An Empirical Analysis of the Effect of Micro-credit Bank Accessibility on Small Business Income

Emmanuel John Kaka[1]

[1] Accounting Department, Faculty of Art, Management And Social Sciences, Federal University, Gashua, Yobe State, Nigeria. Youngkaka2002@Yahoo.co.uk

Abstract: This study sought to give the account of micro-credit bank accessibility on small business income. The study employed an intensive research design over an extensive period of time, a 24-weekly visit, for a period of 6 months. The population for this study consisted of a sample of 87 respondents, which involved 53 beneficiaries of micro-credit banks and 34 non-beneficiaries in Northeast Nigeria. Stratified random sampling was employed in selecting the respondents for the study. Data were collected by the use of structured interview questionnaire and processed using Stata. Ordinary Least Square was used to determine whether a group of independent variables could predict a given dependent variable, *t–test* for mean was conducted to assess the real effect of micro-credit on business income. The three independent variables (credit, savings and supervision) were found to be relevant and positively significant in explaining the effect of micro-credit on business income. The study discovered that the *t-test* analysis showed a significant difference in the mean value of the beneficiaries as compared to the non-beneficiaries on business income. The study concluded that micro-credit increase business income and hence reduces poverty among micro-credit beneficiaries.

I. INTRODUCTION

Poverty is a pervasive problem in society. Spanning the length and breadth of the world, poverty exists in various forms and different levels. At the current threshold of USD1.25 a day, the World Bank estimates that around 25 percent of the population in developing countries exists below the poverty line (Electrin, Masoti, George, Mandere, Jonathan, Kagumba & Njenga, 2013; United Nations, 2012). This figure translates to 1.3 billion people living in extreme poverty, equal to about 20 percent of the global population (World Bank, 2010).

The United Nations Millennium Declaration adopted on 8 September 2000, states as its first goal, that nations should "resolve to halve the proportion of the world's people whose income is below one dollar per day and the ratio of people who suffer from hunger by the year 2015" (Allwine, Rigolinei & Lopez-Calva, 2013). Each member nation is committed to the realization of these goals despite their initial stages of poverty and inequality. The population of the poor people living below USD1.25 per day reduced from 47 percent in 1990 to 24 percent in 2008, a reduction of two billion to less than 1.4 billion (United Nations, 2012). The report of the United Nations shows different results of poverty reduction, with most of the achievements coming from Southeast Asia, which recorded a reduction in poverty from 45 percent to 17 percent between 1990 and 2008. In Sub-Saharan Africa, extreme poverty has been reduced by only nine percent from 56 percent to 47 percent (Allwine et al., 2013). This shows that most of the achievements in poverty reduction has been recorded in Southeast Asia. In Sub-Saharan Africa, the achievement is minimal and less impressive.

Nigeria, being a developing nation, is not free from the shackles of poverty. The budget speech of the Nigerian president in 2013 clearly made poverty eradication a major concern of the government. This was the third consecutive term that the government has considered poverty eradication as a main priority in its budget presentation. Despite the emphasis and significance given by the government in many programs to tackle absolute poverty, the poverty profile of Nigeria keeps worsening. The number of people below the poverty line in Nigeria continues to increase unprecedentedly. It reached 45 million in 2005 (67 percent of the population of Nigeria) and the proportion of people living below poverty line rose sharply in 2010 to 112.47 million (69 percent of the estimated population of 163 million) (Kasali, Ahmad & Lim, 2015; National Bureau of Statistics, 2012; Word Bank, 2010). Women comprise a majority of those living in poverty because of their vulnerability and most of them live in the rural areas (Agbaeze & Onwuka, 2014).

Micro-credit program has been introduced as an anti-poverty tool, aimed to facilitate credit access by the poor households to increase their business income, livelihood and mitigate their poverty. However, in spite of the efforts made by the governments to support and popularize the implementation of micro-credit, empirical studies on poor households' accessibility to micro-credit for poverty reduction have shown conflicting and mixed results (Agbaeze & Onwuka, 2014; Henry, 2015; Odetayo & Anaolapo, 2016).

Many researchers have also considered the combination of several micro-credit factors on business income and poverty reduction. For example, Aziz (2012) considered credit, savings and insurance; Electrin, et al. (2013) examined credit, savings, training and insurance; Girabi and Mwakaje (2013); Kwai and Urassa (2015) and Odetayo and Onaolapo (2016) considered credit and savings; Flavius and Aziz (2011) considered credit and social network; Mahmood, Hussain, Sultana & Ghosh (2014) looked at credit and training; and Hasan et al. (2015); Tammili, Mohamed & Tezona (2018) considered credit and socio-economic characteristics. These studies have shown that supervision has been neglected. Therefore, a contribution of this study is the inclusion of supervision with credit and savings as independent variables. This variable is introduced based on the evidence that micro-credit institutions should explore services delivery opportunities that provide additional room to supervise the use of credit to improve or enhance outreach and the use of loans to improve business income, livelihood and poverty reduction (Imai, Arun & Annim 2010).

The objective of this study is to investigate the effect of micro-credit on small business income and poverty reduction in northeast Nigeria. The study is classified into the following sections a apart from Introduction. Section two discusses the literature review, section three deals with research methodology and model specification. Section four is concern with discussion of results. While section five explain explicitly the conclusion of the study.

II. LITERATURE REVIEW

The proponents or advocates of microfinance and poverty reduction, like Sulemana and Dinye (2016), in their topic on micro-loans and agricultural sector incomes in developing countries: an empirical study of Pru district in Ghana, evaluated micro-credit impact on incomes within the agricultural sector. A case study and quasi-experimental method were used. Data used for analysis were gathered from 60 fishermen and 96 crop farmers using a questionnaire. Ordinary Least Squares regression method was used to analyze the data. The study finds that micro-credit has a positive impact on incomes, and remains indispensable in enhancing agricultural incomes and assists in bridging income inequality. In another study, Najmi, Bashir & Zia (2015) conducted a study to investigate the impact of microfinance on socioeconomic status of borrowers in Minchanadad district, Pakistan. Data were collected from 60 respondents through a questionnaire and stratified random sampling method was adopted. The study finds positives impact of microfinance on income, children's education, health and borrowers' businesses, generally.

Similarly, Thanh, Phu & Hoang (2015) considered the majority ethnic groups and that of the minority in Vietnam. The results show an increase in income of the loan recipients in rural and remote areas, while the effect on enhancement of income is influenced by household features, like number of working adults, lending conditions of the loan and experience of the household's head. Quaiser and Sohail (2013) in their study, tried to compare clients and non-clients, and concluded that micro-credit clients are significantly more efficient than the non-clients in income generation.

Tammili et al. (2018) their study aimed at investigating the effectiveness of the microcredit program on poverty reduction of AIM microcredit recipients in Selangor. The study used systematic random sampling to sample 326 respondents from February to April 2016. Descriptive analysis and multiple regression was adopted to analyze the data. The findings of the study show that most of the respondents were married (95.7 percent) and have obtained secondary education (72.7 percent). In terms of income distribution, majority of the respondents earn below RM1,500. Nonetheless, all respondents reveals a positive income changes after collecting various microcredit program schemes from AIM. Multiple regression analysis disclosed that the hired workers and family workers to be positive and significantly influenced the income-investment ratio of the respondents after joining the microcredit program. This study affirmed the effectiveness of the AIM program in poverty reduction among the poor in Selangor. AIM also plays an important role in meeting the financial needs of respondents which contribute to the enhancement of their microenterprises.

Kwai and Urassa (2015) assessed the contribution of savings and credit cooperatives societies in reducing poverty in rural households, specifically, comparing income levels of savings and credit cooperative society members and non-members. A total of 160 respondents were used comprising 80 savings and credit cooperative society members and 80 non-members. Data were gathered through a structured interview questionnaire. Quantitative data were analyzed using descriptive statistics, independent *t-test* for comparing the mean and multi-linear regression and qualitative data were analyzed using content analysis. The *t-test* analysis shows a highly significant difference in the mean value between the two groups on income earned and household expenditure. In addition, the result of multi-linear regression analysis shows that the effect of savings and credit cooperative societies is favorable and significant, thus, concluding that savings and credit cooperative society member's living standard has improved significantly.

Dupas and Robinson (2011) discovered access to savings accounts leads to personal income growth and increased business investment. In addition, expenditures

increased for women in the treatment group, they concluded that savings decreases vulnerability of women to health shocks. Jain and Munoz (2017) discovery is in accordance with the accepted belief or notion that microcredit is to be preferentially provided to disadvantaged people in the rural areas as they are poorer than those living in urban centers. The results show that rural borrowers weakness more poverty reduction over time than the ones in the urban centers, resulting to the narrowing of the gap in the rural-urban poverty. However, despite the shrinking of the gap in the rural–urban poverty, the differences in poverty remained persistent over time. The study of Bernajee and Jackson (2016) shows a different results. The study discovered microcredit to lead to increasing levels of indebtedness among already impoverished members of the communities which expose them to economic, social and environmental vulnerabilities.

The studies above have shown that supervision has been neglected. Therefore, a contribution of this study is the inclusion of supervision with credit and savings as independent variables. This variable is introduced based on the evidence that micro-credit banks should explore services delivery opportunities that provide additional room to supervise the use of credit to improve or enhance outreach and the use of loans to improve business income, livelihood and poverty reduction (Imai et al., 2010).

II.I Conceptual Framework

Figure 1: Conceptual Framework
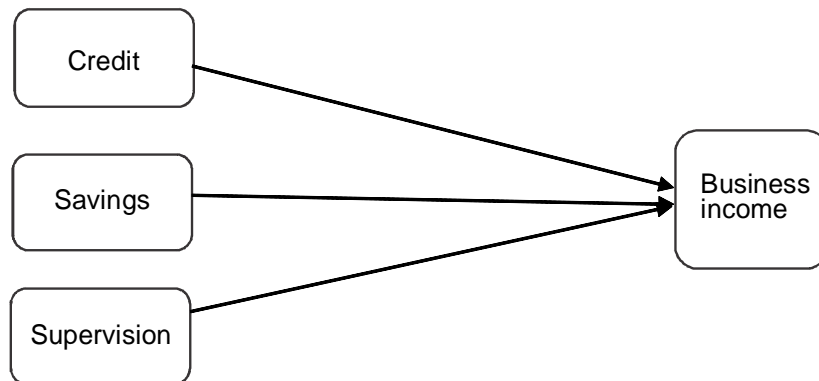
Thus, the following hypotheses are formulated:

H₁: Credit positively influences business income of the beneficiaries

H₂: Savings positively influences business income of the beneficiaries

H$_3$: Supervision positively influences business income of the beneficiaries

III. RESEARCH METHODOLOGY

The research design used or adopted for this study is a case study and intensive research design over an extensive period of time (up to six months in 24 weekly visits or observations). The study also uses cross-sectional data and quantitative data were collected using interviews from a structured interview questionnaire from 1 March to 31 August. In an attempts to measure the effect or describe the performance of DEC micro-credit beneficiaries and non-beneficiaries on' business income of women in Lere and Bombar district in northeast Nigeria, stratified random sampling technique was used. A sample of 53 DEC micro-credit beneficiaries and 34 non-beneficiaries households were selected for this study. The unit of analysis is individual household of the both the beneficiaries and non-beneficiaries. Ordinary Least Squares model and *t-test* for mean was used to analyze the data. Ordinary Least Squares was used to estimate the significant influence of credit, saving, supervision on business income. The *t-test* for mean was used to assess the effect of micro-credit on business income of the beneficiaries and the non-beneficiaries. The mean difference between the beneficiaries and the non-beneficiaries business income signifies an effect on the business income. Pallant (2011) observed that *t-test* is suitable for comparing the mean score on the variable with continuous data, for two different groups of respondents. Thus, the study used *t-test* in comparing the beneficiaries and Non-beneficiaries business income, in order to discover the real effect of micro-credit access.

III.I Model Specification

The research used multiple linear regression model as an analytical model technique. The multiple regression assessed the effect of a single outcome measure and many predictor variables. The independent variables in this study were credit, savings and supervision. On the other hand, the dependent variable is small business income. Thus, the analytical model employed for micro-credit bank and small business income is as shown below:

The linear regression model is as follows:

$$Y = B_0 + B1X1 + B2X2 + B3X3 + B4X4 + E$$

Where;

Y = Predicted dependent variable (Business income)

Bo = Constant,

B1 – B4= Regression coefficient,

X1 – X4= Value of predictor variables – credit, savings and supervision,

E = Error term.

The effect was measured by taking the average business income of both the beneficiaries and non-beneficiaries.

IV. DISCUSSION OF FINDINGS

Data were analyzed using Ordinary Least Squares regression model to test the significant influences of credit, savings and supervision on business income and *t-test* for mean difference in business income of the beneficiaries and non-beneficiaries. The use of Ordinary Least Squares regression model is in line with Babaji, Taiwo & Isibor (2015); and Kwai & Urassa (2015) and the use of *t-test* to determine the mean difference in this study is in line with other studies (Girabi & Mwakaje, 2015). This study used Ordinary Least Squares method to estimate the extent to which micro-credit has been used to eradicate poverty and the *t-test* to compare the mean differences between two groups.

IV.I. Regression Analysis for Business Income Model

In addition to the above analysis on demographic and socio-economic factors, the researcher used multiple regression analysis to test the relationship among explanatory variables (credit, savings and supervision) and predictor variable (business income). The researcher applied the Ordinary Least Squares to aid in the computation of the measurements of the multiple regressions for the study as shown in Table 1.

Table 1: Model 1 Summary

Model	R-Square	Adjusted R–Square	F–Statistic
1	0.36	0.34	0.01

Coefficient of determination explains the extent to which changes in the dependent variable can be explained by changes in the independent variables, or the ratio or percentage of variation in the dependent variable (business income) that is explained by all the three independent variables (credit, savings and supervision).

The three independent variables that were studied explain 36 percent of the influence of micro-credit on the business income in Lere and Bombar districts as represented by the R-Square. The corresponding F-statistic is highly significant at one percent significance level.

Ordinary Least Squares estimates of micro-credit on business income are shown in Table 2.

Table 2: Ordinary Least Square Estimates of Micro-credit on Business Income

Business income	Coefficient	Std. error	t-value	p-value
Credit	0.07	0.05	1.32	0.10
Savings	0.29	0.08	3.54	0.01
Supervision	4609.84	1704.66	2.70	0.01
Constant	37281.17	2023.93	18.42	0.01

*Significant at 1% ***Significant at 10%.

In order to determine the relationship between the dependent variable (business income) in Lere and Bombar districts and the three explanatory variables (credit, savings and supervision), the researcher conducted a multiple regression analysis.

As the regression analysis establishes, if all factors are taken into account (credit, savings and supervision) to be constant at zero, business income will increase in Lere and Bombar districts by 37281.17 units. The data analysis also shows that if all other independent variables are considered to be zero, a unit increase in credit facilities will lead to 0.07 units increase in the business income in Lere and Bombar districts. Further, a unit increase in savings will lead to 0.29 units increase in business income in Lere and Bombar districts; whereas a unit increase in supervision services will lead to 4609.84 units increase in business income in Lere and Bombar districts. From the above analysis of the betas, it can be inferred that supervision contributes a lot to the business income in Lere and Bombar districts followed by savings and credit.

At the 10 percent level of significance and 95 percent level of confidence, credit facilities have a 0.10 level of significance, savings, a 0.01 level of significance and supervision shows a 0.01 level of significance. Hence, the most significant factors are savings and supervision followed by credit. Thus, all the three variables are significant in explaining the business income of the beneficiaries and the non-beneficiaries in Lere and Bombar districts.

IV.II. Diagnostic Tests

To ensure the robustness of the estimation technique, the Breusch-Pagan test for heteroskedasticity, the Ramsey test for functional misspecification, Information Matrix test, Mardia's test for multivariate normality and Link test for model specification were conducted. Table 3 shows the diagnostic tests conducted.

Table 3
Summary of the Diagnostic Tests

	Business Income
Tests Conducted	*Model P-value*
Breusch-Pagan test for heteroscedasticity	0.34
Ramsay reset test for functional misrepresentation	0.14
Information matrix test	0.65
Mardia's multivariate normality test	0.97
Link test for model specification	0.54

Source: Survey (2015).

From the Breusch-Pagan test for heteroskedasticity which uses the chi-square statistics, the result shows that there is no evidence of heteroskedasticity in the models with business income as dependent variable. Table 3 shows the estimated chi-square probability of 0.34 for business income to be insignificant.

To test for specification errors, Ramsey (1969), in his study, considered the test for specification errors in order to determine whether there are omitted variables in a model using reset test for functional misspecification. Thus, in line with this idea, the study also used the Ramsey reset test for functional misspecification. The test, as shown in Table 3, reveals that the model is free of specification errors. This test used the F-statistic to test for omitted variables in the model. The reported F-statistic of 0.14 for business income model is insignificant. This result shows that there are no omitted variables in the model.

For information matrix test, Cameron and Trivedi (1990) stated that information matrix test is a test conducted to determine the error terms of the model as to whether it is homokedastic and normally distributed. The information matrix test was conducted in this study to determine the error terms. Table 3 shows the overall p-values of the information matrix test to be 0.65 for business income model, to be insignificant. These suggest that the error terms of the three models are homokedastic and normally distributed.

Pallant (2011) opined that Multi Linear Regression Model needs to be normally distributed. Hence, a check for normality in the distribution of variables was conducted. Following the normality check using Mardia's (1970) multivariate normality test for multivariate normal distribution, it is observed that the data set follows a multivariate normal distribution. The estimated chi-square of 0.97 for business income model is insignificant as shown in Table 3. Therefore, the study does not have any reason to reject the null hypothesis.

Link test is a byproduct of a diagnostic test (Pregibon, 1979). In order to determine the correct link function of the model's adequacy, Link test enables the user to examine routinely and objectively the fit of a hypothesized model. The Link test for model specification conducted in this study indicates that the model is correctly specified or has no problem with specification in the model with business income. The report of the estimated chi-square of 0.54 for business income model is insignificant as shown in Table 3. Thus, the model is adequate.

IV.III Mean Business Income Effect

The total business income generated throughout the study period presented here is arrived at by computing and adding the monthly business income. It comprises the profit generated from 1March to 31 August 2015. Table 4 shows the mean values of the source of business income for each month and the differences between the beneficiaries and non-beneficiaries.

Table 4
Mean Values of Each Source of Business Income from 1 March to 31 August 2015

Business Income Sources	Beneficiaries Mean #	Non-beneficiaries Mean #	Difference Mean #
March	9,307	7,876	1,431
April	11,015	8,294	2,721
May	9,612	7,186	2,426
June	9,278	6,096	3,182
July	8,236	6,300	1,936
August	6,500	6,993	-493
Total	53,948	42,745	11,203

Source: Survey (2015).

Business income is a very important source of income that improves welfare of the households. Table 4 describes the monthly business income patterns of the

households of the beneficiaries and non-beneficiaries. The business income for the month of March of the beneficiaries is: (mean = 9,307 naira) and non-beneficiaries is: (means = 7,876 naira). The difference shows a positive mean increase of 1,431 naira of the beneficiaries' income as against the non-beneficiaries.

In the month of April, business income of the beneficiaries is: (mean = 11,015 naira), whereas non-beneficiaries is: (mean = 8,294 naira). The month recorded a positive increase in mean value difference between the beneficiaries and the non-beneficiaries of 2,721 naira. For the month of May, the business income of the beneficiaries is: (mean = 9,612 naira) and non-beneficiaries is: (mean = 7,186 naira) respectively. This result shows a positive mean difference of 2,426 naira.

In the month of June, business income has a mean score value for beneficiaries (mean = 9,278 naira), whereas for the non-beneficiaries it is: (mean = 6,096 naira). The mean difference is positive with a value of 3,182 naira. In the month of July, the business income for the beneficiaries is: (mean = 8,236 naira), likewise, for non-beneficiaries is: (mean = 6,300 naira). This shows a positive difference in mean score of 1,936 naira. In August business income for beneficiaries is: (mean = 6,500 naira) and for non-beneficiaries it is: (mean = 6,993 naira). The month recorded a negative (mean = 493 naira), signifying that the non-beneficiaries average profit is greater than the beneficiaries.

This negative difference may be connected to the fact that it is the rainy season. So, most women go to the farm before coming back to open their business. At times, they do not open the business when they come back late or it is raining, or when they are tired. In addition to that, some women have used their money meant for the business on their farm and hence, do not have enough goods for sale to make profit. These factors affect the sales and profit of beneficiaries business.

The Table 4 also shows the average total business profit (beneficiaries mean = 53,948 naira and non-beneficiaries mean = 42,745 naira). The mean difference is 11,203 naira. This shows that there is an increase in the mean business income of the beneficiaries of 11,203 naira. This confirms the positive effect of micro-credit program on the life of the beneficiaries. Generating more income to meet their daily expenditure, and acquiring assets to reduce poverty are the main purposes of engaging in trade or business. If the beneficiaries could meet these comfortably, it means that there are changes in their poverty level. This result tallies with other studies (Electrin et al., 2013; Jain & Munoz, 2017; Kwai & Urassa, 2015; Sulaiman & Dinye, 2016) that have reported that households that choose to collect credit have a greater effect

on business profit or income. Other results that closely aligned with this and found to have significant effects on income of the beneficiaries. (e.g., Boateng, Boateng & Bampoe, 2015; Ghalib et al., 2015; Hasan et al., 2015; Odetayo & Onaolapo, 2016; Tammili et al., 2018).

Figure 2: shows the pattern of mean business income of the respondents from the month of March to August 2015.

Figure 2: Pattern of the Mean Business Income of the Respondents
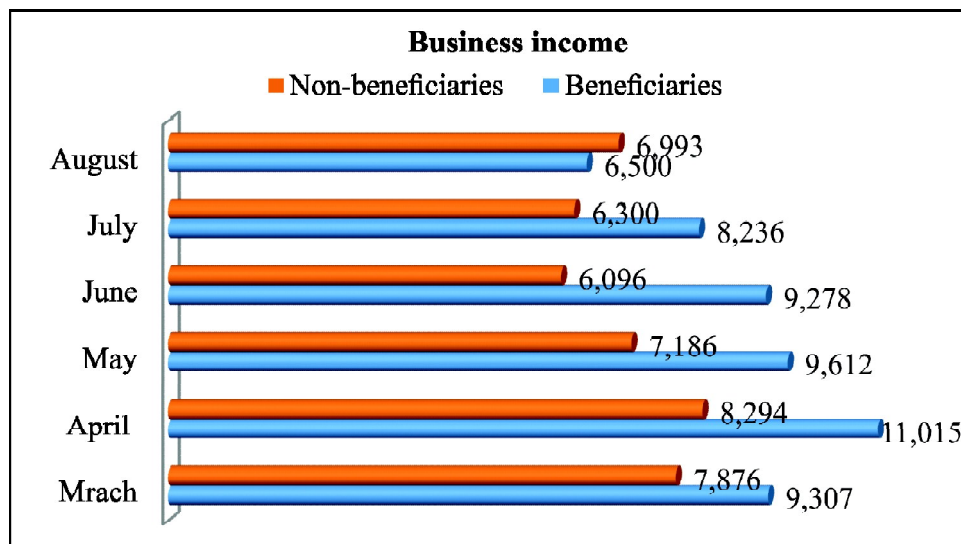
From the information in Figure 2, it can vividly be seen that there are changes in the monthly mean business income pattern. At the beginning of the research period, from the month of March to April, the mean business income of the beneficiaries and the non-beneficiaries increased steadily. It started falling gradually from the month of May to August. The increase in income of the business was recorded because there was a lot of money in circulation, as March and April was the election period. Politicians were busy giving out money or gifts to the people in order to win the election. Thus, people had more money to spend.

However, immediately after the election, economic activities began to slow down as there was no more hand-outs money. Moreover, there was political instability that led to fighting between the tribal groups immediately the election was over. In addition, the rainy season affected sales and profit. These contributed to the downward trend in the business income generated by the women.

V. CONCLUSION

This research provide a fresh insight on the understanding of the real impact of micro-credit bank accessibility in Nigeria on the effect of credit, savings and supervision on business income and livelihood of the beneficiaries as compared to those who do not access micro-credit. The study gave account of 53 micro-credit beneficiaries 34 non-beneficiaries through structured interview method of data collection. The real effect of micro-credit were sought from the respondents in Nigeria, explored based on those who used the credit to operate a business as well as their willingness to participate and potentially benefit from the research. Throughout the discussion, the paper attempts to show the effect of theory and practice in the life of micro-credit bank beneficiaries in improving small business income and livelihood. In this regard, the study followed the strategic views of (Bernajee and Jackson, 2016; Boateng et al., 2015), by analyzing the real effect of credit, savings, and supervision on small business income. The findings are consistent with previous research (Bernajee & Jackson, 2016; Sulaiman & Dinye, 2016; Tammili et al., 2018; Thanh et al., 2016).

With regards to the literature review and empirical analysis, the study offer a possible answer to the research question on how does micro-credit accessibility effect business income? Basically, the findings of this study have shown a link between credit, savings, -supervision and small business income. The outcome of the Ordinary Least Squares regression models shows that credit, saving and supervision significantly and positively influence business income. The findings indicate that the newly introduced determinant gives the micro-credit bank a lead introducing supervision of micro-credit to beneficiaries. In addition, the beneficiaries mean business income increases more than that of the non-beneficiaries as a result of the access to micro-credit bank.

The study concluded that the beneficiaries of micro-credit have improved their business income as well as the livelihoods of the households. The study's policy recommendations are that, since access to micro-credit has improved small business income as well as reduced poverty of the beneficiaries, the non-beneficiaries should be encouraged by the micro-credit bank to join; and majority of the women's education and literacy level is low. Thus, the government should pave way for the education and literacy level of the women to be improved or enhanced in the study area, as education and training is the key to achieving success in life. Thus, the study concluded that micro-credit helps in increasing small business income, livelihood and poverty reduction.

Lastly, despite the valuable contributions of the study, there are some limitations that offer an agenda for future research. For instance, since, the study uses quantitative method to establish the effect of credit, savings and supervision on small business income and livelihood, this should be followed by a qualitative survey to explore the impact of micro-credit accessibility on the beneficiaries. In addition, a study should be carried out using mixed method to also assess the impact of micro-credit bank accessibility on business income and livelihood.

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