UNIVERSITY OF CAPE COAST

INCOME AND NON-INCOME OUTCOMES OF MICROFINANCE

BY

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original work and that no part of it has been presented for another degree in this University or elsewhere

Candidate's Name: James Atta Peprah

Signature..... Date..16-04-14

Supervisors' Declaration

We hereby declare that the preparation and presentation of this thesis were supervised in accordance with the guidelines on supervision of thesis as laid down by the University of Cape Coast.

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ABSTRACT

The study assessed the impact of microfinance specifically micro-credit on beneficiaries and non-beneficiaries of Yaalex Microfinance Limited in selected communities of Takoradi Metropolis and Mfantsiman Municipality of Ghana. Focusing on microfinance outcomes such child education, child health, business profitability and ease of credit access the study tests the hypotheses that access to credit has increasing effect on the latter variables.

Probit and IV-probit, propensity scores matching (PSM) and treatment effect were used to examine the causal effect on beneficiaries and non-beneficiaries using data from the two study areas. The method of study was based on quazi-experimental approach and attempt was made to minimize the potential problems that would arise from contamination, spill-over and self programme self-exclusion selection biases.

The results show that access to micro-credit eases the financial constraint among business operators in the informal sector. However, given women education can ease credit constraints in the informal sector and gender differences constraint access to credit. Again, access to micro-credit impacts positively on child education and health. Finally, in terms of business profitability, micro-credit clients do better than non-clients especially those in trading activities. As a recommendation, women need to be given more education to be at par with their men counterparts. MFIs should intensify the credit with education concept as part of their products. Educational and health loan products need to be introduced by MFIs. Finally, MFIs should target market niche such as trading that produces revenue quickly.

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DEDICATION

To my children Bonsu, Konadu, Obed, Emmanuel and Christmas.

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CHAPTER ONE

INTRODUCTION

Background to the study

In Africa, controlled studies (Barnes, et al., 1998) suggest that participation in microfinance is associated with increase in household investment (small enterprises) and children's education and health. The situation in Ghana is not clear thus one is skeptical about the pathways through which microfinance can improve access to education and children educational performance in the short-term. With regards to children's education, women seem to be much more concerned than men in less developed countries. There is therefore the need to allocate more resources to more women who engage in micro businesses than men. This is not to say that men do not care about children education.

The fifth round of the Ghana Living Standard Survey (GLSS) indicates that women constitute 72% of the population in non-farm activities including manufacturing, trading, and craftsmanship. According to the report 49.2% of women are currently engaged in private informal non-farm activities as compared to 42.3% of men. Again 14.5% of women are engaged in crafts and trading activities as compared with 12.2% of men (GSS, 2008). The GLSS 5 shows that as men contribute 54.9% towards economic activities, women also contribute 53.5%, close to that of men. The implication is that women's contribution towards economic activities is very significant and cannot be under-rated.

In Ghana, various governments have recognised the implications of pervasive poverty for socio-economic and human resource development and have launched different programmes over the years to address the situation (Government of Ghana, 2003). First, the 10-year Development Plan of Guggisburg from 1920-1930, was meant to develop the infrastructure of the country. In 1951, the government launched the 10-year Accelerated Development Plan with the view to fast-tracking the socio-economic development of the country. Others that followed were the 7-year Development Plan (1961-1968) and the Five-year Development Plan (1975-1980). The Poverty Reduction Strategy launched by the Government of Ghana (GoG) in 2003 dubbed: "Agenda for Growth and Prosperity" was meant to tackle poverty reduction.

The Growth and Poverty Reduction Strategy (GPRS) represented comprehensive policies, strategies, programmes, and projects to support growth and poverty reduction over the period 2003-2009. It was informed by the conviction of the then government that the economy of Ghana needed to be managed effectively to enable wealth creation for the benefit of all Ghanaians. The GoG had the aim of assisting the populace to create wealth by transforming the nature of the economy to achieve growth, accelerated poverty reduction and the protection of the vulnerable and excluded within a decentralized environment (Government of Ghana, 2003).

The final phase of the GPRS was implemented in 2009. In 2010 the Government of Ghana announced a new programme dubbed 'Growth and Stability' in the 2010 Budget Statement and Economic Policy. This new

development agenda captioned "Growth and Stability" identifies a comprehensive set of policies to support Government's Medium Term Growth Strategy (MTGS) in a manner that will be sustainable. It also has the objective of focusing on a progressive program of development through job creation intended to improve the quality of life of the citizenry.

Comparatively, the position of Ghana declined in terms of Human Development Index (HDI) within the period due to an increase in the number of countries covered within the last decade. The information reflected the general trend of low well-being in the country. As with a number of African countries in the 1980s and early 1990s, Ghana has become an aid-dependent country with an average budget reliance rate of about 40% every year being donor-funded (Awusabo-Asare, Annim, Abane & Asare-Minta, 2009). This has been primarily due to the decline in income from primary commodities which form the bulk of the country's export. Over the past decades there had also been less investment in human capital (especially in children's education) compared to other countries at the same level of socio-economic development. In general, about 32% of the adult population have never been to school whilst some 25% of others had been to school but failed to obtain any certificate (World Bank, 2000). The problem could probably be associated with lack of finance at the household level to finance child education. The free compulsory universal basic education (FCUBE) is not free as is often thought to be. Parents have to provide for books, school uniform, and other incidentals which could be quite substantial in comparative terms. The FCUBE programme is operational in the northern sector of Ghana (northern

region, upper west region and upper east region), leaving the greater part of southern Ghana. However, the difference in poverty levels in some parts of southern Ghana for example is insignificant as compared to the northern sector (Ewusi, 1984).

Indeed impressive gains have been made in conditions of developing nations over the past three decades. According to the World Bank (2000) report, the progress made thus far demonstrates the possibility of eradicating poverty in the future. Development economists have argued that one way of reducing poverty could be improving the financial markets and systems in developing countries. This is because access to finance is a key to economic growth and development. Unfortunately, the poor in less developed countries lack access to financial services and resources which can be used to leapfrog from the canker of poverty. A new development rethinking thus sees the provision of (micro-credit) small loans and (micro-savings) small savings opportunities as new development paradigm. It is thus believed that microfinance could be one of the surest ways of reducing poverty among those in the third world nations and even the poor in rich countries since microfinance provides access to finance to those lacking financial services.

The root of microfinance can be found in many places but the best-known story is that of Muhammed Yunus and the founding of the Grameen Bank in Bangladesh. In the mid seventies, Bangladesh was starting down the long road to rebuild a new nation as a result of independence from Pakistan and a dreadful impact of drought which caused famine, killing thousands of people (Sen, 1981).

A survey conducted by the Bangladesh government found more than 80% of the population living below the poverty line (Bureau of Government Statistics, 1992). Muhammed Yunus, the Economics professor experimented by lending small sums of money to poor women without collateral and found that these women could repay back without any default and thus make profits as well. With support and approval from the Bangladesh government and the Central Bank authorities, several branches of the Grameen Bank were opened to serve the poor women. It is then that microfinance became popular within the framework of the popular Grameen model.

The concept of microfinance has been defined in different ways by different authors. Gonzalez-Vega (1998) defines microfinance as the provision of financial services to low-income clients, including consumers and the self-employed, who traditionally lack access to banking and related services. Microfinance is a place for the poor and near poor clients to get access to a high quality financial service, which include not just credit but also savings, insurance and fund transfer. According to Ledgerwood (1999), microfinance is a provision of a broad range of financial services such as savings, credit, insurance and payment services to the poor or low-income group who are excluded from the traditional banking sectors. Moreover, Conroy (2002) stated that microfinance is the provision of a broad range of financial services such as deposits, loans, payment services, money transfers, and insurance to poor and low-income households and their micro-enterprises (MEs).

The term microfinance evolved from the concepts of "micro-credit" and "micro-enterprise" financing, to include the importance of savings as well as borrowing. Although the terms are used interchangeably, microfinance represents the field as a whole, while the other two terms are more technical and refer only to provision of small credit (Maria, 2004). Microcredit is also used as the extension of very small loans to those who are in poverty that designed to spur entrepreneurship and help them out from the poverty syndrome. These individuals lack collateral, steady employment and verifiable credit history, which therefore, cannot even meet the most minimal qualifications to gain access to credit from the traditional banking system. The financing gap is thus being resorted to from the evolution of microfinance services.

The above definitions are silent on the training for recipients of micro-credit which is a complement of microfinance. For credit to be properly managed at the micro level, clients need some form of education which will empower them to make good use of the financial resources. Thus, microfinance is not just banking for the poor but it is also empowerment and development tool. The poverty-lending approach claims that the overall impact of microfinance should be poverty reduction and empowerment (Gulli, 1998). According to Yunus (2001):

> *"if we are looking for one single action that will enable the poor to overcome their poverty, it will be making credit accessible and available."*

The above statement by Yunus indicates that access to finance is key to reducing poverty among those who have limited access to finance. Thus, access to finance ensures that entrepreneurs expand their businesses and create wealth out of

it. In this direction, microfinance programmes focus on expanding local economic activities and improve the standard of living of their clients by providing financial services needed to establish small businesses. While the primary goal of most microfinance institutions (MFIs) is improving the economic status of the poorer segments of the population, most service providers aim for a broader impact of enhanced well-being. Because households function as social and economic units, microenterprise programs have a unique opportunity to impact the economic, social, and general well-being of households. In this regard, microfinance is typically viewed as an economic development strategy, and it is a particularly relevant approach in countries where disadvantaged groups tend not to benefit from involvement in the formal financial markets (Ledgerwood, 2000).

In most developing nations, the majority subsist on income from microenterprise activities. The microenterprise sector is estimated to account for about 20 to 70% of all employment in many developing countries, illustrating the importance of the informal economy in the subsistence of impoverished population throughout the world (Wilson, 2001; Waters, Kombe & Hong, 2001). Due to the fact that these microenterprises do not have access to formal financial institutions, microfinance is a logical approach to development because it functions at the grassroot level, can be sustainable, is capable of involving large segments of the population, and builds both human and productive capacity for households and their dependents.

Even the informal financial sector which is expected to address these issues seems to pose some level of financial risks in terms of high interest rates and

transaction costs. Given the fact that males have greater access to formal financial services than females (GSS, 2008; Riksdagen, 2010), the study will thus focus on women who have limited access to formal financial services and rely mostly on informal credit basically microfinance.

The eradication of poverty continues to be a central political issue in most developing countries. Despite serious efforts by local governments as well as bilateral and multilateral donor countries over the past few decades, many people still suffer from poverty. According to estimates by the World Bank, more than 1.2 billion people were classified as extreme poor in 1998, living on less than 1.5 dollar a day (World Bank, 2000). To combat pervasive poverty, the United Nations declared as the first of its Millennium Development Goals (MDGs) to halve the proportion of people who suffer from extreme poverty by 2015 compared with the 1990 level, and called for unprecedented commitment from nations worldwide (World Bank, 2000).

It is widely recognized that limited access to financial services is one of the major bottlenecks preventing poor households from improving their livelihoods. The under-development of the financial markets is felt especially keenly by the rural poor who live in low-density population areas and in riskier environments subject to greater seasonal income fluctuations, and who generally demand smaller-sized loans and have smaller savings accounts, all of which lead to high transaction costs shouldered by financial institutions. Moreover, imperfect information significantly increases default risks caused by adverse selection, moral hazard, and strategic default (Stiglitz, 1990; Ghatak, 1999), which make formal

banks reluctant to offer services to the poor who cannot supply sufficient collateral to secure their loans. As a consequence, poor households tend to be excluded from formal financial services-not only borrowing but also savings and insurance-which in turn prevents the poor from investing in various profitable projects, smoothing consumption, and improving their ability to cope with various unexpected shocks (Okten & Osili, 2004; Conning & Udry, 2007).

In the absence of sufficient collateral to pledge, the poor generally have to rely on loans from informal moneylenders at high interest rates or from friends and families, whose supply of funds is generally limited (Weiss & Montgomery, 2005; Conning & Udry, 2007). In order to supply cheaper credit, many developing countries intensively implemented large-scale subsidized credit programmes between the 1950s and 1970s. These programmes were originally intended to target rural farmers with the hope that subsidized credit at below-market interest rates would not only increase their income but would also promote investment in agricultural modernization, such as in the diffusion of fertilizer and high-yield crop varieties, thereby increasing food production and subsequently stimulating overall economic growth (Yaron & Benjamin, 2002). Nevertheless, a growing body of evidence suggests that the subsidized credit programs were unsuccessful in that they induced local political elites to take advantage of below-market interest rates, leading to their rent-seeking activities, insufficient outreach to the rural poor farmers, very low loan repayment rates, and inefficiency in financial markets with excess demand (Adams, Graham, & von Pischke, 1984; Robinson, 2001; Zeller & Meyer, 2002).

As an alternative, microfinance has recently attracted growing attention as a means of overcoming such a situation (Morduch, 1999). Most microfinance institutions (MFIs) provide collateral free and small loans to low-income households, who have long been deemed to be unbankable. These loans are generally expected to be used for self-employment and income-generating activities.

Even though many MFIs rely on financial support from the state and donors to expand their outreach, in response to the widespread failure of government programs in the past, financial self-sufficiency has also been of major concern, and appropriate pricing of loans is viewed as crucial for sustainability (Zeller & Meyer, 2002). Thus, interest rate is generally set at the market level to cover operational costs and most microfinance programmes across the world have extremely high repayment rates at around 90% to 98%. While the provision of credit is by far the most important product of financial services, much progress has also been made by many MFIs offering a range of savings and insurance products, which has great potential for alleviating poverty and reducing vulnerability (Nourse, 2001; Robinson, 2001; Churchill, 2002; Zeller & Meyer, 2002; Armendariz de Aghion & Morduch, 2005). With enthusiasm for their ability to improve the welfare of the poor, the number of MFIs has rapidly grown globally, from 618 to 3,133 between 1997 and 2005, and correspondingly, the number of clients who benefitted from microfinance increased from 13.5 million to more than 113.3 million over the same period (Daley-Harris, 2006).

Given this growth in the microfinance industry, the United Nations declared 2005 to as the "International Year of Microcredit" and attempted to link the microfinance with the achievement of the MDGs. Furthermore, a leading MFI, the Grameen Bank, and its founder, Professor Mohammed Yunus, received the Nobel Peace Prize in 2006 for their efforts to create economic and social development from below. In this way, microfinance is increasingly gaining popularity as an effective tool for poverty reduction, and its evolutionary process is often termed the "microfinance revolution." Yet, microfinance is not without controversy.

There is also a growing concern that MFIs, often operated by non-governmental organizations, should put more effort into becoming regulated for-profit financial institutions that work to enhance financial sustainability instead of primarily pursuing services to the poor. This kind of commercialization of microfinance has gained momentum since the 1990s (Drake & Rhyne, 2002; Cull, Demirguc-Kunt & Morduch, 2007). There still exist some concerns that MFIs might shift away from serving poorer clients in pursuit of commercial viability, which is called "mission drift".

The genesis of microfinance and microfinance debate

The roots of microfinance can be found in many places, but the best known story is that of Muhammad Yunus and the founder of Bangladesh's Grameen Bank. In the middle of the 1970s, Bangladesh was starting down the long road to build a new nation. The challenges were great: Independence from Pakistan had

been won in December 1971 after a fierce war, and two years later widespread flooding brought on a famine that killed tens of thousands as documented by (Sen, 1981). Government surveys found over 80 percent of the population living in poverty in 1973–1974 (Bangladesh Bureau of Statistics, 1992). In 1976, Yunus started a series of experiments lending to poor households in the nearby village of Jobra. Even the little money he could lend from his own pocket was enough for villagers to run simple business activities like rice husking and bamboo weaving. Yunus found that borrowers were not only profiting greatly by access to the loans but that they were also repaying reliably, even though the villagers could offer no collateral.

Realizing that he could only go so far with his own resources, in 1976 Yunus convinced the Bangladesh Bank, the central bank of Bangladesh, to help him set up a special branch that catered for the poor of Jobra. That soon spawned another trial project, this time in Tangail in North-Central Bangladesh. Assured that the successes were not flukes or region-specific, Grameen went nation-wide. One innovation that allowed Grameen to grow explosively was group lending; a mechanism that essentially allows the poor borrowers to act as guarantors for each other. With group lending in place, the bank could quickly grow village by village as funding permitted. And funding-supplied in the early years by the International Fund for Agriculture and Development (IFAD), the Ford Foundation, and the governments of Bangladesh, Sweden, Norway, and the Netherlands-permitted rapid growth indeed. The bank grew by 40 percent per year at its peak. By 1991 the Grameen bank had over one million members in Bangladesh, and by 2002 the

number had swollen to 2.4 million. Today microfinance programmes are all over the world with several approaches of delivery as well as a replication of the Grameen Bank.

The 1990s was characterized by a major debate between two leading views on how to fill the absurd gap in microfinance. These are the *financial systems approach* and the *poverty lending approach.* Both approaches share the goal of making financial services available to the poor throughout the world but the poverty lending approach focuses on reducing poverty and empowering the vulnerable through credit and other financial services provided by institutions that are funded by donor and government subsidies and other concessionary funds. Government and donor funds dilute the market by charging an interest rate far below the competitive market rates thus making microfinance less sustainable. Again, government funds could not reach the poor as expected and those funds dried up quickly. Since the primary goal of microfinance is to reach the poor and especially the poorest of the poor with micro-credit, private supply of microfinance became more relevant in terms of outreach and sustainability because private institutions charge high market interest rates that are not in the reach of the masses.

Except for mandatory savings required as a condition for receiving a loan, savings is not normally a significant part of the poverty lending approach to microfinance (Adjei, 2010; World Bank, 2000). The poverty-lending approach of microfinance is more likened to the supply-lending approach of microfinance where funds are only made available to clients without making an assessment of

whether the clients need those funds or otherwise. The poverty-lending approach does not emphasize on collateralized loans but rather as has been alluded to earlier, relies on members own savings. In most cases the poverty-lending approach uses government and donor funds to target clients. This is to emphasize that microfinance is not only about credit but also loans and that savings must always precede credit.

In contrast to the poverty lending approach, the financial systems approach focuses on commercialization of microfinance intermediation among the poor borrowers and savers. The approach emphasizes on institutional self-sufficiency. An interesting dimension of the financial systems approach is the emphasis on commercialization with the element of charging market interest rates. This approach to microfinance can be likened to the demand-lending system where financial products are delivered based on clients' needs. For example the Bank Rakyat Indonesia's (BRI) micro-banking system and Bolivia's Banco Solidario (BancoSol) are two leading examples of profitable microfinance institutions that focus on the latter approach. The records of these institutions show that commercial MFIs can attain nationwide outreach among the economically active poor, providing microfinance extensively and profitably (Adjei, 2010; Robinson, 2001).

The two schools of thought bring to the scene the double bottom-line objective of microfinance: outreach and sustainability. In recent times however, another wave rising in the industry is the issue of environmental sustainability. This adds to the overall objectives of microfinance to make the triple bottom-line

approach. MFIs that focus on their single bottom line are exclusively concerned with their financial returns. Notwithstanding the importance of profits as a pre-requisite for continuity of the business, MFIs that want to contribute to sustainable development need to take a more holistic approach to performance. In this regard focusing on the triple bottom line objective includes economic, social and environmental effects that the activities of the MFIs generate. More so, it is neither this approach nor that but rather how access to credit by excluded can be eased. Despite the emphasis microfinance has received in theory, empirical evidence that links its access and impact to income and non-income outcomes has been very limited, providing at best tentative guide for public policy initiatives.

Statement of the Problem

Microfinance which has been identified as a tool for poverty reduction has women as a greater percentage of its target market. The intervention is expected to ease access to micro-credit but it does not to achieve much. One of the immediate impacts of microfinance programmes to ease access to micro-credit before the rest can be observed. Unfortunately many researches done in microfinance seem not to touch this.

Many claims are made about the impact of microfinance programmes, and an outside observer cannot but wonder at the range and diversity of the benefits of such claims. For example in Africa in particular, and despite support from donor agencies and NGOs for over 30 years, the expected growth and transition of most informal sector micro businesses to small, medium or large-scale formal

enterprises has simply not occurred (K'obonyo, 1999). Even though the intervention is expected to impact significantly on businesses and households of beneficiaries, as of now a major issue that puzzles the mind of researchers is that one is not sure of the consistency of microfinance impact on income and non-income outcomes.

In the case of income factors there seem to be no rigorous analysis on how impact is assessed through profitability. A major concern now is not just increase in profit but rather the distribution and allocation of the profit that has been generated. We are still not aware of the portion of the profit created that go into expenditure of the household in terms of child health, nutrition, education etc. Profits from businesses when properly allocated into household welfare especially child education, child health and household food consumption expenditure has several channels through benefits can be derived. The allocation of profits from businesses is also a conduit for sustainable businesses enhancement. When the profits are allocated well, positive externalities runs from businesses to household welfare and then to business.

Therefore the increase in profits as claimed by some impact studies is not complete because an increase in profits might not necessarily be transformed into improvement in welfare. Are the profits re-invested, spent on child education, child health or what? These issues remain unresolved even though more studies have been conducted to show that increase in profits contribute significantly to beneficiaries' livelihoods.

With respect to non-income variables, time series data have shown that access to micro-credit contributes to higher educational attainments among beneficiaries' children but what is missing is that in terms of cross-sectional data how does access contribute to children's education and what are the transmission mechanisms?

The objective of the Microcredit Summit Campaign, which plays a central role in the promotion of microfinance, is 'to ensure that about 175 million of the world's poorest families, especially women, receive credit for self-employment and other business services'. It is well documented that most microfinance programmes target more women than men (Yunus, 2001) but the factors that cause this disparity have not been investigated much in developing countries like Ghana. Microfinance therefore seems to be gender biased assuming that women are the only groups of people suffering from the poverty syndrome.

There is therefore the need for rigorous analysis into the perspectives of the impact across these broad outcomes of microfinance intervention and across gender. The questions that quickly come to mind:

1. Assuming unlimited number of MFIs exist, is access easy or difficult among male and female enterprise operators?
2. How does micro-credit impact on beneficiaries businesses?
3. What household factors and enterprise level characteristics determine benefiting from micro-credit or otherwise?
4. Is there any significant difference in microfinance outcomes across gender?

Objectives of the study

The general objective of the study is to assess income and non-income outcomes of micro-credit among women and men beneficiaries and non-beneficiaries. In pursuance of these, the study specifically seeks to:

1. Determine the factors that ease access to micro-credit among male and female enterprise operators;
2. Examine the impact of micro-credit on stock, profits, household expenses and sales among beneficiaries and non-beneficiaries;
3. Evaluate the impact of micro-credit on child education among beneficiaries and non-beneficiaries and
4. Assess the contribution of micro-credit on child health among beneficiaries and non-beneficiaries.

Hypotheses of the study

The study is meant to test the following hypotheses:

1. Household and enterprise characteristics do not ease access to credit
2. There is no significant difference between sales, profits, household expenses and business revenue among beneficiaries and non-beneficiaries;
3. Access to micro-credit does not contribute significantly to child education among beneficiaries and non-beneficiaries;
4. There is no significant difference between the impact of micro-credit on child health among beneficiaries and non-beneficiaries' children.

Significance of the study

The study will offer more pragmatic approaches to developing such policies that will contribute to improving households' access to microfinance. It will contribute to policies that will catalyze the informal businesses to stimulate employment generation and poverty reduction.

The results of the study will provide useful input to practitioners, government and donors to improve the design of microfinance programmes, and provide basis for dialogue on policies and strategies aimed at improving the performance of MFIs.

Scope of the study

Most studies have compared the impact of micro-credit among men and women clients and beneficiaries in Sub-Saharan Africa and other Asian countries. Due to the peculiar nature of women and the fact that microfinance targets women more than men, the study is delimited to more women than men. This thesis therefore focuses on beneficiaries and non-beneficiaries of micro-credit who engage in small scale economic activities such as trading, processing and artisanal work.

Organization of the study

The rest of the study is organized follows: Chapter two discusses developments of Ghana's financial sector. Chapter three reviews related theories and studies as well as some methodologies on impact assessment. Chapter four

presents the methodology of the study. The fifth chapter focuses on gender differences and ease of access to micro-credit. In chapter six the study provides empirical analysis issues on impact of microfinance on income outcomes using propensity scores matching. Non-income outcomes of microfinance including child education and health are presented and analyzed in chapter seven. Chapter eight summarizes, concludes, and gives policy recommendations of the study. The chapter also looks at the limitations and future research direction of the study.

CHAPTER TWO

FINANCIAL SECTOR AND THE MICROFINANCE SUB-SECTOR IN GHANA

Introduction

Ghana's financial sector has gone through several metamorphoses since the inception of the Economic Reform Programme (ERP) in 1983. This chapter focuses on the review of the overall financial sector of Ghana in general and the microfinance sub-sector in particular as well as the recent Bank of Ghana (BoG) proposed regulatory guidelines for the microfinance sub-sector in Ghana. The chapter concludes with a description of the study institution, Yaalex Microfinance Limited (YML).

Structure of Ghana's financial sector

The financial sector of Ghana is divided into banking and non-banking sectors. The banking sector is supervised by the Bank of Ghana which is also the Central Bank of Ghana. The Bank of Ghana supervises banks and deposit-taking non-banks. Deposit-taking non-banks include savings and loans companies, discount houses, finance houses, leasing companies, venture capital companies and building societies. The banking sector includes commercial banks, development banks, investment banks, merchant banks and rural banks. The insurance industry is supervised by the National Insurance Commission (NIC) and the institutions that fall under it include insurance companies, insurance brokers and re-insurance

companies. The Security and Exchange Commission (SEC) is apex body for the Stock Exchange, brokerage firms and investment management companies. The financial sector classified into formal and informal sectors as discussed in the subsequent section.

Formal and informal financial sectors

Like all other economies, Ghana's financial sector is made up of both formal institutions as well as informal institutions. The formal sector included as by 1989 the Central Bank, a Merchant Bank, Commercial Banks, about 100 Rural Banks, a discount house, a building society, insurance companies and trust holding company which also acts as a stock market. In 1990 the Ghana Stock Exchange was established to intermediate in the capital market where long-term funds could be channelled from surplus spending units to deficit spending units. Currently the picture is different. The number of commercial banks has increased with foreign commercial banks like International Commercial Bank, United Bank of Africa (UBA), the Trust Bank, Zenith Bank, and many more. Forex Bureaus (FBs) continue to increase in number. At least there are three or more Forex Bureaus in every regional capital in Ghana except the three northern regions where the picture may be somewhat different. There is every indication that the formal financial sector has grown in size.

More Rural and Community Banks (RCBs) continue to mushroom in the urban and rural areas of the country. As of 2004 there were about 128 RCBs and by 2010 the number has increased to 133 throughout Ghana. The reform also saw

the spread of discount houses listed on the Ghana Stock Exchange, over 10 insurance companies (public and private), and building societies.

By 2001 Ghana's formal financial sector has developed with an increasing number of banking and non-banking financial institutions. As at 2001 total deposits have increased from GHS 23.5 million to GHS 37.3 million. Out of this deposit, savings alone was 58 percent (Institute for Social, Statistical and Economic Research, 2001) showing a significant increase in savings and time deposits relative to demand deposits as a result of general decline in inflationary expectations in the economy. One major characteristic of Ghana's financial sector is its liberated form. This move was made in September 1987 when a liberalized system to determine borrowing and lending rates was instituted by the Central Bank for all Commercial Banks. This has replaced the previous administrative fixing of rate by the Bank of Ghana. Today Ghana's financial system is operating the free exchange rate regime. The interest rate as part of the liberalization policy has also been liberalized, thus no caps are set for lending and borrowing rates in the Ghanaian financial system. The policy is that BoG sets the prime rate and allows banks to set their base rates and lending rates to determine their margins.

Informal finance embraces all transactions that take place beyond the functional scope of various countries' banking and other financial sector regulations. The informal financial sector is of three types namely savings mobilization units (including susu operators) that do little or no lending, lending units that seldom engage in saving mobilization and units that combine savings mobilization with lending. The money lenders are generally rich individuals who

advance credit at rates well above commercial bank rates, primarily in rural areas. The informal entrepreneurs without access to bank credit approach the money lenders for loans. A hybrid of the savings mobilizers is susu operators. The *susu* is a rotational savings system operated by small-scale operators and low income earners and sometimes in a form of co-operatives. It involves small sums of monies collected on daily basis and the lump sum paid to the client at the end of an agreed period. Usually, the first contribution goes to the operator as his or her income. In the Ghanaian context, *susu* business is usually operated by men. The susu business can take several forms. The commonest one found in Ghana is the individual susu where each client contributes to his or her own pool and takes the lump sum at the end of an agreed period usually one month. Another form is the typical *susu* club which consists of members who agree to make regular contributions into a common bucket, which is given, in whole or in part, to each contributor in rotational basis. This form of *susu* savings is described as Rotating Savings and Credit Associations (RoSCAs).

The susu system operates where the individual susu collector sometimes described as mobile banker, visits savers' shops, work places, market stalls, and homes at agreed times each day and collects a specific amount determined by the saver in consultation with the collector. Many market women, farmers and traders find this form of saving more convenient in achieving their limited saving targets of obtaining a lump sum at regular intervals to meet working capital and other financing activities. Most rural banks in Ghana today mobilize savings like *susu* collectors (Institute for Social, Statistical and Economic Research, 2002) by

moving from door to door. They have been helping to cultivate regular savings habits in small-scale business owners and provide easy access to credit for their clients, who are bothered with bureaucratic procedures and the collateral requirements in the formal financial sector. In fact, these informal financial groups fill an important gap left by the formal financial intermediaries. They intermediate between groups of small savers and rather larger individual borrowers (Aryeetey, 2000; Sowa, 1993).

The informal financial intermediaries operate effectively in the rural sectors of the economy where access to banking facilities is not available. For example according to International Fund for Agricultural Development (IFAD, 2000), Women are unable to have access to credit facilities from banks and also they have problems leaving their children and household duties long enough to travel to the bank. They therefore rely on *susu* groups for assistance that could have been provided by the banks. Between 1990 and 1992 *susu* collectors in Ghana increased significantly the size of their clientele. In Accra the mean number of depositors in a month per collector rose from 155 in 1990 to 221 in 1991 and 290 in 1992, a total of 48 percent over the period. Currently, there are more than 10,000 *susu* collectors operating as individuals and companies in Ghana. As the number of depositors grew, so did average deposit size (Aryeetey, 2000). According to Soyibo (1994) individual savings collectors are the most significant informal savings mobilizers in terms of deposit size. They deposit all that they gather with formal financial institutions. In recent times most rural banks have employed staff that move from house to house to collect deposits from

customers, a system known as mobile banking. This is how the informal financial operation complements that of the formal financial operations.

The third form of informal financial service providers include saving mobilizers and lenders. Again, the susu operators are the key players in this segment. They mobilize savings on daily basis and lend out monies to deficit spending households and individuals. Their activities are claimed to be more risky because they sometimes use short term funds to finance long term projects causing asset-liability mismatch.

A comparison of the formal and informal financial sector characteristics will be important at this stage. The formal financial institutions ignore small farmers, lower-income households, and small-scale enterprises in favour of large-scale, well-off, and literate clientele, which can satisfy their stringent loan conditions. This shows that while level of education of the household head may be an important factor in determining the level of formal financial savings; it is likely that it may not influence that of informal savings so much. The level of education of the household head will also determine the ease or difficulty in accessing credit. Conversely, the informal financial sector provides savings and credit facilities for small farmers in rural areas, and for lower-income household and small-scale enterprises in the urban areas.

The formal sector is full of complex administrative procedures, which may be beyond the understanding of the rural masses and small savers. In the case of the informal financial units, the procedures may be simple and straightforward; as

they emanate from local cultures and customs, the rural people easily understand them.

Formal financial units are selective in terms of their clientele. This is probably to avoid clients who may make small deposits and cannot afford to provide the needed collateral. Contrary to this, the informal financial institutions accept any amount of regular savings, even the most modest, which a saver can afford to save. For example at most informal and semi-financial institutions such as susu companies and credit unions, a minimum deposit of GHc 5.00 is accepted from customers to open an account as account holder. In the informal financial units, access to credit is very simple, non-bureaucratic, and does not require too much documentation. Literacy in fact is not a prerequisite but recent development in the microfinance sector is likely to put emphasis on education and reading ability of clients. This is because MFIs are to submit regular returns to the Bank of Ghana on their operations as well as their clients.

In the case of formal financial institution, loan application procedures are very complex and require reading and writing skills before a file on the borrower may be established. Collaterals are also not required before loans are granted to members in the case in the informal financial units. In the formal financial units, collateral requirement correspond to the situation of relatively well-off urban dwellers: deposits or savings account in a commercial bank, or a property that can be mortgaged. This might probably be the reason why most rural agricultural households prefer saving with the informal financial units so they can easily have access to loan and credits to acquire farm inputs to expand their farms.

In the informal financial units collateral requirements on loans are subject to local conditions and borrowers' capacity. At times a mere guarantor (a known person in the community) is enough to qualify for credit assistance. In most cases the conditions may be based either on regular contributions to ROSCAs or on precise knowledge of farm size and or crops harvested so as to determine the borrower's capacity to repay the loan. The working days and opening hours of formal financial institutions do not take into account the rural work schedules. This is because banks are opened at times when farmers are at work in their fields. Even apart from this, farmers and poor market women do not have access to banks' services. Braverman and Huppi (1991) argue that the informal financial units have developed in rural areas because they have been providing faster services to their clients.

Chipeta and Mkandawire (1994) and Soyibo (1994) have expressed similar views that informal finance will do well so long as the economic activity demands increasing financial services for groups that cannot be reached by formal financial institutions. A typical informal savings in Ghana take forms such as giving credit to customers, relatives and friends. Such credits which represent savings for the giver are not guided by any formal conditions but the underlying factor is trust. The recipient is expected to pay back the credit at the end of the period agreed upon thus representing saved amount to the giver. Credit conditions (term, amounts, interest rate, and repayment schedule) vary according to the level of trust between individuals. According to Lacoste (2001) custom interest is not normally

charged although in trade, there is usually a discount for payment in cash, which can be interpreted as a form of interest for later payment.

The informal and semi-formal financial sectors on the other hand operate at times and on days which are convenient for clients. For example, susu collectors contact members in their homes, market places, at funeral gatherings, church meetings and even during family meetings for their contributions. Members do not actually feel it because any amount is acceptable at any time. This reduces the transaction cost and opportunity cost of doing business. All these characteristics and lessons emphasize the fact that financial intermediaries at the rural level must be prepared to offer the financial services demanded by clients if savings mobilization and microfinance activities are to be sustainable.

Financial sector reforms in Ghana

Financial reforms in Ghana took the form of liberalizing the sector. Financial liberalisation variously entails the elimination of interest rate and credit controls, allowing interest rates to find their market level, the elimination of credit and trade controls, and allowing the exchange rate to find its market level through demand and supply conditions, and privatisation of state-owned banks, with encouragement of entry of foreign banks and the creation of a competitive banking sector in Ghana.

The argument for financial liberalization rests on the supposed link between financial sector and economic growth and development, and hence poverty reduction. Financial sector liberalization could take two major forms

namely liberalizing the domestic financial sector and opening the capital account section of the balance of payment of a country for effective inflow and outflow of capital resources. This section of the thesis focuses on the internal financial sector liberalization basically the banking and non-banking sector reforms.

As far back as the 1970s, the theory of financial sector liberalization was pioneered by McKinnon (1973) and Shaw (1973). They claim that one of the reasons for the poor growth performance of many developing countries including Ghana had been financial controls and government involvement in the financial sector by way of financial restrictions. The basis is that real negative interest rates discouraged savings and encouraged inefficient use of capital. Thus, financial liberalization, primarily involving deregulation of interest rates would lead to higher levels of savings. Liberalization would also channel funds to finance productive entrepreneurs (especially those in the informal sector) for more productive projects. Therefore, an increase in real interest rates following liberalization is meant to propel the economy to operate at the optimum frontier. Financial sector liberalization also means that re-thinking poverty reduction should encourage saving and expand the supply of credit available to domestic investors (basically households), thereby enabling the economy to grow more quickly through the removal of all financial bottlenecks.

In Ghana like most African countries, the financial system was virtually under-developed in the period up to independence. After the introduction of money in the colonies principally for the reason of taxation, not much was done to develop the financial system of the colonies. There were only a few expatriate

banks, which catered for the needs of the expatriate merchants. These banks failed to advance loans to local peasants and entrepreneurs primarily because they lacked collateral securities. Credit thus circulated only among the big expatriate commercial houses, which could afford to provide 'good' collateral. The collateral demanded included life assurance policies, stocks, shares, bills and other financial instruments, which could not be found in the portfolio holding of the poor households. Thus, after independence, most African governments initiated plans to indigenise their banking sectors so as to make credit easily accessible to the indigenes. After independence, the pressure to develop economically led to fiscal pressures, which put severe strain on the financial sector.

With interest rates fixed at ridiculously low levels most governments borrowed cheap from the financial system, thereby crowding out the private sector investment. As the economies of African countries run into more macroeconomic problems, the financial sector became more and more distressed. For instance, the high inflation rates experienced in some countries together with the devaluations that were introduced to correct the imbalances left most banks with negative net worth. There was therefore the need to reform the financial system.

The period 1983-1988 was an era of crisis in the financial system in Ghana. High default rates had rendered most bank assets non-performing, the high rates of inflation had wiped out the capital base of most banks, and the weakened confidence in the financial system had adversely affected bank deposits. These affected the ability of the banks to perform their intermediation function properly. This also affected the recovery effort initiated under the ERP. Thus, in 1988, a

comprehensive Financial Sector Adjustment Programme (FINSAP) was launched. The FINSAP was financed with an adjustment credit from the World Bank, with co-financing from Japan and Switzerland. The Government of Ghana also contributed by converting its loans to the banks into equity and by paying government guaranteed loans to the state-owned enterprises.

The financial sector reform involved institutional restructuring, enhancement of the legal and regulatory framework for banking operations, and liberalization of interest rates. These were carried out in phases. FINSAP-1 covered the period 1988-1991; FINSAP-2 was from 1992-1995; and FINSAP-3 started in 1995. The major objectives of FINSAP-1 were: (1) to review the legal and regulatory environment and amend the existing Banking Acts and Laws; (2) restructuring the banking sector to make the banks viable and efficient; and (3) revitalize the financial sector by creating new institutions. FINSAP-2 and 3 were to continue with the restructuring of the financial sector that was initiated during FISAP-1.

Financial regulatory and legal reforms

The Banking Law (PNDCL 225) was revised in 1989. The innovations in the law included:

(i) The tightening of risk exposure limits;

(ii) Establishment of tighter capital adequacy ratios;

(iii) Strengthening of accounting standards and making them uniform for all banks;

(iv) Broadening the scope for audits of the banks;

(iv) Imposition of stringent reporting requirements and

(v) Improvement of on-site and off-site supervision of banks by the Bank of Ghana.

Subsequently, a revised Bank of Ghana Law (PNDCL 291) was also enacted in 1992 to give more supervisory powers to the Central Bank. These two laws together provide the legal and regulatory framework for the banking sector in Ghana. In order to bring more financial institutions under the purview of the Bank of Ghana a Financial Institutions (Non-Banking) Law (PNDCL 328) was also enacted in 1993. This law covered the activities of discount houses, finance houses, acceptance houses, building societies, leasing and hire-purchase companies, venture capital funding companies, mortgage financing companies, savings and loans companies, and credit unions. The law clearly distinguished the activities of pure banking institutions from those of non-banking institutions which hitherto was not so. These laws brought a lot of financial restructuring into the Ghanaian banking industry. These reforms among others were to promote sound banking practices and also ensure that more Ghanaians were bankable because of the shallow financial depth at that time.

Financial and institutional restructuring

Financial restructuring is any substantial change in a country's financial system, ownership or control, business portfolio, designed to increase the value of

the financial institutions. As part of the restructuring, the reforms also involved management and financial restructuring of the commercial banks. New boards were created for most of the commercial banks and there were shake-ups in the top management positions as well especially in the government owned banks. Financial restructuring involved in the recapitalization of the banks with equity injection where liquidity was low, and the cleaning up of their balance sheet of non-performing assets (NPLs). NPLs were repackaged and sold to individuals as equity shares. For examples government sold significant percentage of her interest in Agricultural Development Bank (ADB), National Investment Bank (NIB) and Ghana Commercial Bank (GCB).

The financial sector liberalization brought about institutional restructuring of the financial system involving the establishment of new institutions, mergers and liquidation of banks and divestiture of public sector shareholding in some of the banks. Under the FINSAP, five new banks and twenty non-bank institutions were established. This was to encourage competition in the financial sector. In 1995, the Social Security Bank now SG-SSB merged with the National Savings and Credit Bank (NS&CB). Under the institutional restructuring, the money market was formalized and the creation in 1991 of a second discount house, the Security Discount Company (SDC) to compete with the Consolidated Discount House (CDH), which was created in 1987. Both were wholly owned by some commercial banks in Ghana and charged with carrying out interbank operations. These institutions helped to optimise the allocation of resources within the banking sector and facilitate proper mobilization of resources to the needy sector; thus,

reducing structural imbalances in the system. Although the first rural bank in Ghana was established in 1976, the period of the financial sector reform saw a lot more of them coming up. This was to make up for the inability of the commercial banks to reach the rural areas and also to support agriculture. The rural banks were established as small unit-banking operations, which are owned and managed by the rural communities. The central bank also owns shares in the rural banks and also acts as their supervisor. The prime aim was to mobilize savings from the rural folk and also to help cottage industries.

Interest rate liberalization

The financial sector reforms liberalized interest rates to encourage competition among the banks. But, the deregulation of the interest rate was also to conform to the new form of financial programming Ghana was following under the Structural Adjustment Programme (SAP). Under the SAP, Ghana was using the money supply as the nominal anchor. This implied that the price interest rates should be determined by market forces. The move towards interest rate liberalization was a gradual process. The first distinctive move was the abolition, in September 1987, of the maximum and minimum deposits, except the minimum saving deposit rate, which was temporarily maintained at 12%. In February, 1988 minimum lending rates for commercial banks were also abolished and by March 1989 commercial banks were given the right to determine their own rates and display them in their banking halls. In November 1990, there was further

liberalization of the financial sector by the abolition of 20% mandatory lending to agriculture.

Thus, by the beginning of 1991 the financial sector was almost liberalized. Since the liberalization, both real lending and real Treasury bill rates have been positive. Saving rates have been struggling to stay positive. This is reflective of the weak mobilization efforts by the banks since most savers would rather hold their idle balances in the form of the relatively risk-free but high yielding government bills. In spite of the financial sector reforms embarked upon there seem to be a large gap between rural and urban access to finance in Ghana. The picture one can see is that the financial sector reform gave little attention to rural financing in Ghana even though majority of Ghanaians live in the rural areas. Again, the financial sector liberalization did improve access to borrowing by small scale businesses and the poor (Nissanke & Aryeetey, 1995). They attributed this to tightening of monetary controls, introduction of high-yielding securities to mop up liquidity, and efforts to raise the performance of loan portfolio.

The role of rural and urban credit

The financial sector provides financial services including savings, credit, insurance, leasing and money transfer as well as non-financial services to meet the needs of users. In all cases the financial sector works through financial intermediation where surplus funds move from surplus spending units (SSUs) to deficit spending units (DSUs). The notion that rural folks need more financial resources than their urban counterparts is challenged. This is because even in most

urban communities access to finance is still a problem. Thus, access to credit is a vital instrument for both rural and urban communities. For both rural and urban populace, credit helps in a variety of ways.

Credit access can significantly increase the ability of households with no or little savings to meet their financial needs for agricultural inputs and productive investments. Access to credit could also increase rural and urban poor households' willingness to adopt new technologies that raise both mean levels and riskiness of income (Rosenzweig & Binswanger 1993; Carter 2000). Again, access to credit allows rural and urban households to smooth their consumption in the face of adverse events or shocks. The importance of rural and urban credit in most economies is also well supported by empirical evidence.

There is positive relationship between credit access and 'households' welfare (Diagne, 2000). Lack of access to finance is believed has been a major constraint to those in the agricultural sector as well as the retail sector. In Peru for example, Guirkinger & Boucher (2007) showed that 27% loss of agricultural output is associated with credit constraints in rural areas. Thus the role of credit within the financial sector cannot therefore be underrated be it rural areas or urban areas. In such cases it is women who are most often disadvantaged. The importance of access to credit stems from the role of financial markets.

According to Herring and Santomero (1991) the indirect impact of financial markets and institutions on economic performance is extraordinarily important. The financial sector mobilizes savings and allocates credit across space and time. It provides not only payment services, but also enables firms and

households to cope with economic uncertainties by hedging, pooling, sharing and pricing risks. An efficient financial sector reduces the cost and risk of producing and trading in goods and services and thus makes an important contribution to raising the standard of living among those engage in small scale business activities.

In Ghana the fourth round of the Ghana Living Standards Survey (GLSS 4) shows that credit was used for several purposes. In 1998/99 for example, as to the purpose for which loans were used, 35 percent of households reported that loans were for the purchase of consumer goods, 22 percent for business expansion, 10 percent for health reasons, 9 percent for ceremonies such as weddings or funerals and 7 percent for agriculture inputs. This reveals that loans which are basically meant for businesses are not being used for that purpose. Probably, this could be one of the key reasons why most financial institutions including MFIs reject loan applications.

However in 2005/06 as reported by the GLSS 5, the most common reason why households demand loans was to use it for their businesses. The proportion of households in all localities who obtained loans for business is higher among female-headed households (38.8%) than among male-headed households (18.8%), an indication that women are good users of loans. A significant proportion of heads also use the loans for other consumer goods with females recording a higher proportion (24.1%) than male heads 13%). Here too, women play a key role in the use of credit. Apart from rural savannah, female heads in all other localities use at least 20 percent of loans on other consumer goods.

The highest proportion for male heads was 17.4 percent in other urban localities. The least reported reason for obtaining a loan was to purchase a vehicle: less than 1 percent of female headed households and two percent of their male counterparts in all localities reported vehicle purchase as their main reason for obtaining a loan. The acquisition of loans for the purchase of cars was common in the urban communities especially in Accra as compared with the rural areas.

Sources of loans to households in Ghana

According to the 2005/06 report of the Ghana Statistical Service the highest reported source of loan is relatives, friends or neighbours, with the proportion of loan recipients higher among male-headed households (56.3 %) than among female-headed households (50.4%) in all localities. In rural savannah households, about two thirds of male-headed households (67.1%) borrow from relatives, friends or neighbours, while among their female counterparts, half (49.5 %) borrow from relatives, friends or neighbours. This is an indication of the relevance of informal finance in Ghana. One major reason why informal finance is essential in Ghana is that formal commercial banks have not been able to serve the needs of most poor households because of the provision of collateral, formal application procedures and guarantors among to mention a few.

The second highest source of loan is the trader with more females (19.9%) than males having access to loans from traders. Among the localities rural forest has the highest proportion of female heads, 24.6 percent with loans from traders, followed closely by female heads in other urban localities (19.8%). Rural coastal

also has significant proportions of both female (19.0%) and male heads (16.1%) taking loans from traders.

Another major source of loan reported is the state banks. About three in twenty male headed households (15.3%) and about one in ten female-headed households (7.9%) that reside in other urban areas have loans from state banks. Less than 10 percent of the rural household population receives loans from the state bank, both among male- and female headed households. In Ghana males have the opportunity to obtain loans from state banks as compared to females. Microfinance which focuses on women is therefore supposed to bridge the gap in access to credit.

Microfinance Institutions in Ghana

The rural financial market in Ghana is dominated by three main types of institutions:

1) Formal institutions, such as the traditional commercial banks, rural and community banks (RCBs) and savings and loans companies;
2) Semi-formal institutions, such as non-governmental organisations (NGOs) and credit unions (CUs) and
3) Informal institutions, such as 'susu' companies, religious groups, rotating savings and loans schemes (ROSCAS).

In Ghana, Rural and Community Banks constitute the largest players in the rural formal banking sector. RCBs are unit banks owned by community members and stand out as the largest financial player in terms of geographical coverage,

depth of outreach, and number of products in rural areas (Basu et al., 2004; Andah, 2005). They play a much greater role than NGOs, which is unusual when compared with many other African countries (Basu et al., 2004; GHAMFIN, 2004). With 115 RCBs operating at the end of 2001, the total number of recorded depositors was 1.2 million and the number of borrowers was 150,000. Nevertheless, RCBs are generally rather small, especially in terms of the number of outstanding loans. Total loans advanced to clients in 2006 by all RCBs equalled 115.10 million Ghana Cedi (approximately US$127 million), an increase of 35.4 percent from 2005 (Bank of Ghana, 2007).

Originally, RCBs made standard commercial loans to individuals or groups, often related to agriculture; later they adjusted the terms of loans to make them more microfinance-like, by including short-term duration periods, requiring weekly repayments, and retaining a compulsory up-front savings of 20 percent of the loan amount as a security (Steel & Andah, 2003; Basu, Blavy & Yulek, 2004).

Savings and Loans Companies (S&Ls) are financial institutions licensed by the Bank of Ghana to mobilize savings as well as extending credit to clients (Adjei, 2010). Steel and Andah (2003) indicate that S&Ls have proved to be a flexible means of regularizing three types of MFIs intermediaries through (1) transformation of NGOs into licensed financial intermediaries; (2) formalization of informal money-lending operations and (3) establishment of small banking operations serving a market niche. S&Ls make use of microfinance strategies which are highly innovative in reaching relatively poor clients with very small,

short-term transactions but which remain both costly and risky (GHAMFIN, 2004).

The interest rates of these institutions are therefore higher than the traditional banks. However clients place greater value on ready access to funds than interest charges. The modes of frequent small payments (weekly, fortnightly and monthly) make it easier for clients to bear. A saving orientation that develops provides a useful strategy for screening and selection. Savings and Loans Companies also demand that potential clients save with them before applying for loans. This aids in the selection of clients with discipline to pay off loans and to eliminate those who are unlikely to be able to bear the debt burden (GHAMFIN, 2004). The companies employ both individual and group lending strategies.

NGOs and cooperatives, such as credit unions, are considered to be semiformal, as they are formally registered but are not licensed by the Bank of Ghana until 2011. NGOs have facilitated the development of microfinance practices in Ghana by introducing internationally tested methodologies, which are often based on group solidarity (Steel & Andah, 2003). The NGOs' poverty focus leads them to achieve comparatively deep penetration among poor clients in rural areas, but microfinance is in most cases only one of their activities. Total outreach remains limited to about 60,000 clients (Basu et al., 2004). Two categories of NGOs can be identified in the microfinance sector. Deposit taking NGOs and non-deposit taking NGOs. Non-deposit taking NGOs are not licensed by the Bank of Ghana and hence not allowed to take deposits, they have to rely on donor funds for providing microcredit to the targeted poor households. Deposit taking NGOs can

mobilize deposits from the public and are therefore supposed to obtain license from the Bank of Ghana.

Credit unions were originally characterised by weak financial performance, mostly due to their welfare focus and their policy of low interest rates. Yet performance improved through enhanced management and financial reporting, and as a consequence, the proportion of 'unsatisfactory' credit unions decreased from 70 percent in 1996 to 60 percent in 2001 and the proportion of those in the worst categories from 42 percent to 15 percent in Ghana (Basu et al., 2004).

The informal financial sector has been very important in Ghana, especially in rural areas. It covers a range of activities known as susu, which are performed by individual savings collectors, rotating savings and credit associations, and savings and credit 'clubs' run by an operator. Susu collection involves individuals saving outside the banking system to enable them to invest in projects; promote their welfare by way of business expansion; and finance child education, funeral organisation and other ventures where lump sums are needed. In 2003, there were over 4,000 collectors nationwide, collecting the equivalent of an average of US$15 a month per client from approximately 200,000 clients (Steel & Andah, 2003). In 2005, the Ghana Co-operative Susu Collectors (GCSCA) signed on to a micro insurance scheme to insure their collectors in case of accident, robbery, or death. Some RCBs and commercial banks (for example, Barclays Bank Ghana Limited) developed linkages with susu collectors in order to expand their own services, as they have, in some cases, adopted the savings mobilisation methods developed in the informal sector (Steel & Andah, 2003).

Unfortunately, due to high rate of default among clients, the programme has been cancelled for the reason that the susu collectors were unable to service the wholesale funds retailed to the end users. Furthermore, RCBs have also become bankers to some informal financial actors. Growing linkages between RCBs, NGOs and susu collectors are an important pre-condition and foundation for greater outreach to rural poor clients, with RCBs providing a decentralised network of licensed financial institutions in rural areas and the others providing the grass root orientation that permits reaching relatively poor, remote clients with small transactions (Steel & Andah, 2003). To facilitate the work of RCBs in Ghana and to deliver efficient services in more economic manner, computerization of all RCBs is on-going.

Currently about a third of RCBs are fully computerized to enable them to deliver internet banking services to reach a wider number of rural poor. The main challenge in the computerization programme is unstable power supply. Even though stand-by high-powered generators have been provided, this seems not adequate. There is therefore much to be done to speed up and complete the computerization process in order for the rural and community banks to provide more efficient and cost effective services to the rural poor.

Recent developments in the microfinance sub-sector in Ghana

The microfinance sub-sector in Ghana is undergoing several changes in recent times. The level of operations continue to increase as more businesses are adding microfinance products to their business lines even though they might not have registered as microfinance institutions legally. Associated with these

developments is mushrooming of several unidentified small and medium scale enterprises that call themselves 'MFIs'. In recent times, a lot of concerns have been raised about the unscrupulous activities of such institutions which serve as a threat to resources of hard working and innocent depositors.

In Ghana, the BoG has the mandate to protect the interest of all depositors and ensure sanity in the overall banking system according to the BoG Act, 2002 Act 612 (BoG, 2002). In pursuance of this mandate, the BoG took bold steps to regulate all MFIs in Ghana effective August, 2011. As part of the regulatory process, all MFIs have been categorized into three categories namely: Tier 2, Tier 3 and Tier 4 according to minimum capital requirements and licensing types to be issued. Tier 1 activities comprise those undertaken by Rural and Community Banks, Finance Houses and Savings and Loans Companies. These institutions are regulated under the Banking Act, 2004 (Act 673) and they are excluded from the current BoG regulatory guidelines.

According to the guidelines, Tier 2 institutions include *susu* companies, profit-oriented financial NGOs and other companies engaged in financial services that are taking deposits and granting loans. Tier 3 institutions include money lenders and non-deposit taking financial NGOs. These institutions operate like finance houses using their own resources, borrowed funds or donor funds. For these institutions, deposits taken must be kept in an escrow account with a bank or a Savings and Loans company.

Bank of Ghana has also given recognition to institutions that deliver microfinance services. For example MFIs have formed apex body called Ghana

Association of Microfinance Companies (GAMC). Money lenders have also been given the mandate to form Money lenders Association of Ghana (MLAG). The role of the associations is to ensure that their members comply with the Bank of Ghana prudential and regulatory requirements. Thus, microfinance in Ghana is now subject to full supervision from the Bank of Ghana.

Microfinance delivery models

Microfinance evolved with the aim of reaching households assumed to possess the capability of using financial services to improve their standard of living but for reasons of self-exclusion and formal banking restrictions were deprived access to financial service. Wide practised models of microfinance that have been replicated in almost every country are; group lending mechanisms, compulsory savings, small loans and shorter repayment durations and integrated financial services (Brau & Woller,2004). While the first three seem easily adaptable, integrated financial services which is precedent on the 'welfarist' ideology continues to attract concerns in terms of nature and scope. Among the issues of concern is the need for a clear distinction between the following perspectives of integrated financial services: (1) offering several financial and non-financial services; (2) providing diversified financial products with the aim of reducing risk from their perspective and (3) delivery complementary financial and non-financial services with a clear growth path for clients. The perspectives can be viewed as tiers in terms of complexity and implications required in implementing each of these different interpretations of integrated financial services. Expanding

the scope of financial services and ensuring that the different types of products collectively smoothens financial returns by reducing risk seem relatively easier and convincing for a microfinance institution to pursue than the delivery of products that is aimed at tracking both social and financial performance of clients. The latter is mostly unappealing to MFIs due to the inherent cost of monitoring clients. However since their mandate calls for ensuring household poverty reduction, MFIs are obliged to engage in client specific oriented social services which hitherto were not considered as part of the functional roles of financial intermediaries.

In Ghana all the aforementioned models are in practice. MFIs in Ghana combine one two or three of the delivery models. Individual lending seem to be more popular than group lending but in recent time most MFIs in Ghana have adopted the group lending methodology. The reasons are that group lending offers joint liability and peer monitoring and enforcement of repayment. The joint and several liability provide incentives for peer monitoring thus reducing strategic default among clients. Clients who default lose the social capital they have acquired in the past.

MFIs' relational services in contrast to transactional roles performed by traditional banking institutions expanded the added on services of business development services to include other non-financial duties. The non-financial are predominantly informal education on issues related to; improving health status, developing entrepreneurial and/or vocational skills, creating value chain production processes to the point of marketing, building self esteem for

empowerment and instituting social safety nets to mitigate both idiosyncratic and covariate risks. The importance of such non-financial interventions for poor and vulnerable households is apparent especially in the context of potential spill over effects for different generations and the community. However, its success both in the short and long term depends on the mode and timing of rolling out of such services. The mode of delivery should be based on the distinctive features of the poor and vulnerable households and the time of delivery should coincide with potential beneficiaries' resource flows (including occupational arrangements) and other social interventions. In view of the restricted capacity (both financial and human) of MFIs and peculiarity (deep cultural value and public good constraints) of the poor, dispensing both financial and non-financial services simultaneously requires a well thought through mechanism and reliance on other institutions. The success of such multiple financial and non-financial interventions depends on the complementarily between all the services and not just their mere availability.

In recent times, MFIs have attempted to reduce the undisputable high transactional cost of reaching poor and vulnerable clients with increased use of technological approaches such as mobile phone banking, banking on wheels (mobile banking) and point of sale devices. Examples of such branchless banking interventions are widespread with the M-PESA scheme initially developed in Kenya hitting headlines news of success outcomes in recent time (CGAP, 2010). In Ghana, some MFIs use mobile collection devices to record small deposits collected on daily basis thus reducing cost and fraud. The cost saving attribute of these devices are impeccable as human-led transactions are considerably reduced.

The quest of reducing transactional cost with the aim of improving profitability and financial sustainability of MFIs drives the motivation to use technological systems. The evolution of technological devices created a platform for linkages between the agents involved. Typically, linkages between mobile phone operators and MFIs have emerged across the globe. In Ghana for example, a mobile telecommunication network called TIGO and MTN engage in small money transfers that are available to all the remote parts of the country where the network operates. This form of money transfer reduces transaction costs for clients who would have travelled kilometres to cash monies sent to them.

In addition to technological integration fostering linkages, the microfinance industry is currently witnessing different shades of institutional collaborations given the orientation and mandate of each institution. The linkages are between: MFIs (Rural banks and Not-for-profit financial non-governmental organizations); MFIs and traditional formal banking institutions that hitherto microfinance operations was not part of their core mandate; MFIs and government; MFIs and development finance institutions (DFIs) and MFIs, traditional banks and government. Formation of institutional linkages has been motivated by the following: overcome regulatory restrictions; expand access; reduce client's transactional cost; enhance disclosure; demystify stereotype about the financial sector and increase profit margins.

Among the different forms of institutional linkages in the Ghanaian microfinance sector, two of them (1) between government and MFI and (2) among government, MFI and traditional banks have gained wide popularity in expanding

access. While the success outcomes have been extensively touted, issues of repayment and drop-out have ignited a pessimistic view on the extent to which such collaborations can achieve their intended goals.

Despite the aforementioned challenges the increasing scope of delivery models offers diversification which is essential for the growth of the microfinance industry and specifically enhances an expansion of the scope of financial services (credit, savings, insurance, money transfer and a payments points) offered to clients. This attribute promotes another achievement of microfinance outreach referred to as scope of outreach. However, addressing the potential synergy expected from diversified products such as money transfer complementing credit to expand and sustain financial service access is yet another important exercise.

Yaalex Microfinance Limited

Until 2011, Yaalex Microfinance Limited was called Yaalex Investment Limited. The company is a registered financial institution involved in delivering financial services including savings mobilization, granting of loans, business management training and other financial services to low income population in the Takoradi Metropolis and Yamoransa in the Mfanstiman Municipality. The ownership of the company is by way of shares provided by the founder and other board members with capitalization of GHc 500,000. Since 2004 the company has been at the forefront of providing financial services to 10,000 clients of which 80 percent are women.

Yaalex Microfinance Limited has the vision of becoming one of the leading, sustainable and socially responsible MFI in Ghana and Africa through provision of financial services to women, men minority, micro and small scale enterprises and broadening the knowledge base of its clients in financial management. In pursuant of this the company delivers excellent financial services in a more sustainable manner to promote the well being of its customers.

The company is strategically managed by a seven member board of directors who come from diverse background including accountants, lawyers, information technology (IT) experts, microfinance practitioners, businessmen and women as well as personnel from the academia. There are three levels of management namely senior management, operational and supporting staff. Senior management staff is involved in the day to day management of the company. The specific clerical duties that take place at the office are undertaken by the operational staff. The supporting staff provides day to day supporting services to aid management and operational activities. Below the supporting staff are the field officers also called marketing officers who go round on daily basis to mobilize savings.

The company with its proven track record of revenue mobilization and administration is internationally recognised. The strengths of the company, apart from what is stated above, also include: To reach out to the un-served and the under-served, Yaalex Microfinance Limited expanded by opening a branch at Yamoransa, near Cape Coast in the Central Region in October, 2011. The branch has staff strength of 30 field mobilizers, branch supervisors and data entry clerks.

Apart from the key products (savings and loans) the company offers goods clearance loans to businessmen in Takoradi.

Besides, the company offers emergency loans that are repayable within months. For poor households who have problems in paying of school fees of their wards, Yaalex offers them with a product called back to school. This product enables clients to pay their wards' school fees in the subsequent terms ahead. Apart from the financial products, Yaalex offers non-financial services as way of complementing the financial products. It is well known that financial products do not in themselves solve clients' business problems. Recognizing this, Yaalex organizes business training and financial literacy programmes for its clients. The impact has been very significant for participants in terms of increase in business profit, clientele growth and overall business growth. For example, the company offered business literacy programmes to prospective clients at Yamoransa branch in June 2011 which led to the establishment of the branch in October 2011.

Yaalex Microfinance Limited uses the individual lending approach as the main lending methodology. This approach has been very successful for the past 6-7 years. For individual loans at least a guarantor is required to guarantee for each borrower. The guarantor must be a client at YML and must also have enough savings in his or her account. To qualify for individual loan, clients must have saved with the institution for at least 4 months continuously. Any savings contributed by the individual can be withdrawn at the end of each month except that of the month in which the client borrows. Repayment of loans is done on daily basis (susu system). The rationale is that for low income clients, it could be

difficult for them to pay accumulated amount (interest plus principal). The daily repayment offers clients the opportunity of not feeling the monies they pay. However, borrowers can negotiate for repayment terms that are favourable to them.

In 2011, Yaalex Microfinance Limited started with the group lending on pilot basis. Proving successful, the method is now been implemented on a small scale for its greater implementation in the years ahead. Clients are made to form their own groups independent of the loan officers at Yaalex. Two to three weeks training is offered to the groups during which time they make savings into their accounts. When clients have successfully undergone the training, the loan is disbursed to them according to appraisal of the loan applications.

Conclusion

This chapter has discussed Ghana's financial sector as well as the microfnance sub-sector. The financial sector has gone through several reforms and restructuring. The new regulatory guidelines that have been introduced means that the sub-sector is no longer informal or semi-formal. This implies that the modus operandi of the sub-sector is just going to be like the traditional banking institutions.

CHAPTER THREE

LITERATURE REVIEW

Introduction

Ever since microfinance first began to capture public attention some three decades ago, the usual story line has been that it is a tool of extraordinary power to add value to low income people especially women who engage in small scale economic activities, by funding their micro-enterprises and raising their incomes. This notion has been buttressed by hundreds of inspiring stories of micro-entrepreneurs who used tiny loans to start or expand their businesses, and experienced remarkable gains not only in income and consumption but also in health and education.

The literature review focuses on both theoretical and empirical aspects of the subject matter. The first section of this chapter reviews relevant theories on how micro-credit produces income and non-income outcomes. The second section focuses on empirical literature on income outcomes, micro-credit and child education as well as micro-credit and child health.

Theoretical review

There is a large literature on theory of access to credit and development related issues in general and gender aspects in particular. Similarly, theoretical linkages on microfinance outcomes abound in the literature. This section looks at the rationale for microfinance intervention; some theoretical issues that link access to micro-credit with business outcomes; child health and child education.

The theory of microfinance

Many theoretical models have stressed the role of credit market imperfections as obstacle to rapid economic growth and social progress at the marco and micro levels (Durlauf, Bowles & Hoff, 2006). The implication is that a sound financial system is a pre-requisite for economic development. Microfinance proponents believe that provision of micro-credit (the core business of microfinance) creates a vicious cycle of investment and increased income and has the potency of improving the material and social well-being of low income households. Progressive micro-credit and the process of increased investment increases income and further eases credit constraints among those individuals who are not served by the traditional banking system (Khan, 2008).

Thus, one rationale for microfinance intervention is as a result of market failure in the credit market. The argument is that low income households are unable to provide traditional collateral required by traditional banks; rigorous application processes may disqualify them; location of banks may also constrain most households; small loan sizes required may not be attractive to traditional banks; and in worse situations lack of regular income source may lead to self-exclusion (Bowles, 2006). All these factors do not ease credit access even in the informal financial sector.

It therefore, makes sense why low income household rely on family and friends and money lenders for their financial needs. Unfortunately, these sources too are not reliable. For example money lenders charge extremely very high interest rates which make borrowing from them unattractive. It is in response to

these difficulties that has necessitated MFIs with more social rather than commercial orientation to serve the financial needs of numerous low income households around the world.

Thus, microfinance intervention is highly supported by the neo-liberal ideology of providing opportunities for low income households to help themselves engage in productive activities (Khan, 2008). With recent developments in the microfinance sector it is becoming doubtful if microfinance could really achieve the objective of easing financial access to the target market.

Micro-credit, consumption and savings

Traditionally, consumption and savings are functions of income (either permanent of transitory). The basic hypothesis posited is that individuals consume a fraction of their permanent income in each period and thus the average propensity to consume would equal the marginal propensity to consume. According to Keynes, both consumption and savings depend on household income. Therefore, it means that within a period, household consumption expenditure and saving amount depend on household income. Household income also depends on productive investment financed by micro-credit. By the law of transitivity, both consumption and savings could be functions of micro-credit. It is however not micro-credit per se that contributes to the above but rather the return from it. Thus, micro-credit is seen as an investment input that enters household production function thereby producing income.

This can be viewed from the stand point of the neo-classical model with concave production function assuming micro-credit is capital input (Armendariz & Morduch, 2010). Armendariz de Aghion and Morduch (2005) argue that theoretically, low income households produce higher return on micro-credit than the high income group. The theory behind this is law of diminishing marginal returns.

Parental altruism, micro-credit and human capital development

The altruistic model assumes that parents are altruistic, and they might want to derive satisfaction from their children's future consumption. Parents may augment their children's future consumption in two ways: schooling them so as to raise their future earnings, or by bequeathing them an inheritance. The cost to parents of leaving a bequest is, naturally, a reduction in their own consumable resources. Similarly, by schooling their children as opposed to working them, parents forego children's earnings from labour now. Parents choose an optimal combination of schooling and bequest by, for example, trading-off a quantity of bequest for more schooling. Poverty poses the particular difficulty that poor parents may not have resources to bequeath their children and so there is no question of trading-off a sum of bequest for more schooling, that is, unless it were possible for bequests to take negative values. Therefore, poverty-stricken parents unable to engineer negative bequests, that is, resource transfers back in time from adult children to parents, may be constrained to educate their children less than

they would like. Access to micro-credit may alleviate this difficulty by enabling negative bequests.

Theoretically, education is an economic good because it is not easily obtainable and thus needs to be apportioned from limited financial resources. Economists regard education as both a consumer and capital good, because it offers utility to a consumer (as well as parents) and also serves as an input to develop the human resources necessary for economic and social transformation.

The possible impact of micro-credit on children's education might be better explored when put against the framework of intra-household allocation. Micro-credit schemes do not target children directly, but the influence of the scheme goes through the non-neutral intermediary of the household (World Bank, 2001). Credit enters the household production function and might influence several of the factors that determine children's educational performance measured by term scores and attendance, including the overall financial budget as well as the individual parent's budget, the time allocation, the individual parent's degree of participation in household decision making, and the perceptions regarding the importance of children's education. Education has been identified as the core element of human capital development.

Human capital is the knowledge and skills people accumulate through formal instruction, training and experience that facilitate the creation of personal, social and economic well-being (Becker, 1993). The argument is that if human capital is both capital and consumption good then it must be financed. As credit is used as an input factor in cooperation with other factors including parents' own

education, child characteristics and community characteristics, the expectation is that child educational performance will be improved.

The unified growth theory

Associated with Galor and Weil (2000), the unified growth theory though macroeconomic is also applicable at the household level. Among others the theory captures the interaction and arbitrage between the quantity and quality of children as part of the development process. The theory posits that a child's level of education and educational achievement depends positively on their parents' education and the level of income but negatively with household size. In a world of the low income and poor people therefore, income is derived from household enterprises that are financed by microfinance.

Modifying the theory suggests that micro-credit investment produces incomes for low income and poor households. Thus, child education can be linked to micro-credit investment via income from micro-credit. This theory is directly linked with technological advancement which is limited in the case of micro-credit users. However, once we assume that technology is constant then a case can be made for micro-credit users whose activities are less dependent on technology.

Micro-credit and health production

Modelling health production is most often associated with the work of Michael Grossman; to understand the demand for health, he based his model on the theory of human capital (Grossman, 1972). This theory is based on a health

production function, which ''shows how much health can be obtained for a given quantity of health input, given technical knowledge'' (McGuire, Henderson & Mooney, 1988). According to Grossman, health care is both consumption and investment good. 'Health is a 'stock', and individuals will attempt to maximize their health stock by exploiting opportunities to transform inputs into health, given the constraints in their life, such as budgetary limitations.

Over time, this stock will depreciate, especially during certain periods of the lifecycle. A person can, however, choose to increase his or her health stock, through investing in inputs that include time, medical care, diet, housing, education, and so on. These resources are financed by credit and in the case of poor households micro-credit is theorised to finance health inputs.

Even though the Grossman model received high recognition for providing an understanding of demand for health and demand for healthcare, it has also received some criticisms. Among the criticisms that are relevant for the purpose of this thesis is the fact that, the model considered an individual as an isolated health provider, which neglects the fact that most individuals spend their lives with other individuals (within the family), who may influence each other's health behaviour and health outcomes. It thus recognises the individual as a producer of health since it seeks to explain individuals' health related behaviours and differences in health and health care utilisation. This therefore implies that, the model can only be used to analyse adult health, not children 'demand' for health and their health care utilisation. It also implies that the influence of other family members on the

individual's demand for health and health care cannot be considered under the Grossman model.

A critical look at the family as producer of health means that each family member is the producer, not only of his own health, but also of the health of other family members, and that not only his own income and wealth, but also the earnings of other family members, can be used in the production of health.

Another shortcoming of the Grossman model is that, the model operates in the world without health insurance and assumes that all health care costs are covered either from income or personal wealth. This assumption logically arises from another assumption that, continuous investment in health under conditions of perfect information, which means that an individual is purchasing health care or health inputs like any other commodity. However, due to the unpredictability of illness and the corresponding healthcare costs, health and health care are fundamentally linked to the demand for insurance at the very least.

However, the economic pathway is the most straightforward in explaining women participation in microfinance and child health due to the close link between wealth and health, and because the primary objective of microcredit is to reduce poverty. Key mechanisms include increased access to economic resources, better access to collective resources or public goods and services, and overall improvements in material conditions (Lynch, Smith, Kaplan & House 2000). These mechanisms can improve health via the production channel through two main actions: maintaining and protecting health, and restoring health.

More economic resources or access to a food distribution programme can increase the quantity and quality of food available. Greater income can support healthy food choices, making it possible to purchase non-staple foods, and to reduce consumption of those unhealthy foods, high in fat and refined sugar, which are often cheap and fast meals. Improvements in material conditions, access to safe drinking water, good sanitation, and adequate housing reduce exposure to health risks (Judge & Patterson, 2001; Deaton, 2002). With rising income, health-promoting and hygienic practices are increasingly adopted (Wagstaff, 2001; Deaton, 2002). Also, income is inversely related to health-damaging behaviours. An increase in economic resources can help reduce exposure to major sources of stress, such as financial insecurity and associated household tensions. Higher income also reduces barriers to accessing quality health care (Wagstaff, 2001). In poor countries, where most of the population is uninsured, access to health care is constrained by households' ability to pay for services.

The mechanisms in the economic pathway can also enhance the determinants of health via the conversion channel, especially if mediated by education. Greater access to economic resources can enhance autonomy and awareness, and can help expand one's action space. More economic resources can also improve the poor's ability to manage their own illness by enabling them to purchase the necessary drugs and health technology. In practice, access to credit does not necessarily translate into greater access to resources through higher income or more financial assets. Some authors have pointed out that the poor are sometimes compelled to use micro-credit for consumption purposes, and these

authors have made suggestions for redesigning microcredit programmes to serve these needs (Mosley & Hulme, 1998). The implication is that theoretical issues in microfinance cannot always hold due to the moral hazard problems. However, the overall logic is that if health is investment as well as consumption good then among the poor households micro-credit can contribute to its financing and production. Therefore, in understanding the linkages between child health and participation in microfinance, it is imperative to explore the theoretical framework of the Grossman model and its extended versions discussed above.

Access to credit and empowerment

The concept of empowerment is usually linked to women who are usually considered as vulnerable in society. Women do not have control over economic resources and have limited power in decision making that affect their own lives. It is believed that with access to credit, women will be able to create jobs for themselves, earn income, and they will be empowered. One example of the use of the concept of empowerment within development agenda are the Millennium Development Goals (MDGs). The third goal 'gender equality and women's empowerment' demonstrates according to Kabeer (2003) is that empowerment is now explicitly seen as an end in itself and not just a tool for achieving other goals.

It is argued that micro-finance helps increase women's empowerment which is defined as women taking a greater role in household decision making, having greater access to financial and economic resources, having greater social networks, having greater bargaining power in relation to their husbands and having

greater freedom of mobility. Furthermore, it is concluded that access to credit provides women with increased spousal communication about family planning and parenting concerns.

Theoretically, several studies have shown that micro-credit programmes contribute positively to the development of the low income household in several ways. For example according to Mosley and Hulme (1998), micro-credit programmes create employment opportunities, increase productivity, provide economic security, improve nutritional and health status as well as housing conditions for low income households. In the sociological context, access to micro-credit influences social empowerment, creates awareness and improves educational status, enhances self esteem and contributes to organizational and management skills among participants (Pitt & Khandker, 1996).

Empowerment of clients of microfinance emerges from the income outcome that microfinance produces. Theoretical assumption that makes microfinance work well is that: micro-credit is for the active poor. On the basis of this micro-credit is expected to go into productive investments-usually small scale business. The credit is converted into purchases of business stock by increasing the level of sales which eventually translates into profits. The profit outcome is thus distributed to benefit the families of the recipients through household consumption, purchase of healthcare, education and an improvement in the overall well-being of dependents. Thus, access to micro-credit often leads to greater investment in education, housing, and nutrition for children in most cases.

Economic and social dependence is therefore reduced. Once this is observed, it is said that microfinance has empowered the beneficiaries.

Economic empowerment translates into economic well-being of clients themselves and their dependents. Generation of business profits produces economic empowerment of clients. This enables clients to cater for their children's education, health needs, as well as educational needs. Among women microfinance promotes the use of contraceptives to limit the number of children. This is achieved through the increase in the opportunity cost of women's time. Through peer pressure women are urged to reduce family size in order to increase expenditure on education and health especially for their children. Another transmission mechanism is where the use of contraceptives reduces the number of children thus beneficiaries tend to have fewer children. With fewer children, they will be able to take good care of their children's educational and health needs. Once children are in school the time they spend on household and enterprise activities will eventually reduce.

Theoretically, MFIs can affect child health by: (1) providing a powerful mechanism through which parents can increase their social capital and support the spread of health-related knowledge; (2) increasing the bargaining power of women so that resources are shifted towards expenditure that most benefit children and (3) promoting broad-based community economic development. These mechanisms translate into the economic and social empowerment as well as growing social capital of the poor.

As Miller and Rodgers (2009) argue, anything that improves the economic well-being of the poor will affect household bargaining power. With greater power, the poor are in a better position to bargain for a greater share of household resources to be allocated towards expenditures that improve the health and well-being of their dependents especially children.

Access to micro-credit has also been hypothesized to influence child health outcomes through the development of parents' social capital. Gleasar, Laibson, and Sacerdote (2002) note that, 'an individual's social capital characteristics include charisma, status and access to networks that enable that person to extract something beneficial to the individual. Grootaert and van Bastelaer, (2002) defines social capital broadly as the institutions, the relationships, the attitudes, and values that govern interactions among people and contribute to economic and social development.

Nobles and Frankenberg (2009) hypothesized that, children from households with lower levels of wealth and human capital fare better when their mothers are more active participants in community organizations. The reason why participation in programmes such as microfinance is thought to influence child health is that these informal networks provide a way for parents to circulate information about nutrition and communicable diseases. On this premise group lending in microfinance builds social capital which leads to information sharing among members. In this sense, social capital in poor communities plays a similar role in the improvement of child health as formal maternal education does in more developed communities (Nobles & Frankenberg, 2009).

Empirical review

The results from many of the studies on gender aspects of microfinance across the world have been quite insightful with mixed results. Whiles some studies produce evidence of considerable impacts, others portray marginal and insignificant impacts. This section reviews empirical literature on microfinance and income outcomes, microfinance and child use or child work, microfinance and child education, microfinance and child health and microfinance non-financial services and its impact on clients' businesses emphasising on credit with education.

Microfinance and income outcomes

In finance and accounting, income is determined by finding the difference between revenue and expenses. Thus income is the revenue net of all expenses of the enterprise. Microfinance is believed to contribute to raising the income level of clients as compared with non-clients but the results have been mixed. Amendariz and Morduch (2007) have indicated that microfinance may affect household outcomes through a variety of channels. To them the immediate is making households wealthier, yielding an income effect that should push up total consumption levels and holding other factors constant, this will automatically contribute to expenditure on children's education and health.

Microfinance has proved as having either positive or negative impact on business profits as well as household assets and sales. For instance a study conducted by Swain and Varghese (2009) among the self-help group members in

India reported that total amount of savings increase with the length of participation in microcredit program. Their study also found a positive impact on livestock accumulation, but no impact on land value, business wealth or physical assets. Their study also indicated that credit and training together, have a positive impact on asset creation.

In a recent study conducted by Montgomery and Weiss (2011) to assess the impact of Khushhali Bank in Pakistan they reported that although around two third of the total participants borrowed microcredit for livestock raising, agricultural activities or microenterprise, there was no significant positive impact on sales or profit from those activities. The study also noted that even though microfinance produces insignificant positive impact on sales and profit, it produced positive impact on aggregate consumer expenditure on food or educational expenditure per child as well as positive significant impact on health expenditure and health care.

Some studies find wider impacts whereas others discover marginal impacts. However those studies that find greater impact of microfinance on clients' income were conducted on women businesses. In 1995 the United States Agency for International Development (USAID) launched the Assessing the Impacts of Microenterprise Services (AIMS) Project, which developed five tools namely impact survey, client exit survey, use of loans, profits and savings over time; client satisfaction; and client empowerment to provide practitioners a low-cost way to measure impact and improve institutional performance of microfinance institutions. The AIMS Core Impact Assessments of SEWA in India, Zambuko Trust in Zimbabwe, and Mibanco in Peru avoid this problem through the

use of longitudinal data and non-client comparison groups. "Managing Resources, Activities, and Risk (MRAR) in Urban India: The Impact of SEWA Bank" by Chen and Snodgrass (2001), compared the impact of clients who borrowed for self-employment to those who saved with SEWA Bank without borrowing, and compared both groups to non-clients. The result suggests that, borrowers' income was over 25 percent greater than that of savers, and 56 percent higher than non-participants' income. Savers too enjoyed household income 24 percent greater than that of non-participants. These findings indicate that microfinance can be quite effective.

Barnes (2001) studied on the topic "Microfinance Program Clients and Impact: An Assessment of Zambuko Trust, Zimbabwe", and finds that, while clients' income was significantly higher in 1997 than the incomes of other groups, by 1999 the difference was no longer statistically significant, though continuing clients still earned the most. Dunn and Arbuckle (2001) on "The Impacts of Microcredit: A Case Study from Peru", finds Mibanco clients earn $266 more per household member per year than non-participants. This is a typical case which shows significant impact of microfinance on clients' income.

Similarly some impact studies have been conducted using randomized control trials (RCTs) and the results of such studies have shown that microfinance have contributed to income with spill over effects. For example, Dupas and Robinson (2009) conducted a randomized field experiment in Kenya where they gave interest-free savings accounts in a local village bank to a random sample of poor daily income earners (primarily micro-entrepreneurs). The accounts paid no

interest and charged withdrawal fees, so they offered a de facto negative interest rate, but they were the only formal savings option available in the area. Dupas and Robinson find wide variation in the intensity of account usage. Some refused the accounts, and many signed up but did not use them. Nearly 50 percent of those with accounts used them more than once but only a few used them intensively. Account ownership was associated with substantial increases in investment and increased daily expenditures for women, but no measurable impact for men. Possibly more important, the women who did not receive accounts were forced to draw down working capital or stop working in response to health shocks (like malaria). Presumably, savers were less able than non-savers to be able to afford prompt treatment.

Again, Karlan and Zinman (2008) randomly prompted loan officers of a South African consumer lender to reconsider and approve applicants for a loan from a pool who were initially rejected but who fell just below the cut-off. Applicants who were reconsidered (many, but not all, of these were then given a loan) were more likely to keep their jobs, have incomes significantly higher (possibly because they had kept their jobs), have households that were less likely to experience hunger, and have a more positive outlook on the future

Furthermore, Banerjee, Duflo, Glennerster, and Kinnan (2009) conduct a randomized evaluation on the community-level impact of new branches of a microfinance bank. Half of 104 slums in urban Hyderabad, India, were randomly selected for the opening of an MFI branch. At the beginning of the study, there was almost no micro-lending in the sample areas, but 69 percent of the households

had at least one outstanding loan from a moneylender or family member. The authors find that the areas with branches featured more new business openings, higher purchases of durable goods and especially business-related durables, and higher profits in existing businesses (despite presumably greater competition from the new businesses). Households were scored on how likely they seemed to start a business. Those who scored high increased durable purchases and decreased purchases of luxury items, both of which are consistent with having started a business. Those who scored less likely to start a business increased consumption of nondurables. The main effects are consistent with borrower households starting businesses, but the authors cannot tell whether the loans are actually used to start businesses, so these effects may come through indirect channels.

Access to micro-credit and child education

Children are indirect beneficiaries of microfinance through what their parents especially, women, earn. As micro-credit enters the household, it might influence several of the factors that determine children's education, including the overall financial budget as well as the individual parent's budget, the time allocation, the individual parent's degree of participation in household decision making, and the perceptions regarding the importance of children's education.

Research on the relationship between parental income especially women and educational outcomes can broadly be divided into general educational attainment and borrowing constraint by parents. Studies on educational attainment usually find that an increase in parental income modestly increases the educational

attainment of children. Borrowing constraints and school enrollment research in developing countries is motivated by the fact that going to school is expensive. Thus it is believed that in poor countries, parents can finance their children's education with revenue from microfinance access to credit for productive ventures.

The link between microfinance and child education is indirect. The assumption is that all things being equal rich parents are able to give better education to their children than poor parents. Meyers (2008) has noted that children of affluent parents are more likely to succeed in life than the children of poor parents. For example, compared to more affluent children, poor children score lower on tests of cognitive skills in early childhood, have more behaviour problems in school and at home, are more likely to drop out of high school, and those who do graduate are less likely to enrol in or graduate college and are more likely to be poor themselves when they are adults.

The most intuitive explanation for this difference is that well to do parents can spend more than poor parents on their children and that these "investments" lead to better outcomes for their children. This intuition fit the interests of policymakers looking for simple solutions to alleviate poverty and its apparent by-products: If poor children fail because their parents cannot make sufficient monetary investments in their future, then government can improve the life chances of poor children by providing families with the means to make the investments or by providing the investments directly in the form of schooling and health care infrastructure, and other human capital development inputs. Such

investments presumably also promote economic growth as the "higher quality" children grow to adulthood.

The literature distinguishes *child labour* and *child work*, where the latter is the more unharmful and probably healthy kind, and includes helping household in various chores and household activity. These activities may take place after school hours or during holidays more intensively and are probably inevitable in rural areas. ILO's Minimum Age convention authorizes the employment of children above 12 or 13 years in certain type of light work under certain conditions (Boockmann, 2010). On the other hand, child labour is defined as the participation of school-age children on a regular basis in the labour force in order to earn a living or to supplement household income. Child work, therefore, prevents school participation and also possibly exposes children to health hazards. In the same manner, child work even though not hazardous retards education among children. In some situations, regular child work can lead to child labour if parents do not become altruistic and invest in their children's education. This thesis focuses on child work rather than child labour which is more forbidden according to the ILO Convention.

Children in poor families are believed to contribute to income generation in their homes. Empirical studies reveal that children contribute as high as one third of household income at times and their income source cannot be treated as insignificant by poor families (Patrinos & Psacharopoulos, 1995).

Another form of child labour is child work which is a widespread and growing phenomenon in the developing world. ILO (1996a) estimates put the

prevalence of child workers at 250 million in the World, out of which 61 percent is in Asia, 32 percent in Africa and 7 percent in Latin America. The same source also indicates that 120 million children are full time workers and 80 percent of them are between 10-14 years of age. In terms of child labour force participation rates in Africa ranks highest with 33 percent in East Africa; 24 percent in West Africa and 22 percent in middle Africa, followed by East Asia and South Asia with 20 and 14 percent respectively. The above information indicates the intensity of child workers and the necessity to address it, in order to eliminate its adverse effects on human capital development and the future growth potential of developing countries.

Many reasons account for why children are involved in work both at home and outside the home. Most children work to support the incomes of their parents in the home. Lack of proper parental care could also be an important factor contributing to child work. This happens especially among children of single female parents. These parents leave home early to work and come back late only to find their children either asleep or out of the home. The implication is that the day's activities of these children are not effectively monitored. This brings a trade off between child educational attainment and their involvement in economic activities. The result of this is the low capital formation and low level of development in most less developed countries of which Ghana is no exception. For example between 2003 and 2006 the Gross Enrolment Rate (GER) in Ghana increased from 87 to 94% and the Junior High School (JHS) enrolment rate from 73-77% but completion rate reduced drastically. The completion rate of primary

school which is currently 85% and the completion rate in JHS is 65% should have been higher but for the above reasons among other expectations were far below. There are significant accomplishments in relation to the 2003 – 2015 Education Sector Plan (ESP) despite the shortfall. In spite of this progress in the Ghanaian educational sector, there is still much to be done. In rural areas and other peri-urban towns in Ghana, one observes that many children of school going age are involved in economic activities during school hours. The cause could be numerous. Some parents, especially women headed households, are unable to offer the necessary educational support for their children of school going age. Such support includes books, meals and regular payment of school fees.

One of the major constraints in Ghana's growth challenge has been the lack of human capital development. The enrolment rates have not been picking up fast and the future trend on human capital does not look optimistic. The non-school attendance rates in Ghana are very high with wide gender disparities. The 2005/06 Ghana Living Standard Survey (GLSS) data indicate that one in every three girls and one in every four boys does not attend school. The rural non-schooling is still higher than the urban non-schooling rates, with 37 percent for girls and 28 percent for boys. *Ghana 2000* in its strategy for accelerated growth in Ghana argued for massive investment in primary education as a way of building the necessary human capital for sustainable growth (World Bank, 1993). The role of microfinance in promoting children education has therefore become very significant. Thus access to savings and credit by women has become a central focus and an area of great attention to most development partners. In most

developing countries, child welfare and education are left into the hands of women. This is not to say that men are not concerned about children's education but the reality is that women are more altruistic than men in terms of child welfare. In this regard microfinance provides women the opportunity to save for example towards child education.

Microfinance has proved to be contributing to children's education in some spheres of the globe. For example in a focus group discussion conducted by MicroSave (2011) in Sri-Lanka, women save with MFIs for several reasons. Prominent among them is that they feel children's savings is critical in order to ensure access to a solid education (more than 30%) and to prepare for marriage, especially in the case of girls. Besides, social occasions are also very important as clients generally do not have a choice because of social compulsion. Unforeseen emergencies, like accidents and hospitalisation, were the third most important reason to save. Business expansion and starting a new business were the other important reasons for clients to save. In addition to these, other reasons mentioned included meeting working capital needs of a business, for old age, for inheritance to children, and savings to buy land and property and to meet medical expenses being the least (less than 5%).

In a similar development, in Nepal the most common reasons to save with MFIs by women was to cater for children education and illness. The reasons why people save for their children include education, marriage and the desire to leave an inheritance. With regards to illness, people usually cannot plan for these expenses and thus, when in need, they have to borrow from friends or from other

sources at high interest rates (MicroSave, 2011). Even though in the literature women have shown some level of altruism for their children, the outcomes of this attitude is yet unknown. Again, we are not sure of such attitude among Ghanaian women who benefit from microfinance funds. It is therefore important to investigate the relationship of microfinance and child education in the Ghanaian context.

Microfinance and child health

Poverty, which is widespread in rural peri-urban areas, is often closely associated with poor nutrition and poor health and "on a global scale, probably the leading cause of increased host susceptibility to infection is malnutrition" (Morris & Potter, 1997). Hence, impoverished persons who have nutritional deficiencies, parasitic diseases, and poor health, and who have little access to health services, have greater susceptibility to infectious diseases whatever the mode of infection (Stillwagon, 2002). Moreover, nutrient deficiencies result in infections lasting longer than in well-nourished individuals (Grellier & Omuru, 2008). The victims are majority of children of women who are single parents. Such women are poor because they do not have any source of income-generating activities. They therefore resort to microfinance as a way of accumulating savings and accessing credit. It is therefore logical to argue that there is a link between microfinance and health especially among beneficiaries, children.

The link between microfinance and health outcomes has also been researched into. In a recent study by Hamad and Fernald (2010), longer

participation by a large sample of adult women in a micro-credit programme in Peru was strongly associated with higher haemoglobin concentration and improved food security, but not Body Mass Index (BMI), when controlling for a wide range of potential confounders. The research shows that, women who had participated for five years in micro-credit programme had haemoglobin levels that were higher by 0.3 g/dl on average than those of new clients, and food insecurity scores that were lower by 0.8.

MkNelly and Christopher (1998), of Freedom from Hunger (FFH), completed two comprehensive evaluations of Credit with Education programs dubbed "Impact of Credit with Education on Mothers and Their Young Children's Nutrition'' using Lower Pra Rural Bank as a case study. They observed that participants experienced an increase in monthly non-farm income of $36, compared to $17 for the comparison group. Participants were more likely to breastfeed their children and more likely to delay the introduction of other foods into their babies' diets until the ideal age, and they were more likely to properly rehydrate children who had diarrhoea by giving them oral rehydration solution. These impacts paid off in a significant increase in height-for-age and weight-for-age for children of participants. In a similar instance, Pitt, Khandker, Chowdhury, and Millimet (2003), conducted a study in Rural Bangladesh on microfinance clients and non-clients. They found substantial impact on children's health (as measured by height and arm circumference) from women's borrowing, but not from male borrowing, which had an insignificant or even negative effect. The positive impact of child health among women can be attributed to growing income

from women's businesses but there is the need to conduct further investigations in other settings to confirm existing evidence.

Access to micro-credit may also improve the health of the children of clients in terms of (a) protective behaviours (such as sleeping under a mosquito net (Brannen, 2010), and (b) nutritional status for families in particularly stressed environments (Doocy, Teffera, Norell, & Burnham, 2005). However, Doocy and colleagues' findings are only significant for some of the geographical areas investigated. When one considers nutrition as an indication of health, Doocy and her colleagues find that established and new borrowers have better nourished children than non-borrowing community controls, suggesting that borrowers are quite different from non-borrowers. It is worth noting that Doocy et al. (2005) do find that it is largely the female clients (and not male clients) who invest in their children's nutrition.

The Ghana Health and Demographic Survey (GSS, 2008) reports that weight-for-height index (a proxy for BMI) gives information about children's recent experience with food intake. This indicator also measures the level of wasting. Wasting represents failure to receive adequate nutrition in the period immediately preceding the survey and may be the result of recent illness or of seasonal variations of food. Wasting generally decreases as mother's level of wealth quintile increases indicating a direct link between income levels and children's health. The implication is that if micro-credit leads to increase in income of clients especially women, then it can promote child's health.

Gender and access to credit

Gender explains the social construct of what an individual is expected to do and behave in society. Gender does not usually refer to sex as it is normally thought of. For example it could mean the differences in occupational ability of men and women, differences in access to some resources between men and women. Whatever the definition, gender compares the socio-economic attributes between men and women.

The term gender therefore, refers to the economic, social, political and cultural attributes and opportunities, associated with being male or female. In most societies, men and women differ in the activities they undertake, in access to and control of resources, and in participation in decision-making. And in most societies, women as a group have less access than men to resources, opportunities and decision-making (Desprez-Bouanchaud et al. 1987).

Despite this definition, gender is often misunderstood as being the promotion of women only. However, gender issues focus on women and the relationship between men and women, their roles, access to and control over resources, division of labour, interests and needs. Gender relations affect household security, family well-being, planning, production and many other aspects of life (Bravo-Baumann, 2000). One important issue of concern is that of access to finance creates disparity among men and women owned enterprises. This is because in all countries men differ in all aspects of endeavours so it is by no chance that they also differ in access to financial resources.

This phenomenon has the potency of pulling back the effort of achieving the MDGs by 2015. It has been articulated that access to finance is key to alleviating poverty through the creation of microenterprises especially in the informal sector. Again, gender gap also widens the poverty gap between men and women. Empirical evidence from recent studies show that across gender, women owned enterprises lack formal financial resources and even informal financial resources as compared to men owned businesses.

Some studies has shown that lack of access to finance has been identified as the second most important constraint to doing business in some African countries such as Tanzania, falling only marginally behind access to infrastructure (World Bank, 2004). The same study reports that gender gap in access to credit in Tanzania shows that men are twice as likely to be banked as women and only 6 percent of female business owners have any type of banking relationship, compared to 11 percent of male business owners, and the most common type of banking service used by males and females is a savings account.

Across gender, financing new businesses differs widely in terms of start-up capital. For example, Ousmane and Hallward-Driemeier (2011) find that in four African countries, there is a gender gap in capital at the start up of a business. Although start-up capital gender difference is higher along sector than by gender, the median capital for male entrepreneurs is more than twice that of the female entrepreneurs. This is an indication that female entrepreneurs face larger entry barriers than their male counterparts, but that as they progress they are not constrained with top-up capital in subsequent years.

The literature documents a host of factors that cause gender differences in access to credit. For example Bigsten and Söderbom (2011) explain how entrepreneur capabilities are likely to be correlated with both the ability to obtain credit and general firm performance. The gender disparity in access to credit will have to be revisited by way of making finance more accessible to women entrepreneurs because the notion that they (female business operators) are not productive does not hold, assuming the neo-classical theory of efficiency-augmenting argument holds. For example according to Amendariz and Morduch (2007), theoretically, lending to women have advantage for the institution and may enhance economic efficiency taking into account the fact that they are poor, less mobile and are risk averse.

There are however, several factors that have been identified as causing gender gap in access to credit. Socio-economic variables such as the borrower's gender, age, household wealth and/or asset values (Zeller, 1994), educational level and access to network information (Vaessen, 2001) can influence the probability of a borrower's credit being rationed. Men may be perceived by lenders as more credit-worthy than women because they generally control household resources. Household wealth and/or asset values are important as collateral and male control of these can reduce the probability of credit rationing. Educational attainment enhances human capital in the form of skills, which is associated with effective utilization of credit and minimization of default risk. Access to network information enables the screening of potential clients and reduces default risk, as

only those with good reputations are likely to be recommended for credit (Okurut & Schoombee, 2007).

Geographically, entrepreneurs in urban areas are likely to have easy access to credit than rural counterparts. For example, Kumar and Francisco (2005), report that there is a large variation in branch density across different regions in Brazil and argued that well branched regions in Brazil would be expected to ease physical access and also lower information asymmetry problems as a consequence of greater ratios of banks per firm and they argued that the firms located in these regions have easy access to credit.

Byiers et al (2010) using data from Mozambican manufacturing firms also found that sector seems important for having credit access. The results of their research indicated that both metal-mechanic and wood-furniture sectors have significantly lower credit access than the food processing sector. Their interpretation for this was that banks attach a lower risk premium to food processing sector compared to other two sectors. On the other hand some industries are more likely to depend on external financing than others, depending upon project scale, and cash flows. Firms in certain sectors will require more credit to invest in equipment, machinery, buildings, labour and raw materials than firms in other industry sectors. For instance, the industries with more capital requirements may face proportionately greater constraints (Kumar & Francisco, 2005). In another research by Silva and Carreira (2010) they argue that, for most services, the main input is human and not physical capital and therefore service sector firms find it hard to use this physical capital as collateral when resorting to

external finance. The implication is that credit concentration of financial institutions is a function of economic activities, profitable economic activities attract more financing than others.

Gender differences also exist in ease or otherwise of accessing credit. A research conducted on behalf of the German Technical Co-operation (GIZ) by A2F Consulting (2012) in six Sub-Sharan African countries including Namibia, Botswana, Uganda, Malawi, Zambia and Rwanda. In all the six countries studied, the level of income and education seem to have the strongest impact on women's access and usage of financial services. According to the report, the two often go in parallel so that well-educated women are in better and more stable jobs or run more successful businesses and as a result are able to source for credit without difficulty. As such, the difference in usage of financial services between men and women diminishes considerably at higher levels of income and education (A2F Consulting, 2012).

In another development, convenience, easy and quick processing were repeatedly mentioned as important factors in deciding where to apply for a loan. Women tend to be more time-constrained than men, as they have main or often sole, responsibility for their household and children's care, in addition to being involved in income-earning activities. As a result of their increased responsibilities, they only have limited time available to do banking/financial transactions or to running their business. The simpler and easier requirements to borrow from a MFI, from a loan and saving revolving scheme or, in emergency cases, from a moneylender can make these options more attractive than applying

for a loan at a bank, even if taking into consideration the higher interest rates. This can be an important factor in explaining gender differences in the type of formal credit used and is considered a key barrier in women's ability to access financial services.

Impact methodology issues

In the microfinance landscape, practitioners and policy makers are focused on how best to deliver financial services to the poor on the most sustainable basis. With the push toward financial sustainability and outreach, client level impact assessment has been marginalized in favour of the assessment of institutional performance that takes into account how well an MFI is doing. However, this has begun to change in recent past. Responding to demands by practitioners, donors and policy makers, a great deal of attention has been given to developing middle range approaches to impact assessment that are at once credible, cost effective and useful. Evaluations of the performance of microfinance institutions (MFIs) with their emphasis on sustainability and outreach, place a premium on financial criteria. Conventional wisdom has it that clients will automatically follow if the services are available, and high rates of repayment and repeat borrowing can be taken as proxies of client satisfaction and are indicative of a positively valued service. However, such measures fail to answer the persistent questions that are at the centre of impact assessment basically who these programs reach and whether and how they make a positive difference to clients' lives and that of their households.

The challenges of microfinance impact evaluations which (Morduch, 1998) address is to account for participant selection and program placement biases (Coleman, 1999); Pitt and Khandker (1996) did this using a specific model, and Khandker (2005) adds data on the same households to construct a panel, putatively overcoming at least the problems for evaluation posed by participant selection. A number of studies have attempted to replicate the findings of the original Pitt and Khandker and Khandker studies. For example, Morduch (1999) contested but was seemingly refuted by Pitt (1999) with considerable effort and difficulty replicated Pitt and Khandker, producing variables which in some cases differ significantly from their equivalents.

Measuring the impact of microcredit programs is a challenging task because establishing 'causality' between credit effects and changes in the outcome of interest is complicated by the well known problems of self-selection and program placement biases that are inherent in such programs (Pitt & Khandker, 1998). Self-selection is a problem because participants may already have initial advantages such as better entrepreneurial ability that can translate into higher outcomes variables, even without micro-credit. For example in a study about Peruvian MFI, Tedeschi (2008) discovered that differences in income posed selection problems. The main challenge is therefore to address the counterfactual question. MFIs may also design their credit programs to fit into specific districts or specific groups and screening may be based on criteria that influence outcomes of interest. Self-selection and program placement decisions in principle do not pose problems if they are based on known and measurable variables, because then they

can be easily controlled for empirically. The problem however is that these decisions are often based on unobservable variables. In the absence of "comparison" and "treatment" groups, credit impact assessments that do not account for these problems are likely to be biased (Armendáriz & Morduch, 2010; Tedeschi, 2008).

How microfinance impact studies have dealt with these problems varies. One strand of literature that is common among MFI practitioners simply compares existing clients (treatment group) with new entrants with similar characteristics or covariates (control group). Although simple to implement, this method is criticized for attributing the mean difference between the two as impact without dealing with selection problems (Tedeschi, 2008).

A second methodology that relies on cross-sectional data deals with the selection problem. In overcoming these problems most studies have adopted instrumental variables (IV) and quasi-experimental techniques that exploit the nature and timing of program designs. One of the earliest and most cited studies in this line is Pitt and Khandker (1998) who used cross-sectional data from Bangladesh and employed a quasi-experimental survey design to instrument non-random program placement and self-selection issues. However, such instrumental and experimental designs are often coincidental and difficult to replicate. Moreover, these approaches assume that the initial conditions of control and experiment villages are identical.

Another approach that has received considerable attention in recent microfinance impact analysis is pre-designed randomized experimental approach

(Karlan, 2007). These designs that randomize over observable and unobservable attributes of participants and non-participants would, in principle, provide unbiased estimates. Unfortunately, randomization does not come without problems. For example, such designs are time consuming and costly to undertake. The goal of randomly assigning individuals to interventions is to create equivalent groups. Random assignment ensures that if there are any systematic or unmeasured differences within the sample, the differences will be randomly distributed among interventions, but random assignment does not guarantee that sample groups will be balanced or equivalent. With small sample sizes, it is quite possible to have unequal assignment of cases such that one group has more high or low severity cases. Random assignment generates balanced groupings only when there are large enough numbers to average out any chance of asymmetries.

A fourth strand of recent literature uses panel data to mitigate the biases present in cross-sectional studies. Assuming strict endogeneity between selection variables and time-varying unobservable variables that could affect the outcome of interest, fixed effect panel data methods can provide consistent estimates by differencing out time-invariant unobserved individual and village effects (Wooldridge, 2002). Khandker (2005), Copestake et al. (2005) and Tedeschi (2008) relied on this assumption and used a fixed-effects approach to analyze the impact of credit. The fixed-effects estimator is however critically dependent on this strict heterogeneity assumption, particularly on the assumption that the time-invariant heterogeneity is the only potential source of selection bias.

Finally, there is problem of attributing any change that is found in the circumstances of the beneficiaries specifically to the credit intervention. Normally, microfinance interventions take place alongside a whole array of social and economic projects, all aimed at promoting development. Consequently, other events and changes occur while the intervention is taking place, and this may make it virtually impossible to separate out the specific impact of credit programs (Johnson & Rogaly, 1997). The use of control and experiment groups allows, at least to a limited extent, the isolation and capture of programme benefits. In the light of the above this study uses the control and experimental groups to resolve some of the problems in assessing the impact of micro-credit in the study areas.

Conclusion

Previous studies have indeed shown that microfinance produces mixed results. Whiles several studies have been conducted Sub-Saharan Africa, little evidence exists on Ghana. Results are also mixed due to methodological differences. In filling the gap, it is important to examine the impact of microfinance by using mixed estimation approaches. Again, the success story of microfinance cannot be complete without evidence from Ghana.

CHAPTER FOUR

STUDY METHODOLOGY

Introduction

The chapter begins with a description of the study areas, research design, data, sample and sampling techniques as well as instruments used for data collection. The chapter continues with presentation of theoretical underpinnings of the study including household profit maximization, access to micro-credit and its impact on child work, education and health.

The study areas

The study focuses on two main areas: Mfantsiman Municipality in the Central region and Sekondi-Takoradi Metropolis in the Western region. This section discusses the background of the two study areas (Figures 1 and 2).

Mfantsiman Municipality (Figure 1) is one of the districts in the Central Region of Ghana. It is bordered on the West by Abura-Asebu-Kwamankese District; on the North-West by Assin South district, on the East by the Gomoa East District and on the south by the Gulf of Guinea. The Municipality covers about 612 sq km and the proportion of land area to the region is in the ratio 1:16. The Municipality with Saltpond as the capital has population of 152,855 constituting 9.6% of the total population in the region. There are 36,316 households in the Municipality with average house hold size of 4.2 lower than the regional and the national levels. In the Mfantsiman Municipality, household heads

constitutes 22.7% of the total population. Overall most household heads are between the ages of 25-49. In terms of sex however, the situation is different. Males tend to assume household headship at younger ages than females. At least 10% of male household heads in the Municipality are between 25-49 years. The concentration of male household heads is in the age range 25-49 years, while that for females is 40-54 years.

The major economic activities are trading, services, value addition, fishing and farming. More than 50% of the population engage in small scale trading activities. Women are the majority of those in trading activities. Such activities include sale of food items, chop bar operators, and sale of second hand clothes. Those in the services sector engage in hair dressing, auto repairs, tailoring and dress making. The main value addition activity is kenkey production. In the municipality, Yamoransa is well noted for kenkey production. Fishing is mostly undertaking by men in the communities located along the sea. The output is processed by the local women for direct sale to the surrounding communities.

Mean annual household cash expenditure by region and expenditure group according to the GLSS 4 shows that in the Central region an amount of GHc 208.75 is spent on food items as compared with GHc 346.58 for the whole country. The highest expenditure is incurred on food and beverages GHc 105.83 (50.7%) and the least on transport and communication GHc 7.43 (3.6%).

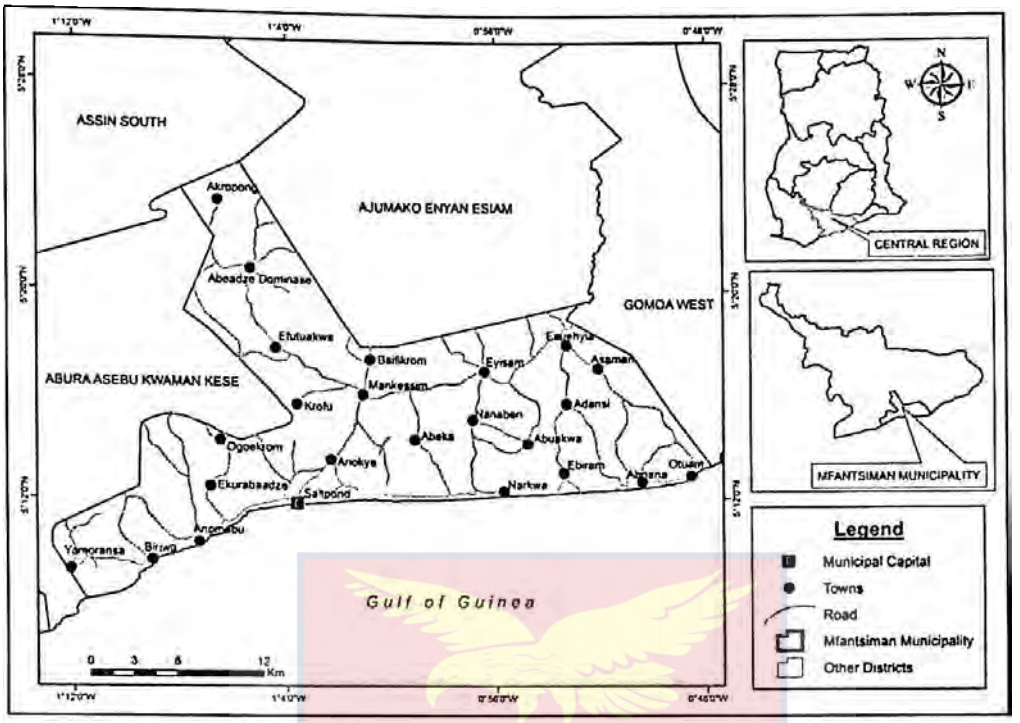

Figure 1: Map of Mfantsiman Municipality

The Sekondi-Takoradi Metropolis (Figure 2), with Sekondi as the administrative capital, occupies the south-eastern part of Western Region. It shares boundaries with Ahanta West, Shama and Komenda-Edina-Eguafo-Abrem (KEEA) Municipal. It is located on the coast, about 200 km west of Accra. This makes it the smallest, but easily the most highly developed of the 13 districts of the Western Region. Indeed, it is the third largest metropolis in the whole of Ghana. The Metropolis, as a gateway to the region offers the best facilities for tourists. Heritage, culture, beaches and ecology serve as one of the main tourism products. About 69% of the population live in urban communities whereas 31% in rural in 2000; however there has been tremendous increase in the urbanization

from 69% to 72.9% and rural decrease from 31% to 27.1% as at 2010. Most of the socioeconomic infrastructures are densely concentrated in the core urban centers of the metropolis such as Takoradi and Sekondi with sparsely distributed facilities at the peri-urban and rural communities.

The metropolis has a number of manufacturing industries such as cement, cocoa, timber processing and other small scale industries. There are also individuals in micro enterprises such as confectionery, sachet water production, batik, tie and dye and leather works. The major agro-processed items are cassava and palm kernel and fish that are mostly smoked. Examples of existing industrial set-ups include paper manufacturing, timber processing, metal fabrication, micro enterprises, and agro-processing. The recent oil discovery in the region puts the metropolis at a greater advantage over the other districts in the region. Financial institutions are springing up including microfinance institutions thus the metropolis becomes a unique case to study.

The major economic activities in the area include trading, processing, value addition, fishing and farming. More than 50% of the population engage in small scale trading activities. Such activities include sale of food items, chop bar operators, and sale of second hand clothes. Women constitute the majority in trading activities in the area. For example, the dominant employment forms for women in the study communities are petty trading, food crop farming, fish mongering and food vending which are typical informal economic activities in Ghana. A few other economic activities identified include dress making and hair dressing but these normally form an insignificant proportion of occupations

women are engaged in. About 30 percent and 32.7 percent of the women are into farming and petty trading, respectively. For those who do petty trading the commodities traded in are mostly food stuffs. Those in the services sector engage in hair dressing, auto repairs, tailoring and dress making. The main processing activity is timber. Takoradi is well noted for timber processing. Fishing is mostly undertaking by men in the communities located along the sea. The output is processed by the local women for direct sale to the surrounding communities and greater percentage is transported to nearby market centres.

The mean annual household cash expenditure by region and expenditure group according to the GLSS 4 shows that in the Western region an amount of GHc 376.20 is spent on food items as compared with GHc 346.58 for the whole country. The highest expenditure is incurred on food and beverage GHc 166.61(44.3%) and the least on housing and utility GHc 18.71 (5%).

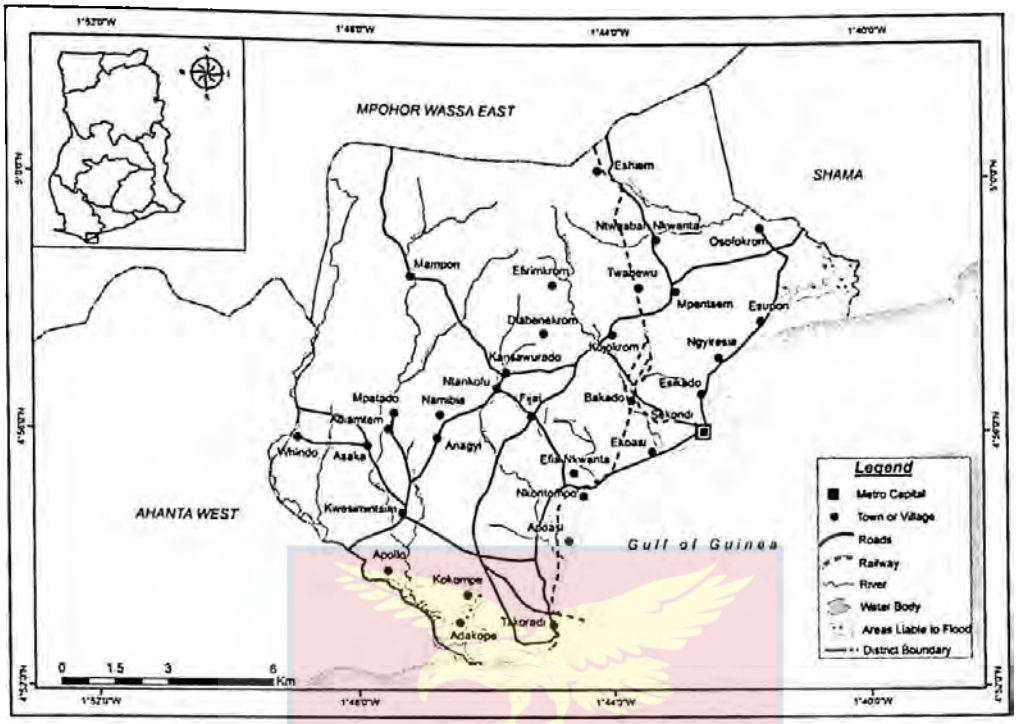

Figure 2: Map of Sekondi-Takoradi Metropolis

Theoretical framework

This section develops the theoretical basis for estimating the empirical models. The theoretical foundation of this thesis is the neo classical framework and the ordinary demand theory from the Keynesian demand for money. This theoretical framework is also built on the studies of Blancard et al. (2006) and Karlan and Zinman (2005). These studies mainly consider a representative profit-maximizing firms or utility maximizing households with a possibility for input credit constraint. However, there are three fundamental assumptions in the neo-classical economics for credit demand:

1) Business operators are rational;

2) Individuals and firms maximize utility and profit and

3) Individuals behave independently and with full information.

Demand theory assumes that demand for loan is linear and is a function of household characteristics, enterprise characteristics, community level characteristics as well as price of loan (interest rate).

The foundation of this thesis is the first two assumptions. First we model profit maximization behaviour of business operators assuming they make rational decision to join an MFI or otherwise and to take loan or otherwise. Since each entrepreneur is the sole owner of the enterprise, the firm is the same as the individual operator and for that matter the unit of analysis could either be the operator or the enterprise. From the profit maximization function, we develop the probability or otherwise of accessing credit with ease or otherwise and business outcomes. Probit and IV-Probit equations are therefore used to estimate the factors that are likely to determine ease or otherwise of access to credit. The propensity scores matching (PSM) and the treatment effect models are used to estimate the impact of access to micro credit.

Business outcomes

The profit maximization model is based on the following assumptions following Joshi (2005) with an extension of his model by including household, community level and enterprise characteristics:

1. Business operators live in a risk-neutral world where they always attempt to maximize their expected profits;
2. A one period model for the sake of simplicity;
3. Borrowers do not engage in strategic default;
4. Limited income for consumption is assumed meaning individuals only consume out of profits they harvest;
5. Business operators borrow (clients) from MFIs whiles non-clients use their own resources or borrow from other sources;
6. The level of technology under which businesses are operated remains the same for all business operators; and
7. There are no idiosyncratic shocks such as sickness of entrepreneurs

To begin with, let S (C, E, X, Ω , Θ) represent the function of entrepreneur's sales.

Where C = micro-credit input

E=enterprise characteristics

X=entrepreneur and child characteristics

Ω=location (community) characteristics

Θ = uncertainty parameter representing sales risk.

Let us also assume for simplicity that S is increasing in all its arguments following the unpublished work of Joshi (2005) where:

$\frac{\partial S}{\partial i} > 0$, $\frac{\partial S}{\partial j} > 0$, $\frac{\partial^2 s}{\partial i^2} < 0$, $\frac{\partial^2 s}{\partial j^2} < 0$, and $\frac{\partial^2 s}{\partial i^2 j^2} < 0$ for all inputs *i* and *j*.

The entrepreneur's aim is to maximize his expected sales revenue by choosing a level of C to complement his endowment of productive assets. This is because naturally all entrepreneurs are assumed to possess some amount of resources which might not be enough for investment. Thus, micro-credit complements what they already possess for undertaking investment activities. Clients borrow micro-credit C at interest rate *r* at the beginning of the period (usually each loan cycle lasts for four months). At the end of the four-month period loans are re-paid at the rate of *(1+r) C* (the principal amount plus interest) after selling outputs at price *p* where *p* is a non-negative random variable.

As usual prices are uncertain and business owners do not have any control over them thus, this could be a source of risk. Again businesses are full of risks (ó) which are outside the control of business operators. The combined risk is the therefore price risk and business risk denoted by *pó*. Sales levels are therefore affected by the combined risk which entrepreneurs are concerned about and the risks are assumed to be multiplicative in nature. The net revenue obtained from sales S is therefore:

$$S = \Theta S(C, E, X, \Omega, \Theta) \qquad (1)$$

Where Θ is a non-negative random variable. Let $\theta = p\,\Theta$ as income uncertainty and θ is a non-negative random variable with cumulative distributive function $F_\delta(\theta)$ defined over some finite interval ($\underline{r}$, $\bar{r}$) and δ is the borrowers risk type.

The objective function that entrepreneurs seek to maximize is taking into account a certain amount of micro-credit (C). We therefore maximize S(*pó*):

Max U = S(*pó*) subject to micro-credit (C), household characteristics (X), and enterprise characteristics (E) used as input in the enterprise. Using the Hamiltonian rule for computing present value of revenue which takes into account current utility and any increase in capital stock as a function of shadow prices of the inputs (such as interest rate on loans):

$$\prod = \int_{\bar{r}}^{\underline{r}} S\theta\, \partial F_\delta\,(\theta) - rC[1 - F_\delta(\theta)] \qquad (2)$$

Using integration by parts we have:

$$\prod = \int_{\bar{r}}^{\underline{r}} S\theta\, \partial F_\delta\,(\theta) - \theta - \theta \partial F_\delta(\theta) - \int_{\bar{r}}^{\underline{r}} F_\delta\,(\theta)\partial\theta \qquad (3)$$

Substituting equation 3 into the optimization problem:

$$\text{Max}_C \quad \prod = \int_{\bar{r}}^{\underline{r}} S\theta\, \partial F_\delta\,(\theta) - rC[1 - F_\delta(\theta)] \qquad (4)$$

We obtain:

$$\prod = S(.)[\theta - \partial F_\partial(\theta) - \int_{\bar{r}}^{\underline{r}}[1 - F_\partial\,(\theta)\partial\theta - \theta S(.)[-F_\delta(\theta)] \qquad (5)$$

This implies that: $$\prod = S(.) \int_{\bar{r}}^{\underline{r}}[1 - F_\partial\,(\theta)\partial\theta \qquad (6)$$

and $$\frac{\partial \prod}{\partial c} = \frac{\partial s}{\partial c} \int_{\bar{r}}^{\underline{r}}[1 - F_\partial\,(\theta)\partial\theta - \bar{r}_C(S)[1=F_\delta(\theta)] \qquad (7)$$

From equation (7): $S_C = \int_{\bar{r}}^{r}[1 - F_\theta\ (\theta)\partial\theta - r(1-\varepsilon)[1=F_\theta(\theta)]$ (8)

where $\bar{r}_C = \frac{r}{s}(1-\varepsilon)$

The first order condition requires that $\frac{\partial \Pi}{\partial c} = 0$

Thus: $S_C = \int_{\bar{r}}^{r}[1 - F_\theta\ (\theta)\partial\theta - r(1-\varepsilon)[1=F_\theta(\theta)] = 0$ (9)

Simplifying equation (9) and using the implicit function theorem gives equation (10):

$$\Pi^* = \Pi^*(X, C, \Omega, E, r) \quad (10)$$

The first order condition implies that the profit maximizing loan size (Π^*) may be represented as a function of micro-credit C, interest rate factor r, the borrower characteristics X, enterprise characteristics E, as well as location (community level) characteristics L. In a linear form we have which represents the demand function of the business operator. Normalizing interest on loans to one (r=1), amount of credit that maximizes sales revenue is a function of borrower characteristics, enterprise characteristics and location characteristics. Thus, equation (10) becomes:

$$\Pi^* = \Pi^*(X, C, \Omega, E,) \quad (11)$$

Moreover, using the implicit function theorem, the second order condition from (11) gives:

$\frac{\partial \pi^2}{\partial c^2} = \pi_{cc} > 0$: Micro-credit impact positively business profits. The relationship between micro-credit and sales, stock of goods, expenditure holds the same as that of profits. Thus, in a similar situation using the implicit function theorem:

$\frac{\partial^2 S}{\partial c^2} = S_{cc} > 0$: micro-credit impact positively on sales

$\frac{\partial^2 Exp}{\partial c^2} = Exp_{cc} > 0$: micro-credit impact positively on business expenses

$\frac{\partial^2 G}{\partial c^2} = G_{cc} > 0$: micro-credit positively business stock

Ease of access to micro-credit

The indirect form of (11) can be taken as the demand for micro-credit function where 'ease of access' (EA) is a function of entrepreneur characteristics (X), profits ($\prod$), enterprise characteristics (E) and community characteristics (E). Modifying equation (11) gives:

$EA = (X, \prod, \Omega, E,)$ (12)

Ease of access is assumed to be 1 (easy) or 0 (difficult). A respondent is assigned 1 if he or she reports that there is no difficulty 1 obtaining credit and 0 if obtaining credit is difficult. The use of 1/0 is equivalent to access (1) and no access (0). Easy access means clients are offered loans and difficult access means clients are refused. Equation (12) is estimated using the probit models as explained subsequently.

Empirical models and estimation techniques I

The empirical models to be estimated are based upon equation (11) and (12). The next step is to transform equation (11) into a probability model, specifically the probit model in order to determine the likelihood of microfinance

participation. After, this the Propensity Scores Matching (PSM) is used to estimate the impact of micro-credit on clients' businesses and their households. Participating in microfinance is denoted by either client or non client and beneficiary or non-beneficiary. Since not becoming a client does not necessarily makes one a beneficiary, the study focuses on client status instead of participation status. The participation equation therefore takes into account whether respondent is client or otherwise and has benefited from credit or not. The participation equation is therefore modelled as follows:

$\Pr(B_i = 1 | \Upsilon_i) = \phi[(\Upsilon_i)]$

$B_i = 1 \quad \text{if } Cl^*i > 0$

$= 0$ otherwise

Where Υ = X, Ω, E, C and X, Ω, E, C are as defined before and Cl_i is binary response denoting '1' if observed respondent is a beneficiary of micro-credit and '0' if otherwise and ϕ is the coefficient for each of the factors (household covariates, enterprise characteristics and community level variables) Xi explaining the ease or otherwise in obtaining credit. Cl_i represents the unobserved latent variable and $\upsilon_i \sim N(0, 1)$. The outcome equation is therefore:

$\Upsilon_1 \mid$ X, E, Ω, C: for beneficiaries

$\Upsilon_0 \mid$ X, E, Ω : for non-beneficiaries

From the outcome equation, the impact of micro-credit is empirically specified as follows:

$$Business\ Var = \alpha_0 + \alpha_1\ (Pastcredit\ record) + \alpha_2(\beta_1 Location) + \alpha_3(Economic\ activity) + \alpha_4 Household\ size + \alpha_5\ (Level\ of\ reading) + \alpha_6\ (Level\ of\ education) + \delta_A\ (Beneficiary\text{-}Non\ Beneficiary) + u$$

Business variables include profits, sales, stock, and average business expenses. In the case of ease of access to credit the following equation will be estimated:

$$EaseAccess = \beta_0 + \beta_1(Pastcredit\ record) + \beta_2(Location) + \beta_3(Economic\ activity) + \beta_4\ (Household\ size) + \beta_5\ (Level\ of\ reading) + \beta_6\ (Level\ of\ education) + u$$

The main estimation technique adopted is the propensity scores matching which is discussed in the subsequent paragraphs.

The propensity scores matching (PSM) which is a semi-parametric can be used to create groups of treatment and control units that have similar characteristics so that comparisons can be within the matched groups. The PSM usually assumes that all confounders that affect both treatment assignment and the outcome can be observed. Unfortunately, this assumption cannot always hold and therefore there is the need to find a variable that affects the treatment assignment but not the outcome. This calls for another estimation technique, instrumental variables (IV).

Assume that functionally, the probability of participating in a programme is given by:

$$\text{Prob}\ (Y=1 \mid D) = f(D, X) \qquad (13)$$

and non-participation by:

$$\text{Prob}\ (Y=0 \mid D) = 1 - f(D, X \qquad (14)$$

Where Y is the outcome of the programme, X is covariates of household characteristics and D represents participation or non-participation, then the programme's impact M can be estimated by:

$$M=Y_{1i}-Y_{0i}|D_i=1 \quad (15)$$

Where $D_i \epsilon (0, 1)$ is indicator of the treatment actually received by individual i, Y_{1i} is of client i if one were expected to be the treatment and Y_{0i} is the outcome client i if one were not expected.

The expected value of the above can be calculated as

$$E(M) = E(Y_{1i}-Y_{0i} \mid D_i=1) \quad (16)$$

The outcome of participation can be observed while non-client is conditional upon the presence of the programme only. Thus the observed outcome for participants and non-participants can be formulated as:

$$Y_i = D_iY_{1i} + (1-D_i)Y_{0i} \quad (17)$$

Representing the actual observed outcome of client,

In a standard econometric form, outcome will be measured using the following equation:

$$Y_i = a+\beta Di +\delta X_i +e_i \quad (18)$$

The difference between the two groups, β, is the parameter (co-efficient) of interest. In order to arrive at an appropriate estimate of the impact, the propensity score matching (PSM) will be used following the works of others (Rosenbaum & Rubin, 1985; Heckman, et al 1997; Abadie et al 2001; Becker & Ichino, 2002; Khwaja et al, 2006). The probability for outcome has a value of $0< P(X) <1$ and can be computed as:

$$P(X) = Pr\ (D=1 \mid X=E\ (D \mid X) \qquad (19)$$

The study will adopt the qualitative response model (QRM) that can conveniently be estimated using the maximum likelihood estimation (MLE) method and the cumulative distribution function (CDF) through the probit model (Gujarati, 2006). The next step is to match the scores from the PSM to identify the average treatment on the treated (ATT) which measures the impact with reference to the control group.

Matching of Scores

Even though several matching methods are available, most studies (Becker & Ichino, 2002; Arun, Imai & Sinha, 2006) have used the nearest neighbour (NN) matching. Nearest neighbour matching is the method that takes each treated unit and search for the control unit with the closest propensity score.

Let T be the set of treated units (i.e. households with access to MFIs) and C be the set of control units (*i.e.* households without access to MFIs), and $T_i\ W$ and $C_j\ W$ be the observed outcomes. $C(i)$ denotes the set of control units matched to the treated units i with an estimated value of the propensity score of i p. In Nearest Neighbour Matching,

$$C\ (i) = \min \|P_i - P_j\|$$

Denoting the number of controls matched with observation $i \in T$ by N_i^c and define the weights $w_{ij} = \frac{1}{N_i^c}$ if $j \in C\ (i)$ and $w_{ij} = 0$ otherwise. The number of units in the treated group is N^T. Then the formula for a matching estimator is:

$$\tau = \frac{1}{N^T}\sum_{i\in T}\left[W_i^T - \sum_{j\in c(i)} w_{ij}W_j^c\right]$$

$$= \frac{1}{N^T}\sum_{i\in T} W_i^T - \frac{1}{N^T}\sum_{j\in c(i)} w_{ij}W_j^c$$

where $w_{ij} = \sum_i w_{ij}$

Endogeneity and instrumental variables

A disadvantage of the propensity score matching method is that we need to assume that we have observed all potential confounders which is impossible because one cannot be sure about that. One way round is to find a variable that affects treatment assignment, but not outcome. This brings the use of IVs. In medical science for example, non-randomized studies are necessary to assess the safety and effectiveness of medical interventions as they are used in routine practice. One of the principal problems of such studies is confounding. To the extent that differences between the groups can be measured, using econometric approaches such as propensity score matching methods, can be used to remove the confounding effects of these variables. This approach relies on statistical modeling of the outcomes of the intervention and requires that all confounding factors are accurately measured, and that the statistical model is correctly specified (Brookhart, Rassen & Schneeweis, 2010).

Some residual bias due to uncontrolled confounding is likely to be present in most comparative effectiveness research. In the same vein, in microfinance impact assessment, similar problems that occur in medical science are not uncommon. Even though PSM corrects the problem of selection bias, the problem of endogeneity might not allow the impact estimates to be consistent.

Instrumental Variables (IVs) regression in effect replaces the problematic independent variable with a proxy variable that is uncontaminated by error or unobserved factors that affect the outcome. Instrumental variables regression is designed to relax some of the rigid assumptions of OLS regression, but IV introduces assumptions of its own.

IV methods are also used to overcome measurement error problems in explanatory variables. Measurement error can arise for many reasons, including the limited ability of statistical agencies to collect accurate information and the deviation between the variables specified in economic theory and those collected in practice. If an explanatory variable is measured with additive random errors, then the coefficient of that variable in a bivariate ordinary least squares regression will be biased toward zero in a large sample. The higher the proportion of variability that is due to the errors, the greater the bias. Given an instrument that is uncorrelated with the measurement error and the equation error but correlated with the correctly measured variable, instrumental variables provide a consistent estimate even in the presence of measurement error (Angrist & Krueger, 2001). IV analysis begins with the identification of an instrumental variable, a factor that

is assumed to be related to treatment, but neither directly related to the study outcome nor indirectly related via pathways through unmeasured variables.

Two substantive properties must hold for an instrument to be a valid one. Consider the linear model:

$$Y=\beta_0 + \alpha D + \lambda X + u \qquad (20)$$

where α is the common effect of treatment. Suppose that we have a participation equation of the form:

$$P = Z\gamma + \eta, \qquad (21)$$

where $D = 1$, if $P > 0$ or otherwise if $D = 0$ and η is assumed to be independent of Z. Selection bias problem occurs if there is a relationship between u and D conditional on X:

$E(u \mid X, D) \neq 0$

If the selection problem is due to a correlation between u and Z, then we refer to it as selection on observables. Here the selection problem results from a correlation between the outcome equation unobservable and the observed determinants of participation. If the selection problem is due to the correlation between u and η, then we refer to it as selection on unobservable. Two conditions are required for a variable Z to act as an instrument in the linear model.

Condition one

The first condition is that:

$$E(u \mid X, Z) = E(u \mid X) \qquad (22)$$

This is the condition that the instrument is unrelated to the error term in the outcome equation, conditional on the included conditioning covariates.

Condition two

The second condition is that Pr (D =1 | X, Z) depends on a non-trivial way on both X and Z. In particular for this condition to be satisfied, there must be at least two values of Z, such that Z=z and Z=z' such that:

$$\Pr(D=1 \mid X, Z=z) \neq \Pr(D=1 \mid X, Z=z') \qquad (23)$$

Taking expected values of the outcome conditional on X and Z = z' , we have

$$E(Y \mid X, Z=z) = \beta 0 + \alpha \Pr(D=1 \mid X, Z=z) = \lambda X + E(u \mid X)$$

Similarly:

$$E(Y \mid X, Z=z') = \beta 0 + \alpha \Pr(D=1 \mid X, Z=z') = \lambda X + E(u \mid X) \quad (22)$$

Subtracting the second from the first yields:

$$E(Y|X,Z=z) - E(Y|X,Z=z'$$

$\beta 0 + \alpha \Pr(D=1 \mid X, Z=z) - \beta 0 + \alpha \Pr(D=1 \mid X, Z=z')$, and solving for α yields:

$$\alpha = \frac{E(Y \mid X,Z=z) - E(Y \mid X,Z=z')}{\beta 0 + \Pr(D=1 \mid X,Z=z) - \beta 0 + \Pr(D=1 \mid X,Z=z')} \qquad (24)$$

α measures the treatment effect across control and experimental group.

$$\Pr(Yi=1 \mid Xi) = (e\lambda hXi)/1 - (e\lambda hXi) = \ln(Pi/1-Pi) \qquad (25)$$

$$ln\frac{P_i}{1-P_i} = f(X, \Omega, E) \qquad (26)$$

Micro-credit, child education and health

Suppose clients take micro-credit and repay on monthly basis for a period of four months and that clients use micro-credit to undertake productive activities such that the return is spent on children education (C_e) and health (C_h) as well as

other household commodities (H). In addition it is also the normal practice for clients to save (S) part of their revenue in order to qualify for loans in subsequent periods. They also maximize from the saved amount. It is further assumed that spending on child health and education are normal goods that parents consume with rising income levels. The parent's utility (additive function) is therefore a function of child education, child health and other household commodities respectively:

$$U_p = U(C_e, C_h, H) \quad (27)$$

Where: U_p is parental utility which is a function of child education, child health outcomes and consumption of other commodities.

Equation (27) defines the component of additive utility accruing to parents from spending on their children's education and health such as school attendance, termly performance and body mass index (BMI) as well as consumption of other commodities. Parents are assumed to allocate the net revenue (R) from micro-credit where:

$$R = S_r - (1 + r)C - E_b.$$

and R=Net income from household enterprise,

S_r= sales revenue

$(1 + r)C$= monthly interest payments plus the principal loan on micro-credit obtained

E_b = other business expenses such as labour cost, transport expenses and rent (these are assumed to be constant).

Again suppose child health, child education and other household consumption are constrained by child own characteristics, household size and other community characteristics (η) such that η=(child sex, child age, type of school, NHIIS, number of schools in the community, number of health posts, and parent's level of education). In this case parents maximize the child education and health as well as consumption of other goods subject two constraints subject to a budget constraint $\boldsymbol{R}$ and other household and community characteristics:

Constraint 1: $\boldsymbol{R} = S_r - (1+r)C - E_b$.

Constraint 2: η= (child sex, child age, type of school, NHIIS, number of schools in the community, number of health posts, household size, and parent's level of education).

Assume also that parents allocate α, β, and ϒ of **R** to child health, education and other goods such that: $\mathbf{R} = \alpha C_e + \beta C_h + \gamma H$ so that $\alpha + \beta + \gamma \leq 1$. If parents are altruistic, 1-(α + β) < ϒ meaning more resources will be spent on child health and education. In a situation where ϒ > α + β, parents are committing more financial resources to other goods and services than child health and education.

We maximize $U(C_e\, C_h + H)$ subject to the constraints:

$$\mathbf{R} = (\alpha C_e, \beta C_h, \gamma H) + (1 - \alpha - \beta - \gamma)S \text{ and } \eta = (\eta C_e, \eta C_h, \eta H) \quad (28)$$

Thus in a Langrangian form we obtain:

$$L = U(C_e\, C_h + H) - \lambda [\alpha C_e + \beta C_h + \gamma H + (1 - \alpha - \beta - \gamma)S + (\eta C_e + \eta C_h + \eta H + \eta S)] \quad (29)$$

Maximizing equation (14) we obtain the following:

$$\frac{\partial L}{\partial C_e} = C_h - \alpha\lambda - \eta = 0 \quad (30)$$

$$\frac{\partial L}{\partial C_h} = C_e - \beta\lambda - \eta = 0 \quad (31)$$

$$\frac{\partial L}{\partial S} = H - \lambda(1 - \alpha - \beta - \gamma) - \eta = 0 \quad (32)$$

$$\frac{\partial L}{\partial S} = H - \lambda(1 - \alpha - \beta - \gamma) = 0 \quad (33)$$

Solving for λ in (30) to (33) we obtain:

$$\lambda = \frac{C_h - \eta}{\alpha} = \frac{C_e - \eta}{\beta} = \frac{H - S}{1 - \alpha - \beta - \gamma} = \frac{S - \eta}{\gamma} \quad (34)$$

The objective is to solve for C_e and C_h. From equation (34):

$$\frac{C_h - \eta}{\alpha} = \frac{C_e - \eta}{\beta} \rightarrow C_h = \frac{\alpha C_e - \alpha\eta + \beta\eta}{\beta} \quad (35)$$

$$\frac{H - S}{1 - \alpha - \beta - \gamma} = \frac{S - \eta}{\gamma} \rightarrow H = \frac{(s - \eta)(1 - \alpha - \beta - \gamma) + \gamma\eta}{\gamma} \quad (36)$$

Substituting (35) into (35) gives:

$$C_e = \frac{\alpha\eta + (S - \eta)(1 - \alpha - \beta - \gamma) - (S + \eta)}{2\alpha} \quad (37)$$

The proportion of revenue from micro-credit spent on child education is α. Taking partial derivative with respect to α gives:

$\frac{\partial C_e}{\alpha} > 0$: micro-credit is expected to have positive impact on child educational outcome. We further investigate the impact of micro-credit on child health by substituting (37) into (35).

$$C_h = \frac{2\beta\eta - (S - \eta)(1 - \alpha - \beta - \gamma) - (\alpha\eta)}{2} \quad (38)$$

The proportion of revenue from micro-credit that is spent on child health is β. Taking partial derivate with respective to β gives:

$\frac{\partial C_h}{\beta} > 0$: micro-credit is expected to impact positively on child educational outcomes. The above theoretical derivations show that access to micro-credit is not an end in itself but a means to an end. Therefore, the purpose of micro-credit is not for direct consumption but for investment into productive activities to produce revenues for the benefit of beneficiaries.

Empirical model and estimation technique II

From the theoretical models, equations (37) and (38), the generalized linear equations to be estimated are of the form:

$$C = f(\beta, \eta, \Upsilon, \alpha, s) \quad (39)$$

In a general form we can write (24) as:

$$C_j = X'\beta + \Delta\Omega + \varepsilon \quad (40)$$

Where j=1 if beneficiary and 0 if otherwise and Δ measures the average change in child education and health outcome due to parent's access to micro-credit Ω. The main method for estimating the equations (37) and (38) is the treatment effect model due to the problem of self-selection which leads to selection bias problems. If the problem is one of selection bias then estimating (37) and (38) using OLS will be biased. Thus the expected child education and health outcomes for parents who have received micro-credit is given by the joint density bivariate normally distributed function as follows:

$$E[C_i|\Omega_i = 1] = \beta X_i + \Delta + E[\varepsilon|\Omega_i = 1] = \beta X_i + \Delta + \rho\sigma \frac{\theta(\gamma h_i)}{\phi^{\gamma} h_i} \quad (41)$$

Similarly, the expected child education and health outcomes for parent who have not benefited from micro-credit is also given by:

$$E[C_i|\Omega_i = 0] = \beta X_i + \Delta + E[\varepsilon|\Omega_i = 0] = \beta X_i + \Delta + \rho\sigma \frac{\Theta(\gamma h_i)}{1-\phi^{\gamma h_i}} \quad (42)$$

Where Θ is the standard normal density function and ϕ is the standard normal cumulative distributive function. The ratio of ϕ and Θ is called the selection hazard ratio (SHR) which takes account of the selection bias. When the coefficient of the SHR is positive there are unobserved variables that increase the probability of selection and a higher than average score on the dependent variable. If $\rho > 0$, the co-efficient estimate of Δ employing the method of OLS will be biased upward (downwards), but the sample selection term will correct for this (Imai, Arun & Annim, 2010).

Empirically, the equations to be estimated for child education and child health outcomes are:

$$Average\ attendance = \varphi_0 + \alpha_1(typeofsch) + \varphi_2(Numberofsch) + \varphi_3(Ageofchild) + \varphi_4(Sexofchild) + \varphi_5(Sexhhhead) + \varphi_6(SavewithMFI) + \delta_A(Beneficiary\text{-}Non\ Beneficiary) + u \quad (43)$$

$$BMI = \varphi_0 + \alpha_1(Pastcredit\ record) + \varphi_2(\beta_1 Location) + \varphi_3(Economic\ activity) + \varphi_4 Household\ size + \varphi_5(Level\ of\ reading) + \varphi_6(Education) + \varphi_7(NHIS) + \delta_B(Beneficiary\text{-}Non\ Beneficiary) + u \quad (44)$$

The variables used in models have been explained in Table 1. The expected signs are derived from theory and the empirical literature.

Table 1: Measurement and Description of Variables

Variables	Measurement/description	Expected signs
Beneficiaries	Yes =1 and 0 if otherwise	Dependent variable
Household size	Number of household members	+/-
Ease of access	Easy=1 and Difficult=0	Dependent variable
Credit amount	Amount of loan in Ghana cedis	+
Household expenditure	Amount in Ghana cedis for the past 12 months	+(Dupas & Robbison, 2009)
Level of education	Informal=1, primary/JSS=2, Sec/VOTEC=3, Higher =4	+ (Joshi, 2005; A2F Consulting, 2012)
Reading ability	Unable to read=0, difficulty in reading=1, easy to read=2	+(Joshi, 2005; A2F Consulting, 2012)
Loan access	1=if accessed credit in the past 12 months, 0 =if otherwise	+
Business profits	Average profits in cedis	+McKernan(2000) (Madajewicz,2003)
Stock of goods	Average stock of goods in cedis	+Adjei & Arun, 2009
Sales revenue	Average revenue in cedis	+ Adjei & Arun, 2009
Health	BMI (weight-for-age)	+(Adjei & Arun,2009)
	Expenditure on health in cedis	Dupas & Robbinson, 2009
Education	School attendance in days	+/-(Barnes et al, 2001)
	Average term performance	Brannen, 2010

Source: Compiled from literature and theories

Research design

The study adopts the quazi-experimental approach where individual were not randomly assigned to treatment. This is because beneficiaries were already

clients of the MFI. In such a situation the problem of self-selection arises. The use of propensity scores matching addresses the selection bias problem. A survey of 550 entrepreneurs from 550 households was conducted in Sekondi-Takoradi and Yamoransa. The survey was primarily intended as an assessment of microfinance program outcomes focusing on income generation, household consumption, expenditure on education and health, and household socio-economic status.

This study compared two categories of business owners: beneficiaries and non-beneficiaries. Beneficiaries are those clients of YML who have benefited from loans for the past 12 months (GSS, 2008). Non-beneficiaries are those who are likely to be potential borrowers in future or are clients but have not benefited from loans or are currently not clients of the institution or have been refused loans. The non-beneficiaries have similar characteristics as the beneficiaries because they also qualify for loans.

In using control and experimental groups, the rationale was to analyze how each of these groups differs in terms of their outcomes. Given this, within 12 months, successful beneficiaries could obtain three loan cycles. The policy at Yaalex Microfinance Limited is that clients should finish paying the first cycle of loan before they can apply for another round. The main lending technique adopted by Yaalex Microfinance Limited is the individual lending methodology. Thus, the unit of analysis is the individual business owner who is the same as the enterprise.

Another reason for focusing on individual clients is that increased scale and professionalization has led a number of leading MFIs to move from group or

joint-liability lending, as pioneered by the Bangladeshi Grameen Bank (GB) in the 1970s, to individual micro lending.

Ethical considerations

Ethical considerations were taken into account in order for the respondents to be aware of the general aim of the study and also to enable respondents give accurate responses to the items in the questionnaires. This is very important because most of the respondents have low levels of education. Again, the questions were interpreted in the local language in order to ensure that respondents understood each and every question well. Clients were briefed prior to the data collection about the purpose of the interview.

Hitherto, permission was granted by the Managing Director of Yaalex Microfinance Limited after a letter of introduction from the Department of Economics has been presented. Children aged less than 18 years of all respondents in basic schools were also involved in the interview. Their weights and heights were taken in school during class hours. Consent was also sought from their respective parents as well as the heads of the concerned basic schools. This was to ensure that an undue advantage was taken of the children because they are minors.

Study population

The study concentrated on beneficiaries of YML. Non-clients were selected from the Sekondi-Takoradi Metropolis (Takoradi) in the Western region

and the Mfantsiman Municipality (Yamoransa, Eguase, Kyedaw and Brafo Yaw) in the Central region. Women and men who engage in small scale businesses were the target for the study. The reason is that these are the groups who usually rely on informal finance for their businesses. The choice of Central and Western regions for this study is motivated by the fact that first, in southern Ghana, the Central region has consistently maintained fourth position in terms of poverty ranking. At the national level the region has been in the fourth position meaning poverty is an issue of concern in the region. The choice of Western region is also informed by the fact that the study institution, Yaalex Microfinance Limited (YML) has its head office in Takoradi and operates a branch at Yamoransa in the Mfanstiman Municipality. The two regions therefore have something in common since the institution of study supplies financial services to these regions only.

The total number of beneficiaries of YML as at 2011 was 5000 consisting of about 4000 women and 1000 men. At Yamoransa and the surrounding communities, the number of women in small scale businesses is about 2000 whereas the number of men in small scale businesses is around 1000. In Sekondi-Takoradi Metropolis the estimated number of women in small scale businesses is 3000 women and 2000 men.

Sample and sampling technique

The study focused on women and men in small scale business activities basically retail traders, processors (kenkey and fish processors) and those in service activities (mechanics, hairdressers, dress makers) who have benefited

from microfinance services during the past 12 months and non-clients (potential clients who have not) in the selected communities of Mfantsiman Municipality and Sekondi-Takoradi metropolis respectively. Thus the study uses control and treatment groups. A valid comparison group is the holy grail of any microfinance impact assessment and must have participants who possess the same "entrepreneurial spirit" as those in the treatment group that receive the loans. The cross-sectional approach claims to overcome this problem since both its control and treatment group consist of individuals who have opted to participate in the MFI. The non-beneficiaries or new entrants are the comparison group, whereas the veteran participants with at least 4 months experience with the MFI are the treatment group (as before). The methodology then attributes any difference between these groups to the micro-credit, since the new entrants have received little to no treatment from the MFI, but the veterans have received two or more cycles of loans (Karlan, 2001).

In determining the sample size we allow for margin of error of ±5% within a confidence interval of 95%. Payne and Mc-Morris (1967) have suggested scientific technique for estimating sample size for a given population. The continuous data sample size determination formulae (Bartlett & Higgins, 2001) as modified was used to determine the sample size for non-clients (non-beneficiaries):

$$n = \frac{t^2 * s^2}{d^2}$$

Where t= selected alpha level of 1.96

s= estimated participation rate in microfinance in Ghana (60%) and

d=acceptable margin of error (5%).

The estimated participation rate in microfinance in Ghana is 60% (Steel & Andah, 2003; Global Findex Report, 2011). Using the formulae above the sample for non-beneficiaries is calculated as follows:

$n= (1.96^2 X\ 0.6^2) / 0.05^2 = 550$

The assumption is that non-clients are likely to become clients in the near future and the participation rate will determine the number of potential clients.

Based on this, sample for the study was estimated to be 550: 274 beneficiaries and 276 non-beneficiaries. About 80% of microfinance participants are women so this was used as the basis for selecting more women than men for beneficiaries and non-beneficiaries. For beneficiaries, the purposeful sampling technique was used. Beneficiaries were randomly selected from the list of clients of the institution.

Table 2: Study Sample

Municipality/Metropolis	Beneficiaries	Non-beneficiaries	Total
Takoradi	150 (F=120, M=30)	150 (F=120,M=30)	300
Mfantsiman	124 (F=100, M=24)	126 (F=100,M=26)	250
Total	274(F=320, M=180)	276 (F=315,M=85)	550

Source: Author calculation

The purposive and multi-stage sampling technique were adopted in the selecting the non-beneficiary respondents. This is because the study focuses on respondents with children less than 18 years who are in basic school. Again purposive because the focus was on those business operators whose children might assist them in their businesses thus, in those who do not have such children in the households were dropped from the interview. The first stage sought to identify respondents with children aged less than 18 years and are in basic schools. The second stage indentified respondents who engage their children in economic activities. The questionnaires were finally administered on the final sample: those with children less than 18 years and are involved in the household enterprise.

Pilot testing and reliability test

The data collection process began with a pre-test of the survey instruments at Abura a suburb of Cape Coast. The pre-test was carried out to ensure that the research instrument designed for the fieldwork was suitable and comprehensive. It was also to ensure the reliability of the data collected for the study and to safeguard the validity of inferences drawn from the estimated results. The reliability test was to measure the extent to which the instrument produces consistent results. The reliability of the instrument was determined through the test pre-test procedure (McMillan & Schumacher, 1993).

The test pre-test procedure ensures that a group of people is surveyed twice on different dates, using the same instrument and the two sets of scores

obtained are then correlated. Validity is the extent to which inferences made on the basis of scores from an instrument are appropriate, meaningful and useful (McMillan & Schumacher, 1993). The validity of any measuring instrument depends upon the degree to which it measures what it purports to measure. In this study, the Cronbach's alpha coefficient for reliability test was determined after the pre-test.

In all, sixty respondents were interviewed for the pre-test exercise. This was done to find out the difficulties to be encountered in the collection of the actual data and design remedial measures for them. It also enabled the researcher to streamline and modify some of the questions for easier and better responses (Kumar, 1999). The pre-test revealed some inaccuracies and inconsistencies in the responses which indicated that some of the questions were not framed or structured well to elicit the appropriate responses from the respondents. These inconsistencies were noted and the necessary corrections effected. Cronbach's alpha (Zinbarg, Revelle, Yovel & Li, 2005) which measures the coefficient of reliability is applied in measuring the reliability of the test instruments after the pre-test. It is commonly used as a measure of the internal consistency or reliability. The statistic is measured as follows:

$$\alpha = \frac{K}{K-1}\left(1 - \frac{\sum_{i=1}^{K} \sigma_{Y_i}^2}{\sigma_X^2}\right)$$

Where k is the number of components (*K-items*), σ_X^2 the variance of the observed total test scores, and $\sigma_{Y_i}^2$ the variance of component *i* for the current sample of

respondents and $0 \leq \alpha \leq 1$. Alpha level close to 0.9 denotes strong or excellent internal consistency and α level close to 0.5 connotes weak internal consistency.

Table 3: Results of Reliability Test

Section	Average Inter-item Correlation	Alpha (α)
Section A	0.9021	0.8912
Section B	0.8342	0.8289
Section C	0.8041	0.8801
Section D	0.8702	0.8065
Section E	0.8699	0.8483
Test Scale	0.8659	0.8791

Source: Field Survey, 2011

From Table 3, Cronbach's alpha coefficient for the five sections of the questionnaire was higher than 0.7, the minimum as recommended by Nunnally (1978), (from α = .8065 to α = .8912) and all inter-item correlations measured between r = .8041 to r = .9021. The questionnaire therefore proved to be reliable with overall (α = .8791 and r = .8659).

Data collection

Data for the study was collected in November 2011 and lasted for 3 months. Structured questionnaires (Appendix A) were used for collecting data for the study. Research assistants from the Department of Economics were engaged

in the data collection. The items in the questionnaires were read to the respondents and the responses entered onto the questionnaires. Data collection was supervised by the researcher. Due to inconsistency in the responses, all questionnaires that were not well administered were not used for the analysis. Thus, in 485 questionnaires were used for the actual analysis. This did in anyway affect our results.

Diagnostic and fitness tests

Normality

Statistical methods are based on various underlying assumptions. One common assumption is that a random variable is normally distributed. In many statistical analyses, normality is often conveniently assumed without any empirical evidence or test. But normality is critical in many statistical methods. When this assumption is violated, interpretation and inference may not be reliable or valid.

Goodness of fit

Since the maximum likelihood estimation (MLE) will be used the pseudo R^2 will be used to test the good of fit of the model. The pseudo-R^2 also known as the likelihood ratio test has the potency of measuring the fitness of most maximum likelihood functions. The ratio compares the value of the likelihood of the estimated model to the value of the likelihood when none of the X^s are

excluded as regressors. Specifically, the pseudo R^2 for the probit model is measured as follows:

$$\text{Pseudo } R^2 = \frac{\ln(fmax\ probit)}{\ln(\max Bernoulli)}$$

Where *fmax probit* is the value of the maximized logit likelihood (which includes the X's) and *fmax Bernoulli* is the value of the maximized Bernoulli likelihood (the probit excluding all the X's). A more reliable test of goodness of fit uses the Hosmer-Lemeshow statistic which compares observed versus predicted counts of outcome events in each of several "meaningful" subgroups of the data. The statistic approaches Chi^2 when the null hypothesis of goodness of fit is true. Statistically, $\chi 2$ Hosmer-Lemshow = $\sum$decile of risk $\frac{(Observed\ count - Predicted\ Count)^2}{Predicted\ Count}$. In this thesis the Hosmer-Lemshow test of goodness of fit is applied.

Sensitivity Analysis

In quasi-experimental studies, randomization inference is not valid. Without randomization of a treatment, we cannot assume the data points are exchangeable due to the probability of treatment being equal across the treated and control groups. It will therefore be difficult to assess the treated outcome due to chance. With matched data, however, we might say that the latter is valid if there are no unobserved confounders. That is if we have correctly matched on all the covariates that causes difference in the distribution of the treated and control groups, then the probability of treatment will be constant within those matched

pairs just as if we had randomly assigned treatment within those pairs. If this is true randomization inference is valid with observational data. This is the basis on which Rosenbaum develops sensitivity tests for matched data (Rosenbaum, 2002).

Rosenbaum's method of sensitivity analysis (Appendix C) relies on the sensitivity parameter that measures the degree of departure from random assignment of treatment. Two subjects with the same observed characteristics may differ in the odds of receiving the treatment by at most a factor of Γ (Gamma is used to measure the degree of departure from estimates that are free from bias). In a randomized experiment, randomization of the treatment ensures that $\Gamma=1$. In an observational study, if $\Gamma= 2$, and two subjects are identical on matched.

Hypothesis testing

The Satterthwaite (1946) t-test of comparing means is used to compare the difference in means of the variables of interest. The test performs t-tests on the equality of means. This is to confirm the hypothesis that the mean differences in the impact variables are not equal to zero.

CHAPTER FIVE

EASE OF ACCESS TO CREDIT: ARE THERE GENDER DIFFERENCES?

Introduction

Access to finance by enterprises and households is of increasing concern to policy makers across Africa and the rest of the developing world. Recent data collection efforts on both enterprise and household levels have enabled a more rigorous analysis (World Bank, 2007). In most cases female owned enterprises lack financing as compared to male owned businesses. Specifically, it has often been argued that lack of access to finance impedes growth of female businesses and prevents women from participating in the modern financial market economy. Given the overall lack of financial service provision, with fewer than one in five households having access to formal financial services, this problem is potentially more pressing in Sub-Saharan Africa than other developing regions of the world (Honohan & Beck, 2007). Khandker et al. (1998), note that the objective of micro-credit programmes is to ease the credit constraints of households and provide them with capital to invest in an activity; thereby increasing their income and consumption.

The main focus of this chapter is to explore the causal link between ease of access to micro-credit and education (reading ability and level of education) after controlling for other confounding factors. The chapter proceeds to examine the differences in the key variables of interest among male and female small scale business operators.

Characteristics of Households

A summary of the household characteristics (Table 4) shows that almost all households (96.9%) live in houses roofed with corrugated iron sheets, cement or concrete roofs. The remaining percentage of households live in houses roofed with palm leaves/raffia/thatch/wood/mud/bricks. This collaborates with the GLSS 5 report (GSS, 2008) that 85% of Ghanaians live in similar houses. Unfortunately more than half of households (62.30%) use firewood, charcoal or kerosene in cooking. This means that household expenditure on these cooking materials is likely to constitute a greater percentage of household consumption expenditure.

Almost all households (95.45%) drink water from pipe-borne stand, borehole, or hand-pump. This is higher than the national average of 40 percent of households in Ghana has access to pipe-borne water. At the national level, about 41 percent of the people use water from the well, and 16 percent depend on natural sources for drinking water (GSS, 2008).

At least more than half (76.2%) of all households in the sample own radio cassette or 3-in-1 sound system while less than half of households (23.8%) do not own any radio in their homes. This shows that the use of radio and tape is common and probably it also provides a lot of information to the household. The use of radio is also very necessary since it could be a source of providing information on financial literacy. Land ownership is a form of real asset. In some cases a piece of land owned can be used as collateral but does not necessary guarantee a loan from a bank.

Table 4: Household Characteristics

Indicator	Description	Frequency	%
Roofing material	Palm leaves/raffia/thatch/wood/mud/bricks	11	3.1
	corrugated iron sheet, cement/concrete	347	96.9
Fuel for cooking	Firewood/charcoal/kerosene	217	60.6
	Gas(LPG or natural)	132	36.9
	Electricity/buy food	9	2.5
Main source of water	Vendor/truck/protected well	17	4.7
	pipe-borne water, borehole/hand-pump	341	95.3
Ownership of working radio	None	85	23.8
	Radio cassette, but not record player	109	30.4
	3-in-1 system	164	45.8
Ownership of piece of land	No	179	50.0
	Yes	179	50.0
Children in school	No	82	22.9
	Yes (no children aged 5-12)	276	77.1

N=485

Source: Compiled from field survey, 2011

Half of all households indicate ownership of land and half do not. In almost all households, 77.1% have children aged 5-15 in school whereas less than half (22.9%) have no children in school or children aged 5-15 are not in school.

Economic activity, profit and credit amount

Type of economic activity that men and women engage in is very vital in determining their well-being as well as control of resources in the household. It also influences access to credit be it formal or informal. The figures in parentheses in Table 5 represent the percentage distribution of economic activities.

Table 5: Economic activity by sex

Activity	Trading	Processing	Services	Others	Total
Female	169 (57.5)	72 (24.5)	40 (13.6)	13 (4.4)	294
Male	115 (60.2)	28 (14.7)	38 (19.9)	10 (5.2)	191
Total	284	100	78	23	**485**

Source: Calculated from field survey, 2011

Table 5 shows the distribution of economic activities by sex in the study areas. More women (57.5%) engage in trading than men (60.2%). There are more traders in microfinance because microfinance loans are for short-term between usually 1-6 months. Processing activities include gari processing, palm oil processing, kenkey processing and fish processing. Again, more women (24.5%) engage in the processing activities as compared with men (14.7%). Normally this

is one of the main activities women usually engage in some parts of southern Ghana and some communities along the coastal belt. Services include hairdressing, taxi work, small scale automobile repairs, and tailoring. In the study areas there are more men (29.7%) in service activities than women (17.4%).

Credit amount and profit levels of household enterprises are presented in Figure 3. Credit amount represents amount of loan in Ghana cedis obtained during the past 12 months and profits also represents household enterprise profit for the past 12 months. The highest amount of loan obtained is GHC 5000. There is a cluster of clients around small loan sizes as can be seen from Figure 3.

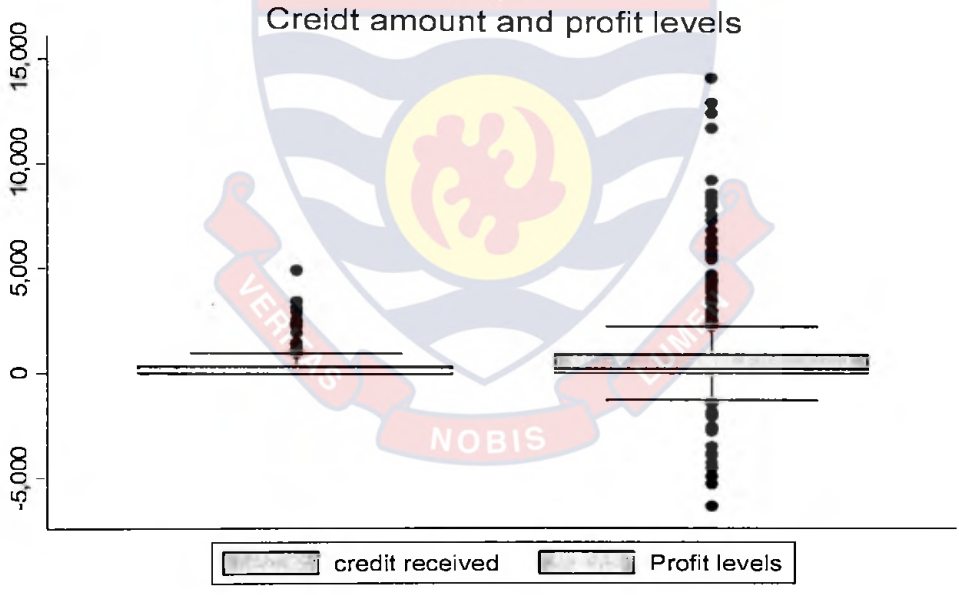

Figure 3: Credit amount and profit levels

Source: Computed from field survey, 2011

Profit or loss levels range from loss of GHc -5000 to profit of GHc 15000 in a year. Comparing credit amount with profit levels shows that loan beneficiaries

are able to use the loan to generate some profits even though a few of the respondents incur losses.

Table 6: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Easy_access	0.223464	0.41715	0	1
sexhhm1	0.357542	0.479947	0	1
agehhm1	38.78771	11.53048	17	78
readhhm1	1.743017	0.81711	1	3
schhhm1	2.446927	0.844311	1	4
Numsch	10.85475	9.013598	4	30
Economicaty	1.907821	0.9525994	1	4
Loanacess	0.434174	0.496344	0	1
marritalhhm1	1.360335	0.687049	1	3
Community	2.268156	1.328693	1	4

Source: Computed from field survey, 2011

Table 6 presents the summary statistics used in the regression models. Easy access, sex of household member operating the enterprises and ever accessed loan within the past 12 months are dummy variables. Age of business owner is a continuous variable whereas the rest of the variables are categorical. The mean age

of respondents is 38 years whiles the minimum and maximum ages are 17 and 78 respectively.

Empirical evidence of ease of access to micro-credit

In this thesis, ease of access to credit is defined as whether business owners have difficulty or otherwise in accessing credit from financial institutions. According to Diagne, Zeller & Sharma (2000), there are two methodologies for measuring household access to credit and credit constraints. The first and indirect method infers the presence of credit constraints from violations of the assumptions of the life-cycle or permanent income hypothesis, while the second collects information directly from household surveys on whether households perceive themselves to be credit constrained. The latter is what was adopted in this thesis. Further, the thesis adopts the methodology by the World Economic Forum (2009). The global competitive index is made up of 12 pillars of which the eighth pillar measures ease of access to credit. According to the Global Competitive Index Report of 2010-2011, Ghana ranks 106 out of 139 in terms of ease of access to credit meaning ease of credit access is a problem (World Economic Forum, 2009)..

This is captured as 1=for easy access and 0=if otherwise. The novelty of this variable is the fact that much of the literature focuses on access to credit by asking if business owner has access (=1) to credit or not (=0). The limitation is that access or otherwise does not capture the level of difficulty. Thus, ease of access to credit combines both access and the level of difficulty or otherwise in accessing credit. In this model also, both household and enterprise as well as community

level characteristics are considered. Again, male-female characteristics such as education, household size, are also introduced into the model to determine the ease of access to credit.

Ease of access to credit does not imply that the demand for credit will be satisfied. Lenders determine how much credit is allocated based on the probability of loan default, often resulting in credit rationing. Thus, the probability of receiving the credit may be influenced by a number of factors that include borrower and enterprise characteristics. The most important and the focus of this thesis is how education of household business operators eases access to credit. Again, ease of access to credit takes into account number of days credit is approved and disbursed. If it takes more than 30 working days to obtain the approved amount after submission of loan application forms, access is said to be difficult (0). However, all loans approved before 30 working days are assigned a value of 1 indicating easy access. Loan applications that are queried and referred back to the applicants are classified as difficult applications. Such applications may be re-submitted for fresh processing. The limitation of measuring ease of access to credit needs to be acknowledged. The measurement is arbitrary but the intuition is that at Yaalex Microfinance Limited if a loan is not approved within 30 days then it is likely to be rejected.

Male-Female access to micro-credit

One of the non-income outcomes of microfinance programmes is to ease access to credit among poor households. The reason is that in the informal sector

huge gap exists in access to credit so microfinance is seen as a corrective measure. However, this cannot always be the case even in the informal sector. This section presents the factors that influence access to credit among male and female enterprises. Differences exist in access to credit by sex in the informal financial sector. The first sub-section discusses the probit results followed by the IV probit model. The last section tests the significant differences in the coefficients of male and female samples.

Model I: Probit Regression

Table 7 presents the probit estimation results after controlling for some household and enterprise characteristics. Enterprise and household characteristics included in the probit regression include type of economic activity, ever accessed loan within the past 12 months (GSS, 2008), location of respondents (community), reading ability level of education, number of persons in household (household size), and the square of household size. The unit of analysis is at the household or the enterprise level because the owner of the business is the same as the business since he or she owns the business alone. Table 7 shows three levels of analysis: male sample, female sample and the total sample. The rationale is to identify the male-female differences in ease of access to credit.

Trading activity eases access to credit in the informal sector. For both men and women, trading activity significantly determines the likelihood of easing access to credit at 10% and 5% respectively. However, women are (4.8%) more likely to access credit easily than men (0.1%). Engaging in trading is significant at

10% for both men and women and the probability that either male or female business operator will access credit easily is (4.7%). One reason that might be attributed to the significance of trading activity in easing access to credit is that those in trading are able to repay their loans on regular basis because they have regular cash flow.

Processing includes gari, palm oil, *kenkey*, and fish. This activity predicts ease of access to credit for men (9.5%) at 5% level of significance but not women. Men in processing activity are (9.5%) likely to access credit with ease than women. For women, processing is not significant in obtaining credit easily. This confirms Diagne, Zeller & Sharma (2000) in a study in selected developing countries that female borrowers are constrained in most sectors of the economy as compared to their male counterparts. A plausible reason might be that processing activity by men is more profitable than that of women (Diagne, Zeller & Sharma, 2000). Again, processing activities engaged by women (for example kenkey and gari) are usually on small scale as compared with men who engage in palm oil processing on larger scale. Service activities do not influence the likelihood of ease of access to credit at all levels.

Household size is measured as the number of equivalent adults (GSS, 2007) that eat from the same bowl and under the same care. This measure recognizes that the consumption requirements of babies or young children are less than that of adults. Again, since in the credit market only people of more than 18 years can participate, setting the age of household to 18 makes economic sense. Household size enters the total sample model with a positive sign whereas square

Table 7: Probit Regression Results (Marginal Effects)

Covariates	M=177	W=308	Total=485
Trade	0.001*	0.048**	0.047*
Processing	0.095**	0.065	0.066
Services	0.127	0.010	0.038
Yamoransa	0.179**	0.135**	0.145**
Eguase	-0.003	-0.210*	-0.128*
Takoradi	0.256	0.075	0.130*
Householdsize	0.021	0.020*	0.176*
Householdsize2	-0.001*	-0.001**	-0.001**
Loanaccess_12	0.277**	0.164**	0.188***
Easyread	0.026	0.137**	0.0465**
Diffcultyread	-0.081	0.154**	-0.118**
Non-formal	0.178*	0.202**	0.192**
Prim/JSS	0.095**	0.147**	0.1260**
Sec/Voc	0.065**	0.079*	0.093**
Log likelihood	-50.782	-108.594	-162.909
Wald Chi2	45.65	66.90	114.40
Prob>Chi2	0.000	0.000	0.000

***, **, * significant at 1%, 5% and 10% respectively.

Source: Computed from field survey, 2011

of household size appears to be negative. Women business operators with larger households are about (2%) more likely to access credit without difficulty.

Theoretically larger household size means high dependency ratio and high dependency ratio implies households will have many dependents to take care of thus, increasing their household per capita expenditure and therefore reducing the amount of money that can be invested in business activities. Larger household size therefore limits access to credit holding other factors constant. For men business owners, household size does not influence ease or otherwise of credit access. The result is inconsistent with Nguyen (2007) that household characteristics including number of household members, education level of household head influences ease of access to credit.

This means that men are not constrained by credit with reference to household size. There is natural discrimination in access to credit as far as household size is concerned. It is not surprising because women usually cater for household activities and may sometimes assume the responsibility of major household expenses. The likelihood that women might use commercial loans for household expenses is high as compared to men. Thus, institutions may be very reluctant in granting loans to female business owners with large household sizes.

In both the developing and developed world small firms have been found to have limited access to external finance and are more constrained in their operations and growth (Galindo & Schantiarelli, 2003). Many households and businesses in developing countries are said to face credit constraints which limit their ability to undertake investments in various production-enhancing economic

activities required to reduce poverty. This limited access to credit is often attributed to the lack of `acceptable' collateral, resulting from the absence of formally registered land titles (Domeher & Raymond, 2012). In the same manner business registration documents are often used as collateral for both formal and informal credit and lack of it is likely to serve as a credit constraint.

One of the borrower characteristics that ease access to credit in the informal financial market is previous business relationships. In this study respondents were asked to indicate if they have received credit within the past twelve months preceding the survey. This is used as a proxy for previous business relationship and credit worthiness. Again, clients who have ever accessed loans within the past 12 months are perceived as having established business rapport with the MFI and thus access will be easier for future credit demand. Received knowledge has it that clients with past favourable credit record easily have access to progressive loans.

Ever accessed loan in the past 12 months (*Loanaccess_12*) is positively related with ease of access to credit. On the basis of intuition, this is correct. Practically also, this seems to sound reasonable. However, there is the need for theory to support this assertion. For men business operators, previous loans obtained is more likely to ease credit access by (27.72%) whereas the probability for women is (16.38%). This implies that assuming males and females have good credit records, male are more likely to have their loans approved without difficulty than females. The usual notion that microfinance favours women can therefore be challenged on this ground.

The total sample also indicates that controlling for other factors, past credit record eases access to further credit with probability of (18.79%). In support of the above finding is that of Aleem (1990), in a study of informal market lenders and their clients in Chambar, Pakistan. He argued that informal lenders mainly used their established relationship with borrowers as a screening mechanism. Our result is also consistent with another study by Fatoki and Chigamba (2011) of SMEs in South Africa, in which they found that SMEs that have accessed credit in the past 12 months found it easier to access subsequent loans as compared with those who had not. This may imply that lenders did not generally entertain loan requests from people who had not had previous dealings with them either in the form of the sale of harvested output through them or purchase of farm inputs. The longer the period of the previous business relationship, the higher will be the probability of the borrower having access to future loans.

All MFIs are to be regulated effective January 1st, 2012. MFIs have therefore become more formalized in their operations like traditional commercial banks. Some of the transformations include application and processing of loans. Currently, MFIs in Ghana sell application forms to clients as first step in accessing loans. Hitherto, MFIs used not to follow any formal procedures in granting loans. From the demand side firms' level of education influences their probability of accessing credit (Isaksson, 2002). For example, the level of education of the business owner is important in obtaining credit not only from formal financial institution but also informal financial institution. The supply side also shows how

MFIs staff ability may influence credit screening and monitoring of loan applicants but the former is the focus of discussion in this section.

First the study captures education outcome which comprises reading ability and level of schooling of respondents. This variable is important because it determines to a large extent clients' ability to read and understand the terms of loan contract in the application form. Reading ability is a rank variable (3=highest to 1=lowest) and is captured as 3= can read without difficulty, 2=can read but with difficulty and 1= cannot read at all. The base variable is can read with some difficulty. The level of education is also captured as non-formal, lower (primary, junior high school and vocational) and higher (secondary or tertiary). At all levels of the analysis level of education is significant in influencing ease of access to micro-credit in the probit model. The implication is that even in microfinance education cannot be taken for granted as it is often thought of. In spite of the fact that education is important factor that affects ease of credit access, the magnitude is different.

Women have higher probability of accessing credit with ease at all levels of education. Women with non-formal education are more likely (20.2%) to access credit with ease as compare with men (17.83%). In the case of lower education, women are more likely (14.71%) to obtain credit without difficulty as compared with men (9.5%). Again, secondary/higher education offers women 7.88% chance of accessing credit with ease as compared with men (6.48%). The implication is that at least non-formal education is enough for women to close the access gap in the financial market. This confirms Gemmelt (1996) that at most primary

education is one of the most important drivers for economic growth that promotes participation in market activities in low income and developing countries.

Model 2: IV Probit Regression Results

Intuitively, endogeneity of an individual's loan activity could occur if individuals with higher unobserved ability are more likely to obtain a loan from a bank and are also more likely to engage in entrepreneurial activities. Endogeneity problem was observed after using the Hausman test to check for possible endogeneity. The Hausman Test is used to determine whether or not one of the explanatory variables in a regression suffers from omitted variable bias, measurement error, or reverse causality. The need to use the endogenous model in this case is as a result of causality. The null hypothesis that the coefficient on the residuals is zero is rejected at the 5%. In other words, there is overwhelming evidence that reading ability and educational levels of clients are endogenous and that endogeneity comes from the causality of number of schools in the different communities. Instrument used for the endogenous variable in the model is number of schools present in each of the locations of the study.

The variable should satisfy the exclusion restriction and it should not be correlated with the error term through unobservable characteristics, conditional on observable household and enterprise level attributes. It is within this context that intuitively, we use the number of schools in the various communities as instrument for the IV Probit model. This is because it is expected that reading ability and level

of schooling are positively correlated with number of schools in a particular locality but does not influence the ease of access to credit.

The Durbin-Wu-Hausman is performed to test the presence of endogeneity. The null hypothesis that there is no endogeneity is rejected since the χ^2 =11. 41 with p > 0.57. This gives the indication that the coefficients of the two estimates (probit and IV-probit are significantly different) thus use of the IV-probit will provide more reliable results. The structural form of the IV-probit model is presented on Table 8. The rationale for presenting the table 8 is to show that the instrument is significant.

Once it is significant then we are convinced that the instrumented variables (reading and level education) are endogenous. Table 8 shows that number of schools is significant at 5% and it predicts reading ability and level of education. The predicted residuals are plugged into the reduced form equation (Table 9) to estimate the final model.

The remaining of the discussion focuses on Table 9 which reports the reduced form of the model. The variable reading is significant in all the models at 10% (men), 1% (women) and 5% (total sample) respectively. However, the impact of reading ability varies across sample. For women an increase in the level of reading ability is more likely to make access to credit more easily by (71.5%), (6.1%) for men and (47.9%) for both men and women (table). The implication is that reading ability is likely to be a constraint to access to credit for women than men. The result is consistent with previous studies.

Table 8: Structural IV Probit Model

Covariates	Coefficient	T	P>T
Trade	0.230	1.98	0.048**
Processing	0.080	0.39	0.693
Services	0.020	0.20	0.845
Yamoransa	0.005	0.02	0.983
Eguase	0.101	0.49	0.624
Takoradi	0.272	1.20	0.228
Householdsize	0.001	2.52	0.005**
Householdsize2	-0.012	2.986	0.007**
Loanaccess_12	0.053	8.22	0.000***
Numofsch	.0180	1.97	0.056*
Constant	2.217	6.99	0.000
Rho	-0.822		
Athrho	-1.166		
Wald test of exogeneity(athrho) = 0: chi2			
0.56 (Prob>Chi^2 =0.453)			
Wald $Chi^2(16)$ = 234.69			
Prob> Chi^2 = 0.000			

Source: computed from field survey, 2011

, * significant at 5% and 10% respectively.

For example Kozan, Oksoy and Ozsoy (2006) found a positive relationship between higher educational qualifications and business growth which enhances access to credit.

Furthermore, education helps to enhance the exploratory skills, improves communication abilities and foresight (Dobbs & Hamilton, 2007) and these enhanced skills are positively related to present a plausible case for a loan to a banker at the time of preparing a loan proposal and convincing the banker during the client interview. The result is consistent with Zeller (1994). He concluded that the higher the educational level of customers the more likely they are able to obtain loans. In the wake of Bank of Ghana's tight supervision of MFIs, institutions are required to operate more formal by ensuring that customers go through all the necessary documentations before loans are granted. Thus, customers with little reading ability or cannot read at all are not likely to benefit from micro-loans.

Ability to read provides vital sources of information to households. Households whose access to information is either limited, or very costly, may be unaware of other resources that are available, may fail to allocate their resources efficiently, may forego income-enhancing opportunities, or may bear unnecessarily high levels of risk. This would be the case if, for example, individuals are unaware of several forms of information, including the requirements for obtaining loans with favourable conditions. In the specific context of financial markets, inadequate access to information can lead producers to choose a sub-optimal loan, savings, or insurance strategy despite the options

available to them, or to simply abstain from participating in a typical financial market (Stango & Zinman 2008).

Type of economic activity engaged by households is an important determinant of access to credit. This is because financial institutions usually define their credit concentration. For example in Ghana most MFIs do not lend to the agricultural sector possibly because agricultural activities are risky and are rain fed such that once there are no rains there is no harvest. Again, micro-loans in Ghana for example are for short period of time usually not exceeding six months. In the IV models, engaging in trading activities (buying and selling) enhances women access to credit whereas other economic activities do not. Table 8 shows that men are more likely (28.10%) to access micro-credit easily as compared to women with a probability of 0.0763. This means men who are in trading are better off than women in terms of micro-credit.

Processing activity is part of the manufacturing sector. Previous studies have shown that the manufacturing sector attracts credit as compared to say the services sector. In this regard this finding is line with Silva and Carreira (2010) who argue that, for most services, the main input is human and not physical capital and therefore service sector firms find it hard to use this physical capital as collateral when resorting to external finance. According to them those in the processing sector can even use their equipment as collateral for loans. This might not be possible in the case of the service activity.

Table 9: IV Probit Regression Results (Marginal Effects)

Covariates	M=177	W=308	Total=485
Trade	0.281*	0.0762*	0.056
Processing	0.130	0.1846	0.154
Services	0.111	0.3202	0.269
Yamoransa	0.778	0.3247	0.441*
Eguase	0.071	0.3839	0.329
Takoradi	0.986	0.1836	0.381
Hdsize	0.009	0.0705*	0.057*
Hhsize2	0.0001	-0.002*	-0.002**
Loanacces	1.155**	0.692**	0.774***
Easyread	0.784	0.847*	0.859**
Difficultyread	0.179**	0.135**	0.145**
Non-formal	1.907*	0.759**	0.992**
Prim/JSS	1.960*	1.362***	1.423***
Sec/Voc	2.361*	1.691**	1.803***
Log likelih'd	-199.553	-343.388	-498.18
Wald Chi^2	37.18	61.97	89.90
Prob>Chi^2	0.002**	0.000***	0.000***
Rho	-0.343	-0.683	-5.42*
WTE(ρ=0)	2.6(0.091)**	1.70(0.10)*	2.56(0.10)*

Source: computed from field survey, 2011. ***, **, * significant at 1%, 5% and 10% respectively.

In comparison with the other activities, those in trading and processing activities are able to access credit with ease than service activities. Across samples (men, women and total) service activity does not influence ease or otherwise of access to credit. However, processing activity is significant (1%) for men whereas trading activity is significant (10%) for women in determining ease of access to credit. The implication is that women in processing activity are more likely to face difficulty in accessing credit likewise so as men in trading. In fact in the context of the Ghanaian economy, commercial activities attract more credit as compared with processing even among the SMEs.

Previous credit record is an important factor in determining the approval or otherwise of current loan. For both men and women, 'ever accessed credit in the past 12 months' significantly eases access to credit. However, the differences across gender are significant. For men any extra loan taken during the past 12 months eases credit access (173%) whereas that of women is about 60%. This means women are almost thrice less likely to access credit than men. This finding implies that the notion that microfinance targets women does not mean that men clients are not to be served. When men take loans and they pay back, they are likely to be equally better clients like women. It should be noted that most MFIs seem to have shifted from social mission to commercialization where the focus is on profitability instead of outreach. If the mission is to target poor women it does not also mean that only women qualify to be clients. Credible men business operators are also targets of commercialized MFIs.

Household size is an important determinant of access to credit. In microfinance also household size seems to be very significant. For example Okurut (2006) in a study in South Africa confirms this. The current study also finds a positive and significant relationship between ease of access to credit and household size for all except male sample. Women are about 7.05% likely to source credit easily and across location, household size influences credit access by 5.65% (10% level of significance) for both men and men.

However, the square of household size is positive over in the long run. This means as household size increases, credit access becomes difficult. Increase in women household size makes access to credit difficult by 0.2% and across location 0.2% for clients in Mfantsiman municipality but not for those in Sekondi-Takoradi metropolis. Traditionally, women are caretakers of the home and they may be tempted to use business loans for consumption purposes thus when the MFI is suspicious of this access may be delayed or denied.

Both men and women face discrimination due to old age, but women experience ageing differently. Gender relations structure the entire life cycle, from birth to old age, influencing access to resources and opportunities and shaping life choices at every stage. Good health, economic security and adequate housing are essential requirements of ageing with dignity, but older women in both developed and developing countries face difficulties in accessing these on a basis of equality with men and hence their inability to access credit with ease even in the informal sector.

Male-Female differences in access to micro-credit

The main hypothesis is that in terms of ease of access to credit, there are no differences across gender. The seemingly unrelated estimation (SUE) test was used to test the differences in the coefficients of interest (Table 10).

Table 10: Differences in Ease of Access to Credit

Variable	Chi^2	$Prob>Chi^2$	Decision
Loan access_12	4.03	0.045*	Reject null hypothesis
Reading ability	4.00	0.043*	Reject null hypothesis
Education	4.15	0.042*	Reject null hypothesis

Source: Computed after regression estimates *significant at 5%

One advantage of the SUE estimator is that it is always admissible, so the resulting test is always well defined. A second advantage of the SUE approach is that we can estimate the (co)variance matrix of the multivariate normal distribution of the estimators of the models and test that the common coefficients are equal.

Gender differences in ease of access to credit emanate from different sources. Past credit history measured by whether a client has received credit in the past 12 months or not shows differences in credit access at 5% level of significance. It is therefore concluded that clients who have accessed credit in the past 12 months are advantaged and are able to access further credits without any hindrance.

The level of education is a source of gender difference in accessing informal credit. This debunks the view that within the informal financial sector, level of education is not relevant. This is probably so because as alluded to earlier, MFIs are now aspiring to be fully regulated by Bank of Ghana and as such need to document all credit procedures. Thus, MFIs that hitherto were not formalizing loan application procedures have to do so. In this regard, clients are to go through formal procedures of loan application which includes writing of request for loans, filling of loan application forms, keeping of financial records, cash flow projections and so on. Thus, more educated clients are likely to access loans without difficulty.

Reading ability is an outcome of education. The assumption is that at higher levels of education, reading ability is high. However, this might not always be so. Testing the differences between coefficients shows that there is significant difference between males and females' level of reading ability at 5% thus reading ability is a source of gender difference that eases credit access.

Conclusion

In this chapter, we have shown that gender differences exist in access to micro-credit. Reading ability, level of education and past credit records are the main sources of gender differences. Women seem to be constrained in accessing micro-credit than men.

CHAPTER SIX

INCOME OUTCOMES OF MICROFINANCE

Introduction

Microfinance produces two main outcomes: income and non-income. The basis of income outcome is the ability to generate profits from beneficiaries businesses. Once the profits have been generated, households use it to better their welfare. The uses of profits among households vary. Among the uses of profits generated are business investment (plough-back), household consumption, payment of children's school fees, and payment of medical bills just to mention a few. The focus of this chapter is to analyze the impact of micro-credit and the diverse uses of income from business. The chapter compares these income outcomes among beneficiaries and non-beneficiaries over the nine month period of the pre and post surveys. Again, the chapter provides an answer to the question of what beneficiaries would have been without microfinance. The next sections discuss the attrition rate and summary statistics of the combine dataset (pre and post surveys) of beneficiaries and non-beneficiaries and the income outcomes. This follows a thorough investigation of the impact of micro-credit across beneficiaries versus comparison group by gender and geographical locations. The last section of the chapter looks at the sensitivity analysis carried out to validate the results of the PSM

Impact of access to micro-credit: Evidence from Yaalex Microfinance

This section discusses the empirical evidence of micro-credit impact from the case institution, Yaalex Microfinance Limited (YML). The first part of this section discusses the PSM and its validity. We then discuss the common support and the balancing properties to validate the estimates. The next section discusses the estimation results and finally sensitivity analysis is used to support the estimates obtained from the PSM results.

Nearest neighbour matching

The matching method used in this study is the nearest neighbour matching (NNM). This is one of the most common, and easiest to implement and understand. It is generally the most effective method for settings where the goal is to select individuals for follow-up. Nearest neighbour matching nearly always estimates the ATT, as it matches control individuals to the treated group and discards controls who are not selected as matches. Several forms of NNM exist but the most effective is the 1:1 nearest neighbour matching. This method selects for each treated individual *i* the control individual with the smallest distance from individual *i*. A common complaint regarding 1:1 matching is that it can discard a large number of observations and thus would apparently lead to reduced power. However, the reduction in power is often minimal, for two main reasons.

First, in a two-sample comparison of means, the precision is largely driven by the smaller group size (Cohen, 1988). So if the treatment group stays the same size, and only the control group decreases in size, the overall power may not

actually be reduced very much (Ho, Imai, King & Stuart, 2007). Second, the power increases when the groups are more similar because of the reduced extrapolation and higher precision that is obtained when comparing groups that are similar versus groups that are quite different (Snedecor & Cochran, 1980). This is also what yields the increased power of using matched pairs in randomized experiments (Wacholder & Weinberg, 1982). Smith (1997) provides an illustration where estimates from 1:1 matching have lower standard deviations than estimates from a linear regression, even though thousands of observations were discarded in the matching. One strategy to avoid poor matches is to impose a calliper and only select a match if it is within the calliper. This can lead to difficulties in interpreting effects if many treated individuals do not receive a match, but can help avoid poor matches. Rosenbaum and Rubin (1985) discuss those trade-offs.

Overlaps and common support

The common support is the region where the balancing score has positive density for both treatment and comparison units. No matches can be formed to estimate the average treatment effects on the treated (ATT) parameter when there is no overlap between the treatment and control group. Table 10 shows that examination of the means of the treated and matched control group reveals that the two groups indeed seem similar hence satisfying the common support assumption.

Table 11: Tests for Bias Reduction

Variable	Treated	Control	% Bias	% Reduction	p>|t|
Schhhm_1	7.4684	7.0546	0.1	99.4	0.089*
Ecoactivity	1.8252	1.7937	3.3	67.2	0.018**
Marritalhhm_1	2.1675	2.0097	3.3	49.2	0.006**
Household size	12.617	11.636	10.1	45.4	0.019**
Years in business	1.6626	9.0833	0.4	98.2	0.05**
Sexhhm_1	1.6626	1.6335	6.1	65.8	0.087*
Agehhm_1	39.798	40.461	-5.9	42.9	0.86
Readhhm_1	2.0097	1.9248	8.7	98.2	0.05**

Source: field survey, 2011. **, * Significant at 5% and 10 % respectively.

The standardized bias measure results on Table 11 show that the difference in propensity score of treated and control sample is close to 100% ($p<0.001$). After matching the bias significantly reduced. The bias significantly reduced for each covariate after matching. Although, we do not have a clear indication for the success of the matching procedure, in most empirical studies a bias reduction below 3% (97% reduction) or 5% (95% reduction) is seen as sufficient (Caliendo & Kopeining, 2008). A two sample t-tests used to check if there are significant

differences in covariate means for both groups also confirm this result. Once the p> t are significant it means the balancing property is satisfied.

Impact on business

Microfinance is not charity. Funds that go out must come back with returns. On that basis, profits from businesses are one of the most important and the first outcome that microfinance seeks to attain. This is because when profits are increased it goes to benefit the household in terms of consumption, health care, education, and the overall well-being of clients/participants. Again, microfinance seeks to target clients who are capable of using credit to generate profits.

In a World Bank study on lending for small and micro-enterprise projects, three objectives of microfinance institutions are frequently cited: (1) to create employment and income opportunities through the creation and expansion of microenterprises; (2) to increase the productivity and income of vulnerable groups, especially women and the poor; and (3) to reduce rural families' dependence on drought-prone crops through diversification of their income generating activities (World Bank, 2007). It is clear therefore, that without generating profits from businesses beneficiaries will be unable to pay off their loans and poverty cannot be reduced.

Table 12 reports the marginal effects or the likelihood of being a beneficiary (1) of credit or otherwise (0). The probit model is used to generate the probability or the likelihood of receiving credit conditional on selected household and business characteristics.

The level of education of respondents influences access to credit. Education helps in developing skills that are rewarded in the marketplace and this has been confirmed for Pakistan by Alderman (1996), for Morocco by Angrist and Lavy (1997), and for South Africa by Moll (1998). Educational skills have also been found to raise self-employment income in Ghana (Jolliffe, 1998). The authors suggest that the returns to numeracy and literacy are high in non-farm enterprises. Thus, clients with minimum levels of education are likely to be more productive and hence are likely to benefit from micro-credit for productive activities.

Educational level of household head significantly influences access to micro-credit at 5%. Not all respondents are household heads. In most cases the head of the household decides whether a business owner should take credit or otherwise. The higher the level of education of the household head the more likely (3.8%) a member will be taking credit. This is the case of female business owners whose husbands are household heads. In the Ghanaian setting, decisions about taking loans are made by the husbands who are most often heads of the family. Less educated household heads may not support their members to go in for credit. This confirms Glewwe and Gillette, (1998) that households whose heads are less educated are vulnerable and credit constrained. This result is consistent with Schultz's hypothesis: education reduces vulnerability (Schultz, 1975). In the Ghanaian context, less educated households are reluctant to go in for loans simply because they are afraid of being indebted. This is what a woman respondent had to say:

'My husband never allowed me to take loan even though the institution says I qualify for loan. According to him, loans from banks are for those who can read and write because the bank managers are corrupt and they cheat illiterates'.

This demonstrates that education enhances one's participation in the financial market. Thus the higher the level of education of the head of the household, the more likely the entire household will participate in the financial market. Even though the probability seems to be low (4%), the import is on its significance. Three types of economic activities were captured but only the significant one, trading activity is reported in the discussion.

Benefiting from microfinance credit is influenced by the level of education of clients. Two variables are used to measure level of education of respondents: schooling and reading ability. Schooling is captured as the number of years spent in school whereas reading is captured as whether the individual can read (1) or not (0). It is noted that both variables are likely to influence access to micro-credit by about 11% and 17%respectively. Education usually captures human capital development in development economics. It also captures the ability to deal with the formality of loan evaluation procedures. Thus, those individual who have spent more years in school are able to participate in financial markets. The reason is that they are likely to be financially literate thus will be in the position to borrow and save in financial markets.

Trading is important in determining who should benefit for micro-credit in Ghana. Table 12 shows that trading is significant at 5% with likelihood of 6.1%.

Table 12: PSM Probit Model

Variable	Marginal effect	Std. error	Z	P>|z|
Highest education of HH	0.0383	0.0157	2.43	0.015**
Trading	0.0612	0.1285	2.10	0.038**
Marritalhhm_1	0.1669	0.0371	4.50	0.000***
Household size	-0.0153	0.0057	-2.70	0.036**
Years in business	0.0152	0.0073	2.10	0.036**
Agehhm_1	0.0078	0.0046	1.68	0.093*
Readhhm_1	0.1708	0.0571	2.99	0.026**
Schhhm_1	0.1102	0.0664	1.65	0.098*
N	485			
LR (Chi^2)	36.0			
Prob>Chi^2	0.000			
Pseudo R^2	0.0378			

Source: field survey, 2011

***, **, * significant at 1%, 5% and 10 percent respectively.

This means that those who engage in trading are 6.1% more likely in benefiting from microloan all other things being equal. This is not surprising because in Ghana like many parts of the world, trading generates income faster and as a result can repay any loans contracted. Trading is also significant probably due to its nature of importance as confirmed by Otoo (2012).

Years in business measure how long the respondents have been operating their current business. Traditionally the longer one has been in business the more experience the person has. To be productive, experience matters. MFIs prefer lending to sustained businesses for reason of getting their loaned funds back. Experience is significant at 5% with just 1.52% likelihood of benefiting from micro-credit. In spite of the low probability level, experience matters. This is probably the more reason why institutions are sometimes unwilling to finance start-up business. For example in Ghana less than 10% of newly established enterprises have access to bank loans (Aryeetey, 1994). The study institution, Yaalex Microfinance Limited, has the policy of lending to existing businesses that have proved to be sustainable. In most cases the future of new businesses cannot be tested and for that matter their loan applications are usually turned down.

Household size measured as number of members in the household significantly predicts the probability of benefiting from micro-credit. A large household size is likely to be more productive than a smaller household size because members could support the activities of the enterprise. The beneficiary equation shows that household size significantly influences access to credit and it is significant at 5% ($p > 0.019$). We therefore reject the null hypothesis that

household size does not influence benefiting from micro-credit. All things being equal large households are assumed to be more productive than smaller households and the higher probability of benefiting from credit.

Contrary to our findings, Adjei (2010) observed a negative relationship between access to credit and household size in Sinapi Aba Trust (SAT) programme impact assessment in Ghana. He argues that women with larger family sizes depend on their partners and might therefore not depend on SAT loans for investment. This is however debatable because it is not always the case that husbands will take full responsibility of their wives investment. With larger household size, man working hours will be higher and taking into the communal living in Ghanaian societies, more hands will be available to household enterprise thereby increasing productivity. With higher productivity returns will be high and that can latently influence the likelihood of benefiting from micro-loans.

Table 13 reports the matching estimates (parameters of interest) using the nearest neighbourhood matching (NNM) method without replacement. The NNM is done on the assumption that control individuals with the similar propensity scores are matched to estimate the differences in the mean values. The key variables of interest are sales amount, stock, average expenses and average revenues all in Ghana cedis. The Table also shows the unmatched estimates, matched estimates as well as the differences between the control and experimental groups. It is important to note that we are interested in the matched estimates to determine impacts. The impact variables of interest are the average monthly figures for stock, sales, household expenses and business profits. Average monthly

values have usually been used in similar impact assessments (See Afrane, 2002) for the purposes of easy recall. Access to micro-credit has positive impact on sales, stock, average business revenue and average household expenses.

Business size can be measured using number of employees, market share of clients, gross sales value or stock of goods.

Table 13: ATTs of Treatment and Control Sample

Variable	Treated (GHc)	Controls (GHc)	Difference (GHc)	T-test
Sales: Unmatched	1922.83	1074.62	848.21	
Matched	1922.83	1131.65	**791.18**	2.30***
Stock: Unmatched	2311.04	1419.17	691.87	
Matched	2311.04	1442.92	**868.12**	3.46***
Average Expenses				
Unmatched	1014.25	800.61	213.64	
Matched	1014.25	668.64	**345.61**	2.16**
Average Profits				
Unmatched	2126.80	1519.42	607.38	
Matched	2126.80	1516.41	**610.39**	1.86*

Source: Field survey, 2011. ***, **,* significant at 1%, 5% and 1% respectively.

Number of employees even though an important measure of business size cannot be used because the study focused on small scale businesses where employment levels are at most 10 people. Stock of goods available for sale therefore defines the size of a business in this thesis. As gross domestic product measures the size of countries, it is proper also to use stock of goods and services to measure the size of enterprises. Businesses with lager stock are assumed to be bigger than those with smaller stock sizes.

Micro-credit and stock of goods

Yaalex Microfinance Limited has majority of its clients being traders. The reason is that clients in businesses are able to generate regular cash flow which is a pre-condition of accessing credit. In granting loans to customers, most MFIs assess the value of current stock available for sale. It is also expected that loans received will go directly into the business by increasing the value of stock.

Results of the study indicate that beneficiary clients who access loans are able to increase their stock levels but the increase is probably due to hidden bias. Comparatively, client beneficiaries have recorded positive increase in stock as compared to non-clients (non-beneficiaries). Beneficiaries recorded GHC **868.12** increase in stock over the nine month period as compared with non-beneficiaries over the nine-month period. The increase in stock represents the net additions to stock after several cycles of stock turnover within the nine month period. This demonstrates that micro-credit has the potency of increasing business size among recipients. This demonstrates how well beneficiaries of the MFI use their credit. A

contributing factor might be the situation where loan officers monitor the use of every credit given to clients. In most cases contracts are signed between the MFI and the suppliers for direct payment of all goods supplied to clients.

Micro-credit and sales

Microfinance seeks to empower poor clients who engage in small scale businesses. Access to small loans is meant for purchase of wares or stocks for resale to produce profits. Ability of clients to repay their loans is dependent upon the ability to generate profits. The results indicate client businesses performed better than those of non-clients, although this was statistically significant at 1% supporting (Gubert & Roubaud, 2005). Micro-credit therefore produces a significant difference of **GHc 791.18** (monthly average) in favour of beneficiaries. This clearly shows that microfinance has promises for its beneficiaries. A further investigation reveals that beneficiaries are able to turn out their stock 5 times in a month as compared to non-beneficiaries of 3.5 times in the same period. In accounting sense, higher stock turn produces higher sales revenues assuming all comparable business operators operate under similar conditions.

Micro-credit and business profits

Business profits play a dominant role in the capacity to access financial resources since they are simultaneously a source of internal financing and a hook to attract external sources of credit. Commercial banks, venture capitalists, investment banks, pension funds as well as MFIs base their decisions on present

and expected future values of profits or ratios of other financial variables on profits and usually consider businesses with high returns as secured investment. Thus, MFIs also target not only poor clients but rather clients with profitable businesses or clients whose businesses seem to be profitable.

In 1954, Drucker in his paper *The Practice of Management* noted that the primary responsibility of business is to make enough profit to cover the costs for the future (Drucker, 1954). Philosophically, it is contended that making profits is a social responsibility because it is this responsibility that will lead to achieving other more specific social responsibilities. This is the purpose of business. Our results show that there is positive and significant impact of micro-credit on profits. The matching estimates indicate that over the period beneficiaries have recorded GHc **610.39** in profits more than non-beneficiaries and it is significant at 10%.

Thus, an important money metric indicator of microfinance outcome is business profit or income. Profits measure the residue of business expenses and sales revenue. Business owners who are able to record positive business results are able to transform the nominal returns into real social impacts. More importantly, Khan and Rahaman (2007) reported that microfinance recipients had empowered themselves and become very active participants in the economy through profit generation. Further, using a regression model to examine the impact of microfinance, Priya (2006) found that there is significant positive relationship between credit recipients and income; the findings suggest that program participation led to a 10% increase in income representing their profits.

The results of this study confirm Lensink and Pham (2012) in Vietnam that micro-credit loans generate positive, significant impacts on household self-employment profits. In their study a micro-credit is associated with a 15 per cent increase in self-employment profits in the total sample and a 20 per cent increase in profits in the subsample of households formally eligible for loans. From a policy perspective, the results of their study provide further support optimistic assessments of the impact of microfinance. Additionally, the finding of stronger effects in the formally eligible subsample suggests that microfinance can be especially effective when channelled to poorer households.

In a similar impact study of impact of group micro-loans in Bangladesh, Madajewicz (2003) shows that the mean profits of beneficiary group are higher than those of eligible households in villages without a programme by 280 taka, or 37% of the average profits in villages without a programme. The difference suggests that group micro-loans do increase profits even though results were statistically insignificant. However, in a recent study by Karlan and Zinman (2010) in evaluating individual lending programme for micro entrepreneurs in urban Philippines, the authors found small or no effects on profits and business expansion.

What did household do with the profit they earn from their economic activities? The usage of profits earned by small scale business operators varies in the study areas. In the study areas among the uses of profits are savings, household consumption, education and social events. Interestingly, part of the profits earned by women are used to supplement wage earnings of their husbands. Most

beneficiaries also use part of the profits generated for re-investment as plough-back capital.

Micro-credit and household expenses

Access and utilization of micro-credit is expected to impact on household expenses. Household expenses among poor households usually comprise of expenditure on food, health and education. Our results show that in comparison with control group (non-beneficiaries) have gained increase in household expenses over the nine month period of GHc **345.60.** Respondents were unable to give the individual specific items of household expenses for lack of recall. The survey solicited from them the average amount of household expenses per month. It is obvious that in most developing countries households do not keep records of income and expenses. The results is consistent with a number microfinance impact studies such as Panda (2009) that the highest impact of group based microfinance was found in the expenditure on productive assets and household consumables. A qualitative analysis of the survey shows that the highest expenditure of the household was on food (50%), with the rest on education (30%) and health (30%).

Expenditure on food consists of staples, water and vegetables. The main component of educational expenses include pocket money for children, books, school fees, and transport costs for those who travel some distance to school. In terms of health, most parents have registered their children with the National Health Insurance Scheme but occasionally may have to visit the chemical shops for some minor medications. Much as there have been mixed statistical impacts of

microfinance, there also has been no widely acclaimed study that robustly shows strong impacts, but many studies suggest the possibility of good welfare impact (Aghion & Morduch 2005). A woman beneficiary had this to say:

> *I have observed that the health of my five year old boy has improved because any time I close from market; I am able to buy ingredients and vegetables to prepare good stew for him. I thank YML so much for lending me the GHc 500.*

Impact of micro-credit by gender

This section tests the heterogeneity of return to micro-credit across sex. Gender differences exist in the way access to micro-credit impact on businesses. The differences are however mixed. In some case positive impact have been observed for male enterprises whereas in others for female enterprises. In a recent study by de Mel, Mckenzie and Woodruff (2008) in Srilanka, they found that treatment impacts are significantly larger for enterprises owned by males but no positive return in enterprises owned by females. It is not surprising because the study focused on formal financial capital but not micro-credit. Table 14 shows the ATT values across gender in the study areas. It is observed that even though micro-credit impact positively on beneficiaries businesses after matching using the NNM, the magnitude varies across sex of business owners.

On the average women gain GHc 246.81 as compared to men (GHc 74.73). This makes a case that more micro-credit needs to be supplied to women than men. Women are good users of loans and that is one reason why microfinance

targets women. Contrary to our findings, some studies have found that economic resources to women sometimes produce negative outcomes (Juarez, 2010; Bertrand et al., 2003).

Table 14: ATTs of Treatment and Control Groups by Sex

Variable	Treated (GHc)	Controls (GHc)	Difference (GHc)	T-test
Sales: Females	1054.74	807.92	**246.81**	2.11***
Males	1178.15	1103.41	**74.73**	0.45
Stock: Females	1291.94	1042.33	**249.62**	1.82*
Males	1531.06	1263.27	**267.79**	1.42
Average Expenses				
Females	1281.32	952.68	**328.64**	1.77*
Males	1213.96	717.09	**496.88**	1.80*
Average Profits				
Females	2411.84	1651.86	**759.97**	2.55***
Males	1969.19	1620.86	**348.32**	0.90

Source: field survey, 2011. ***, ** Significant at 1%,

If women are producing higher return to micro-credit it is not surprising because women are generally seen as being more credit constrained than men in low

income countries (Khandker, 1998; SEAGA, 2002). This is also in parlance with theory since at higher levels of capital marginal returns are expected to be low in a simple classical production framework.

Sensitivity analysis

Sensitivity analysis tests the robustness and unmeasured bias of the estimates due to unobserved confounders in the survey. The bias can arise if participation in the program has positive externalities on the control group. Such a bias is likely to be inconsequential for the current study as most members in the control group are located at a fair distance from the treated group. This rule out any possibility of shared business and economic link among beneficiaries and non-beneficiaries.

Rosenbaum's (2005) method of sensitivity analysis provides us with a method to assess the robustness of the estimates. The pseudo-R^2 indicates how well the regressors explain the probability of access to micro-credit. Table 15 shows the Rosenbaum bounds for the variables of interest in the impact equation. Gamma is the log odds of differential assignment due to unobserved factors. A higher Γ value indicates that the effect of micro-credit is less sensitive to hidden bias due to unobserved confounders. Sig+ and Sig- indicate the lower and upper bounds significance levels respectively. T-hat+ and T-hat- also indicate the lower and upper bounds Hodges-Lehmann point estimates for each variable of interest whereas CI+ and CI- show the lower and upper bounds confidence intervals at α = 0.95. In the analysis, the maximum value for Γ is set to 2 with increments of 0.2.

The Hodges-Lehmann point estimates for each variable of interest indicate the mean difference between treatment and control groups when there is no hidden bias. A comparison of these estimates with the actual mean estimates shows how matching leverages or corrects the hidden bias. In interpreting the significance of the sensitivity results the upper bound significant levels are used.

With the exception of stock all the other impact variables are significant at 5%. There is therefore enough evidence to suggest that sales, average expenses and average revenue of beneficiaries and non-beneficiaries differ significantly. However, across beneficiaries and non-beneficiaries the amount of stock of goods available for sale does not significantly differ. This does not mean that access to credit does not impact on beneficiaries businesses. The only probable reason might be that due to unobserved confounders inherent in the data might be huge.

Table 15: Rosenbaum Sensitivity Analysis

Gamma (Γ)	Sig+	Sig-	T-hat+	T-hat-	CI+	CI-
Stock						
1	0.25819	0.25819	50	50	-80	150
1.2	0.82839	0.12191	-50	145	-173	250
1.4	0.98937	0.00015	-140	225	-250	350
1.6	0.99976	7.1e-07	-200	300	-330	450
1.8	0.99999	1.8e-09	-260	365	-400	515
2	1	2.9e-12	325	440	-450	600

Table 15 Continued

Sales						
1	0.00655	0.00655	110	110	25	200
1.2	0.18635	0.00002	40	190	-50	275
1.4	0.67226	2.1e-08	-20	250	-110	350
1.6	0.94594	1.0e-11	-75	300	-170	400
1.8	0.99581	2.8e-15	-124	350	-225	460
2	0.99999	0	-200	450	-275	515
Expenses						
1	0.05565	0.5565	100	100	-22.5	230
1.2	0.50209	0.0007	-3.9e-07	205	134	350
1.4	0.91237	2.3e-06	-90	300	-227.5	455
1.6	0.99432	3.2e-09	-170	390	-325	560
1.8	0.99982	2.6e-12	-242.5	470	-420	660
2	1	0	-390	550	-515	750
Profits						
1	0.01283	0.01283	250	250	30	460
1.2	0.26220	0.00006	70	425	-150	665
1.4	0.76018	8.4e-08	-75	587.5	-300	860
1.6	0.96952	5.2e-11	-200	750	-440	1050
1.8	0.99819	1.9e-14	-320	896.5	-560	1240
2	1	0	-425	1030	-680	1420

Computed: from survey data, 2011

The point estimates are more robust as it requires a gamma (Γ) value of two before the upper and lower bounds bracket one and zero respectively. This can be interpreted as the difference in medians across treatment and control groups, though they are not the same as the impact estimates. The general conclusion then is that while it appears that access to micro-credit had a positive average treatment effect, the impacts are insensitive to possible hidden bias unobserved confounder(s).

Conclusion

This chapter has discussed the empirical results of income outcomes of micro-credit with reference to the client or beneficiaries businesses. The general conclusion is benefiting from micro-credit produces positive outcomes on clients' businesses in comparison with non client or non-beneficiaries. Microfinance therefore has promises for small scale enterprise development.

CHAPTER SEVEN

MICRO-CREDIT, CHILD EDUCATION AND CHILD HEALTH

Introduction

Non-income outcomes of microfinance are those indicators that are not measured in monetary terms. This chapter provides empirical evidence on the welfare effectiveness of micro-credit. Basically the chapter examines whether the income generated from businesses translates into the development of beneficiaries dependents such as children. For example, goals two and three of MDGs stipulate that by the year 2015, "all boys and girls should complete a full course of primary schooling" and that "the gender disparity in primary and secondary education should preferably be eliminated at all levels by 2015" (World Bank, 2000).

This chapter therefore, seeks to investigate the impact of micro-credit on education and health of beneficiaries' children. Again, the focus is on primary and junior high school education because the State of the Ghanaian Economy usually focuses on basic education since it the foundation of education in Ghana (ISSER, 2010). In addition, the focus is on child health because children are the future of a nation and the state of health of children determines the future workforce of any country. This chapter begins with discussion on descriptive analysis followed by presentation of the treatment effect results.

Education and health as human capital development

Education and health are economic goods because they are not easily obtainable and thus need to be apportioned. Economists regard education as both a consumer and capital good, because it offers utility (satisfaction) to a consumer and also serves as an input to develop the human resources necessary for economic and social transformation. The focus on education as a capital good related to the concept of human capital, which emphasizes that the development of skills is an important factor in production activities. It is widely accepted that education creates improved citizens and helps to upgrade the general standard of living in a society. The increased faith in education as an agent of change in many developing countries, has led to heavy investments in it. The pressure for higher education in many developing countries has undoubtedly been helped by public perception of financial reward from pursuing such education. There is belief that expanding educational opportunities and access promotes economic growth.

Education has been described as one of the main ingredients of human capital development. The creation of human capital is key in the effort to alleviate poverty in the developing world including Ghana. As the returns to education are delayed and enrolment in schools is costly, families in underdeveloped nations, especially those who live in rural environments where schools are often not locally situated, can be caught in poverty traps. The less educated and impoverished demand less schooling for their children and, therefore, their children are less able to raise their standard of living when they reach adulthood.

A strong argument has been that access to micro-credit has the potency of improving beneficiaries' children's education through the allocation of sizeable expenditure to it. As beneficiaries are empowered through income generation, the decision to spend on their children's' education remains their own choice instead of others. This is the case of women who usually depend on their spouses for the spending decisions.

In Ghana, the decision to spend on child education remains the responsibility of the father in the case of couples living together whereas it is the mother in the case of single parents. Most children live with their mothers in cases where the couples are no longer together. Of the 500 respondents, the survey showed that 22.43% of children are not in school whereas majority (77.57%) of the children are in school. School here refers to basic school comprising kindergarten, primary and junior high school. Beneficiaries had more children (58.9%) in school than non-beneficiaries (41.1%).

There are more children in primary school (57.25%). as compared with Kindergarten (19.50%) and Junior High School (23.25%). In Ghana basic school starts compulsorily from primary one at age six. The government compulsory education system starts from class one meaning pre-school is not compulsory. As a result not all parents are compelled to send their children to pre-school. Most children begin basic school from the primary level. The number of children in Junior High School is lower than those in the primary school probably because Junior High School brings additional cost to parents such that not all children from primary six are able to proceed to the Junior High School. The implication is that

completion rate is higher for children in primary school than those in the junior high school as confirmed by the report on 'Basic Education in Ghana: Progress and Problems' submitted by the (Mitchel Group, 2009) to USAID. The report concluded that completion rate of primary school was 85% and 65% for junior high school.

One reason why there are few children in Junior High School as compared to primary school is that respondents claim cost of JHS is higher than primary school. This assertion by respondents confirms the findings of GLSS 5 report (GSS, 2008).

Micro-credit and child education

Traditionally, in Africa as a whole and Ghana in particular, parental involvement in child education is very important. Parental involvement in children's education may take several forms including visiting the school, communicating with teachers, or assisting children at home with their home work, among others. However, one major role of parents in the educational life of their children is assuming financial responsibility. Financial responsibility includes payment of school fees, buying of books, school uniform and other materials that enhance the child's academic work. When parents are unable to discharge these responsibilities, the academic performance of their children is slacked back.

Since it is assumed that parents who are financially sound are more likely to be involved in the education of their children than their counterparts who are not financially sound (Pryor & Ampiah, 2003), access to micro-credit which produces

income is also likely to impact positively on children's educational performance. This could be achieved probably through the provision of basic school materials to children.

Access to micro-credit and child education: Empirical evidence

This section presents the empirical evidence on micro-credit and child education from the study areas and the institution. We first present the summary statistics of the variables used in the empirical model. The empirical model regresses child and parental characteristics as well as access to credit on educational outcomes. The main educational outcomes are attendance to school (obtained from the school register) and child termly performance (obtained from their terminal reports).

Child education: summary statistics

Table 16 shows the summary statistics of the variables used in the education model. The number of observations differs as a result of non responses. The minimum attendance to school is 10 days and the maximum is 54 days. In a year the average school attendance for a term is about 55 days depending on the number of public holidays and re-opening as well as closure schedules. Table 16 shows that the minimum school attendance is 10 days whiles maximum school attendance is 54 days. The mean amount of savings is GHc 384 and maximum is GHc 600.

Table 16: Summary Statistics

Variables	Mean	Std.dev.	Min	Max
Aveatta	21.68838	29.69533	10	54.66666
sexofchild~h	0.499089	0.500468	0	1
SaveMFI	384.1243	637.1834	0	600
Averageexp	896.6045	1409.266	0	960
Beneficiar~y	0.528249	0.499554	0	1
Credamt	267.8531	635.0264	0	5000
sexhhm1	1.396893	0.718982	0	2
schhhm1	2.015537	1.14989	0	5
Whopays	1.294231	0.828192	0	4
Parentstay	0.886719	0.514809	0	2
Typeofsch	1.547753	0.4980643	1	2
Ageofchd	8.495549	4.928386	0	18
Numsch	5.528249	2.626821	0	22

Source: Field survey, 2011-2012

Treatment effect: micro-credit impact on child education

This section discusses the impact of micro-credit on child education using attendance to school as the proxy for education outcome. Two regression results are presented on table 17. They are the factors that explain school attendance (**Aveatta**) and the impact of micro-credit on school attendance and average term performance (**ATP**). **Aveatta** is the average of three terms attendance by children.

The Wald test of independent equations (Rho=0) with Chi2 value of 13.97 and Prob > Chi2 = 0.0002 means that there was selection bias in the model and it has been corrected. Therefore, at 5% level of significance we fail to accept the presence of selection bias in our results. As indicated earlier, the key variable of interest is **Aveatta.** Micro-credit has positive impact on school attendance but the impact seems to be insignificant. Table 16 shows that at 1% level of significance access to micro-credit increases the attendance of children in basic school by 3.8%. Even though the impact seems marginal, what is of interest to us is its positive effect.

Our result has challenged one recent study which shows that micro-credit has negative impact on child school attendance. Using data from Malawi, Shimamura & Lastarria-Cornhiel (2009) show that micro-credit significantly decreases primary school attendance among borrowers' children, leading to a repetition of primary grades in young boys and delayed or lack of enrollment for young girls. Contrary to this finding, our results have two important implications: first, micro-credit has the power to maintain children in school. This may be as a result of regular payment of school fees, beneficiaries' ability to provide meals for their children because they have regular income. This shows that household income matters if parents use the money for child education-centered goods like books, quality day care or pre-school programs, for better dependent health care, or to move to a better neighbourhood.

On the other hand a study by Chowdhury (2001) found no significant difference between school attendance of beneficiaries and non-beneficiaries

children of 6-13 years even though the average yearly educational expenditure of beneficiaries was (135%) higher than the average yearly educational expenditure of non-beneficiaries.

In an attempt to explain this, we observe that average monthly expenditure (**Averageexp**) of the household is positively related (**0.0010**) to school attendance meaning household expenses is prioritized towards education. It is possible that beneficiaries of micro-credit are able to pay their wards school fees promptly, buy them school materials, and ensure that children have the basic necessities for school. It implies that the economic background of the household determines whether children will be regular in school or otherwise. This confirms Pryor and Ampiah (2003) in a study in Ghana which found a positive relationship between household income and schooling in some villages. This finding is also consistent with the unified growth theory by Galor and Weil (2000).

By inference, as school attendance increases, child involvement in household enterprise will be reduced and in effect general child work will be reduced. For example, Ravallion and Wodon (2000) have theorised that there is a trade-off between children's work and school attendance. The inference of our findings is also consistent with Shimamura and Lastarria-Cornhiel (2009), even though they found no significant effect of micro-credit on child work; indeed they report that micro-credit reduced child participation in household chores and increased school attendance.

Consistent with basic theory of microfinance is that one of the main problems the poor face is access to capital and credit, and by providing them

access to small amounts of loans, they will be able to escape from poverty through investing in businesses. It is therefore not micro-credit itself that is important but what comes out of it. Once the credit is used productively, part of the revenue that is produced will be spent on child education thus impacting positively on their education (Rooyen, Stewart & de Wet, 2012). Micro-credit is not an end in itself but a means to an end.

A striking result is that we do not observe any impact of micro-credit on term performance. Micro-credit does not contribute directly to child academic performance even though children may be regular in school. Intuitively the plausible explanation may be several. It must be noted that academic performance is not only based on being regular at school. Other factors might include teachers, environmental, availability of teaching and learning materials, as well as child own characteristics that affect how well or otherwise a child will perform at school. Attendance to school is just one of the necessary conditions for performance but not sufficient one. Fortunately, this result confirms the study by You and Annim (2013) on rural China. The authors find a causal impact of accessing formal micro-credit on schooling by nearly three years in 2000 only, but no influence on children's academic performance for both rounds of the survey.

The study further investigates the factors that are likely to influence school attendance among basic school children. The results show that benefiting from micro-credit has positive impact on child school attendance. This confirms the treatment effect results that micro-credit impacts positively on child education.

Table 17: Treatment Effect: Education

Variables	Coef.	Robust Std. Errors	Z	P>|z|
sexhhm1	6.789	1.291	5.26	0.000***
Ageofchd	2.879	0.232	12.4	0.000***
Typeofsch	2.889	1.336	2.16	0.031**
Disttosch	-0.235	0.434	-0.54	0.588
Numsch	-0.114	0.206	-0.55	0.580
SaveMFI	-0.000	0.001	-0.29	0.772
highestgrd~m	1.136	0.212	5.34	0.000***
Averageexp	0.001	0.000	1.68	0.093*
sex_child	4.218	1.459	2.89	0.004**
Beneficiar~y	6.438	2.804	2.3	0.022**
ATP	-0.000	0.009	-0.06	0.956
Aveatta	0.038	0.006	6.63	0.000***
Cons	-1.938	0.347	-5.58	0.000***
Athrho	-0.893	0.238	-3.74	0.000***
Lnsigma	2.123	0.071	29.67	0.000***
Rho	-0.712	0.117		
Sigma	8.360	0.598		
Lambda	-5.960	1.329		

Source: Field survey, 2011. ***, **, * significant at 1%, 5% and 10% respectively.

One reason might be that clients do not only benefit from financial resources but they also benefit from other non-financial resources such as advice on the need to educate children. It is likely that such training might change their mindset by ensuring that their children remain in school.

Boys are more likely to attend school regularly than girls. The variable **sex_child** captures the sex of child in school (1/0). With reference to girls, boys are more likely to be regular at school. This is not surprising because available data indicates that in Ghana there are more boys in school than girls at the primary and junior high school levels. For example according to the Institute of Statistical, Social and Economic Research (ISSER) from 2004/05 academic year to 2009/10 academic year the gender parity ratio (GPI) is less than one meaning more boys are attending school than girls (ISSER, 2010). The plausible reasons are in two folds: economic and cultural. For example in Ghana boys are assumed to have higher returns to education as compared to girls. Again, cultural reasons might also affect girls' attendance to school on the notion that the office of the girl is the kitchen.

Type of school that children attend is very important in determining their regular attendance at school or otherwise. The treatment effect model for education shows that with reference to public schools, children who attend private schools are more regular or have higher attendance rates. Stated differently private schools increase school attendance in comparison with public schools. This is not surprising because teacher and child supervision are effective in private schools than public or government schools. Again, parent participation in private schools

is more effective than public schools thus the likelihood of improving school attendance in comparison with public schools. The variable **Typeofsch** (1/2) is significant at 5% and increases child school attendance by 288%. Most parents also place higher premium on private basic schools than public schools and thus make sure that children are always regular. Most of the private basic schools in the study areas are low-fee private schools with considerable cost of education. Children themselves are also proud of the type of school they attend. Probably, children in private basic schools are happier to go to school each day as compared with those in public basic schools. The current findings corroborates with the study on Sinapi Aba Trust in Ghana by Adjei (2010). He concluded that programme participants are in a better position to send their children to private schools as compared with non-participants.

The level of education of the head of the household (**highestgrd~m**) also has positive impact on school attendance. At 1% level of significance **highestgrd~m** increases child school attendance by 114 percentage points. This means that in households where the head has attained higher level of education, children in those households are more likely to be regular at school. Alternatively, household heads with higher number of years of education are more likely to ensure that children attend school. Parental education is an important factor which is expected to have a positive and significant effect. This is due to the fact that, intuitively, the higher stock of human capital in the family not only generates higher income if "returns to schooling" work but also a more optimistic parental

perspective on the benefit of education for their children (Maldonado & Gonzalez-Vega, 2008)

Mean differences in education outcomes

Following Efron and Tibshirani (1993) the Satterthwaite's approximation that estimates the statistic from the test of equal means is used to test the differences in means across beneficiaries (clients) and non-beneficiaries (non-clients). Differences exist in school attendance among children of beneficiaries and non-beneficiaries of micro-credit (Table 18). There is enough evidence to conclude that school attendance for beneficiaries differs significantly from those of non-beneficiaries.

Table 18: Mean difference in School Attendance

Group	Mean	Std. Err.	Std. Dev.	[95%Conf.	Interval]
Beneficiaries	60.9338	0.9034	3.7379	59.1458	32.900
Non-beneficiaries	28.2909	2.3364	10.141	23.6810	62.721
Combined	41.4168	1.6948	29.695	38.3534	45.023
Difference	37.5782	2.5048		37.5782	27.707
Ho: diff = 0					
t= 13.0319					
Pr(|T| >|t|)= 0.000					

Source: Field survey, 2011

The null hypothesis that there is no significance difference between school attendance of beneficiaries' children and non-beneficiaries' children is therefore rejected at 1%. Beneficiaries' children are regular at school by more than 37 days within an academic year than children of non-beneficiaries.

Again we test the difference in means of school performance of three term class positions among children of beneficiaries and non-beneficiaries. Table 19 shows that there is significant difference between average term performance. The null hypothesis that there is no significance difference between term performance of beneficiaries' children and non-beneficiaries children is rejected at 1%. The average term performance of beneficiaries children is 13th position in class and they are also about eight times better than non-beneficiaries' children.

Table 19: Mean difference in Term Performance

Group	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
Beneficiaries	13.243	0.7646	8.0556	11.727	14.758
Non-beneficiaries	5.8275	0.7218	9.5214	4.4028	7.2522
Combined	8.7157	0.5727	9.6685	7.5884	9.8430
Difference	7.4156	1.0515		9.4861	5.3451
Ho: diff = 0					
t= 7.0525					
Pr(|T| >|t|)= 0.000					

Source: Field survey, 2011.

Micro-credit and child health

The health status of a people determines their quality of life, level of productivity and longevity. The results from the core welfare indicators questionnaire (CWIQ) survey carried out across Ghana in 1997 identified a linear increase in levels of handicapped persons from non-poor to the poorest households with eight times more physically or mentally handicapped persons in the poorest households (GSS, 1998). Thus there is a close association between poverty levels and health status. With access to credit both poor health and poverty are likely to be reduced. It is within this assumption that this section seeks to investigate the impact of micro-credit on child health.

The key variable of interest is body mass index (BMI) of the child. This is used as a proxy for child health and can also be used to measure short-term indicator of physical growth. Traditionally for under-five children, weight-for-age z-scores are used to measure wasting among children but since the children in this study are aged 7-18 years the BMI is used as has been used by other researchers (Ramaswamy, Mirochna & Perlmuter, 2010). Among children BMI can also be used to measure wasting (abnormally low weight-for-age) and an indicator of current malnutrition among. The weight loss due to wasting can be restored quickly under favourable conditions such as where parents are engaged in income generating activities. Therefore, wasting is particularly useful indicator in describing the current health status of a population and in assessing the benefits of interventions since it responds more quickly to changes in nutritional status than

does stunting. Figure 4 shows the distribution of the BMI scores for the children in the study areas.

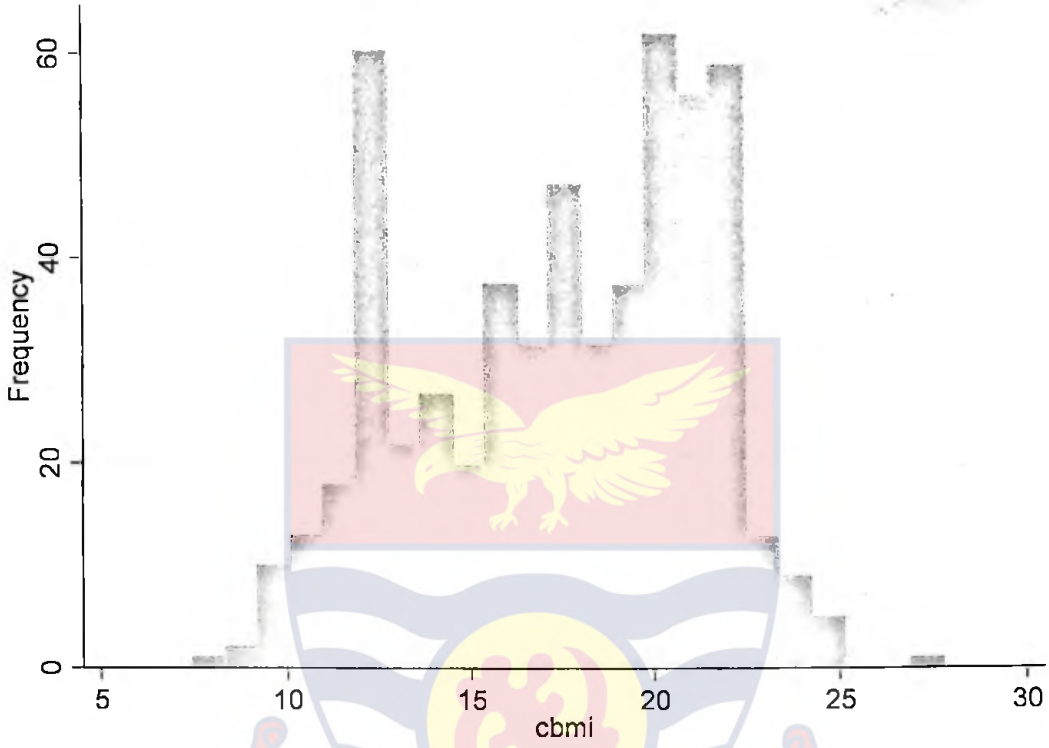

Figure 4: Distribution of BMI Scores

Source: Graphed from survey data, 2011

For adults the BMI ranges between 17 and 30 normal health. A BMI of less than 17 is underweight whiles more than 30 is overweight. In the case of children usually the z-scores are used for under five children whiles BMI in relation to age is used for pre-adolescents and adolescent children. In this study the BMI of normal health ranges between 5th percentile and 85th percentile. A child is described underweight or stunted if his score is less than the 5th percentile of the

rest of their peers whiles BMI of more than 85th percentile is described as overweight or obese. Maximum and minimum values for body mass index (**cbmi**) of children in the study areas are 7.44kg/m^2 and 27.70 kg/m^2 respectively. On the average children in the study areas have BMI of 17.46 kg/m^2. On the basis of percentiles, normal BMI is 11.36 (5th percentile) to 22.37 (85th percentile). All children whose BMI are less than 11.36 and those with BMI above 22.37 are classified as not healthy. The average BMI for girls is 17.63 whiles that for boys is 17.07 and the average BMI for beneficiaries' children is 17.97 whiles that of non-beneficiaries' children is 17.15.

Table 20 presents the descriptive statistics of the variables used in the health model. Maximum and minimum values for body mass index (**cbmi**) of children in the study areas are 7.44kg/m^2 and 27.70 kg/m^2 respectively. On the average children in the study areas have BMI of 17.46 kg/m^2. Source of drinking water includes water from streams, rivers (=0), water from well (=5) and treated pipe borne water (=7). The average value of 6.8 indicates that majority of the respondents obtain their drinking water from treated sources including pipe borne. Source of drinking water is very important determinant of health. Evidence in the United States illustrates the importance of public health investments where two-thirds of the decline in overall infant mortality and the entire decline in excess female infant mortality in the early 20th century were attributable to clean water and sanitation (Cutler & Miller, 2005).

Another important determinant of health status is source of drinking water. These are either treated water or non-treated water. Treated water includes pipe

borne water and non-treated water includes water from rivers and dams. Alternative way of measuring head of household education is number of years in school. On the average household heads have spent 1.14 years in school whiles the highest is five years. The average age in business is 6.52 years with the oldest entrepreneur having spent 30 years in business.

Table 20: Descriptive statistics Used in the Health Model

Variable	Mean	Std. Dev.	Min	Max
Cbmi (weight/height sq)	17.46	3.87	7.44	27.7
Expenditure (in cedis)	322.06	158.2	100	900
Beneficiary (1/0)	0.23	0.42	0	1
Yearsinbus (age of business)	7.98	6.52	0.6	30
Ageofchd (in years)	11.18	2.18	7	18
Schooltype (private/public)	1.40	0.49	1	2
NHIS (1=NHIS)	1.60	0.49	1	2
Sourceofwater	7.31	2.92	0	10
District (Takoradi/Mfantsiman)	1.68	0.46	1	2
Hhmembership	11.60	10.30	0	15
Schhhm1 (years in school)	2.01	1.14	0	5

Source: Field survey, 2011

Regression Results

Table 21 shows the result of the treatment effect model. Results of the study show that micro-credit impacts positively on child health. Table 20 shows two separate models: outcome equation and the selection equation. The coefficients rho (ρ), sigma (σ) and lambda (λ) are all significant. But $\rho\sigma=\lambda$. Since ρ is significantly different from zero it can be concluded that selection bias has been corrected in sample. The variable **cbmi** which measures body mass index is significant at 1%. The results demonstrate empirically that access to micro-credit increases child body mass index by 76.68%. In other words access to credit improves child health by 76.68%. The impact of micro-credit on child health is very significant looking at the size of the coefficient.

The model shows that access to micro-credit increases expenditure on health. Surprisingly, the impact on health expenditure (**Expenditur~h**) is also marginal (0.09%) and significant at 10%. In comparison with non-beneficiaries, beneficiaries spend average of GHc 323.75 a year on health whiles non-beneficiaries spend GHc 317.78 for the same period. This confirms the fact that health is both consumption and investment good and for that matter households must spend on it. Another prominent study on micro-credit and child health in Ghana by Adjei (2010) confirms this positive relationship. The author concludes that for every one hundred cedis increase in loan amount expenditure on child health increased by five cedis. Some earlier studies also confirm this finding that both micro-credit and micro-savings have a generally positive impact on the health of poor people in terms of the amount of days when they are unable to work due to

sickness, the number of episodes of sickness and their levels of nutrition assessed using standard measures such as the middle upper arm circumference and height (Calderon, Garrido & Navarro, 2008).

Expenditure on health is an input into the health production function. The production channel model explains the factors that influence health of a people. For example, those other determinants of health that complement expenditure and act as inputs into health production are: (i) diet and nutrition, (ii) environmental risks, (iii) health behaviours, (iv) psychological stress, and (v) health services. Diet and nutrition include dimensions of both quantity (energy intake) and quality (nutritional value); poor quality diet and nutrition can lead to malnourishment, obesity, or vitamin deficiencies (Frank et al., 1991). Health-promoting activities include good hygiene, healthy eating patterns, physical activity, and safe practices, such as the proper storage of poisons.

Evidence from Tanzania (Brannen, 2010) and Rwanda (Calderon, Garrido & Navarro, 2008) do suggest that participation in the Village Savings and Credit Association and the Red Cross credit program respectively is associated with a significant positive increase in meal quality, and with an increase in consumption of meat and fish which are very vital for growth. Barnes, Keogh & Nemarundwe (2001) also found that participation in the Zambuko Trust in Zimbabwe also had a positive impact on consumption of nutritious food in extremely poor client households compared to non-clients and those who have left the program. Clients were able to increase their household expenditure on meat, chicken, fish and milk which are important sources of protein.

One plausible reason that might explain the marginal impact of micro-credit on health expenditure is the duration of the programme. For example Adjei (2010) observed that client who have been on Sinapi Aba Trust (SAT) microfinance programme for a long time recorded higher impact than those who have not. It is therefore suspected that the duration on the programme can affect the magnitude of the impact. The longer the participation in micro-credit, the greater the propensity to obtain different kinds of benefits. These benefits could be economic (more or larger loans), social (expansion social network), political (greater voice), or psychological (greater self-efficacy).

In general micro-credit affects household health in several ways. First, microcredit serves as a medium to communicate health messages. When borrowers participate in regular repayment meetings, they may be provided with health education or service provision, increasing their knowledge of and access to formal healthcare. The regular meetings associated with the group-based lending models of microfinance programming for example provide a forum for health education and training. The altruistic theory supports this assertion parents who are altruistic will not discount the future benefits of their children and will therefore invest in their children's health out of income from their enterprises.

Second, micro-credit improves the general quality of life of borrowers by increasing disposable income, reducing vulnerability through diversifying income sources, strengthening financial shock-coping mechanisms such as insurance and savings, and assets building. Third, availability of credit can assist the poor with financing health emergencies, such as ill-health of the main breadwinner. The

main difference from the point above is the immediacy of a need to finance a curative health emergency as opposed to a slower process of building a healthier and more secure household.

In particular, the impact of micro-credit on child health passes through several mechanisms. For example, through the empowerment of women child health is improved. Historically, microfinance has often been aimed at increasing women's access to credit. As Miller and Rodgers (2009) argue, anything that improves the economic well-being of women will affect household bargaining power. With greater power, women are in a better position to bargain for a greater share of household resources to be allocated toward expenditures that improve the health and well-being of children. In addition to expanding the social capital of parents and the economic power of women, the presence of microfinance institutions in a community is likely to affect child health through more traditional mechanisms. For instance, the availability of credit for entrepreneurs is likely to lead to economic diversification and wealth. This increase in wealth will eventually support the development of health-related infrastructure that focuses on children such as sanitation and medical facilities (Deloach & Lamanna, 2011).

Parental education influences child health. In this study we use highest grade of household head (**schhhm1**) as a proxy for education. This confirms the unified growth theory extended to the household level (Galor & Weil, 2000). A level increase in the education of the household head is likely to promote children's health by 77.6%. Children whose parents are educated are less likely to be wasted. We observe that there is positive association between household head

Table 21: Treatment Effect Results for Child Health

Variables (cbmi)	Coef.	Std. Err.	z	P>|z|
NHIS	0.066	0.032	2.063	0.022**
Yrsinbus	0.059	0.032	1.843	0.06*
Hhmembership	0.065	0.033	1.969	0.048**
sourceofwa~r	0.595	0.580	1.03	0.305
Schooltype	-0.696	0.447	-1.55	0.120
schhhm1	0.777	0.259	3.00	0.000***
Ageofchd	0.213	0.108	1.97	0.049**
ClientNonc~t	3.043	1.796	1.69	0.09*
Expenditur~h	0.0017	0.001	1.75	0.081*
Cbmi	0.767	0.258	2.97	0.002**
_cons	0.127	0.301	0.42	0.674
/athrho	-0.637	0.296	-2.15	0.032**
/lnsigma	1.409	0.082	17.26	0.000***
Rho	-0.563	0.202		
Sigma	4.092	0.334		
Lambda	-2.303	1.005		
Wald test of indep.	eqns.	(rho = 0): chi2(1) =		4.62
Observations =	280 Wald	Chi2(9)=		29.17
Log likelihood	-932.667	Prob>Chi2=		0.001

Source: from field survey, (2011) ***, **, * significant at 1%, 5% and 10%.

education and child health. This confirms a cross-sectional study involving the assessment of the anthropometric status of selected school children in Accra, Ghana by Owusu, Lartey, de Onis, Onyango & Frongillo (2004). They concluded that children who experience unconstrained growth belonged to a sub-population of households characterized by high paternal education.

The study focused on children aged 7-18 years who are in basic schools. These children are categorized into pre-adolescents (7-9years) and adolescents (10-18). Older children Adolescents (adolescents) are healthier than younger children (pre-adolescents) according to the results.

At five percent level of significance, a year increase in age increases child BMI by 21.3%. Thus the child's age shows that older children tend to be of normal size than younger children. Among the studies in the domain of the wider (non Ghanaian) literature that our findings on the child's age tend to corroborate are those of Alderman and Christiansen (2004) and Valdivia (2004). In the case of previous empirical literature on Ghana, our findings tend to support all three previous studies identified (Alderman 1990; Strauss and Duncan, 1996).

Household membership defines the number of people that eat from the same bowl and sleep under the same roof. There is negative relationship between household size (**hhmembership**) and the health status of children in basic schools. It is interesting to note that the result confirms the unified growth theory championed by Galor and Weil (2000). The results of the current study show that as household size increases by one more person, child health deteriorates by about

6.5%. Intuitively, as household size increases expenditure of the household also increases and in a situation where household is income constrained, there will be little to spend or there will be re-allocation of expenditure thus affecting how much is spent on children. Given this, it is possible that the health of children will be negatively affected if household size is large.

Ghana's National Health Insurance Scheme (NHIS) was created by the National Health Insurance Act of August 2003, and is one of very few attempts by a sub-Saharan African country to implement a national-level, universal health insurance program. A newly-created National Health Insurance Authority (NHIA) was commissioned "to secure the implementation of a national health insurance policy that ensures access to basic healthcare services to all residents. The main aim of the national health insurance was to abort the cash and carry system of paying for health care services. In that direction the poor and those in the low income bracket as well children in particular were to be protected.

National health insurance scheme (NHIS) has positive impact on child health. Earlier studies have shown that there is evidence of micro-credit impacting positively on child health through health insurance. In this study too, NHIS is statistically significant at 5% and it increases child health by 6.6% with reference to children who do not have. Children with health insurance are better off in terms of their body mass index than those without health insurance. Basic school children themselves are minors and for that reason do not register for NHIS. The rule is that parents' premium should cover their children under age 18.

In a related strand of the literature which focuses on the relationship between health care and well-being using strategies better-suited for identifying causal effects the authors gave a conclusive evidence of the relationship between health insurance and child health. In their review of the evidence on the causal impact of health insurance coverage, Levy and Meltzer (2008) conclude that "the evidence available to date conclusively demonstrates that health insurance improves the health of vulnerable sub-populations" such as infants and children. With health insurance there is regular usage of health care services and this will automatically mean that children will have easy access to medical care. All things being equal, one would expect children who are given regular medical attention to be healthy than those who do not. This is where we see health care as investment good in that it produces healthy people today for future activities.

Years in business measures the age of the micro-enterprise and experience of the business operator. Age of the firm is a standard measure of reputation (Diamond, 1989) in capital structure models. As a firm continues longer in business, it establishes itself as an ongoing business and therefore increases its capacity to take on more credit; hence age is positively related to credit. Before granting a loan, banks tend to evaluate the creditworthiness of entrepreneurs as these are generally believed to pin high hopes on very risky projects promising high profitability rates. Diamond (1989) suggests the use of firm reputation as a proxy for credit worthiness of an enterprise also influences the level of profitability. The argument goes on that profitable enterprises are able to improve the welfare of their households. It therefore, implies that enterprises that have been

in business for longer period of time are likely to improve the welfare of their household members including that of children.

Differences in mean outcomes

Following Efron and Tibshirani (1993) the Satterthwaite's approximation that estimates the statistic from the test of equal means is used to test the differences in means across beneficiaries and non-beneficiaries. The difference in means of BMI (Table 22) among beneficiaries and non-beneficiaries children is 0.83 kg/m^2 and this is significant at 5%.

Table 22: Mean Difference in BMI

Group	Mean	Std. Err.	Std. Dev.	[95% Conf. Interv.]	
Beneficiaries	17.97289	0.2521	3.7379	17.47622	18.469
Non beneficiaries	17.14611	0.2099	3.9279	16.73316	17.559
Combined	17.46522	0.1622	3.8734	17.14656	17.784
Difference	0.826786	0.3280		0.182279	1.4713
Ho: diff = 0					
t= 2.5206					
Pr(|T| >|t|)=					
0.0120					

Source: Field survey, 2011.

The null hypothesis that there is no significant difference between means of BMI is rejected. Alternatively there is enough evidence to say that mean BMI for beneficiaries' children is different from that of non-beneficiaries. Relatively, using BMI as a proxy for health, beneficiaries' children are 4.75% healthier than non-beneficiaries' children.

There is also significant difference in mean expenditure on health for beneficiaries and non-beneficiaries. Table 23 shows that on the average beneficiaries spend more on health than non-beneficiaries. Testing the hypothesis that there is no significant difference between mean health expenditure, the results show that on the average beneficiaries spend more than non-beneficiaries and the difference is significant at 1%. However, it must be borne in mind that expenditure on health may mean different nutritional combinations.

Beneficiaries spend GHc 53.35 on health more than non-beneficiaries thus confirming that beneficiaries are likely to be better off in terms of health than non-beneficiaries. In relative terms, beneficiaries spend 16.46% more than non-beneficiaries which again imply that given their characteristics they will be better off than the comparison group.

Table 23: Mean difference in Health Expenditure

Group	Mean	Std. Err.	Std. Dev.	[95% Conf.	interval]
Beneficiaries	358.2092	13.006	3.73791	332.5127	383.905
Non-beneficiaries	302.8623	11.052	3.92797	281.0925	324.632
Combined	324.0325	8.5423	3.87342	307.2389	340.826
Difference	53.3468	17.068		21.77452	88.9190
Ho: diff = 0					
t= 3.2427					
Pr(|T|>|t|)=0.001					

Source: field survey, 2011.

Conclusion

This chapter has shown that indeed access to micro-credit impacts positively on child health and education. However, in terms of term performance the impact is marginal. Beneficiaries' children benefit indirectly from micro-credit. Microfinance can therefore be used as a tool for human capital development.

CHAPTER EIGHT

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The previous three chapters have demonstrated that microfinance eases credit (non-income outcome), impact on child school attendance and health (non-income outcome) and finally contribute to business growth (income outcome). The eighth chapter of the thesis presents the summary, conclusions and policy recommendations as well as areas for further research. In addition, the study is not without flaws. Thus, the chapter also presents the main contributions and limitations of the study.

Summary

The main motivation for undertaking this research was to test and confirm the mix-results nature of microfinance impact studies especially in Ghana. The general objective of the study was to assess the income and non-income outcomes of micro-credit among beneficiaries and non-beneficiaries. Specifically, the study sought to evaluate the impact of micro-credit on businesses, child health and child education. In addition, it sought to examine the factors that ease access to micro-credit in the study areas.

In order to achieve the above objectives, household and enterprise level data were collected from beneficiaries and non-beneficiaries of Yaalex Microfinance Limited in Takoradi Metropolis and Mfantsiman Municipality

respectively. Questionnaires were used for the data collection. In all 500 clients were interviewed. Three separate models were used to analyze the data that was collected. The probit and IV-probit models were used to examine the ease of access to micro-credit. Propensity scores matching (PSM) was employed to estimate the impact of micro-credit on business outcomes. To estimate the impact of micro-credit on education and health outcomes of children, the treatment effect model was used. The key impact variables of interest are child school attendance and body mass index measured by weight-for-height. In addition we also investigate how micro-credit impact health expenditure and average school performance.

Conclusions

Sources of gender disparity in access to micro-credit within the financial sector lie in the other dimensions related to human capital factors and household as well as enterprise level characteristics such as levels and outcomes of education. Policies to ease access to micro-credit to close gender gap have to address these other dimensions if women are to reap the benefit of financial services as much as men (Aterido, Beck & Iacovone, 2011). The regulation of MFIs in Ghana is likely to change the modus operandi of most MFIs from typical informal operational requirements to formal operational requirements.

Micro-credit impacts positively on child school attendance but not term performance. The impact on school attendance though positive is marginal. Whiles there is no evidence of micro-credit impact on term performance, the relationship

is positive. A further investigation of the control variables indicate that the level of education of household head, sex of children in school, type of basic school (public or private), sex of parent, and age child in school all affect school attendance positively. From result of the study it is argued that once access to micro-credit increases basic attendance, it has the potency of reducing child work or beneficiaries' children are likely to spend less time in helping in the household enterprise.

The study has shown that with access to micro-credit, beneficiaries are able to increase expenditure on child education. Again, it is also inferred that once children will be regular at school, child involvement in household economic activities will be minimized. In other words, child work will reduce so as long children attend school regularly. On the other hand micro-credit does not impact on child school performance even though it impacts on attendance. The argument put forward is that it is not only attendance that affects school performance. In most cases learning materials, teaching methodology, learning environment, nature of assessment are basic ingredients that determine how well a particular child will perform.

Clients who have been in business for a long time contribute to the health needs of their children. The argument spans from the fact that longer business operation is associated with higher profits. By inference, there will be more to spend on the dependents of such category of clients. This is the more reason why age of business of the beneficiaries impact positively on the health of their children.

Recommendations

1. MFIs need to emphasize on the education needs of their clients. Education should not only focus on the credit and business management but rather general functional literacy programmes that will offer clients the opportunity to read and write need to be included in MFIs training programmes.
2. Credit with education (CwE) should also include possible business ventures such as trading which has the potential for producing higher revenue in the short term. Males need to be encouraged to venture into small scale trading activities since it has the potential of producing higher profits. Thus, trading should not be seen as economic activity for women alone.
3. Special microfinance products for child education need to be developed to promote investment in child education. MFIs can do this by conducting need assessment of their clients to know exactly the kind of educational products that clients need.
4. In order for micro-credit borrowers continue to ensure their children's punctuality in school, MFIs need to offer loans conditional upon household children attending school. In a similar vein support schemes could be instituted to assist clients whose children are in school.
5. Again, once access to micro-credit impact positively on children education, MFIs need to engage themselves in activities that will promote child education. Such activities include sponsorship to

beneficiaries' children. Moreover, different credit terms and conditions for beneficiaries could also help them finance their children education.

6. MFIs need to offer more loans to clients who have been in business for a long time. This will push them to produce more profits out of which they can spend on their households to improve their well-being. Higher profits are associated with experienced clients which also increases expenditure on their household. In fact age of business should be a factor in granting micro-credit.

Study limitations and further research areas

This thesis is not without limitations. A basic limitation of studies of this kind normally relates to the use of cross-sectional data. Although this data is informative for determining the income and non-income outcomes of microfinance, the cross-sectional nature of the study principally provides a one-time measure of the impact of micro-credit on beneficiaries. Since the growth patterns in cross-sectional data are based on many individuals, they do not necessarily portray the observed growth pattern of any particular beneficiary (McMurray, 1996). The use of longitudinal dataset or randomised control trials would be preferable to scrutinise the actual causalities. Hence, the direction of causation between micro credit on income and non-income outcomes of households can be ambiguous since this research uses only cross-sectional data.

Again, making inferences from a single MFI may be biased and not inconclusive. However, the finding could be generalised due to the homogeneous

nature of MFIs in Ghana. Further research needs to sample a number of MFIs from more than two regions for better institutional and geographical representation.

Maybe a broader picture of microfinance impact may be obtained as we listen to defected clients and why they left. Thus focusing on current clients alone may be misleading. Future research should therefore focus on mixed method approach and the use of cross-sectional time variant data.

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APPENDICES

APPENDIX A

QUESTIONNAIRE ON INCOME AND NON-INCOME OUTCOMES OF MICROFINANCE

The purpose of this study is to find out how the use of micro-credit affect beneficiaries' businesses and their household in comparison with non-beneficiaries. We would be glad if you could take some few minutes out of your busy schedule to complete this instrument. You are assured of confidentiality and non disclosure of the information you provide to any other party.

Thank you.

SECTION A: ENTERPRISE INFORMATION	
1. Questionnaire serial number: ___	2. Name of District and community: District..... Community.....
3. Type of economic activity Trading .....1 Processing .....2 Seam stressing/hairdressing 3	4. Sector Agricultural .....1 Industry .....2 Services.....3
5. Size of enterprise Males Females Number of employees ___ ___	6. Is this your main economic activity? Yes .....1 No.....2
7. If No, indicate your main economic activity	8. What is your major source of income? Main economic activity .....1 Other economic activity 2
9. Type of other economic activity? Trading 1	10. Average number of hours in a day spent on main economic activity:

Processing ……2 Services(eg seamstress)……..3	Less than two hours: ……1 Between two and four hours: ……..2 Between four and six hours: ……3 More than six hours: ……4
11. If trading, indicate what you actually sell Provisions …… Food stuffs…….. Clothes and foot wear……	12. If processing, indicate what you process Palm oil…… Gari…… Soap…… Fish……
13. Indicate the major source of financing your business: MFI (credit union, RCB, Saving & Loans, Susu, etc)…… Traditional bank…… Loans from family and friends……	14. Indicate the average monthly business revenue and expenses: Average revenue GHc…… Average expenses GHc……
15. Do you receive remittances for your business in the past 12 months? Yes……..1 No……2	16. If Yes, indicate on the average how much remittances you received in the past 12 months GHc……..
17. What is value of your business stock for the past 12 months? GHc……	18. Indicate the sales for the past 12 months. GHc……

SECTION B: HOUSEHOLD ECONOMIC CHARACTERISTICS

21. What is the main material of the floor?

Earth/wood planks/other/no residence 0

Cement 1

Parquet/polished wood/linoleum/vinyl/tile 2

22. What fuel does household most frequently using in cooking?

Other 0

Firewood/Charcoal/kerosene.....2

Gas(LPG or natural) 3

Electricity/buy food..... 4

23. What is the main source of drinking water for the household?

Unprotected well/rain water/ river/lake/pond 0

Vendor/truck/protected well..... 1

Pipe-borne water, borehole/hand-pump 2

24. How many color televisions does the household have?

None 0

One.....1

Two or more.....3

25. How many household members are 15years old or younger/physically challenged/above 80years

Four or more 0

Three.....1

Two.....2

One.....3

None.....4

26. Is there any adult illiterate in the household?

Yes.....1

No.....0

27. How many members of the household have savings accounts?

None.....0

One.....1

Two or more.....2

28. Does household often skip a meal as a result of coping with hardships?

Yes.....1

No.....0

29. Does any household member belong to any of the following groups: occupational/professional; political; tribal/ethnic and religious?

Yes.....2

No.....0

30. Does any household member have access to land/natural resource?

Yes.....1

No.....0

SECTION C: CHILD EDUCATIONAL AND HEALTH CHARACTERISTICS	
1. Indicate the present class of the child……	**2.** Child termly performance for the past three terms Term One class position…….. Term two class position…… Term three class position……
3. Is the child regular at school? Yes……2 No……..1	4. Class attendance during the past three term Term one……out of…… Term two……out of…… Term three…….out of……..
5. Child activity in class 1 2 3 4 Reading Arithmetic Writing	1=poor 2=good 3=very good 4=excellent
6. Does the child have educational materials regularly? (books, maths set, school uniform, sandals, school bag, etc) Yes…….2 No……..1	**7.** Is the child's school fees paid regularly? Yes……2 No……..1
8. If YES, who pays it? Mother……..1	9. Indicate the termly school fees for the past three terms

Father……2 A family member……..3	Term one GHS…… Term two GHS…….. Term three GHS……
10. What is the current state of the child's health as can be observed? Poor ……..0 Good……..1 Very good……3	**11.** Has the child been registered for NHIS? Yes……1 No……..2
12. Measure and record the following for the child Height (cm)…….. Weight (kg)……..	**13.** Has the child been taken to the hospital/health post or clinic for the past one year? Yes……..1 No……..0
14. If YES, how many times? More than 5 times……..1 Five to 10 times……..2 More than 10 times……3	15. If YES, indicate the illness diagnosed of the child…… ……
16. Has the child been registered for National Health Insurance? Yes……..1 No……0	17. Is child in private or public school? Private……2 Public……..1
18. Indicate the number of schools in this community	

SECTION D: ACCESS TO MICRO-CREDIT	
19. Have you taken micro-credit in the past 12 months from Yaalex MF? Yes.....1 No.....0	**20.** If YES to (19), was it easy or difficult to obtain the loan? Yes.....1 No.....0
21. How much loan did you benefit from Yaalex MF? GHc.....	22. How much loan have you taken for the past 12 months? Traditional bank GHc..... Friends and families GHc.....
23. How much savings do you have with the MFI? GHc.....	24. How many times have you obtained loan from the MFI? .....
25. How long have you been with Yaalex MF? (In number of months)	26. How did you become client? ....
27. Indicate in terms of percentages how the loan was used: Business (%)..... Consumption (%)..... Others (%).....	28. Was the loan individual or group? Group.....2 Individual.....1

ECTION E: HOUSEHOLD DEMOGRAPHIC CHARACTERISTIC

LEASE TELL ME THE NAME OF EACH PERSON IN YOUR HOUSEHOLD STARTING WITH THE HEAD OF THE HH.
lse survey definition of HH member). List the first name in line 01. List adult HH members first, then list children.
hen ask: ARE THERE ANY OTHERS WHO LIVE IN YOUR HOUSE – PROBE TO DETERMINE WHETHER THEY BELONG TO THE AME HOUSEHOLD. *Then, ask and record answers to questions as described in Instructions for Interviewers.*

14. *ine o.*	15. *Name*	16. IS (*name*) MALE OR FEMALE? 1 MALE 2 FEMALE		17. HOW OLD IS(*name*)? *Record in completed years* 99=DK*	18 CAN HE/SHE READ A LETTER OR NEWSPAPER EASILY, WITH DIFFICULTY OR NOT AT ALL? 1 EASILY 2 DIFFICULT 3 NOT AT ALL 9 DK	19. WHAT IS THE HIGHEST LEVEL OF SCHOOL ATTENDED (NAME)? LEVEL: 1. NONE 2. PRIMARY 3. SECONDARY 4. HIGHER 5. NON-STANDARD	20. WHAT IS THE MARITAL STATUS OF (*name*)?** 1 CURRENTLY MARRIED/ IN UNION 2 WIDOWED 3 DIVORCED 4 SEPARATED 5 NEVER MARRIED
INE	NAME	M	F	AGE	E D N DK	N P S H NS	M W D S N
01		1	2		1 2 3 9	1 2 3 4 5	1 2 3 4 5
02		1	2		1 2 3 9	1 2 3 4 5	1 2 3 4 5
03		1	2		1 2 3 9	1 2 3 4 5	1 2 3 4 5
04		1	2		1 2 3 9	1 2 3 4 5	1 2 3 4 5
05		1	2		1 2 3 9	1 2 3 4 5	1 2 3 4 5
06		1	2		1 2 3 9	1 2 3 4 5	1 2 3 4 5
07		1	2		1 2 3 9	1 2 3 4 5	1 2 3 4 5
08		1	2		1 2 3 9	1 2 3 4 5	1 2 3 4 5
09		1	2		1 2 3 9	1 2 3 4 5	1 2 3 4 5
10		1	2		1 2 3 9	1 2 3 4 5	1 2 3 4 5

Summary

Total number of persons in the household.....
Number of children less than 18 years1. Males..... Females.....
Schooling years of respondent.....
Schooling years of husband/wife .....
Indicate the schooling years for each of the children
Child 1..... Child 2..... Child 3..... Child 4.....child 5.....child 6.....

APPENDIX B

STRUCTURAL IV-PROBIT RESULTS

	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Ecoactivity						
1	.0202497	.1036959	0.20	0.845	.22349	.1829905
2	.2309714	.1168318	1.98	0.048	.4599575	.0019853
4	.0801361	.2032346	0.39	0.693	.3181964	.4784686
Community						
1	.005283	.2060752	0.020	0.624	.5048282	.3029716
2	.2729347	.2265462	1.20	0.228	.7169572	.1710877
3	.0100824	.2262447	0.02	0.983	.4386074	.4482556
Hhmembersh	-.0002229	.002520	2.52	0.007	.0006224	.0010683
hhmembership2	.008518	.035832	2.98	0.005		.0392301 .0155264
Loanaccess	.7192742	.0874542	8.22	0.000	.5478672	.8906813
Numsch	.01805085	.010294	1.97	0.0566	-.0276843	.0126673
_cons	2.217419	.3174525	6.99	0.000	1.595224	2.839615
/athrho	-1.165861	1.555001	-0.75	0.453	-	4.213607 1.881886
/lnsigma	-.3126	.031121	-10.04	0.000	-	.373596 -.251604

```
         rho |   -.8229407    .5019055                -.9995624
.9546595
       sigma |    .7315425    .0227663                 .6882549
.7775526
------------------------------------------------------------------------------
Instrumented: Readhhmm1 schhhm1
Instruments:    1.Ecoactivity 2.Ecoactivity 4.Ecoactivity
1.Community
2.Community 3.Community hhmembership2 hhmembership
Loanacess  Numsch
------------------------------------------------------------------------------
Wald test of exogeneity (/athrho = 0): chi2(1 = 0.56 Prob >
chi2 = 0.4534
```

APPENDIX C

SENSITIVITY ANALYSIS RESULTS

Gamma (Γ)	Sig+	Sig-	T-hat+	T-hat-	CI+	CI-
Stock						
1	0.25819	0.25819	50	50	-80	150
1.2	0.82839	0.12191	-50	145	-173	250
1.4	0.98937	0.00015	-140	225	-250	350
1.6	0.99976	7.1e-07	-200	300	-330	450
1.8	0.99999	1.8e-09	-260	365	-400	515
2	1	2.9e-12	325	440	-450	600
Sales						
1	0.00655	0.00655	110	110	25	200
1.2	0.18635	0.00002	40	190	-50	275
1.4	0.67226	2.1e-08	-20	250	-110	350
1.6	0.94594	1.0e-11	-75	300	-170	400
1.8	0.99581	2.8e-15	-124	350	-225	460
2	0.99999	0	-200	450	-275	515
Expenses						
1	0.05565	0.5565	100	100	-22.5	230
1.2	0.50209	0.0007	-3.9e-07	205	134	350
1.4	0.91237	2.3e-06	-90	300	-227.5	455
1.6	0.99432	3.2e-09	-170	390	-325	560
1.8	0.99982	2.6e-12	-242.5	470	-420	660
2	1	0	-390	550	-515	750
Profits						
1	0.01283	0.01283	250	250	30	460
1.2	0.26220	0.00006	70	425	-150	665
1.4	0.76018	8.4e-08	-75	587.5	-300	860
1.6	0.96952	5.2e-11	-200	750	-440	1050
1.8	0.99819	1.9e-14	-320	896.5	-560	1240
2	1	0	-425	1030	-680	1420