi-urban area

Factors	Semi-urban (n=198)	
	Mean	STD
Education (yrs)	8.0	6.7
Age (yrs)	45.0	10.6
Household size	7.0	2.4
Farm size (ha)	2.0	1.3
Monthly Income (₦)	39,883.7	26,208.2
Farming Experience (yrs)	14	9.56
CDR	0.1	0.171
Cost of family Labour (₦)	9,048.0	11,500.3
Cost of hired Labour (₦)	9,502.0	16,184.0
Assets (₦)	194,266.8	250,754.0

Source: Field Survey, 2011.

labour of about ₦9,000.0. Households engage in other income generating activities such as petty trading, livestock and poultry production fish farming that require labour outside the family setup. Average value of asset amounts to ₦194,266.80 The assets base, though relatively low can be liquidated in lean periods to meet households' food requirements and general welfare.

In Table 2, other socio-economic characteristics were further explained. Household heads in the study area were mostly males (about 98%). This is in consonance with the religious inclinations of the respondents. About 56% of the respondents had no cooperative affiliation. Also, in the study area, 74% of the household heads had no contact with extension agent(s). This implies that respondents are subsistence farmers and still practicing the traditional pattern of farming.

Table 2: Other Socio-economic Characteristics of Urban Households

Other Socio-economic factors	Semi-Urban (n=198)	
	Frequency	Percentage
Gender		
Male	193	97.5
Female	5	2.5
Membership of cooperatives		
Membership	87	43.9
Non-membership	111	56.1
Extension contact		
Has Contacts	52	26.3
No Contacts	146	73.7
Access to credit		
Accessible	38	19.2
Not Accessible	160	80.8
Total	198	100

Source: Field Survey, 2011.

3.2 Households Income Generating Activities

The distribution of household by types of income generating activities in the semi-urban area and their corresponding monthly income in Naira is presented in Table 3. Households engaged in a variety of economic activities as part of complex livelihood strategies. This can in principle have a positive effect on the food security situation of the households that engage in these activities through two main avenues: the income it generates, and the direct access to the food. These include both on-farm and off-farm income generating activities. The on-farm activities were fish farming, poultry and local livestock husbandry while off-farm activities were civil service employment, petty trading, tailoring, food processing, etc. The result showed that a total of ₦22,609,449.4 was generated per month in the urban households from both on-farm and off-farm activities. These are crop production, civil service employment, petty trading, livestock,

Table 3: Main Sources of Income and their corresponding Monthly Income

Sources	*Percentage of Total Respondents	Mean Household Income (₦)	Total Income Generated (₦)	Percentage of Gross Income
Crop production	100	34,642.53	6,859,220.94	30.34
Monthly Wage	77	31,315.99	4,760,030.00	21.05
Petty Trading	55	25,853.00	2,814,707.00	12.45
Carpentry	17	18,416.67	607,750.11	2.69
Barbing/Hair Plaiting	29	10,215.20	592,481.60	2.62
Weaving/crafts	14	16,875.00	472,500.00	2.09
Tailoring	23	24,963.33	1,123,349.9	4.97
Agro processing	14	23,165.45	648,632.60	2.87
Fishing	16	12,364.60	383,302.60	1.70
Poultry	21	29,204.00	1,226,568.00	5.43
Livestock	33	33,650.48	2,220,931.70	9.82
Bike/motor repairs	21	21,425.60	899,875	3.98
Total			22,609,449.45	100

* Multiple responses existed

Source: Field Survey, 2011

poultry and tailoring were the commonest income generating activities representing about, ₦6,859,220.94, ₦4,760,030.00, ₦2,814,707.00, ₦2,220,931.70, ₦1,226,568 and ₦1,123,349.90 representing 30.34%, 21.05%, 12.45%, 9.82%, 5.43% and 4.97% of the total gross income among semi-urban households respectively. Households engaged predominantly in farming activities (crop production, livestock, poultry, agro-processing and fishing) which yielded about 50.16% of the total gross income. Off-farm activities such as civil service, petty-trading and tailoring yielded about 38.47% among others. This depicts the economic inclination and livelihood pattern of the semi-urban households which does not effectively guarantee access to food from own production and sufficient income to purchase food at prevailing market prices.

However, households' income generating activities are also forms of income diversification activities that are key factors to household food security. They provide for immediate needs of the households and also serve as buffers during lean periods. In the study area, households with more access to income generating activities, or access to higher paying work are expected to be more food secure than households without such benefits. All things being equal, such households generate more income which improves their economic access to food and general welfare. Households' engagement in fish farming, poultry and livestock husbandry directly improves food security as some of these products are consumed. Kwaghe (2006) also reiterated that the additional income could be used to purchase farm inputs, transport, and even to expand farm lands, which tends to increase the productivity and incomes of farming households. However, the type of activity which will improve food security level for individual households will depend on household composition and resources.

3.3 Food Security Measure among Respondents

The summary statistics of food security measures among semi-urban households is presented in Table 4. Based on the recommended daily energy levels (L) of 2260 Kilocalories FAO (2009), the food security line was found to be ₦1,985 per day per adult equivalent for the households. On annual basis, this is equivalent to ₦23,821.88 per adult. From the food security line result, 44% of the sample semi-urban households were food secure. This implies that 56% of the sample households were food insecure. Furthermore, the aggregate income gap (G) of -555.04 indicates that food insecure households would need an average of ₦555.04 per adult to meet their monthly basic food requirements.

Table 4: Food Security Measures among Households

Households	Semi-Urban (n=198)
Constant	4.260 (60.67)*
Slope coefficient	0.0000 (5.779)*
FAO recommended daily energy Levels (L)	2260 Kcal
Food security line (Z)	₦ 23,821.44 per year ₦ 1,985.12 per month
Head Count (H)	111 (food insecure) 87 (food secure)
Percentage Household	56% (food insecure) 44% (food secure)
Aggregate income gap (G)	-555.04

* t-values of estimates

Source: OLS estimates and cost-of-calories equation, 2011

Differences in income levels predispose households to different consumption patterns due to their economic access to food. Among the semi-urban households there was heavy reliance on agriculture. Respondents are primarily involved in own food production which include mostly cereals, legumes and tubers and also had home gardens which reduced household cost on vegetables. Engagement in livestock, poultry and fishing equally provide animal sources of protein. When own production depletes, available incomes are spent on food or assets liquidated to cater for consumption and general welfare. Households with insufficient economic access to food ultimately become food insecure.

3.4 Determinants of Food Security Status among Semi-Urban Households

The determinants of food security for semi-urban households are presented in Table 5. It revealed that 12 out of 16 variables included in the model were significant in explaining the variation in food security status of households in the study area. Nine variables (education, farm size, income, contact with extension agents, cooperative membership, child dependency ratio, family labour, assets and farm enterprise) were significant at 1% level while three variables (sex, farming experience and food diversity) were significant at 5% level. The value of R^2 suggests that the model explains 80% variations in the data. The results of the significant determinants are discussed as follows:

3.4.1 Household Income (HHINC)

The coefficient of household income variable was found to be significant at 1% level and shows a positive relationship with households' food security status. This indicates that the higher the household income, the higher the probability that the household would be food secure. This agrees with the *a priori* expectation and the possible explanation is that income determines the

Table 5: Determinants of Food Security among Semi-Urban Households

Variable	Coefficient	Standard Error	t-value
Constant	2.309	1.6098842	-1.435
AGE(X ₁)	-0.005	0.023	-.259
HHINC(X ₂)	0.5312	0.09964	5.3***
FARMSZ(X ₃)	1.302	0.401	3.241***
HHSZ(X ₄)	-0.165	0.153	-1.077
FARMEXP(X ₅)	0.09499	0.0398	2.382**
COOP(X ₆)	2.24	0.579	3.869***
EDUC(X ₇)	2.152	0.534	4.024***
GEND(X ₈)	-2.408	0.967	-2.490**
ASSETS(X ₉)	0.577	0.112	5.136***
FARMENT(X ₁₀)	1.286	0.346	3.715***
CREDIT(X ₁₁)	0.687	0.610	1.127
CDR(X ₁₂)	-0.000234	0.0000620	-3.782***
EXTAG(X ₁₃)	0.0742	0.0282	2.630***
HLAB(X ₁₄)	-.0000145	0.0000226	-.641
FLAB(X ₁₅)	0.000231	0.721	3.210***
DD(X ₁₆)	1.383	0.663	2.086**
R ²	80.11		

***Significant at 1%; **Significant at 5%

Source: Field Survey Data, 2011.

purchasing power of the household at the prevailing prices. It is imperative therefore that increase in household income, other things being equal means increased access to food in quantity and quality, and is also a sure way of combating food insecurity.

3.4.2 Farm Size (FARMSZ): The regression coefficient of farm size variable was positive as expected *a priori* and significant at 1% level. Farmland holding is a basic asset in semi-urban livelihood. This indicates that households with larger farm sizes are likely to produce more food and possibility of increased production translates to more income and improves food security than those with smaller farm sizes and vice versa. Land holdings among the semi-urban households are on the average about 2ha. The farm output may likely be insufficient (compared to the family size) to support the food requirements and households have to buy food when own production is exhausted. It is expected that efficient use of land resources and application of modern agricultural practices will ensure food security in households.

3.4.3 Farming Experience (FARMEX): The coefficient was found positive as expected and significant at 5% level. Most experienced farmers know cropping practices to employ for optimum yield to ensure household food security. This translates to the fact that limited farming experience may result into low food production and income, therefore, food security problem in the study area. Oluyole *et al.* (2009) also reiterated that an experienced farmer is likely to have higher productivity and hence be able to provide more food for his household members.

3.4.5 Cooperative Membership (COOP): As expected, the coefficient for cooperative membership was positive and also significant at 1% level indicating that the food security status of households increased with cooperative membership. Active participation in cooperative activities tend to attract benefits in terms of helping members in mobilizing resources within society for agricultural operations and marketing, access to inputs (essential manufactured goods) at cheaper rates, enables members take advantage of economies of scale in production, processing and marketing of agricultural produce. Also, it assists in the training and education of members in modern agricultural practices and use of agricultural inputs. It is expected that as the level of participation increases, the probability of being food secure increases.

3.4.6 Educational Level (EDUC): The coefficient of the variable was found to be positive as expected and significant at 1% level. The more years respondents spent in formal education, it's likely they have higher income. Quaye (2008) opined that educational qualification/level is explained in terms of contribution of education on working efficiency, competency and diversification of income. Household heads become more visionary in creating conducive environment to educate dependants with long term target to ensure better living condition, hence are food secure compared to their uneducated counterparts. This implies that food security increases with years spent in school. There is positive correlation between years spent in school and level of income to some extent. Maxwell (2003) observed that education also has other important components of human capital that is the purchasing efficiency and food knowledge of the household head. Household heads will also be able to adopt more modern farm technologies on their farms thus improving their productivity. Low level of

education among household heads in the study area therefore indicates a high probability of food insecurity.

3.4.7 Gender (GEND): The coefficient was significant at 5% and showed a negative relationship with household's food security status. Culturally, provision of household needs and general welfare are responsibilities accorded men. Male household heads are not limited to job opportunities in their immediate environment whereas, child bearing and home keeping may limit food security among female household heads. Consequently, households headed by females may likely have high probability of being food insecure in the study area.

3.4.8 Credit Access (CREDIT): The coefficient of credit was expected to be positively significant suggesting that households with access to credit facilities would be economically empowered to divert incomes and access food in adequate quantity and quality. However, the result indicated that the coefficient was insignificant. This may likely be attributed to the bureaucratic process(s) involved in credit acquisition, nature and type of collateral etc.

3.4.9 Household Asset (HHAAS): As expected *a priori*, a significant positive relationship existed between food security intensity experienced by the households and the value of household assets. Household assets holding in the study area was considered as one of the measures of household resilience, which cushioned the effects of adverse circumstances such as crop failure, drought, etc on household food security. Assets are seen as readily available convertible resources to meet household needs in lean periods. Hassan and Babu (1991) and Amaza *et al.* (2009) also found that the level of assets ownership is an indication of its endowment and provides a good measure of household resilience in terms of food crisis, resulting from famine, crop failures, or natural disasters. Ownership of assets therefore lays a good foundation for food security and general household livelihood sustenance.

3.4.10 Household Farm Enterprise (FARMENT): The coefficient of the variable was found to be positive as expected and significant at 1% level. Among other income generating activities, households' engagement in farm enterprises such as livestock (33.3%), poultry (21.2%), fish farming (1.7%), agro-micro processing (2.87%) suggest incomplete reliance on crop production. This is a common practice in the study area. These farm enterprises can provide direct access to a large number of nutritionally richer foods such as vegetables and products of animal origin (milk, eggs, meat) and a more varied diet. It can also increase the stability of household food consumption against seasonality or other temporary shortages and further create more avenues for income generation. It is therefore plausible that the higher the level of involvement in household farm enterprise, the higher the probability of food security.

3.4.11 Child Dependency Ratio (CDR): The coefficient of child dependency ratio negatively affected the food security status of households as expected but was statistically significant at 1% level. The classification of households by child dependency ratio in the study of food security is important because as child dependency ratio increases food security among households decreases and vice versa. This is plausible as high child dependency ratio results in increased households' food requirements, probable reduction in quantity and quality of food, heavy dependence on available households' income, hence high probability of food insecurity.

3.4.12 Contact with Extension Agents (EXTAG): The coefficient of number of contact with extension agent was positive as expected and also statistically significant at 1% level. Frequent extension contacts expose the farmer to new and improved farming practice, enhances the level of adoption and general farm output. This implies that the higher the number of extension contacts per cropping season, the higher the probability of increased productivity, hence food security. However, the analysis of socio-economic characteristics shows that about 74% of the respondents had no extension contact. This implies that crop production in the semi-urban area may be based on traditional farming practices.

3.4.13 Family Labour (FLAB): The coefficient of the variable was significant at 1% and as expected exhibited a positive relationship with food security. This is plausible as the use of family labour reduces cost of production and it is expected that food requirements of the family members are provided for from the farm output. This implies that the higher the involvement of family members in farming/agro-processing, the higher the probability of food security and vice versa. It is also believed that most farming households in developing nations employ more of family labour than hired labour. The study revealed that 78% of sample households in the semi-urban area employed mainly family labour, 32% employed hired labour and 40% employed both family and hired labour.

3.4.14 Diet Diversity (DD): The coefficient of diet diversity was significant at 5% and had a positive sign as expected suggesting that diet diversity is more prevalent among food secure households than food insecure households and vice versa. As explained by Ruel (2006), diet diversity may also be a reflection of food availability through own-production, engagement in wage income and non-farm self employment, extent of income diversification, level of education and household asset endowments. In fact dietary diversity is the product of the food access, availability, and stability dimensions. Households' food security increases as they are economically empowered and have physical access to food in sufficient quantity and quality, hence food security.

4. Conclusion and Recommendations

The study observed that food security level among the households in the study area hinges significantly on crop production and wage from civil service. Also, households' involvement in petty trading and production enterprise(s) that augments income level with assets base that they could fall back on in times of shortages, enabled some households to meet their food requirements.

Based on the findings of this study, the following policy measures aimed at improving households' food security status in the study area were recommended:

- i Currently in the study area, agricultural activities are predominantly labour intensive, at a subsistence level and characterized by traditional practices. There is therefore the need to increase farmers' access to extension services, cooperatives and agricultural credit to enhance agricultural productivity. Efforts towards extension service intensification during cropping season, households should be encouraged to form and sustain cooperative societies by pulling their resources together and increased awareness on agricultural credit availability and accessibility could improve food security.
- ii Household income was also identified to have significant effect on food security status in the semi-urban households especially during lean periods. It is therefore important that improving wage earning capacity and exploring income diversification opportunities are crucial in enhancing food security status of households. This will involve combination of enterprises and off-farm activities that could generate more income for the households and also help to improve their asset base.
- iii. Large household sizes and high dependency ratio were found to affect household food security in the study area. Therefore, policy measures directed towards the provision of better family planning, increased awareness and access to family planning facilities should be given adequate attention and priority by the government. In view of this, strategies for an effective community participation in the design of concepts and messages aimed at imparting knowledge about family planning to households are recommended especially when large family size is a status symbol and a boost to family labour adequacy.

Suggestion for further Study

Based on the findings of this study, there is need to examine food security determinants among non-farming households in the semi-urban areas. This will offer an opportunity for comparison of food security status among farming and non-farming households in the semi-urban areas of Borno State, Nigeria.

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Appendix

Adult Equivalent Scale for adjusting the Household Size

Table 1: Conversion factors for calorie requirement for different age groups

Age category	Male	Female
0-1	0.33	0.33
1-2	0.46	0.46
2-3	0.54	0.54
3-5	0.62	0.62
5-7	0.74	0.70
7-10	0.84	0.72
10-12	0.88	0.78
12-14	0.96	0.84
14-16	1.06	0.86
16-18	1.14	0.86
18-30	1.04	0.80
30-60	1.00	0.82
>60	0.84	0.74

Source: Babatunde *et al.* 2007

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