

*Full Length Research Paper*

# Microcredit scheme impact and food security status of beneficiaries in Kaduna State, Nigeria: A propensity score matching approach

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The prevalence of food insecurity has been generally reported to be higher in the rural areas of Nigeria, despite the fact that the bulk of food production takes place there. This study used the Food Security Index (FSI) and Propensity Score Matching (PSM) to evaluate the impact of the United Nations Development Programmes' (UNDP) micro credit scheme on the food security status of farm households in three Local Government Areas of Kaduna State, Nigeria. A purposive random sampling technique was used to select fifty six beneficiaries and one hundred and sixty six non-beneficiaries households. Primary data were generated from field interviews and used by structured questionnaires. Thirty nine percent of beneficiary's households are food insecure with a Food Security Index of 1.83. The Propensity Score Matching showed that the UNDP micro credit scheme had no significant impact on the food security status of beneficiaries, while the calculated Average impact of treatment on the treated (ATT) was negative (-60.68), indicating that the UNDP micro credit scheme in the study area had not contributed significantly to the food security status of beneficiaries. Implications for policy were also discussed in this study.

**Key words:** Food security, micro-credit, United Nations Development Programmes' (UNDP), rural household, propensity scoring matching.

## INTRODUCTION

Attention has been focused on the means of eliminating food insecurity and hunger worldwide. The 1992 International conference on Nutrition and the 1996 World Food Summit both emphasized the critical need to decrease food insecurity and hunger globally. In Nigeria, many symposia/conferences and workshops has brought to the fore the need to address the problem of food insecurity in the country. According to the study of Maziya-Dixton et al. (2004), food security is the access of all people at all times either through own production or through purchase of enough food for an active, healthy life. It has however, been emphasized that food security

is a necessary but not sufficient condition to obtain good nutritional status for an active healthy life. In addition to individuals simply having access to enough food, they must procure, ingest and digest it. Generally, whatever is consumed to provide energy and nourishment for the human body for an active and healthy life is termed food (Okolo, 2004). Therefore, food security exists when every person has physical and economic access at all times to healthy, nutritious food in sufficient quantity to cover the need of their daily ration and food preferences, in order to live a healthy, active live (Sengooba, 1994). The International Food Policy Research Institute (IFPRI, 2003) have observed that micro credit helps households to achieve food security, and has proven to be an effective and popular measure in alleviating poverty. However, credit to disadvantaged groups including rural poor farmers has not received the attention it requires.

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Hence, various Non-Governmental Organizations (NGOs) and donor agencies like United Nations Development Programme (UNDP) with poverty reduction programs have ventured into micro credit schemes at community level.

The objectives of the UNDP support to the micro credit promotion are to encourage formal banks, government and non-governmental organizations to support credit for the grassroots, to promote sustainable financial intermediaries at the state level, to strengthen community groups to access credit, to facilitate access to credit for the poor and bring about tangible changes in their lives and to advocate for the enhancement of enabling environment for micro-credit activities in Nigeria (UNDP, 1998).

The UNDP micro credit scheme was established in the year 2000 in ten Local Government Areas of Kaduna State with the aim of assisting farmers with farm inputs like fertilizers, herbicides, and seeds. Three million Naira was allocated to the project, three hundred thousand Naira of which was disbursed to each benefiting communities. The State Ministry of Economic Planning serves as the coordinating office while Kajakah Multipurpose Cooperative Society (KMCS) is the microfinance disbursing institution. The KMCS organized workshops, trainings, purchased and distributed the farm inputs to beneficiaries in kind. Impact evaluation of institutionalized and non-institutionalized micro credit schemes on the income, productivity and welfare of beneficiaries have been undertaken by many researchers and based on their findings, these have both positive and negative effects on farmers. However, very little attempt has been made to study the impact of development partners, donor agencies and Non-Governmental Organizations (NGOs) micro credit schemes on the targeted beneficiaries' food security status. Therefore, this study aimed to evaluate the UNDP micro credit scheme in Kaduna state with a view to ascertain its impact on the food security status of beneficiaries using Propensity Score Matching method (PSM).

According to the study of Ravallion (2005), past "evaluations" that only provide qualitative insights into processes and do not assess outcomes against explicit policy-relevant counterfactuals are now widely seen as unsatisfactory. Few researchers have used the PSM/ATT in evaluating projects/programmes; however, Pufahl and Weiss (2009) applied a semi-parametric Propensity Score Matching approach to evaluate the effects of agro-environment programmes on input use and farm output of individual farms in Germany. The analysis revealed a positive and significant treatment effect of agro-environment programmes on the area under cultivation, in particular grassland, resulting in a decrease of cattle livestock densities, while Nkonya et al. (2009) used the PSM approach to evaluate the impacts of a Community Driven Development (CDD) project on household income and acquisition of productive assets in Nigeria. The study

found that participation in the project (Fadama II) increased the income of beneficiaries by about 60%.

## CONCEPT OF MICRO CREDIT

In agricultural finance, the terms micro credit and microfinance have reportedly been used interchangeably and are assumed to refer to the process of obtaining control over the use of money, goods or services in the present in exchange for a promise to repay at some future date (Miller, 1977). However, in recent times, many authors have tried to distinguish the two terms. For instance, Ehigiamusoe (2005) stated that microfinance is the provision of loans, savings opportunities, insurance, money transfers and other financial products targeted to the poor and low income households; while micro credit refers specifically to provision of small loans. The average loan size varies from country to country, but in most cases, the average loan is equivalent to \$120 to 150. Charistonenko (2004) defined microcredit as the extension of small loans to micro entrepreneurs on low income and too poor to qualify for conventional bank loans, which is channeled towards income generating enterprises. Most terms and conditions for micro credit loans are flexible and easy to understand and suited to the local conditions of the community. From the aforementioned definitions, three features distinguished microfinance from other financial products. These are (i) the smallness of the loans advanced or savings collected, (ii) the absence of asset based collateral and (iii) simplicity of operations.

In this study, however, the terms 'Microfinance', 'Micro credit' or 'Credit' are used interchangeably to mean the provision of small loans to poor and low-income rural households especially farmers to be used for current production or consumption. To have a clearer understanding of the meaning of micro credit, it is good to classify it based on sources. Informal sources of microfinance according to Ijere (2000) are provided by traditional institutions that work together for the mutual benefits of their members. These institutions provide savings and credit services to their client.

Adebayo (2004) affirmed that the informal/traditional microfinance institutions operate under different names in Nigeria, for instance '*esusu*' among the Yorubas, '*etoto*' for the Igbos and '*adashi*' for the Hausas. The key features of these schemes are savings and credit components, informality of operations and higher interest rates are prevalent. The informal associations that operate traditional microfinance in various names and forms are found in all the rural communities in Nigeria (Otu, 2003); they also operate in the urban centres. Members of this group include individuals, friends, relatives, shopkeepers, moneylenders, landlords, cooperatives and leasing associations.

Formal microfinance suppliers are licensed, supervised

**Table 1.** Respondents Distribution.

S/N	Villages	Number of beneficiaries	Estimated total farm households	Beneficiaries respondent households	Non-beneficiaries respondent households
1.	Pampaida	95	335	28	72
2.	Dorayi	60	314	18	76
3	Dundubus	85	304	26	66
Total		240	953	72	214

Report of Village Listing Survey (KADP, 2000).

and regulated by Central Bank of Nigeria to operate as financial institutions. Their key features include, taking deposits from members of the public and lending the funds to users directly or indirectly singly or in groups. They have complete management structure, specialized manpower and are generally motivated by profit drive. They may be fully owned by public or private institutions or individuals. Members of this group include Nigeria Agricultural Cooperative and Rural Development Bank (NACRDB), Microfinance Banks (MFB), commercial banks such as First Bank Plc, Union Bank among others.

The source of funds for multipurpose cooperatives is the individual membership monthly contribution, while for the organized microfinance; they are aids and grants which mainly come from abroad (CBN, 2005). Major donor organizations are – United Nations Development Programmes (UNDP); Ford Foundation; African Development Foundation (ADF); Community Development Foundation among others.

## METHODOLOGY

### Study area

This study was conducted in Kaduna State, located in the Northern Guinea Savanna ecological zone. It occupies almost the entire central portion of the Northern part of Nigeria and shares common borders with Zamfara, Katsina, Niger, Kano, Bauchi, Nassarawa and Plateau States. To the Southwest, the State shares border with the Federal Capital Territory, Abuja. The global location of the state is between longitude 06° 00 and 09° 00 East of the Greenwich Meridian and also between latitude 09° 00 and 11° 30', North of the equator. The state occupies an area of about 48,473.2 km<sup>2</sup> (FOS, 2006). It has a population of 6,066,562 people (NBS, 2006); and a projected population of 6,527,620 in 2009.

A multistage stratified random sampling technique (Barnett, 1991) was used to select representative households for the study. Kaduna State is made up of 23 Local Government Areas. The UNDP program which started in 1999 covers ten Local Government Areas (LGAs) of the State, of which Ikara, Makarfi and Giwa LGAs were randomly selected in the first stage. The second stage involved random sampling of three rural communities in these local government areas from which 30% of the beneficiaries' households each were randomly selected. These communities were Pampaida for Ikara, Dorayi for Makarfi and Dundubus for Giwa. There are 95 participating farmers in Pampaida, 60 in Dorayi and 85 in Dundubus. Among the 240 beneficiaries, 30% each were randomly selected to give a total of 72. On the other hand, 214 small scale farmers who qualified for micro-credit but had no access to the

UNDP micro credit programs were also randomly selected as a comparison group (Table 1). Random sampling was employed to give equal opportunity to every member of the strata; 56 beneficiaries and 166 non-beneficiaries giving a total of 222 respondents were used for the analysis.

Fifty six beneficiaries' households were used for the study, while 166 non-beneficiaries' households who qualified for micro-credit but did not participate in the UNDP micro credit programs were also randomly selected as a comparison group.

### Data collection

Primary and secondary data were used for this study. Primary data on the agricultural operations of the farmers were collected from the field survey using structured questionnaires. These were administered to the beneficiaries and non-beneficiaries of the UNDP micro credit scheme in the study area. These data were collected based on 2009 farming season activities. The numbers of farmers in each village were collected from a secondary source; the Kaduna State Agricultural Development Project.

### Analytical techniques

#### Food security index

The approach taken in this study for the determination of food security index followed the identification and aggregation procedures. Identification is the process of defining a minimum level of nutrition necessary to maintain healthy living. This is referred to as the "Food Security Line", below which people are classified as food insecure and subsisting on inadequate nutrition. The food security line used in this study was based on the daily-recommended level of calorie and protein, which are 2260 Kcal and 65 g respectively (Olayemi, 1998). In order to generate food security indices, the nutrient content of the crop consumed was used to derive both calorie and protein availability. The formula for food security index is given as:

$$\text{Food security index } (k) = \frac{\text{Household daily per capita calorie/protein consumed } (x)}{\text{Household daily per capita calorie/protein required } (y)}$$

For a household to be food secured,  $k$  must be greater than or equal to 1 ( $k \geq 1$ ). If  $k$  is less than 1 ( $k < 1$ ) the household is food insecure. It must also be noted that the aforementioned criterion must be satisfied for both protein and calorie requirements. The quantity of crops produced and purchased was converted to kilogram and further to calorie and protein respectively and was divided by adjusted household size and by 365 days to obtain the calorie and protein consumed per day per household and then

compared with the standard (2260 kcal and 65 g) respectively.

The nutrient composition of commonly eaten foods in Nigeria (Oguntona and Akinyele, 1995) was used to estimate the calorie intake of households (Table 5). On the other hand, the equivalent male adult scale to determine adjusted household size computed by Falusi (1985) was used (Table 6). Makinde (2000) and Lawal (2003) focused on calorie availability and consumption in assessing food security status of respondents. According to them, most diets contain adequate amounts of all other nutrients required for good and healthy living once it is taken in quantity that is enough to meet the individual's energy requirements.

### **Propensity score matching (PSM)**

The most common evaluation parameter of interest is the Average Treatment Effect on the Treated (ATT), which is defined as  $ATT = E(Y_1 - Y_0 / P=1) = E(Y_1/P=1) - E(Y_0/P=1)$ . The propensity score is the probability of participation for farm household  $i$ , given a set  $X = X_i$  of characteristics  $P(X) = \Pr(P=1/X=X_i)$  (Pufahl and Weiss, 2009). The propensity scores are derived from the regression models in which these characteristics were compared.

The impact of treatment on the treated (causal effect of project beneficiaries) was estimated by computing the differences across both groups:

$$ATT = \frac{1}{N_1}(Y_1 - Y_0) \quad (1)$$

where: ATT= Average impact of treatment on the treated;  $N_1$  = number of matches (from regression model);  $Y_1$  = average annual crop production by beneficiaries;  $Y_0$  = average annual crop production by non-beneficiaries.

A positive (negative) value of ATT suggests that farm household beneficiaries in the project have higher (lower) outcome variable than non-beneficiaries.

## **RESULTS AND DISCUSSION**

### **Household food security status**

In order to measure household food security, a Food Security Index (FSI) was constructed. The quantity of crops produced and purchased for consumption was converted to kilogram and further to calorie and protein respectively and then divided by household size adjusted for adult equivalence using the equivalent male adult scale weights in Table 6. To obtain the calorie and protein consumed per day per household, the result was further divided by 365 days and then compared with the standard (2260 kcal and 65 g) respectively. The nutrient composition of commonly eaten foods in Nigeria was used to estimate the calorie intake of households (Table 5). The households whose daily per capita calorie intake was up to 2260 kcal were regarded as food secure and those below 2260 kcal were regarded as food insecure.

The results as presented in Table 2 showed that the beneficiaries could be classified as food secured, given the fact that about 61% of households were food secured. About 39% were food insecure with average food expenditure of ₦18, 918.34/month and a Food Security Index was 1.83. The average household daily

calorie consumption for food secure households was 2842 kcal. Based on the recommended daily calorie intake of 2260 kcal, the average household had 582 kcal in excess of the recommended intake. On the other hand, the average daily household per capita calorie consumption for food insecure households was 963 kcal. This means that the average daily households per capita calorie consumption for food insecure households were 1297 kcal below the recommended intake. The results further showed that 39.28 and 36.70% of beneficiaries and non-beneficiaries were food insecure respectively. This is however, in contrast with the findings of Muhammed-Lawal and Omotesho (2010) in their study of intensity of food insecurity in rural households of Kwara State, Nigeria using Food Security Index (FSI) found that 65.45% of the rural households were food insecure with a mean daily capital energy consumption of 1403.56 kcal. On the other hand, Agbola (2005) in his study of food insecurity among farming households in Osun State, Nigeria found that 45% of his respondents were food insecure using the Food Security Index.

### **Impact of UNDP micro credit scheme on beneficiaries' food security status**

Increased crop production was the major objective of the UNDP Micro credit scheme. On the other hand, availability of food is an indicator of farm households' food security status. Therefore, in assessing the impact of the scheme on the food security status of beneficiaries using Propensity Score Matching (PSM), the annual crop production was used as a proxy for food security. The advantage of this is that there is no need for the assumption of constant additive treatment effects across individuals. If a project's outcome indicator is household crop production, the average impact of the project on its beneficiaries is the difference between the quantity of crop production by beneficiaries of the project and that of the non-beneficiaries. If the difference in crop production between beneficiaries and non-beneficiaries is positive, it implies that there was an impact of the project on beneficiaries, otherwise no impact. Since the Average impact of Treatment on the Treated is negative (-60.68), this means that the UNDP micro credit schemes in the study areas have lower impact on the beneficiaries than non-beneficiaries (Table 3).

### **Challenges encountered by beneficiaries of UNDP micro credit scheme**

The challenges encountered by beneficiaries in acquiring UNDP micro credit is presented in Table 4. The major challenge highlighted by the farmers was that credit given was too small; this problem accounted for about 38% of the problems identified by the farmers. The farmers complained that the same worth of credit was given to

**Table 2.** Household food security status.

Variable	Beneficiaries	Non-beneficiaries
Food secure households (No)	34	105
Food security index	(1.83)	(2.15)
Percentage of the food secure households	60.71	63.25
Food insecure households (No)	22	61
Food insecurity index	(0.42)	(0.45)
Percentage of the food insecure households	39.28	36.70
Household size (adult equivalent)	6.43	6.73
Per capita food expenditure/month (₦)	18,916.34	16,249.79
Crop production (grain equivalent)	2325.32	3056.43
Household daily calorie consumption (Kcal)		
Food secure	2842	2979
Food insecure	963	1071

Computation from field survey data, 2009.

**Table 3.** PSM/ATT result of UNDP micro credit impact on beneficiaries.

Variable	Result (PSM/ATT)	Standard deviation	T-Value	Standard error	Crop production (beneficiaries)	Crop production (non-beneficiaries)
Food security	-60.68	1676.32	0.56	0.06	2325.32	3056.43

Field survey, 2009.

**Table 4.** Challenges encountered by beneficiaries.

Problems	Frequency	Percentage*	Rank
Credit too small	21	37.5	1 <sup>st</sup>
Time consuming/cumbersome	8	14.3	4 <sup>th</sup>
Interest rate too high	19	33.9	2 <sup>nd</sup>
Repayment period too short	9	16.1	3 <sup>rd</sup>
Inappropriate time of disbursement	3	5.4	5 <sup>th</sup>

Field survey, 2009; \*multiple responses.

**Table 5.** Nutrients composition of commonly eaten foods in Nigeria – raw, processed and prepared.

Food Item	Composition energy (Kcal/kg)	Protein (g)
Maize	3600	90
Rice	3500	60
Millet and sorghum	3500	100
Cowpea	3300	210
Groundnut	5300	230
Soybean	4000	330
Cassava fresh	1500	10
Cassava flour	3400	20
Yam fresh	1100	20
Yam flour	5200	40
Beef	2250	147.29
Fish	1320	87.98
Egg	938	110

(Deville de Goyet et al., 1987).

**Table 6.** Equivalent male adult weight to determine adjusted household size.

Age category (years)	Male	Female
Under 1	0.00	0.00
1-4	0.25	0.20
5-9.9	0.60	0.60
10-14.9	0.75	0.75
15-59.9	1.00	0.90
60 and above	0.80	0.65

Falusi (1985).

them irrespective of their demand and need. Therefore, majority had less than required by them to make any meaningful impact on their crop production and by extension, food security status. About 34% of the respondents' challenge reported the high interest rate which ranked second among the challenges of the beneficiaries. The third important challenge was the repayment period of the loan which was too short. This accounted for about 16%. The fourth problem was that the time taken to process the credit was cumbersome. These findings conformed to that of Adelakun (1998), who reported that some microcredit schemes hardly make significant improvements on the status of beneficiaries due to the fact that the loans are not large enough to make visible impact; while Diagne (1996) identified very limited supply in time and space as problems associated with credit.

## CONCLUSION AND RECOMMENDATIONS

Regular income is the single most important determinant of per capita expenditure on food such that an improvement in farm income and other economic activities will necessitate an improvement in expenditure on food and food security. The study revealed that the United Nation's Development Program's micro credit schemes had not contributed significantly to the food security status of beneficiaries. Based on the findings of this study, the following recommendations were made in an attempt to improve the activities of development partners towards the improvement of food security status of farming households in the study area in particular and at the national level in general. These recommendations are:

1. Development partners, Non- Governmental Organisations (NGOs), Cooperative Societies, Banks and Government involved in credit disbursement in the study area should give loan based on farm size, farmers' felt needs and experience in farming and not the same amount to all farmers irrespective of the needs and capability of farmers.
2. Loan/credit should be increased annually based on the

repayment capacity of beneficiaries while interest rate should be minimal.

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