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Impact of Group Microcredit Lending on Maize Productivity among the Small Holder Farmers in, Murang'a County, Kenya

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Abstract

Availability, accessibility and affordability of rural credit is one of the key elements for transforming rural economies through enhancing agricultural productivity, food security and poverty reduction. A good number of farmers in Murang'a County have engaged micro credit to boost maize production but the difference in productivity between beneficiaries and non beneficiaries have not been evaluated. This study Sought to examine the contribution of Microfinance services to food security of smallholder farmers in Murang'a county. Descriptive and econometric analysis, were used to analyze the data. Primary data was collected from 200 respondents randomly selected from credit beneficially and non-beneficially groups in Kiharu constituency using a structured questionnaire. The study uses the "counterfactual" approach using propensity score matching to assess whether households who had participated in microfinance services had increased their maize yield compared to non-participants. Logit model was used to determinant factors that influence farmers participation in microfinance services. Multivariate logistic regression revealed that the amount of land allocated to maize production was significantly associated with credit borrowing. Results also indicate that the time a farmer has been in the group and maize yield had a positive and significant relationship. The results revealed that MFI membership and maize yield had a positive and significant relationship. In addition, results revealed that the frequency of meetings had a positive and significant effect on the credit borrowed. The

distance to input and output markets had a negative and significant relationship with maize productivity. The results revealed that MFI membership and maize yield had a positive and significant relationship. In addition, results revealed that the frequency of meetings had a positive and significant effect on the credit borrowed. The results from Propensity Score Matching model show that household who had participated in group credit had increased maize yield by 30% as compared to non-participant. Sensitivity analysis indicated that the observed results on the impact of group access to credit on maize yield, were not biased towards those who received credit. The study recommends that small-scale farmers can work together as a recognized legalized entity in order to improve their bargaining ability and to take advantage of economies of scale. The research brings out unfulfilled potential for integrating microcredit firms into the mainstream rural financial systems. In addition, commercial banks are yet to exploit their full potential with regards to credit provision to high-potential small-scale resource constrained farmers.

Keywords: *Group Microcredit Lending, Maize Productivity, Small Holder Farmers, Murang'a County, Kenya*

1.1 Introduction

Agriculture is a vital economic sector that constitutes the foundation of most African economies. Farming gives 60 percent of all work; represents around 60 percent of the mainland's foreign exchange earnings. In contributor 23.9% of National Gross Domestic Product (GDP); and the prevailing supplier of crude industrial materials (New Partnership for Africa's Development-NEPAD, 2013). Agriculture is an inevitable corresponding to the economies of growing nations, with critical multiplier impacts as it assumes a key part in giving sustenance to the populace and providing different sectors industrial raw materials (Food and Agriculture Organization-FAO, 2009). In Kenya farming is a noteworthy sector of the economy and effects food security, poverty reduction and industrial promotion through the supply of inputs.

Maize is a stable food crop in Kenya. It is approximated to contribute more than 25% of job creation and 20% of total agricultural output (Government of Kenya, 2012 It is food crop for 96 percent of Kenya's population with 125 kg per capita consumption and provides 40 percent of the calorie requirements Byerlee Eicher (1997) and Raw material for industries, Create employment and Reduce income inequalities Contributes to food security and poverty reduction, hence contribute toward achievement of MDG1, currently SDG1,2 and 3 Sustainability in maize creation was accomplished amid the 1970s when generation was high and surplus was traded. The Current patterns demonstrate that the Kenya maize part is attempting to attain sustainability in maize creation. Growth in maize creation has been low averaging around 2 percent. This is lower than the populace development rate which remains at around 3 percent. On the off chance that the nation is to act naturally adequate residential generation needs to develop at a rate of 4 percent. Absence of food sufficiency is ascribed by causes including absence of profitability improving advancements, environmental change, high frequency of pests invasion, difficulties in getting to credit (Nyoro et al., 2007; FAO, 2012).

Subsequently, cultivate yields are low averaging 1.5–2.6 tons for each hectare. Over the most recent one decade, the nation has encountered years of elevated sustenance weakness and reliance on imports and crisis compassionate help. In 2009, Kenya imported 16.8 million

packs of maize (GoK, 2010). Maize request in the nation has been on the expansion exceeding supply. For example, in 2012 maize creation remained at 2.8 million metric tons (33 million sacks) against a national necessity of 4.1 million tons (40 million packs). With the nation's populace anticipated to be 43.1 million by the year 2020, the interest for maize is probably going to be 5 million metric tons. In view of the overarching development rate, 1.2 million metric tons by 2020 (Nyoro et al., 2007). Expanded dependence on imports infers that the outside trade stores and assets reserved for advancement is occupied to obtainment of nourishment.

Increasing maize production in the existing arable land is the surest way to bridge the demand gap as there is limited opportunity for expanding cultivated land without negative environmental consequences. Higher production from a farmers own farm increases access to food and enhances household food security consequently improving the nutritional needs of community (ROK 2013). For those who purchase food, higher production generally means lower food prices and consequently access to a greater quality of food in the markets for a given income level. Traditional farming practices are no longer capable to meet demand and hence, application of scientific and improved farming methods is essential.

Increasing maize production in Kenya can be approached both on farm and at national levels. At the farm level, a number of important measures are necessary. Such measures include early and better land preparation, timely planting, planting of the most appropriate maize varieties, proper fertilization, efficient weeding and improved control of pests and diseases. However, majority of farmers in Kenya are not able to access adequate inputs in order to increase their current yields and to sustain increased yields. According to FAO (2012), better agricultural and post-harvest technologies will improve the quantity and quality of available farmland and to some extent increase access to agricultural inputs which will increase food availability to address food insecurity.

Murang'a County has a potential which has not fully been utilize for maize production .The production has been on decline in recent years .The County has been relying on maize from loitoitock, Karatina and other places of the nation. Some parts of the county also get reliefs foods. The county face a critical food situation. In the year 2016 the county recorded a drop of food security by 15% which stood at 53% from 68% in 2015 (GOK, 2012). The ministry of Agriculture report blamed lack of credit access and technical support from extension officers for the dwindling production.

Farmers in Murang'a, more than than any other part in Kenya, still encounters lots of problems including environmental change, globalization and the current worldwide subsidence, expanded weight on the normal asset base, ominous outside economic situations. The absence of access to imaginative advances, low efficiency of smallholders farmerss, diminished speculation by governments and authority improvement help and the restricted engagement by the private part work log jam the way toward commercializing the horticulture United Nation Development Program (UNDP, 2012). Absence of access to credit and back to empower reception, postharvest (capacity/handling), dry season, restricted accessibility half and half seeds, and most as of late MLN (Maize Lethal Necrosis) are among the significant limitations to maize production in Kenya.

Table 1: Maize production and Consumption in Murang'a

Year	Area in Ha	Yield bag per ha	Achieved Production bags	Food demand
2012	61075	12	732900	953960
2013	91416	14	877357	982579
2014	62108	9	540656	1012056
2015	65365	18	1191702	1042418
2016	66336	8	540316	1073690

Source: Murang'a County Government CIDP

Table 2: Projected maize production and food demand

Year	Area (Ha)	Yield (Bags/Ha)	Production 90 kg bags	Food Demands
2017	67000	12	804000	1105901
2018	67670	12	812040	1139078
2019	68346	12	820152	1173250
2020	69030	12	828360	1208448

Source: AFFA

According to the 2011 Economic Review of Agriculture (Ministry of Agriculture) data, the national average yield of maize was nearly 16 bags/ha. Murang'a County yielded <10 bags /ha. against a potential of 30bags /Ha .It is this potential that this project want to exploit.

Despite the key role maize plays in food security and income generation in Murang'a County and the whole country at large, its productivity has not been adequate especially in the past four decades during which stagnation/decline in maize yield led to frequent food security problems The declining production for small scale farmers has to a large extent been caused due to several factors including lack of proper or non-utilization of farm inputs and poor preservation and storage. Declining maize output and loss of post-reap yields has consequences on welfare as far as food provision amount of lost income is concerned thus contributing to poverty.

The country's ability to fully utilize its agricultural production potential depends on the innovativeness of actors in the agricultural sector, particularly farmers. The capacity of farmers and actors along the agricultural value chain to innovate in their production activities is contingent on the availability of technology. Access to credit through group is a local innovative initiative deemed very important in order for rural households to access farm inputs, improved technology and financial capital (Owour & Shem 2012).

With regards to credit access, farmer organizations are efficient since they can reduce collateral use as they rely on social capital. In addition, they enable farmers access inputs, acquire important market data, secure access to new advancements and take advantage of high-esteem output enabling them to contend with bigger established agribusiness (GOK, 2013). Access to credit enables farmers to afford pesticides and other chemical inputs for pests and diseases management, thereby reducing destruction of crops and losses to the farmers. In the long run, access to credit enhances agricultural productivity, food security, creation of new business and poverty reduction (FAO, 2012).

The challenges farmers face is accessing loans from formal credit institutions. This has made them rely on the unregulated informal credit sources such as the Grameen type institutions that peg lending to memberships in social networks such as groups and cooperatives. Traditionally, non-governmental organizations (NGOs) and microfinance institutions were the only sources for microfinance, but nowadays commercial banks, savings and credit co-operative societies (SACCOs) have taken up provision of microfinance to Kenyans.

In Murang'a County, lack of affordable credit constitutes a big challenge to accessing better inputs and modern technologies in farming (Bekele, 2007). Constraint in accessing credit to acquire agricultural inputs like fertilizers and agrochemicals can in turn reduce the productivity of farming enterprises. This will in turn affect production as even hybrid variety crops may not attain their potential production (Mbugua, 2009). The low participation of farmers in the credit market is an indication of poor output, savings and investment in production assets. These are likely to cause vicious cycle of lower rates of adoption of improved inputs which in turn will reduce productivity and commercialization. One way to address decreasing maize production due to diminishing arable land is to unlock access to credit (Njoroge et al., 2015; Kosura and Karugia, 2005; Mbugua, 2009).

Murang'a County has more than 500 farmer-groups and cooperatives registered with social and gender office (GOK, 2014). The expensive and unaffordable credit and subsequent reluctance of farmers to take up loans from formal credit has contributed to a rise in alternative financial institutions which cater for Small and Medium Enterprises (SMEs) and farmers. Examples of microfinance institutions in the county include farmers' cooperative unions such as Mugama Farmers Sacco, Murata Sacco and Unaitas, among others.

Investing in agricultural enterprises through provision of microcredit services has the potential to increase the income and food sufficiency rural homes in Kenya (Olwande, 2012). Several approaches on increasing farmers' access to credit have been proposed; one form is through farmers organizations, such as farmer groups, cooperatives, common interest groups and merry go rounds (Olwande, 2012). Small-holder farmers at times rely on group credit offered by Micro-Finance Institutions (MFIs). The groups offer social collateral on behalf of individual members who in the long run get to credit, which they would not have gotten to on the off chance that they worked independently (Owuor and Shem, 2012). The MFI programme can increase maize productivity and effectively make the country self-reliant in maize production with the surplus produce exported. Therefore, the study hopes to investigate the impact of group microfinance on small holder maize farmers' productivity in Kahuro Sub-County in Murang'a County, Kenya. The research brings out unfulfilled potential for integrating microcredit organizations into the rural financial frameworks.

1.2 Statement of the Problem

Maize is an important staple food in Kenya and provide food security availability of raw materials in many households .There is a chromic deficit in the supply of maize in Kenya which can be filled through increasing farm productivity (ROK 2014) .Muranga is among the producer of maize whose potential has not been exploited. The low productivity is causing household food insecurity, raw materials and poverty. According to the 2011 Economic Review of Agriculture (Ministry of Agriculture) data, the national average yield of maize was nearly 16 bags/ha. Murang'a County yielded <10 bags /ha. against a potential of 30bags /Ha .It is this potential that this project want to exploit.

Microfinance services has the potential to reduce vulnerability, improve the income and food security of rural households in Kenya (Olwande2012, IFAD 2009). Despite the Kenya government promoting MFI there is limited participation of maize farmers in the commercial credit market (FAO. 2013). Maize farmers have challenges of accessing loans from formal credit institutions. To fill this gap small and resource poor farmers have developed local innovative initiative credit access strategies that peg lending to memberships in social networks such as groups Owuor and Shem (2012), The group credit lending model is popular among the farmers and has been operating for the last ten years.

A good number of farmers have engaged micro credit to boost maize production but the difference in productivity between beneficiaries and non-beneficiaries have not been evaluated. With this in mind, this study seeks to assess access to credit and the impact of emerging and innovative rural finance model on smallholder maize productivity in Murang'a County so as to appraise its contribution to improving the production and productivity of small-scale farmers.

1.3 Objective of the Study

To assess the impact of group microcredit lending on maize productivity among the small holder farmers in, Murang'a County, Kenya

2.0 Literature Review

2.1. Theoretical Review

Impact evaluation is an approach to approve the theories that helped with planning the program and to affirm regardless of whether the impression of recipients and the truth are adjusted. Assessment ascertains affect through basically taking the distinction between the circumstance of the recipients prior and then afterward the program and the channels through which it rises. Knowing this data is significant for enhancing the program's outline, for its possible adjustment to various groups, and for the distinguishing proof of best practices being developed (Copestake et al., 2001)

The real effect of a program relies on upon its potential, obviously, however it is likewise inseparably connected to its usage conditions. A program may not achieve its maximum capacity affect because of blemishes in the usage procedure. Along these lines, knowing the potential effect of a program is not a purpose behind not assessing it. An effect assessment is as yet important to comprehend the genuine effect on recipients and helpful to illuminate policymakers about the need to enhance the procedure of execution. Needy individuals' lives can be enhanced if the advancement group gained all the more efficiently from its endeavors – specifically, if more thorough effect assessments of what works being developed were done, if their outcomes were made generally accessible and comprehended and if policymakers and program chiefs utilized that proof to enhance policy and practice.

2.2 Empirical Review

2.2.1 Propensity Score Matching Technique

The propensity score as per Rosenbaum and Rubin (1983) is the restrictive likelihood of accepting a treatment given pre-treatment noticeable qualities. It is a factual coordinating procedure that endeavors to gauge the impact of a treatment, arrangement, or other intercession by representing the covariates that anticipate accepting the treatment. PSM endeavors to decrease the inclination because of perplexing factors that could be found in a gauge of the treatment impact gotten from basically contrasting results among units that got

the treatment versus those that did not. PSM utilizes an anticipated likelihood of gathering enrollment e.g., treatment versus control gathering—in light of watched indicators, typically Matching by affinity scores disposes of the linearity suspicion. Relapse can extrapolate utilizing the linearity presumption, however coordinating can't. The various presumptions are basically the same amongst relapse and coordinating. The advantage of coordinating over relapse is that it is non-parametric (aside from you do need to accept that you have the correct inclination score, if that is how you are getting along your coordinating). Penchant scores are best comprehended as an information decrease strategy. They are a powerful intends to lessen many covariates into a solitary score that can be utilized to change an impact of enthusiasm for an arrangement of factors.

Propensity scores are an option technique to gauge the impact of getting treatment when arbitrary task of medicines to subjects is not achievable. Affinity score coordinating (PSM) alludes to the blending of treatment and control units with comparable esteems on the inclination score, and conceivably different covariates, and the disposing of every unmatched unit (Rubin, 2001). It is essentially used to look at two gatherings of subjects yet can be connected to examinations of more than two gatherings.

2.3 Conceptual Framework

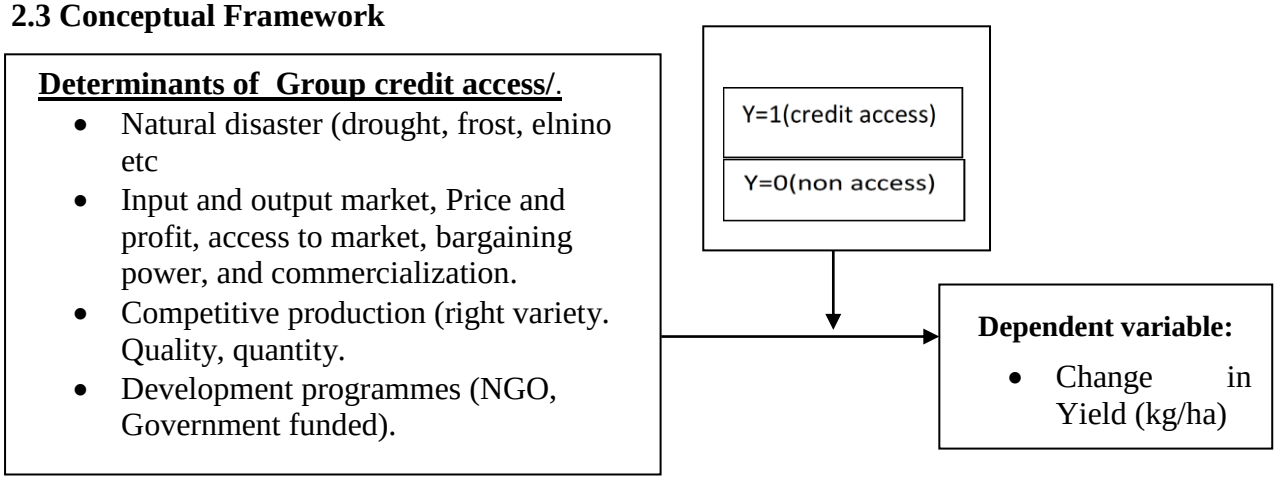

Figure 1: Conceptual framework

2.4 Empirical Evidence on the Impact of Microfinance.

Empirical analysis on the statistical impact of microfinance began in the 1990s. The results of these studies are highly provocative and sometimes they are in contradiction. There are mainly two schools of thought. The first school questions the importance of microfinance as a policy in reducing poverty (Nathan, Banga & Mukungu, 2004).contended that "debt is not a powerful instrument for helping most low income individuals to upgrade their lives be they owners of small farms or or small scale business people". There are other more vital requirements that face little rural family units other than back. These compels incorporate item costs, arrive residency, innovation, advertise get to furthermore, chance. Likewise in support of a similar view, Gulli (1998) contends that credit is not generally the fundamental limitation for miniaturized scale undertakings' development and advancement, and that destitute individuals request an extensive variety of money related, business improvement and social administrations for various business and family unit purposes. Different reviews have revealed blended outcomes proposing the likelihood of both positive and negative

effects for various families. Coleman (2006) found that microfinance programs positively affect the wealthier family units however the effect is inconsequential to the next poorer families. Kiriti, (2005) found that microfinance tend to indebt excessively poor women abandoning them more defenseless and uncovered. Aghion and Morduch 2005, watch that microfinance can have a genuine effect in the lives of those served, yet microfinance is neither a panacea nor an enchantment projectile against destitution, and it can not be relied upon to work all over the place and for everybody. More research ought to in this manner be coordinated towards particular outcomes as well as the setting inside which specific outcomes are normal. The outcomes gotten in a given socio social and financial setting may not really hold if the socio social and monetary conditions were fluctuated.

3.0 Research Methodology

The area under study was Murang'a County. Survey research design was used in this study. The target population for this study was 17,880 small scale maize farmers. A sample size of 202 small scale maize farmers was calculated using Cochran formula (1963). The study employed both primary and secondary data. Questionnaires were sorted to check for completeness and consistency of data, then the data was keyed in an excel spreadsheet. Thereafter, responses were coded for analysis using STATA 12. Descriptive statistics employed were means, standard deviations and frequencies/percentages. The t-test was used to test the correlation between variables, while Analysis of Variance (ANOVA) was used to test the goodness of fit. Regression analysis established the relationships between study variables. Influence of micro-credit on maize production, economic status and living standard of the borrowers was described using graphs and frequency tables. Chi square test was used to bring out the association among the variables. The impact of MFI was estimated using General Propensity Score (GPS) for farmers who have access to credit through a group by applying a Logistic model using observable variables. The estimate of propensity score captures similarities so as to match each beneficiary with his/ her closest non-beneficiary (nearness to neighbor). Several tests were performed to select a preferred estimator that yielded statistically identical covariate means for both groups (Moreno-Serra, 2009).

3.1 Econometric Specification

The impact of group microcredit lending on maize productivity among the small holder farmers was assessed utilizing PSM (propensity score matching) where the observed approximated treatment impacts were contrasted with counterfactual of no treatment. PSM was utilized as an effect estimator to get fair-minded assessments of normal treatment impacts. This was done first by building up the estimators for logit regression utilized as a part of evaluating propensity scores. Nine factors representing the economic and farm features were used in coordinating. They included land measure, area, sexual orientation, age, work, years of experience, number of farms owned, accessibility of water system and land proprietorship. The decision of PSM as an effect estimator was educated by its reliability and comparability with trial affect estimators particularly when comparative survey instruments are utilized.

The average causal impact of group microcredit lending was therefore measured by average treatment effect as follows:

$$\propto = E[Y_1^i - Y_0^i] \qquad \text{……………………………………………………………(1)}$$

and also by average treatment effect of the treated

$$\propto_T = E[Y_1^i - Y_0^i / D = 1] \quad \text{.....(2)}$$

where D indicates whether the small holder maize farmer is accessing credit (D = 1) or not using access credit (D = 0). The symbol measures the impact of access to credit system to the whole population in this case referred to as the treatment while $\propto$ represents the impact for the sub population.

GPS was adopted since lack of random assignment may signify that groups with different levels of the treatment variable can systematically differ in important ways other than the observed treatment. Since these differences may exhibit complex correlations with the outcome variable, the causal effect of the treatment may be difficult to ascertain. Rosenbaum and Rubin (2010) developed the propensity score method for binary treatments, while Imbens (2010) extended their work to multiple treatments. Techniques based on the propensity score have long been used for causal inference in observational studies to reduce bias caused by non-random treatment assignment. (2004).

This allows to estimate the marginal treatment effect of MFI contribution level on farm yield, comparing the outcome of units that have received a specific level of treatments and units that have received a different one (counterfactual units). Ideally, GPS tries to reduce the endogeneity bias (self-selectivity, methodology error, non-random data) caused by difficult variables that could be realized in an estimate of the treatment effect obtained from simply comparing outcomes among units that basically receive the treatments versus those that never received it. The dependent variable (yield in kgs/ per acre) was measured as the log of change in yield per acre. The level of relationship between the three dependent variables of the model was first ascertained by use of correlation analysis.

3.2 Sensitivity Analysis

Since PSM approach cannot fully control for unobservable characteristics (Ichino *et al*., 2006), presentation of matching estimates were accompanied by sensitivity analysis. In this study, sensitivity analysis was used to estimate treatment effects to selection on unobservable variables using the bounding approach (Rosenbaum (2002). The ‘mhbounds’ procedure by Becker and Caliendo (2007) in STATA program was utilized to aid in the construction of Rosenbaum bounds for the sensitivity testing.

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4.0 Results and Discussion

4.1 Effect of Microcredit Participation on Maize Production

The results reveal that MFI membership and maize yield had a positive and significant relationship *(Exp(B)*= 2.48, *P*=0.000). Thus, the odds of being a member of MFI increased maize yield 2.5 times more as compared to those who were not members. In addition, the results reveal that the frequency of meetings had a positive and significant effect on the credit borrowed *(Exp(B)*= 2.70, *P*=0.000). The odds for credit access to those who had attended meetings frequently was 2.7 times higher than the rest. The overall model was significant (p=0.000) as shown in Table 3.

Table 3: Group Microcredit Lending and its Effects on Maize Production

Average yield of maize (1st reference category=Credit access	**Coef.**	**Std error**	**Z**	**P>|z|**
Credit lend group	-0.58	0.57	-1.01	0.31
Membership years	0.04	0.03	1.23	0.22
Credit borrowed	0.00	0.00	1.74	0.08
Membership MFI	2.48	0.68	3.63	0.00
Group meeting frequency	2.62	0.54	4.83	0.00
Constant	-8.60	1.66	-5.19	0.00
No. of observations	200			
LR chi(6)	85.00			
Prob>chi2	0.00			
Pseudo R2	0.40			
log likelihood	-62.88			

4.2 Impacts of Group Microcredit Lending on Maize Productivity Using Propensity Score Matching

Propensity score matching on the average impact of group credit on maize productivity demonstrated the influence of both farm and group characteristics (Table 4).

Table 4: Impacts of Group Microcredit Lending on Maize Productivity

Credit access (Yes, No)	Coef.	Std dev	*z*	*P*>|*z*|
Position household	-0.23	0.27	-0.83	0.41
Religion	0.40	0.47	0.85	0.4
Age	0.59	0.44	1.36	0.17
Education	-0.58	0.53	-1.10	0.27
Land size	0.49	0.181	2.710	0.01
Land	-0.59	0.33	-1.81	0.07
Land owned	0.16	0.35	0.46	0.65
Labour intensive	-1.06	0.92	-1.15	0.25
Source extra labor	-0.05	0.39	-0.13	0.89
Land maize	1.4	0.51	2.75	0.01
Extension visit	-1.34	1.21	-1.11	0.27
Credit lend group	1.94	1.61	1.21	0.23
Membership years	0.49	0.19	2.64	0.01
Interest on loan	0.79	0.19	4.17	0.00
Membership MFI	-0.43	0.73	-0.59	0.56
Group meeting frequency	0.76	0.68	1.12	0.27
constant	-5.32	3.70	-1.44	0.15
No. of observations	200			
LR chi(16)	171.82			
Prob>chi2	0.00			
Pseudo R2	0.72			
log likelihood	-33.61			

The estimated mean propensity score was 0.72 (with a standard deviation of 0.39) implying that the average probability of accessing group credit was 71.5% (Table 5).

Table 5: Mean Propensity Score

Variable	Obs	Mean	Std.dev	Min	Max
p-score	200	0.72	0.39	0.00	1

4.3 Matching with Replacement

In this method, we match on observed characteristics that distinguish treatment and control groups in order to make the groups more similar. Matching ensure that any differences between the treatment and the control groups are not a result of differences on the matching variables. Table 6 shows the results on matching with replacement performed. This was done to minimize the propensity-score distance between the matched comparison units and the

treatment unit, with each treatment unit being matched to the nearest comparison unit, even if a comparison unit was matched more than once.

Table 6: Matching with replacement

Credit access (Yes, No)	Coef.	Std.dev	z	P>|z|
Position household	-0.13	0.15	-0.83	0.41
religion	0.16	0.27	0.59	0.56
age	0.38	0.23	1.64	0.10
education	-0.29	0.28	-1.04	0.30
Land size	0.29	0.09	3.19	0.001
land	-0.35	0.18	-1.93	0.05
Land owned	0.11	0.20	0.55	0.58
Labour intensive	-0.54	0.49	-1.11	0.29
Source extra labor	-0.01	0.21	0.00	1.00
Land maize	0.78	0.26	2.93	0.003
Extension visit	-0.67	0.61	-1.11	0.269
Credit lend group	0.98	0.86	1.15	0.251
Membership years	0.28	0.10	2.88	0.004
Interest on loan	0.40	0.08	4.93	0.00
Membership MFI	-0.24	0.42	-0.58	0.56
Group meeting frequency	0.45	0.32	1.42	0.16
constant	-3.30	2.01	-1.65	0.10
No. of observations	200			
LR chi(16)	171.33			
Prob>chi2	0.00			
Pseudo R2	0.72			
log likelihood	-33.86			

4.4 Difference between Impact

Table 7 presents estimates for the difference among average impact of access to group credit. Overall, matching estimates show that access to group credit had a positive and robust effect on maize yield. The findings indicate that access to group credit improved maize yield by 837.8 kilograms. This means that individuals who had accessed group credit increased their maize yield by almost 30.9%. This suggests that the access to group credit had a causal influence on maize yield when individuals are matched according to relevant farm and group characteristics.

Table 7: Impact Assessment by Evaluating the Differences

Variable	Sample	Credit accessed	Non-credit access	Difference	S.E	t-stat
Average yield maize	Unmatched	837.79	143.29	694.50	180.06	3.86
	ATT	837.79	157.20	680.59	130.15	5.23
Average yield maize	Unmatched	0.31	0.00	0.31	0.06	5.01
	ATT	0.31	0.00	0.31	0.04	7.94
Psmatch2:Common support		143	57			

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4.5 Sensitivity Analysis as a Measure of Impact

Mantel-Haenszel ($_{MH}$) bounds results showed that under the assumption of no hidden bias, when Gamma = 1, the Q_{mh} test statistic were highly significant to treatment effect, in this case, access to group credit on the maize yield. The two bounds in the Mantel-Haenszel output table can be interpreted as follows: the Q_{MH+} statistic adjusts the MH statistic downward for positive (unobserved) selection. In our case, positive selection bias occurs when those most likely to access group credit tend to get more maize yield even without *a*ccess to group credit, given that they had similar vector of covariates as the individuals in the control group. This effect led to an upward bias in the estimated treatment effect. The effect is insignificant under = 1. The Q_{MH+} reveals that the study was insensitive to hidden bias at 5% significance level. The sensitivity analysis thus indicates that the observed results on the impact of group credit access on maize yield were insensitive to selection on unobservable or hidden bias (Table 8).

Table 8: Sensitivity Analysis

Gamma	Q_mh+	Q_mh-	p_mh+	p_mh-
1	.	.	.	.
1.05	-0.16	-0.16	0.56	0.56
1.1	-0.16	-0.16	0.56	0.56
1.15	-0.16	-0.16	0.56	0.56
1.2	-0.16	-0.16	0.56	0.56
1.25	-0.16	-0.16	0.56	0.56
1.3	.	-0.16	.	0.56
1.35	-0.16	-0.16	0.56	0.56
1.4	-0.16	-0.16	0.56	0.56
1.45	-0.16	-0.16	0.56	0.56
1.5	-0.16	-0.16	0.56	0.56

5.0 Conclusions

The study concluded also that the number of years a farmer is a member of a group had a positive relationship with maize yield while distance to market input had a negative effect on maize yield. Despite their mixed performance, credit lending groups had the potential to `provide credit to small-scale farmers. Despite the size of financial intermediaries, they still functioned as viable institutions. With this, microcredit played an important role with regards to agricultural development. From the study on MFIs, for effective poverty reduction, credit access to promote the productive use of farm inputs is necessary. Group microcredit had positive impact on the agricultural development but gaps for improvement existed in this program. The research brings out unfulfilled potential for integrating microcredit institutions into the mainstream rural financial systems. In addition, commercial banks are yet to exploit their full potential with regards to credit provision to high-potential small-scale resource constrained farmers.

Micro Finance Institution loans were used for agricultural production, trading, processing and transport. This brings out increased use of agricultural inputs and increased output of agricultural production. With this, the community was empowered since demand of post-harvest services increased and the prices of food reduced as a result of increased supply.

Trading activities financed by MFIs can help to establish new marketing links and increase the income of traders, and this can potentially reduce rural-urban migration due to increased employment opportunities and increased income.

Based on the propensity matching score, the study concludes that access to group credit improved maize yield. This suggests that the access to group credit has a causal influence on maize yield when individuals are matched according to relevant farm and group characteristics. The sensitivity analysis indicated that the observed results on the impact of group access to credit for maize production are insensitive to selection on unobservable or hidden bias.

6.0 Recommendations

Successful group credit models are available from Murang'a County and different organizations that have used them. Examples of credit models in the county include Ndikwe Self-Help Group, Kiyagi Cereal Self-Help Group, Ngwethe Self-Help groups and Mugaciku Self-Help groups (NAAIAP and NALEP programme). While looking for and testing new models, the existing ones should be scaled up and best practices from them publicized and scaled-up.

Government should promote infrastructure to enable the private sector such as banks to penetrate the rural areas. Rural finance in most cases have addressed the issue of credit but lack innovative measures. Provision of credit in form of input or vouchers can reduce diversion and increase repayment ability. Rural finance policy should be comprehensive and involve the whole value chain actors. The findings show that households using microcredit in combination with micro-insurance derive significant gains in terms of welfare improvement. Microcredit may be good but its benefit to the poor is enhanced and sustained if the poverty trapping risks are covered with micro-insurance. To this extent, combining microcredit with micro-insurance will empower the poor to make a sustainable exit from poverty.

To promote group credit lending, the government should launch a campaign to educate members as well as managers. The active involvement of members is required to build institutions at the local level and to promote members' economic self-sufficiency. Farmers need to be trained on marketing management.

Members' savings and capital contributions are an important element in successful credit cooperatives. Credit cooperatives that rely much on share capital and members' savings deposits to finance their loans usually achieve higher repayment rates because members realize that their own funds are at stake.

The group needs to create more innovations, democratize and be flexible in operations and more entrepreneurship skills. More training in leadership, financial management and entrepreneurship skills are needed. Provide group with non-financial services and, in particular, capacity building in finance, agriculture, agri-business and entrepreneurship.

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Map of Kenya Showing the Study Area