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Poverty Status and Inequality of Income Distribution among Credit Users and Non-users in North Kordofan State of Sudan

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Abstract

This paper is primarily intended to fill part of the gap by providing an in depth study of poverty incidence in the rural areas of North Kordofan based on household expenditure. Specifically, it tries to examine the poverty status and inequality of income distribution among credit users and non-users in the three localities namely Shiekan, Um Rwaba and Enuhud. The study was relied on survey that is conducted in 2014, using a core questionnaire. It surveyed 200 farm households, which were selected through a multi-stage stratified random sampling technique. The common FGT classes, Gini coefficient and Atkinson index were applied to analyze the data. The results showed that poverty incidence is slightly higher among credit non-users (44%) compared to credit users (42%). The results also proved that households who have access to credit are more likely to escape poverty than those who do not. Concerning inequality of income distribution, the result demonstrated that although credit users are found to be better off in terms of income, credit non-users seem to be more equal in distribution. The Atkinson index values for social welfare distribution indicated that credit users in Shiekan locality are likely to give up 63% of their income to have equally distributed incomes, while non-users in Enuhud locality are willing to sacrifice by 49% of their incomes in order to get equal incomes. The result suggested that although credit policy has reduced poverty levels among credit users, still more attention need to be given for both household categories in the study area.

Keywords

Credit, Income Distribution, FGT Classes, Atkinson Index, North Kordofan, Poverty Status

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1. Introduction

Poverty still poses a major problem in most of the developing world, especially in sub-Saharan Africa. Endowed with vast natural and human resources, Sudan is still considered one of the world's poorest countries (UNDP, 2006). The sixty-year period since its independence in 1956 has not just been a failure in terms of developmental efforts, but also a period of regression in many respects (UNDP, 2008). In one respect, poverty measured in terms of household income has progressively increased since the country has had its own national anthem. The period of the 1990s has been exceptional in the scale, rapidity and depth with which poverty has overwhelmed and devastated the majority of the Sudanese (Khalid, 2000). Researchers have unanimously agreed that the Sudan economy in recent years has witnessed a rise in poverty both in number of people affected and in degree of severity (Samia, 2002). Considering this tough situation, a number of attempts were taken in the last two decades to

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quantify poverty in Sudan and to delineate its causes. Currently, the Government launched programs to support vulnerable groups including the extreme poor, the homeless, the orphans and the poor pensioners. The Community Development Fund (CDF) funded by the donor community has supported developmental projects that identified and implemented by poor communities in four States of Northern Sudan. Remarkable progress has been made with these projects (Nuha, 2015).

The Kordofan region in particular, has been prone to much suffering in the past, and was one of the hardest hit areas in the 1980s, 1990s and more recent famines of Sudan. Recently, the region is witnessing deeply entrenched poverty due to civil conflicts. As result, most of the people have experienced food shortages and negatively reflected on household's livelihood. In view of that, the government of Sudan has attempted to utilize microcredit as a means of reducing poverty levels. To do so, the government adopted flexible policies that focus on poverty alleviation through instructing the banks to channel 12 percent of their loan portfolios to microfinance activities and social dimension financing. 70 percent of microcredit must be invested in graduates projects, youth and small vulnerable groups who are not able to access the formal financial services, of which 30 percent should be oriented for women's projects in remote areas (CBoS, 2014).

Given that poverty reduction will continue to be the core of the agenda of the country's development, the government has given considerable attention to promoting agricultural investment through provision of microcredit for rural farmers to engage in productive generating activities which can help increase their income level and thus eradicate poverty in the economy. In this respect, the government liberalized the financial market during the 2000s and since then, there has been proliferation of microcredit institutions involved in the landscape of the microcredit sector in Sudan (FNCFM, 2007). In contrast, the Sudanese's existing realities reveal that there is an acute shortage of capital, especially among the poorest of the poor. It is, therefore, important to understand how microcredit can impact on socio-economic conditions of the poor farmers in North Kordofan State? And what are the strategies that enabled the microcredit institutions to sustain for long run to alleviate poverty in North Kordofan State?

Following this section, the remainder of the paper is organized as follows; section 2 presents statement of the problem and study objectives, section 3 explains the sample area, population size and the methods employed, section 4 discusses the empirical results of descriptive statistics, poverty incidence and inequality of income distribution; section 5 concludes the study.

2. Statement of the Problem and Objectives

Despite the proper efforts that have been made by government to develop microcredit policies that alleviate poverty, yet the impact of microcredit on poverty reduction remain limited and less efficient, especially in North Kordofan, which is the area in which this study is conducted. Presently, it has become very difficult if not impossible for many farmers in North Kordofan to live above the poverty line. According to FAO (2010) the yield of food and cash crops as well as livestock are much lower than the potential among the farmers in North Kordofan. The yields are low because households do not follow the recommended practices, mostly the use of fertilizers and improved seed. The key reason for not using these advices is lack of cash and or credit for purchasing the inputs. This situation enforces many households to seek for different sources of liquidity and income diversification to commit their resources to most profitable activities (Salasya, 2008). Although, existing microcredit institutions is trying to fill the demand gap, much evidence indicates credit is missing where is most needed. Several factors are contributed for this including; limited funding, lack of experience, inappropriate legal forms, high operational costs and moderate human resource quality (Sharma, 2015). As result, small farmers may be trapped in poverty due to lack of funds needed to finance productive investments in agricultural sector.

It has been reported by CBoS (2014) that the greatest challenges that face the microcredit sector in Sudan is supply shortage. Supply of microcredit is extremely small compared to potential demand for this service, as it meets only about 10.7 percent of the real demand. This can be attributed to a number of factors, but most importantly, the lack of a clear policy direction for microcredit institutions (MFIs) and the absence of coordination between them. Another constraint is that most commercial banks are reluctant to invest in agricultural and manufacturing. Currently, a small proportion of funds go to these sectors, while the bulk of funds go to commerce activities. Commercial banks are always hesitant to expand their services to cover this sector, whereas small enterprises do not trust the banks or regard their products to be unsuitable for their businesses. This is especially true in the peripheral states of the country including North Kordofan (Khojali and Hansen, 2010).

Therefore, this paper intends to fill part of the gap by providing an in-depth study of poverty incidence in rural

Sudan taking dryland of Kordofan region as case of point. Specifically, this paper tries to examine the poverty status and inequality of income distribution among credit users and non-users in the rural setting of Kordofan.

3. Methodology

3.1. Sampling Techniques and Data Collection Procedures

To show the incidence and severity of poverty among the rural dwellers, both primary and secondary data were used.The primary data used in this study are derived from an interview-based sample survey of farm households (credit users and non-users) in North Kordofan of Sudan. The study relies on survey that is conducted in 2014, using a core questionnaire. Our questionnaire was designed to provide statistical information on households' demographic composition, income, expenditure, collateral required, loan size, frequent repayment, self-employment activity and socio-economic changes. It surveyed 200 farm households, which were selected through a multi-stage stratified random sampling technique based on proportionality with the size of the society. For this, our reference person was the head of the household who is the breadwinner and bondsman of the family as is customary in the Sudanese society. Subsequently, focus group discussions with the key informants in the village communities were also conducted. To ensure the validity of the local lists, control lists from microcredit institutions have been used for comparison. The secondary data were obtained from available literature in the form of references, journals, published and unpublished materials, annual reports and previous studies from relevant institutions.

3.2. The Study Area

North Kordofan State is located in central-west Sudan, which has a population of 2.9 million inhabitants, of them, 79 percent can be classified as peasant farmers, of which 13 percent are urban, 24 percent are nomads, and 63 percent are sedentary rural (Abdelateif, 2015). It has an area of about 245,000 km². The economic activities in North Kordofan are diverse in businesses activities and income sources. Farm enterprises are generally small, therefore, most households are net buyers of food, especially in off season period. The survey mainly considers three localities namely Shiekan, Um Rwaba and Enuhud. These three localities were selected due to number of microcredit institutions and clients (Wedad and Gwahir, 2015).

3.3. Analytical Approach

In the literature each measurement approach has different indicators; generally poverty indicators can be classified into two categories: Monetary indicators and non-monetary indicators. Monetary indicators always used to measure welfare through income or consumption per-capita, while non-monetary indicators are more relevant to a non-welfarist approach. It solely focuses on whether households in a region have attained certain minimal levels of nutrition or health, infant mortality rates, life expectancy, the proportion of spending devoted to food, housing conditions, or child schooling; these may be thought as measures of output and reflections of utility rather than inputs exploited to generate the utility. Such measures are useful in furnishing a multidimensional portrait of poverty, but they rest on a somewhat different philosophical foundation than the welfarist approach, and this can make interpretation difficult (Jonathan and Shahidur, 2009).

According to Ravallian (1998) three steps need to be taken in measuring poverty. These are: 1) defining an indicator of welfare; 2) establishing a minimum acceptable standard of that indicator to separate the poor from the non-poor; and 3) generating a summary statistic to aggregate the information from the distribution of this welfare indicator relative to the poverty line. In view of that, one can define the poverty measure as a statistical function that translates the comparison of the indicators of household well-being and the constructed poverty lines into one aggregate number for the population as a whole or a target group. For the present, great focus has been given to methodology used, particularly the statistical model empirically applied for this study.

In the poverty literature, a consumption expenditure-based measure is preferred over an income-based measure. There are several reasons behind that. Firstly, income is volatile while households are assumed to seek stable levels of welfare over time (Deaton and Grosh, 2000). Secondly, consumption is believed to vary more smoothly than income, both within a given year and across the life cycle. Theories predict that individuals will try to adjust their consumption across their low and high income years through appropriate borrowing and saving behaviour. Thirdly, consumption is held to be more readily observed, recalled, and measured than income. Experiences have shown that households mostly prefer to answer the questions related to what they have consumed rather than what they have earned. Based on such arguments, we proceed to scale household consumption by adult equivalent to get consumption expenditure per adult equivalent using standards adopted from the WHO and FAO (recommended daily intake of 2300 calories per adult per day). The per capita household consumption expenditure was computed using the data obtained from

the field survey executed in 2009. The household consumption expenditure consisted initially of two components; food items and essential non food items (such as clothing, school, health, shelter, etc.). According to Abdelgadir (2006) a relevant standard of living for developing countries including Sudan is per capita consumption expenditure (including the consumption of own production and/or purchased or gifts). For comparison purposes, we follow the Cost of Basic Needs (CBN) approach. This method is most widely used and preferred for developing countries. It involves identifying a typical diet for the poor that is necessary for leading a healthy life (Abdelgadir, 2006). The advantage of the CBN approach is that the poverty line guarantees that poverty comparisons are consistent in the sense that two individuals with the same level of welfare are treated the same way (Ravallion, 1994: Fitsum and Stein, 2000). Since the prices collected were for the production year 2009, there was a need to deflate them to use the poverty line already constructed for the country based on the consumption price index for the base year 2007. After deflation of both food and non food item prices, the current prices are adjusted to estimate the overall poverty line in the study area. Fortunately, the government of Sudan conducted the National Baseline Household Survey (NBHS) in 2009, the same year of field survey for this study, and the poverty line estimated by the National Household Survey was not different from that we depicted from own data. Therefore, we adopted the poverty line defined for the country and thereby identified the poor and non poor.

Having obtained a poverty line, an immediate measure of poverty is the ratio of the poor thus identified to the total population in a given community. Cited literature on poverty indicated that there are many alternative measures, but the most commonly used measures suggested by Foster-Greer-Thorbecke, FGT (1984) are found to be satisfactory to meet the requirements of this study. This method as indicated by Bamlaku (2010) measures poverty by squaring the transfers needed by poor households so that they can get greater weight. The necessary steps for the FGT method are indicated below; 1) all consumption information including own consumed production should be expressed in money terms; 2) rescaling consumption per household to take into account the household size and composition, then extract Adult Equivalent Unit (AEU) for each household and use it to compute consumption per adult equivalent; 3) extracting poverty lines to allow comparison of welfare across households and regions; and 4) incorporation of food values to the non-food consumption. The FGT poverty measures could be expressed by the following equation:

$$P_{\alpha} = \frac{1}{n}\sum_{i=1}^{q}\left[\frac{Z - y_i}{Z}\right]^{\alpha} \quad \text{.....(1)}$$

Where

α = Poverty aversion parameter, n = total number of individuals in the population (size), q = the number of individuals earning income below the poverty line, Z = poverty line, y_i = consumption expenditure of individuals below the poverty line

Many measures can be derived from the above equation, which is governed by the value of α, which in turn determines how sensitive the measure is to income transfer among the poor.

If $\alpha = 0$, then the FGT simply becomes the head-count ratio, H, and therefore can be mathematically expressed as follows:

$$P_0 = H = \frac{q}{n} \quad \text{.....(2)}$$

This head count ratio index reflects the proportion of the poor in the total population measuring the incidence of poverty in the whole population. The advantage of the head count measure is that overall progress in reducing poverty can be assessed right away. Nevertheless, it is insensitive to the depth or severity of poverty and hence not good to assess the impact of a policy measure. Alternatively, when $\alpha = 1$, the FGT becomes a poverty-gap ratio, which can be expressed as follows:

$$P_1 = P_G = \frac{1}{n}\sum_{i=1}^{q}\left[\frac{Z - y_i}{Z}\right] \quad \text{.....(3)}$$

This measure estimates the average distance separating the poor from the poverty line. The poverty gap could be understood as the amount of income transfer needed to bridge the gap. In other words, the resources that would be needed to lift all the poor out of poverty through perfectly targeted cash transfers. P_1 is sensitive to the depth of poverty but not to its severity.

If $\alpha = 2$, the FGT measure indicates the squared poverty gap or (severity) and can therefore be obtained as follows:

$$P_2 = \frac{1}{n}\sum_{i=1}^{q}\left[\frac{Z - y_i}{Z}\right]^{2} \quad \text{.....(4)}$$

This is often described as a measure of the severity of poverty. It depicts the severity of poverty by assigning each individual a weight equal to his/her distance from the poverty line. P_2, thereby takes into account not only the

distance separating the poor from the poverty line, but also the inequality among the poor.

Given the above, it should be noted that any poverty measure (P) can be expressed as depending on mean consumption expenditure in the community and the poverty line on a measure of the underlying inequality in the distribution of consumption. Thus, in general, any poverty measure can be expressed in the following form:

$$P = P\left(\frac{\mu}{Z}, \eta\right) \quad \text{.....(5)}$$

Where μ is mean consumption expenditure, Z is the poverty line and η is a measure of the inequality in the distribution of consumption expenditure, always considered as the Gini coefficient in this study. According to Abdelgadir (2006) there are four theoretical restrictions that could be learned from the above equation, these are; 1) if the per capita consumption increases, other things remaining the same, poverty declines; 2) as inequality in the distribution of consumption expenditure declines, other things remaining the same, poverty declines. On the other hand, if the poverty line changes at the same rate of change as mean consumption expenditure, other things remaining the same, poverty does not change. Moreover, if the poverty line is set as a constant proportion of mean consumption expenditure, then poverty changes will only depend on the change in the distribution of consumption expenditure.

Furthermore, to measure inequality of income distribution among the targeted groups, we begin with widely used measures of inequality, namely the Lorenz curve, the Gini coefficient and the Atkinson index. The three indices have attractive theoretical and statistical properties which other inequality measures do not have, which explains why they are used by most researchers. The standard Gini coefficient measures twice the surface between the Lorenz curve, which maps the cumulative percentage of income on the vertical axis against the cumulative percentage of population on the vertical axis, and the line of equal distribution. A large number of mathematical expressions have been proposed for the Gini index, but the easiest to manipulate is defined as follows:

$$G = \left|1 - \sum_{k=1}^{k=n} (X_k - X_{k-1})(Y_k + Y_{k-1})\right| \quad \text{.....(6)}$$

Where

G : Gini coefficient

X : Cumulative proportion of the population variable

Y : Cumulative proportion of the income variable

A Gini coefficient value of zero indicates egalitarian income distribution while Gini coefficients greater than zero suggest various degrees of income inequality. The Gini coefficient takes on values between 0 and 1. Larger coefficient values are always associated with greater degrees of inequality.

It has been argued that one of the disadvantages of the Lorenz curve and Gini coefficient is that they do not give a complete ordering of income distribution. In addition to the problem of partial ranking of income distribution and limited indication of people who fall below the poverty line. Such a problem calls for the use of an Atkinson index to overcome the shortcomings that were associated with the earlier measures. The Atkinson index is a common tool to overcome these problems. Additionally, it is characterized by high accuracy in measuring inequality and explaining its value judgments. The Atkinson class is defined as follows:

$$A_\varepsilon = 1 - \left[\frac{1}{n}\sum_{i=1}^{n}\left[\frac{y_i}{\bar{y}}\right]^{1-\varepsilon}\right]^{1/1-\varepsilon} \quad \text{.....(7)}$$

Where

y_i = Average income of the ith income range, n = number of income range, $\bar{y}$ = mean income, ε = a version parameter of inequality usually specified by the researcher

$0 \le \varepsilon \le 1$

It is worth noting that by increasing ε, the value of the Atkinson Index also increases and the society becomes more concerned about inequality (Atkinson, 1970). It means that the society is prepared to give up increasing shares of total income in order to achieve equality in incomes. The Atkinson class of measures range from 0 to 1, with zero representing no inequality.

4. Results and Discussion

4.1. Supporting Services

4.1.1. Collateral and Punishment Expected

Collateral is often seen as a prerequisite to get loans from financial institutions. Given that, the credit repayment of enterprises is inherently risky; therefore banks all over the world use collateral to mitigate these risks, (FSD and KBA, 2009). In this study, collateral is defined as the security given by a borrower to a lender, which is used by the lender to recover the amount borrowed by selling it off for the proceeds. Figure 1 presents the types of collateral and the mechanisms of lending in the study area. About 60% of the households use group lending mechanism to get loans, while 11% have access to credit through

personal guarantee. Conversely, very few households, about 9% and 8% of the sampled households, get their credit using cheque and salary guarantee respectively. In fact, group lending is a common contract in the study area, where borrowers from the same group are jointly responsible for each others' performances. Beatriz and Morduch (2000) pointed out that group lending is an effective mechanism to overcome the problems of moral hazard and adverse selection between lenders and borrowers. Moreover, Figure 1 also shows that using of land as collateral is very weak and not an option. Only one household reported using land as a guarantee on loans. The rare usage of land as guarantee can be seen from two angles. First, land rights and property are very complicated issue, land in Sudan belongs to government as specified by the "Land Settlement and Registration Act", however in reality land acquisition is governed exclusively by tribal customary law, which discourages bankers to accept it as collateral. Another reason is that a land market is completely absent, which stands as a barrier for investment and marketability of land in the future. Generally, the problem of land was found to be common to all farmers in the area, this may leave dark shadows on loan tracking systems and hence the loan repayment progress.

A large body of literature in economics and finance establishes the fundamental link between credit rationing and imperfect information. However, credit rationing can be attributed to restricted collateral and hard punishment expected (Bolton and Rosenthal, 2005). In a normal process, lenders use two instruments to encourage the borrowers to choose the safe business enterprises, collateral and monitoring. Collateral is limited by borrower wealth, which is already explained above. Monitoring can be understood in a two-part process of gathering information and imposing punishment. In reality, a monitor always observes the borrower whether he or she chose a risky project or not, then if the returns did not cover the loan, he or she will confiscate them and punish the borrower. In this study, about 68% of households indicated that they are expecting to be imprisoned if they fail to repay on time. Furthermore, about 21% expected to be prohibited from further loans if they delay repayment. In contrast, only a few of the households mentioned that they will lose their land and animals in case of default. Details are showed in Figure 2. Thus, the anecdotal evidence from the interview with the key informants in the study area suggested that use of assets such as land, animals and houses are very rare in borrowing procedures. Most of the farmers are less likely to apply for a loan if they know before receiving the loan that they may lose their assets.

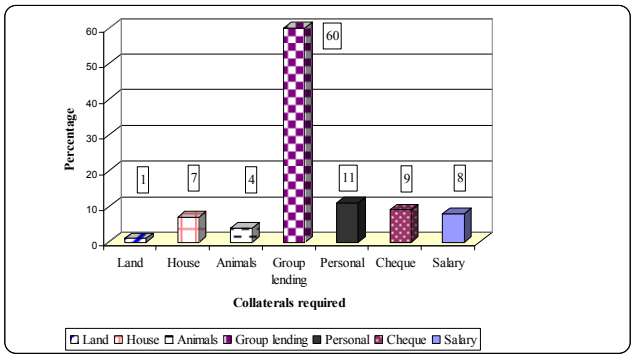

Figure 1. Collaterals required for obtaining loan.

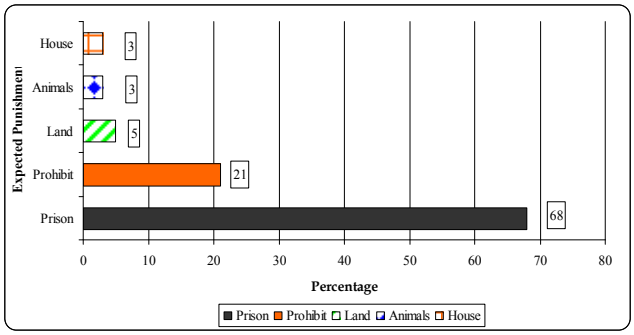

Figure 2. Punishment expected by clients.

4.1.2. Loans Usage and Potential Services

In the existing literature, there is a big debate about access to finance and potential use of loans. Hainz and Nabokin (2010) reported that studying the access to loans by studying the use of loans may be misleading. Their finding indicates that the use of finance as a proxy for access to finance will mix up between the firms that do not need a loan with firms that are searching for loans but are not able to find access. Similarly, the evaluation of firms using balance-sheet data is also a controversial issue. This approach is most appropriate when studying big corporations. But for small- and medium sized enterprises (SMEs) data availability is often a critical issue (Kaplan and Zingales, 2000). Therefore, the important thing to support the protection of creditor rights and the quality of the legal system that can be used to enforce these rights (Safavian and Sharma, 2007). The empirical analysis in Figure 3 shows that about 52% of the sampled households have used their loans for investment activities. These activities include petty trade, food processing services, animal raising and other manufactured commodities. However, about 48% use the loans for family purposes such as covering food shortages, school fees and medical expenses. For the specification of the model this variable is coded as a binary dummy variable to identify the factors influencing the investment and consumption purposes.

The potential services introduced by microcredit institutions are considered a crucial factor, since they

determine whether the farmers benefit from the services offered or whether the services themselves respond to the needs and conditions of such clients. According to CBoS (2006) the major factors negatively affecting the expansion of microcredit services are the lack of needs assessments that would allow MFIs to design methods tailored to the needs of targeted groups. In this study, Figure 4 describes the most important services provided in the study area. About 93% of the households have received loan services, while 6% had an opportunity to get training in small business management. It is expected that households who receive training in business will increase their ability to manage and promote their businesses successfully. Moreover, only 1% of the sampled households reported receiving savings services from microcredit institutions. This result agrees with the current argument that MFIs in Sudan do not provide consumption or emergency loans and do not include a savings component in their microcredit activities (CBoS, 2006). It could be explained by the fact that promoting savings and insurance products requires bold outreach efforts to stimulate effective demand, which would incur additional costs.

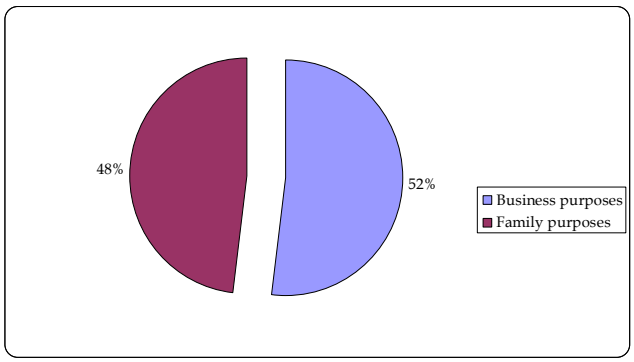

Figure 3. Purposes of loan usage.

Following the recent Strategic Five Years Plan (2007-2011) issued by the central bank of Sudan to activate the role of the banking system in contributing to the activities with a social dimension in the areas of agricultural development, the agricultural sector has been given priority in terms of lucrative business and credit procedures. These policies have been designed to allocate 12% of banks' finance portfolios, at any time, to development, with special priority to agribusiness activities. Although agricultural loans are generally viewed by members of the commercial bank consortium (CBC) as risky, costly to administer and less rewarding as they do not allow quick circulation of funds, agricultural loans have been increasing rapidly in the last years. In this study, it was found that 59% of the households sampled received loans for agricultural inputs, such as improved seeds, fertilizers, pesticides, working labour and industrial agriculture (Figure 5). Typically, about 23% of the households obtained loans for animal rearing or fattening. At the time of survey, it was observed that most households that have received loans and invested in livestock activities had less default. This implies that households in the study have good experience in animal breeding, bearing in mind that this state is considered to be the main source of livestock in the country, supplying almost 30% of the estimated national livestock count. Another interesting result is presented in Figure 5, that very few, about (9%, 3% and 6%) of sampled households received loans to be invested in local trade, handicraft and food processing services, respectively.

Through this kind of finance, a farmer has access to training in small enterprise management, marketing linkage and other services such as election campaigns and leadership skill training.

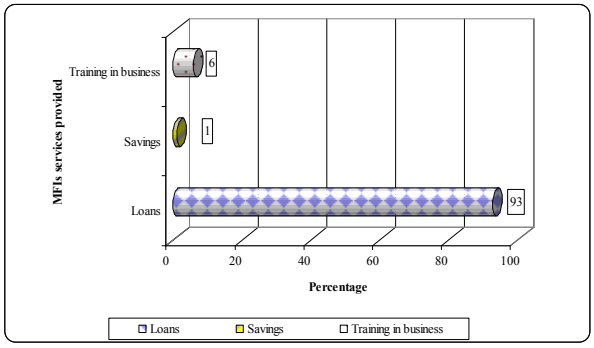

Figure 4. Potential services provided by MFIs.

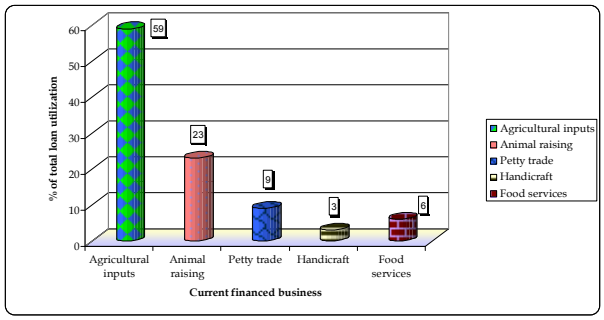

Figure 5. Businesses financed by current loans.

4.2. Incidence and Levels of Poverty Among Credit Users and Non-users

As explained in the previous discussions, farm household consumption-expenditure which includes food and non-food items is used in estimating the poverty indices. In the poverty literature, poverty comparisons always involve the choice of a welfare measure, poverty lines and selection of poverty indices to enable aggregation of poverty (Fitsum H. and Stein, H, 2000). In this study, we scale the household consumption by adult equivalent to get consumption expenditure per adult equivalent using standards adopted from the WHO and FAO (2300 calories per adult per day). Having established the household

consumption-expenditure, a cut-off point that serves as the poverty line using SDG 3.79 a day as consumption expenditure of the whole population under study was established at SDG 113.8 per month per adult equivalent. The poverty line we used is basically adopted from the National Household Baseline Survey (NHBS) which was conducted in 2009 by the National Government of Sudan to assess the current living standards of the population and to provide the government with important data on poverty incidence needed for developing a Poverty Reduction Strategy Paper (PRSP).

From this, the popular P-α class of poverty measure was used in estimating the head count, the poverty gap and severity of poverty among the household category of credit users and non-users. In addition to that, poverty classes for the three localities under study were also estimated. The results, as indicated in Table 1, paint an interesting image in respect to poverty measurement in the study area. The results show that poverty incidence is much higher among credit non-users (0.44) compared to credit users (0.42). This result implies that 44% of credit non-users and 42% of credit users have consumption expenditure below the poverty line. Thus, 44% of credit non-users and 42% of credit users in North Kordofan live in households that are poor, since their adult equivalent consumption expenditure falls below the poverty line (SDG 113.8 per month).

Table 1. Poverty measures categorized by credit users and non-users.

Category	Poverty Headcount index P_0 (%)	Poverty gap index P_1 (%)	Severity index P_2 (%)
Credit users	42	15	8
Non-credit users	44	18	11

Source: Depicted from own data, 2014

Within the same period, the poverty gap index was 0.15 and 0.18 for credit users and non-users respectively. This poverty gap is referred to as the poor's degree of misery. Thus, representing the percentage of expenditure required to bring each household category (credit users and non-users) from below the poverty line up to the poverty line. Table 1 also shows that the severity of the poverty index for both categories were 0.8 and 0.11 respectively. These results imply that 8% and 11% of the poorest of the poor from both categories in North Kordofan must be given more attention by policymakers in the distribution of the standard services that enhance their livelihood and living conditions such as food, income generating activities, health care services, clean water, etc. As can be seen in Table 1, one may conclude that households who have access to credit are more likely to escape poverty than those who do not. The result obtained in this study is similar to results of other studies conducted in different developing countries such as Remenyi, J. and Quinones, (2000) who reported that household income of families with access to credit is significantly higher than those without access to credit. They pointed out that in Indonesia a 12.9 percent annual average rise in income was reported among borrowers, while only 3 percent rise was observed among non-borrowers. Similarly, In Bangladesh, a 29.3 percent annual average rise in income was recorded among borrowers and a 22 percent annual average rise in income among non-borrowers, respectively. On the other hand, Khandker, (2001) argues that microfinance participants do better than non-participants in per capita income, per capita expenditure, and household net worth in rural Bangladesh. A study conducted by Dunn, (1999) in Peru concludes that only 28 percent of clients live below the poverty line compared to 41% of non-clients. Shirazi and Khan (2009) found that microcredit provided by the Pakistan Fund for Fighting Poverty reduced poverty by 3.05 points over the period studied. Mahjabeen (2008) states that Bangladesh microcredit institutions play an essential role in increasing the consumption and incomes of households, and consequently decrease the inequality of income distribution. Boateng, *et al* (2015) indicates that those who access to credit show improved income levels, education levels, family growth and housing compared to those who do not.

In recent years, mixed results in literature were observed regarding the impact of microfinance on poverty alleviation. While a large number of studies confirmed the empirical role of credit in reducing poverty and increasing the incomes of farm households through various activities, still a considerable number of researchers argue that the impact of microcredit on poverty reduction is ambiguous. In a recent study in Dormaa Municipality in Ghana, Antwi, (2015) studied the impact of microfinance on poverty reduction. His finding revealed that credit given to clients has no significant impact on annual income, savings and the value of total assets. The finding of our study supports the former group. For more detailed arguments about microfinance and its impact on poverty (see: Banerjee, A., Duflo, E., Glennerster, R., & Kinnan, C. 2015, Al-Hassan *et al*., 2011, Karlan and Zinman, 2010, Bebczuk and Haimovich, 2007, Mawa, 2008, Khandker, S. R. 1998, Robinson, M. 2001,Mcculloch, N. and Bob, B. 2000), Zaman, H. 2000, and Hashemi and Morshed, 1997).

4.3. Incidence and Levels of Poverty in the Study Localities

Taking into account the poverty line of SDG 1380 per adult per year, an assessment of current the poverty status for the three localities under study was made. The main finding illustrated in Table 2 shows that there is a difference in

current poverty situation in the areas. Both Um Rwaba and Enuhud recorded the highest poverty incidence, with ratios of 45% and 44% respectively, followed by Shiekan with a ratio of 39%. In terms of the poverty gap, Enuhud reported the higher income distance (20%) from the poverty line as compared to the national rural average of 16.2% (MOWSS, 2011). More precisely, the poor in Enuhud demonstrate a higher percentage distance from the poverty line followed by Um Rwaba. Likewise, the severity of poverty in Enuhud is found to be (12%) followed by Um Rwaba (9%) which is also believed to be one of the highest by all standards. Both depth and severity of poverty seem to be highest in the localities with highest incidence of poverty. The size of the latter two measures could be a reflection of the nature of growth (likely to be small if growth is pro-poor and large if growth is anti-poor).

Table 2. Poverty incidence and levels of household categorized by locality.

Category	Headcount index P_0 (%)	Poverty gap index P_1 (%)	Severity index P_2 (%)
Sheikan	39	15	8
Um Rwaba	45	16	9
Enuhud	44	20	12

Source: Depicted from own data, 2014

4.4. Inequality of Household's Income Distribution

For in depth understanding of the above results we compute inequality of income distribution for farm household categories. A large volume of literature has shown that use of the Gini coefficient and the Lorenz curve in combination with one or two of the Atkinson family is useful in ranking inequality of income distribution (Aabarge, 2007). Regarding this study, Table 3 illustrates the Gini coefficient for household categories, credit users and non-users. However, for more elaboration and comparison purposes, we use the same indices to estimate the inequality of income distribution in the three localities under study. Table 3 also explains the disparities of income distribution between household categories. While credit users have a recorded Gini coefficient of 0.32 credit non-users reported only 0.22 as a Gini coefficient value. This result implies that, although credit users are found to be better off in terms of income, credit non-users seem to be more equal in distribution. In other words, credit users have received 32% of the total income, whereas credit non-users received only 22%, indicating that the probability of equal distribution is much higher for credit non-users as compared to credit users. On the other hand, the Lorenz curve in Figure 6 indicates that credit non-users are closer to the line of complete equality which tends to enhance equity among credit non-users over credit users. This result contradicts the findings of Khandker, (2003) who stresses that microcredit has a positive effect on the welfare of the whole household and contributes to the redistribution of their incomes. In the same line Getaneh, (2005) found that the lack of adequate finance hinders the formation of new enterprises and contributes to income inequality.

Moreover, the Gini coefficient and Atkinson indices for household categories, credit users and non-users in the three localities under study were also investigated. Table 4 presents the value of Gini coefficient for credit users and non-users in each locality.

With a Gini coefficient of 0.46, the credit users in Shiekan recorded the highest inequality, followed by Um Rwaba. In contrast, credit users in Enuhud reported the highest degrees of equity (0.25). Similarly, the credit non-users are found to be more unequal (0.33) in Shiekan compared to those in Enuhud. In other words, farm households who live in Enuhud are more likely to be equal in the distribution of their incomes compared to those who live in Shiekan. Details are presented in Table 4. Furthermore, the Atkinson index was used to calculate the proportion of social welfare that would be required if incomes were to be perfectly distributed. Cited literature always connects the Atkinson index with a social welfare function which is represented by average utility and a parameter of inequality aversion (ε) (FAO, 2007).

Different levels of inequality aversion (ε) give different values of equally distributed equivalent income (YEDE). Typically, for $\varepsilon > 0$, the YEDE is simply the average level of income. With $\varepsilon > 0$, the YEDE decreases the value of A and ε increases. As $\varepsilon \to \infty$, the Rawlsian criterion is used and the social welfare function (SWF) becomes more inequality averse. However, conditional to this study, we calculate the Atkinson index based on $\varepsilon = 1$ and $\varepsilon = 2$. As indicated in Table 5 there is a significant difference of Atkinson index values of household categories in the three localities of the study. The value of the Atkinson index increases when society attaches a higher weight to the lower income groups with rising ε. Table 5 also shows that if ε rises from 1.0 to 2.0, the Atkinson index for the distribution of income in Shiekan increases for credit users from 0.63 to 0.77, while for credit non-users it increases from 0.32 to 0.60. Typically, a rise of parameter ε from 1.0 to 2.0, will lead to the Atkinson index of income in Enuhud increasing for credit users from 0.18 to 0.49 and for credit non-users from 0.30 to 0.52. Another explanation of the high values of the Atkinson index (0.63 and 0.32) could be that credit users and non-users in Shiekan are ready to give up 63% and 32% respectively of their income to have equally distributed incomes. Similarly, credit users and non-users in Enuhud are willing to sacrifice 18% and 49% of their incomes respectively in

order to get equal incomes. Details are explained in the Table 5.

Table 3. Gini coefficient of inequality of household's income distribution.

Category	Gini Coefficient
Credit users	0.32
Non-credit users	0.22

Source: Depicted from own data, 2014

Table 4. Gini Coefficient of inequality of income distribution by locality.

Category	Gini Coefficient	
	Credit users	Non-credit users
Shiekan	0.46	0.33
Um Rwaba	0.26	0.28
Enuhud	0.25	0.18

Source: Depicted from own data, 2014

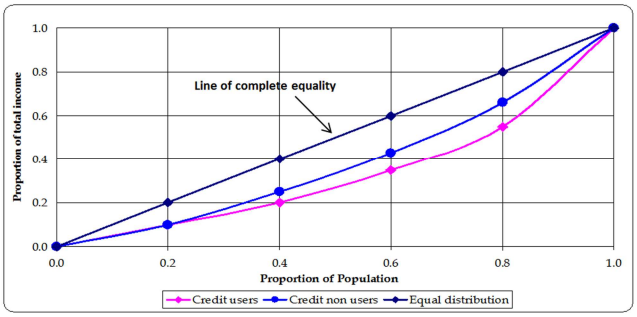

Figure 6. Lorenz Curves of Income Distribution.

Table 5. Atkinson index and inequality of income distribution by locality.

Category	Atkinson index (ε = 1)		Atkinson index (ε = 2)	
	Credit users	Non-credit users	Credit users	Non-credit users
Shiekan	0.63	0.32	0.77	0.60
Um Rwaba	0.41	0.33	0.56	0.65
Enuhud	0.18	0.30	0.49	0.52

Source: Depicted from own data, 2014

5. Conclusion and Recommendations

In the recent literature, poverty levels were measured using various methods and different approaches. However, in this study we follow the Cost of Basic Needs (CBN) approach in estimating absolute poverty levels. The advantage of a CBN approach is that the poverty line guarantees that poverty comparisons are consistent in the sense that two individuals with the same level of welfare are treated the same way. The most commonly used measures suggested by Foster-Greer-Thorbecke, (FGT) were used to estimate poverty status in the study areas. From the finding of the analysis, it is observed that credit users are better off compared to credit non-users in terms of poverty incidence, poverty gap and severity. In other words, households who have access to credit are more likely to escape poverty than those who do not. The improvement among the credit users can be attributed to the positive effect of policy reforms on poverty reduction. Having estimated income distribution for household categories, it was found that the probability of equal distribution of income is much higher among credit non-users as compared to credit users. Moreover, the FGT results showed that there were significant differences in the geographic distribution of poverty among the three localities under study. Furthermore, Um Rwaba recorded the highest poverty incidence among other localities, however, with respect to the poverty gap, Enuhud reported the higher income distance from the poverty line as compared to national figures. Likewise, the severity of poverty in Enuhud and Um Rwaba are found to have a higher percentage distance from the poverty line which is also believed to be one of the highest by all standards. Based on the findings, the study suggests that in order for microcredit to be efficient tool for poverty eradication, larger and longer-term credit services at lower interest rates should be given to households who agreed to invest in commercialization of farm business, efficient technology and marketing facilities. Moreover, the government should set up new microcredit institutions within rural areas, where most of the clients reside. This would not only improve credit market information provision, but would also help meet potential in terms of satisfying the demand for credit. Most importantly, the private sector needs to be encouraged and supported to take the lead in national economic development.

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