UNIVERSITY OF CAPE COAST

EFFECTS OF FINANCIAL DEVELOPMENT AND DIGITAL FINANCIAL EXCLUSION ON ELEMENTS OF WELFARE IN SUB-SAHARAN AFRICA

SEYRAM KAWOR

2023

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BY

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Thesis submitted to the Department of Economic Studies of the School of Economics, College of Humanities and Legal Studies, University of Cape Coast, in partial fulfilment of the requirements for the award of Doctor of Philosophy Degree in Economics

DECEMBER 2023

DECLARATION

Candidate's Declaration

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

Candidate's Signature:…… Date:……..

Name: Seyram Kawor

Supervisors' Declaration

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

Principal Supervisor's Signature: ……. Date: …….

Name: Prof. Samuel Kobina Annim

Co-Supervisor's Signature: …….. Date: …….

Name: Prof. James Atta Peprah

ABSTRACT

The level of financial development is low in Sub-Saharan Africa. This has led to high rates of financial exclusion, digital and non-digital, which may in turn have influence on consumption inequality and multidimensional poverty. Nonetheless, there is a dearth of study on these relationships. This study, therefore, assessed the effect of financial development and digital financial exclusion on elements of welfare in Sub-Saharan Africa (SSA). Data was sourced from the World Bank and the Seventh Wave of Ghana Living Standard Survey (GLSS 7). The data was analysed using mean, standard deviation, histograms, graphs, and multiple regression functions estimated by Ordinary Least Squares and Random Effects. The results revealed that financial development significantly and positively affects consumption per capita. Also, it was shown that both digital and non-digital financial exclusion have a significant positive effect on consumption inequality. Furthermore, digital financial exclusion and non-digital financial exclusion significantly and positively influence multidimensional poverty. It was recommended that leaders of SSA countries make an effort to develop their financial institutions and financial markets to stimulate the level of growth desired in the subregion.

KEYWORDS

Consumption inequality

Consumption per capita

Financial development

Financial exclusion

Multidimensional poverty

ACKNOWLEDGEMENTS

I hardly know where to start saying 'Thank You', for all those who helped me through this journey. First of all, my profound and heartfelt gratitude goes to my two supervisors: Prof. Samuel Kobina Annim and Prof. James Atta Peprah. Your valuable contributions, innovativeness, talents and creative flairs were very evident and much appreciated.

The greatest thank goes to my late Mom, and my Daddy who made it all worthwhile, by always supporting and encouraging me. Mom, you wished you were around to see this day, but wherever you are, I am most grateful. To my lovely wife and children, I say 'God Bless You' for your unfailing support and help when I embarked on this painstaking, but ultimately fruitful journey into the academic world.

I also express my appreciation to Jones Arkoh Painstil, Divine Atinyo and Dr. Joshua Sebu who consistently gave timely and constructive feedback throughout the writing of this thesis. 'Thank You' to the management of Justa Hotels in Accra and Green Hills Hotel in Takoradi, for the accommodation during the times of data analysis. Mr. Isaac Newton, many thanks for buying the Stata software which was used in analysing the data. I also acknowledge the entire staff of School of Economics for their help and support throughout my studies, especially during the course work with its examinations.

DEDICATION

To my family

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CHAPTER ONE

INTRODUCTION

The need to reduce income inequality and poverty is the fundamental focus of the Sustainable Development Goals (SDGs). In fact, three of the 17 target-points of the SDGs are devoted to reducing income inequality, ending poverty, and ensuring inclusive growth. Several researchers have identified a number of factors such as unfair redistribution, and poor resource management and allocation as the main drivers of poverty. In developing countries like those in sub-Saharan Africa, of which Ghana is part, where poverty is relatively high and financial sector is not well-developed, financial intermediation may not allocate resources equitably to the poor.

Indeed, the recent reversals of fortunes as the World Bank (2020) reckon is due to the fact that employment is precarious, resources allocation is inequitable, and financial development is not strong enough. This calls for attention to be paid to financial development due to its implications for alleviation of multidimensional poverty, income and consumption inequalities, and financial exclusion. However, empirical literature provides little evidence in these regards. Thus, the relevance of this study is rooted in examining these economic factors and their interrelationships.

Background of the Study

The role of a free and efficient financial sector is crucial to the development of a congeal environment for the lubrication of economic activities. Greater financial inclusion in this era of technological advancement and financial

development makes it easier for policymakers to target the poor in terms of resource allocation through efficient monetary policy transmission. It is, thus, not surprising that current empirical studies have thrown the spotlight on financial development, and most of these studies have averred that financial development and its associated concepts have implications for drivers of economic development (Pomati, & Nandy, 2020).

The level of financial development in a country can have implications for capita income and income inequality, as inequality-widening and inequality-narrowing are both associated with financial development (Law & Tan, 2009; Usman et al., 2021; Perugini & Tekin, 2022), and financial exclusion which may further lead to high levels of elements of welfare such as poverty, consumption per capita and consumption inequality among people (Perugini & Tekin, 2022). Levine (1997) contended that financial contracts, markets and intermediaries arise to ameliorate information and transaction costs; thereby promoting information acquisition, risk diversification, liquidity transformation, and financial transactions (Levine, 1997). Nonetheless, these concepts are difficult to measure consistently across countries, making different scholars define financial development differently.

Baiardi and Morana (2017) termed financial development as a process that marks improvement in quantity, quality and efficiency of financial intermediary services, and involves the interaction of many activities and institutions. Others defined financial development based on its measurement, such as private credit to GDP, or stock market capitalisation to GDP (Acemoglu & Johnson, 2005);

private credit, domestic credit to GDP, stock value traded, stock market turnover to GDP, or number of listed companies (Baltagi et al., 2007). From these, it could be said that financial development revolves around all activities and arrangements that contribute to the improvement of a financial system. These activities may include improving access to financial markets and institutions, as well as the depth and efficiency of these markets and institutions (Saidu & Marafa, 2020).

The level of a country's financial development is directly associated with the rate of financial exclusion (digital financial exclusion and non-digital financial exclusion) (Perugini & Tekin, 2022), as high levels of financial development may mean high levels of access to financial services and products; thereby ensuring reduced rates of financial exclusion (Baiardi & Morana, 2017). Financial exclusion is characterised by individuals and populations without access to common financial services, such as savings accounts, loans, cashless transactions, credit, and other traditional banking services (FINCA International, 2021). These financial services could broadly be classified under digital and non-digital, hence digital and non-digital financial exclusion.

Whilst digital financial exclusion consists of exclusion from access to electronic-zwich account, electronic-banking, use of e-zwich and mobile money, among others, non-digital financial exclusion includes exclusion from account ownership, credit and insurance (FINCA International, 2021). Many empirical studies intimated that financial exclusion could influence multidimensional poverty and consumption inequality (Attanasio & Pistaferri, 2016; Corrado & Corrado, 2017). Multidimensional poverty is described as the state or condition in

which an individual or community lacks the financial resources and essentials for minimum standard of living, and this revolves around lack of proper housing, clean water, healthy food, and medical attention, among others (Pomati, & Nandy, 2020).

The World Health Organisation (WHO) (2016) also referred to poverty, in pure economic terms, as when a family's income fails to meet a nationally established threshold – however, this threshold differs across countries. Typically, it is measured with respect to families and not the individual, and is adjusted for the number of persons in a family (WHO, 2016). On the other hand, consumption inequality happens when the poor live in relatively cheaper areas or shop in relatively less-expensive stores, or if the prices of the goods and services they usually purchase grow less than the prices of goods and services purchased by rich households (Attanasio & Pistaferri, 2016).

Consumption per capita is a very important element of welfare that needs to be given a rapt attention, considering the fact that higher consumption per capita contributes to economic growth, improved standard of living, business growth and innovation, boosts the retail and service sectors, promotes investment and savings, among others (Attanasio & Pistaferri, 2016). Nonetheless, consumption per capita of Sub-Saharan Africa countries has not been encouraging. For instance, the final consumption expenditure per capita in Ghana has been reported to grow at a rate of 1.184% in 2022; South Africa reported a growth of just 1.762%; Kenya documented 4.271%; and most of the remaining

countries within the subregion reported a growth rate of less than 1.5% (World Bank, 2023).

Thus far, it could be seen from the discussion that all the economic factors have some level of association with financial development. This makes financial development a critical and inextricable part of economic growth of every country (Kavya & Shinjin, 2020). A developed financial system ensures that institutions, instruments, markets, legal and regulatory frameworks, that enable transactions to be made through extension of credit, have improved as well (Law et al., 2014). Consequently, the costs incurred in obtaining information, enforcing contracts and making transactions are overcome (Martin et al., 2012).

Additionally, a line of evidences posit that financial development promotes economic growth through capital accumulation and technological progress by increasing the rate of savings, mobilisation and pooling of savings, production of information about investment, facilitation and encouragement of inflows of foreign capital, as well as the optimisation of capital allocation (Ishmail, 2021; Law et al., 2014; Perugini & Tekin, 2022). Also, countries with well-developed financial systems tend to grow faster over long periods of time, and a large body of extant literature suggests that this impact is causal as financial development is not merely an outcome of economic growth, but contributes immensely to this growth (Kappel, 2010; Jauch & Watzka, 2012; Altunba¸s & Thornton, 2018).

Financial development also reduces poverty and inequality, by broadening access to finance to the poor and vulnerable groups, facilitating risk management

by reducing their vulnerability to shocks, and increasing investment and productivity that result in higher income generation (Saidu, & Marafa, 2020). Moreover, financial development helps with the growth of small and medium-sized enterprises by providing them with access to finance. Since small and medium-sized enterprises are usually labour-intensive and create more jobs than do large firms, they play major role in economic development; especially in emerging economies (Altunba¸s & Thornton, 2018).

Besides, it should be stated that financial development goes beyond just having financial intermediaries and infrastructures in place. It entails having robust policies for regulation and supervision of all the important entities (Pomati & Nandy, 2020). It is, thus, not surprising that the global financial crisis was partially attributed to the consequences of weak financial policies and regulations (World Bank, 2014). Considering all these, the importance of financial development cannot be overemphasised, as better-developed financial systems appear to, in one way or the other, have a link with other economic factors such as consumption per capita and levels of financial exclusion (World Bank, 2020). This implies that an under-developed financial system could result in low consumption per capita and high levels of financial exclusion and poverty, as could be inferred from the McKinnon "conduit effect" theory (McKinnon, 1973).

The foregoing is based on the fact that when financial development is stifled and people get marginalised, the rate of financial exclusion is exacerbated – denying the financially excluded access to credits, savings and other financial services and products; thus, widening income and consumption inequality gaps,

and as well worsening the state of impoverishment of people (Altunbaˏs & Thornton, 2018; Perugini & Tekin, 2022). This means that if access to financial institutions and markets is expanded to reach all and sundry, the poor would have access; thereby, getting them financially included which may eventually contribute to alleviating poverty and narrowing the inequality gaps (Martin et al., 2012; World Bank, 2014; Ofeh & Thalut, 2018).

Ishmail (2021) also argued that improvement in depth, access, efficiency and stability of financial institutions and markets could lead to low rates of financial exclusion and narrowed income and consumption inequality gaps. The theory of active financial development (supply leading financial development) further suggests that improved financial system could enhance the rate of consumption of individuals (Gloukoviezoff, 2007). Empirically, many extant studies have examined the relationship between financial development and other variables such as consumption inequality, income inequality and poverty. Saidu and Marafa (2020) found financial development to have income inequality-reducing effect under the presence of quality institutions. On the contrary, Pleninger and Sturm (2021) stated that financial development leads to greater inequality.

Similarly, Perugini and Tekin (2022) intimated that financial development is pro-inequality; nonetheless, the magnitude of the relationship was found to have been attenuated in the contexts of stricter control of corruption, better regulated quality, political stability and rule of law. Baiardi and Morana (2018) further evinced that a well-functioning financial system favourably impacts per

capita income and income inequality conditions. Altunba¸s and Thornton (2018) reported that financial development impacts inequality, and promotes equality. Jauch and Watzka (2012) revealed a positive impact of financial development on income inequality, after controlling for country fixed effects and GDP per capita. In like manner, Law et al. (2014) argued that financial development reduces income inequality, but this only happens after a certain threshold level of institutional quality has been achieved. Though it could be seen that there are a number of studies on financial development, there is inadequate evidence on the relationship between financial development and consumption per capita.

In respect of financial exclusion and consumption inequality, Bartiaux (2021) reported that financial exclusion has a link with levels of consumption in a society. Li et al. (2020) also found, among other things, a positive relationship between digital financial inclusion and food, clothing, housing, maintenance, medical care, education and entertainment. Corrado and Corrado (2017) documented that affordable and equitable access to financial products for all households and entrepreneurs is pivotal to long-term consumption and investment. This implies that, to some extent, financial inclusion may improve consumption equality in society. Additionally, Park and Mercado (2018) showed, among other things, that financial inclusion is correlated with per capita income.

With regards to financial exclusion and poverty, Ofeh and Thalut (2018) revealed that financial exclusion is negatively related to poverty reduction. Pal and Pal (2012) also intimated that financial exclusion is a severe problem for households across all income groups even though financial exclusion was

disproportionately higher among the relatively poor households compared to households of higher incomes. Surprisingly, Adewale (2014) showed that financial inclusion significantly impedes the acquisition of livelihood assets. In sharp contrast, Anwar et al. (2016) stated that financial inclusion is negatively related to poverty.

Yu, Jia, Li and Wu (2022) confirmed that financial exclusion leads to extreme difficulties for weaker groups of people such as women, persons living in countryside areas, young persons and the poor. Li and Song (2021) also stated that those whose relatives do not own accounts, and those who have no other sources of funds, such as family/friends, employers and money lenders, are more likely to be poor. Gunarsih et al. (2018) further asserted that increase in financial exclusion rate decreases poverty incidence. These imply that the more financially excluded people become, the poorer they get. However, apart from the fact that majority of the extant studies have focused on developed economies with little attention on sub-Saharan Africa; there is also little knowledge of how digital financial exclusion and non-digital financial exclusion affect consumption inequality and multidimensional poverty.

Despite the fact that financial development is crucial for a holistic economic growth, part of the world still experiences inconsistent rates of financial institution and market development – automatically creating high rates of financial exclusion in those economies. Globally, the level of financial development does not seem encouraging, based on data from the World Bank (2020). For instance, the level of financial development in Latin America and the

Caribbean was 10.6 percentage points (pp); that of Middle East and Central Asia was 20.1 pp; Europe recorded the highest of 40.2 pp, followed by Asia and Pacific recording 26.7 pp. Africa's level of financial development was just 1.3 pp more than that of Latin America and Caribbean (World Bank, 2020).

The World Bank data further revealed that majority of the countries in Africa have less-developed financial systems, compared to the continental average. In terms of financial institution development, the continental average was 19 pp, compared to 16.2 pp for Ghana, and 11.7 pp for Central Africa. Cabo Verde, Benin, Burkina Faso, Eswatini and Lesotho were shown to have financial institution development scores of 34.6 pp, 20.9 pp, 21.4 pp, 22.7 pp and 24.1 pp, respectively; these countries, among others, appear to be doing well, relative to the African average (World Bank, 2020). South Sudan had the least level of financial institution development of 3.5 pp. With respect to financial market development, Ghana was among the countries that had scores, though low, higher than the African average of 4.5 pp (World Bank, 2020).

South Africa seems to be the highest performing country in Africa, in terms of financial development, with a score of 45.12 pp, followed by Mauritius with 35.04 pp, and then Seychelles with 30.83 pp (World Bank, 2020). Also, the level of financial development in Botswana was 25.72 pp; Nigeria was 18.46 pp; Cote d'Ivoire was 14.59 pp; Kenya was 13.95 pp; and Ghana, 12.03 pp, according to the (World Bank, 2020). From these statistics, it could be seen that, relatively, Ghana's level of financial development is not encouraging. This implies that the

level of financial exclusion in Ghana is also high, as the under developed financial system would lead to denial of access to financial institutions and markets.

Again, the data showed in Figure 1 that Ghana is lagging behind its counterpart countries in the sub-Saharan region, in terms of financial development. For instance, as South Africa recorded consistent improvement in its financial sector between 1990 and 2015, with a slight fall between 2015 and 2020, Ghana's financial sector seemed to remain consistently low until between 2010 and 2020 where a slight increase was recorded. Also, Nigeria's financial sector appeared to be more developed than Ghana's financial sector. Also, Kenya's financial sector seemed comparable to Ghana's, only that it saw a consistent growth between 2005 and 2015, compared to Ghana's sector that saw some growth but was still below Kenya's rate of growth.

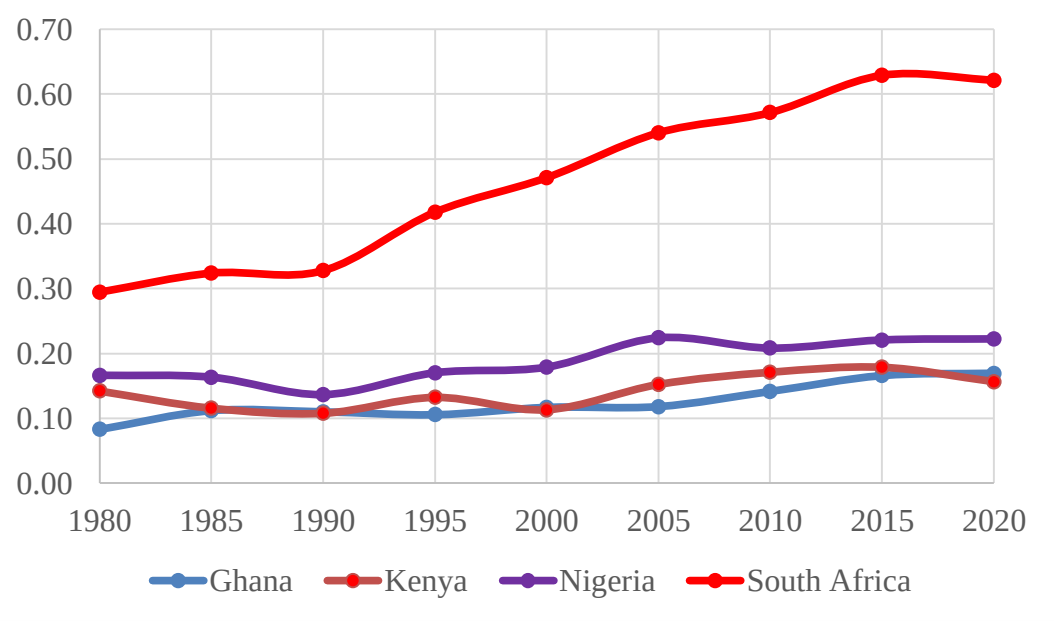

Figure 1: Financial development in some selected African countries

Source: Author's construct (2023)

Considering the foregoing, it could be seen that Ghana's financial sector is under-developed; implying a high rate of financial exclusion in Ghana. This only goes to support the position of prior studies that people, at large, were excluded from accessing basic mainstream financial products in Ghana, primarily due to lack of branch expansion in rural areas and private ownership of majority of banks (Ezzahid & Elouaourti, 2021; Atta-Ankomah et al., 2022). To respond to this, banks in Ghana began to put measures in place, such as branch expansion and establishment of several new branch offices and outlets, which, to some extent, contributed to resolving the geographical dimension to the problem of financial exclusion.

Another intervention, to help address the issue of financial exclusion, was the introduction of mobile money services by telecommunication companies in Ghana. Currently, three major telecommunication companies – MTN, Vodafone and Airtel-Tigo – provide mobile money services known as MTN Momo, Voda Cash and Airtel-Tigo Cash, respectively. Many other online mobile money services have sprang up that people can easily access loans using their phones without their physical presence at financial institutions (Abdul-Rahaman & Abdulai, 2022; Senyo et al., 2022). Banks have also made it simple for the people to engage with their accounts, obtain their account balances, transfer money between accounts, and do transactions without having to visit any bank branches in person (Serbeh et al., 2022).

In spite of the fact that these services are used by many people in Ghana, empirical evidences have it that a huge number of people are still excluded from

the use of these services, especially the digital financial services due to several reasons, including the fact that some places are uninhabited or marginally inhabited, conditional access, and technological access issues, among others (Iddrisu & Danquah, 2021; Abdul-Rahaman & Abdulai, 2022; Senyo et al., 2022; Atta-Ankomah et al., 2022). Taking these into account, it becomes imperative to take a holistic look at financial development and financial exclusion issues in Ghana.

Statement of the Problem

Findings by the Ghana Statistical Services (2020) have indicated that multidimensional poor individuals in Ghana face high levels of deprivation in access to improved sanitation, health insurance coverage and housing. This led to a plethora of studies to be conducted to determine factors that might influence multidimensional poverty. Among the major determinants reported was financial exclusion (digital and non-digital) (Imai, Arun & Annim, 2010; Danquah et. al., 2020). Consequently, many studies have been carried out to assess the relationship between financial exclusion (digital and non-digital) and multidimensional poverty (Clarke & Dercon, 2009; Danquah et al., 2017; Danquah et. al., 2020; Sarder & Golzare, 2012). However, the focus has mostly been on the composite effect of financial exclusion on poverty, with little attention given to how the individual components (i.e., digital and non-digital financial exclusion) influence poverty (Danquah et. al., 2020; Sarder & Golzare, 2012).

Inferring from the individualistic theory of poverty, factors that could describe an individual's situation as being financially excluded are likely to contribute to poverty (Nguembi, Zhang & Abdalla, 2020). This implies that factors such as digital financial exclusion and non-digital financial exclusion which are the main components of overall financial exclusion could, in their individual forms, drive multidimensional poverty. For instance, people who do not have access to digital financial platforms such as ATMs, mobile money services, online banking services, among others, may find it difficult to have access to credit facilities available to individuals who are digitally included (Danquah et. al., 2020).

As a result, the individuals who have inadequate access to these digital platforms, and where the only means of access to financial services is by the use of these platforms, may not be able to enjoy improved sanitation, proper housing, quality education and nutritious meals, among others (Imai et al., 2010). Similarly, access to non-digital financial platforms is crucial to ensuring that multidimensional poverty is kept under control. People who cannot access simple banking services in their localities to enable them create accounts are likely to be left out of the benefits that those who have access to institutions such as insurance companies and banks may enjoy (Imai et al., 2010; Sarder & Golzare, 2012). This can further worsen the level of poverty of some households.

Based on the foregoing arguments that digital financial exclusion and non-digital financial exclusion may influence multidimensional poverty, the researcher contends that ignoring these factors in the study of poverty may deny policy-

makers empirical evidences which could drive the formulation of actionable policies. Nonetheless, prior studies, as mentioned earlier, rather extensively explored the effect of financial exclusion on poverty (Imai, Arun & Annim, 2010; Danquah et. al., 2020). Though it may appear the same objective might have been achieved if they had looked at the individual components against poverty, it should be mentioned that conceptualisation of financial exclusion in majority of prior studies did not strike a balance between elements of digital exclusion and elements of non-digital exclusion to form the overall financial exclusion a a multidimensional construct (Sarder & Golzare, 2012; Danquah et. al., 2020), making it difficult to appreciate the individual effects of digital and non-digital exclusions.

Besides, the fact that financial exclusion affects multidimensional poverty positively or negatively does not justify how multidimensional poverty may be affected by individual digital financial exclusion and non-digital financial exclusion. Whilst the overall financial exclusion may show a positive or negative relationship with multidimensional poverty, the individual components may show opposing relationships, making application of the latter, which is supposed to have integrated both digital financial exclusion and non-digital financial exclusion, misleading and confusing. Therefore, the researcher deemed it imperative to investigate the individual effects of digital financial exclusion and non-digital financial exclusion on multidimensional poverty in Ghana, as the other countries within the SSA subregion did not have adequate dataset available to help explore this interplay (World Bank, 2020).

Furthermore, the researcher argues that financial exclusion may influence consumption inequality. As advanced earlier on the relationship between financial exclusion and multidimensional poverty, it could be reasoned that the consumption gap between the poor and the rich would keep widening as the rate of financial exclusion increases. For instance, Blundell et al. (2008) had indicated that exclusion from insurance, which is one of the indicators of overall level of financial exclusion among people, could influence consumption levels in a society. In like manner, Bartiaux (2021) averred that financial exclusion has a connection with levels of consumption among people. Bartiaux (2021) elaborated further that, individuals of medium and upper social classes seem to have access to more finance than those in lower social classes.

Also, drawing from the individualistic theory of poverty, individuals who are unable or unwilling to engage in economic activities that can afford them the opportunity to be financially included are likely to be faced with ramifications such as lack of funds and inability to meet their daily consumption demands (Saidu & Marafa, 2020). This is to say that high rates of financial exclusion serve as a catalyst for widened consumption gap, as Li, Wu and Xiao (2020) opined that exclusion from digital finance products could impact adversely on household consumption in areas of food, clothing, accommodation, maintenance, medical care, and education and entertainment.

Despite the fact that financial exclusion could directly influence consumption inequality, as advanced above, there is a modicum of empirical studies on the relationship between financial exclusion (digital and non-digital)

and consumption inequality. Majority of extant studies on consumption inequality focused on variables other than financial exclusion (Park & Mercado, 2015; Bartiaux, 2021; Luo & Li, 2022). Others that are closely related only mentioned financial exclusion passively, without analysing how the two concepts are empirically connected (Corrado & Corrado, 2017; Li et al., 2020). These suggest that there is a lacuna in the extant literature; thus, the need to empirically investigate the association between financial exclusion and consumption inequality in Ghana, since the other countries within the SSA subregion did not have adequate dataset available on consumption inequality, digital financial exclusion, and non-digital financial exclusion to help explore these relationships (World Bank, 2020)..

Additionally, the researcher is of the view that financial development may drive consumption per capita. A developed financial system implies that financial institutions and financial markets have experienced a consistent growth, and this is likely to translate into enhancement of access to financial services and products by people. People will be able to obtain bank accounts; purchase insurance policies; use digital financial platforms such as ATMs, mobile money and as well engage in online transactions and businesses, among others. Specifically, having a bank account, for instance, may encourage savings and investment activities from the people, which, ultimately may lead to considerable achievement of financial stability (Abdin, 2016). Also, those involved in entrepreneurial ventures may benefit from credit facilities to support their businesses. All these may translate

into improving consumption per capita, as the individuals will be able to take care of their expenditures.

In alignment with the foregoing, the theory of active financial development posits that making available more infrastructures, systems, services and products within a financial sector would enhance accessibility to financial systems in an economy (Gloukoviezoff, 2007). Buttressing the theory of active financial development, the McKinnon-Shaw hypothesis, also known as the McKinnon conduit effect, suggests that financial development can contribute to increased economic growth by facilitating the allocation of savings to the most productive investment opportunities (McKinnon, 1973). It is argued that as financial sector develops, it acts as a conduit to channel savings into productive investments, which can lead to higher economic growth and an increase in consumption per capita (Dauda & Makinde, 2014; McKinnon, 1973). This relationship can be analysed through empirical studies to determine the magnitude and direction of the impact of financial development on consumption per capita (Inoue, 2019; Mohieldin et al., 2019).

However, there is a dearth of empirical studies on the relationship between financial development and consumption per capita in SSA, despite the fact that the level of financial development in SSA is low (IMF, 2019). Extant related empirical studies conducted several decades ago only looked at aspects of financial development and other variables such as poverty and income inequality (Dehejia & Gatti, 2002; Stiglitz, 1994). More specifically, the focus has been on aspects such as access, depth and efficiency of financial institutions and financial

markets (Sınıflandırması, 2022). The aggregated construct (i.e., financial development) measured as an index of the various aspects has been given limited attention (Perugini & Tekin, 2022), making it difficult to appreciate its holistic effect on welfare elements such as consumption per capita to help address the low rate of growth of consumption expenditure per capita in the subregion (World Bank, 2023). Considering this, there is the need to fill this gap by looking at the relationship between financial development and consumption per capita in SSA as an encouraging number (i.e., 26) of countries within it (i.e., SSA) had data available to help examine this relationship (World Bank, 2020).

Moreover, majority of existing studies employed data from developed and more industrialised economies, with little attention given to Sub-Saharan Africa of which Ghana is part, in spite of the fact that the subregion cannot match its level of financial development with its ever-increasing population rate (IMF, 2019). More specifically, according to the World Bank's Consultative Group to Assist the Poor, only 58 percent of Ghana's adult population had access to formal financial services in 2015, which the National Financial Inclusion and Development Strategy (NFIDS) seeks to increase to 85 percent by 2023 (NFIDS, 2018). This means the rates of both digital and non-digital financial exclusion may continue to increase, and worsen multidimensional poverty and consumption inequality among the increasing population, if relevant strategies are not implemented. In the light of these, there is the need to examine the relationship between financial development and digital financial exclusion, and elements of welfare.

Purpose of the Study

The main purpose of this study was to assess the effects of financial development and digital financial exclusion on elements of welfare in Sub-Saharan Africa.

Objectives of the Study

The specific research objectives were to investigate:

1. The effect of financial development on consumption per capita of sub-Saharan African countries.
2. The impact of financial exclusion (digital financial exclusion and non-digital financial exclusion) on consumption inequality in Ghana.
3. The effect of financial exclusion (digital financial exclusion and non-digital financial exclusion) on multidimensional poverty in Ghana.

Research Hypotheses

Based on the research objectives, the following hypotheses were formulated and tested.

1. $H0_1$: There is no statistically significant effect of financial development on consumption per capita in sub-Saharan African countries.
2. $H0_{2a}$: There is no statistically significant effect of digital financial exclusion on consumption inequality.
3. $H0_{2b}$: There is no statistically significant effect of non-digital financial exclusion on consumption inequality.

4. $H0_{3a}$: There is no statistically significant effect of digital financial exclusion on multidimensional poverty.
5. $H0_{3b}$: There is no statistically significant effect of non-digital financial exclusion on multidimensional poverty

Significance of the Study

This research seeks to inform public policy formulation to aid in addressing welfare issues. The recent revolution in the area of financial globalisation and technology means that policymakers need to investigate the implication of financial inclusion, digital financial exclusion and financial development on the welfare of the masses. This is indeed the knowledge this study provides to policymakers interested in the inclusive agenda of Ghana.

This study intends to inform government, entrepreneurs, and managers of business, enterprises and the public of the general financial exclusion within the economy of Ghana. The knowledge of this situation will inform the appropriate strategy for firms and business enterprises to run their operations. Further, findings on digital exclusion will inform policymakers on the strategies to adopt to improve financial inclusion or accelerate financial participation especially because of the capability of financial inclusion to improve economic wellbeing.

Unlike previous studies, this study establishes the link between digital financial exclusion and poverty and make known to policymakers the extent to which household that are financially excluded experience greater poverty than household that are financially included. Moreover, this study contributes to literature by expanding the relationship between financial exclusion on

multidimensional poverty and consumption inequality, as it has considered the individual constituents (digital and non-digital) of financial exclusion.

Limitation of the Study

The first issue of concern is in the multidimensional measurement for both financial exclusion and poverty. This broad measurement makes it difficult at times to target specific policy actions for desired purposes. Further, in finding the relationship between poverty and financial exclusion, the study adopted a proxy variable used by the Welfarist School of thought i.e., household consumption expenditure. However, there are other proxies used by other schools of thought like the basic needs approach and capabilities school of thought led by Amartya Sen. These schools of thought employ a multidimensional approach to measure economic wellbeing of a household and hence poverty.

Thus, employing multidimensional dependent variable to replace household consumption expenditure, our proxy of economic wellbeing, might have potential effect in the magnitude of financial exclusion estimates of this study. Furthermore, the study is based on cross-sectional data from Ghana Statistical Service, Ghana Living Standard Survey round six and seven, financial inclusion insight survey and data from WDI. The cross-sectional nature prevents the phenomenon of financial exclusion to be studied over time. Thus, different rounds of the Ghana Living Standard Survey data can be pooled to access the time variant nature of the phenomenon of financial exclusion in Ghana.

Delimitation of the Study

The study of the effect of financial exclusion, digital financial exclusion and financial development on poverty in Ghana and sub-Saharan African countries is limited in the following ways. Foremost, the study is limited to Ghana and Rwanda for the first two empirical chapters. Further, the study is limited to the current version of the Ghana Living Standard Survey, the sixth and the seventh round. The study is further limited to household head analysis where the characteristics of the head represent the entire attribute of the household. Again, the panel aspect of the analysis is limited to the Sub-Saharan African countries.

Contributions of the study

The contributions of this study can be appreciated from academic, methodological, and policy perspectives. Academically, this study contributes to the literature on digital financial exclusion, digitisation and financial development in Sub-Sahara Africa region and Ghana in particular. The study presents the argument on the link between financial exclusion, financial development and poverty. The study further made a case for the investigation of digital financial exclusion on the welfare on Ghanaian households. The study suggests that financial inclusion and digitisation greatly reduces poverty in a multidimensional lens.

Even though literature have analysed the effect of financial (ex)inclusion on poverty levels, this study provides varying combinations of digital financial exclusion and inclusion levels that are likely to be present in households and that subsequently affects multidimensional poverty in the household. The study did

this with comparing Ghana and Rwanda in one breadth and SSA countries in another breadth. Thus, this complements the literature on subjective analysis. The findings suggest that financial exclusion thwart the ability of households to move out of poverty.

From methodological perspective, varying estimation techniques are used in order to drive a practical, meaningful and relevant analysis so far as the objectives of the study are concerned. For example, in the objective one, the use of logistic regression to estimate the marginal effect at representative values of the probability of a household that is financially excluded to fall into poverty gives a clear determinant of the effect of financial exclusion on multidimensional poverty. The study also makes policy recommendations for policy makers concerned with financial inclusion and poverty matters, to focus on making the poor financially included. The study indicates that households must be educated (preferably financial education) to boost their ability to come out of poverty.

Organisation of the Study

In order to achieve the objectives of the study, the thesis is organised into seven chapters. The next chapter, which is the second chapter, considers critical examination of both theoretical and empirical literature. The main focus of the literature review is to highlight the concept of financial exclusion and inclusion, financial development financial digitisation and multidimensional poverty. Chapter three deliberates on the research methods employed by the study. The chapter discusses the study area, philosophy of the study, and the various estimation techniques and measurement of variables that are employed in the

analysis. Chapter four presents a panel estimation result discussing the effect of financial development on consumption per capita in SSA. The fifth chapter presents the effect of financial exclusion on consumption inequality in Ghana, and the sixth chapter presents the effect of financial exclusion on multidimensional poverty in Ghana. The final chapter presents the summary, conclusions and recommendations of the study.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter presents a review of related literature. The chapter is divided into four main aspects. The first part looks at the underpinning theories of the study. The second part reviews the relevant concepts. The third part presents review of related empirical studies. Finally, the fourth section discusses the conceptual framework guiding the entire work. Specifically, the theory of active financial development or supply leading financial development and the individualistic poverty theory were employed in this study. Key concepts such as financial development, poverty, and financial exclusion were reviewed.

McKinnon Conduit Effect Theory

The McKinnon "conduit effect" theory is predicated on the fact the deepening and the development of the financial sector lead to a reduction in inequality and poverty (McKinnon, 1973). According to the "conduit effect", financial development directly reduces poverty and its associated events among the poor of developing countries (Boukhatem, 2015). Poverty and its associated elements have been described to include high rates of income and consumption inequalities, low consumption per capita, and poverty in its multidimensional fashion (Dauda & Makinde, 2014; Kpodar, 2006). Financial deepening and development has been termed as a financial system which is able to provide opportunities for deposits and financial services to all economic agents,

particularly for the poor in order to diversify self-financing possibilities (Boukhatem, 2015).

McKinnon (1973) further stated that less developed financial systems are characterised by a lack of organised financial markets and institutions, and the absence of a distinction between savers and investors. These characteristics have been said to be consistent with economies of most developing countries where investors are themselves savers (Jeanneney & Kpodar, 2011). The lack of organised and formal financial markets and institutions, according to Boukhatem (2016) and Sehrawat and Giri (2016), leads to financial exclusion (digital and non-digital exclusion) which may further exacerbate inequality and poverty among the masses. The McKinnon conduit effect also posited that financial development can increase economic growth and raise living standards by improving the allocation of savings to investment, leading to an increase in consumption per capita (Dauda & Makinde, 2014).

Sehrawat and Giri (2018) identified several studies that have applied the McKinnon model to profile economic growth, financial development and poverty in developing economies. More contemporary finance and economic growth-related studies have applied the McKinnon conduit effect model to explore explanatory mechanisms in various contexts, including modelling the interplay between financial development, economic growth, income inequality and poverty (Seven & Coskun, 2016) and confirming the role of financial exclusion in poverty reduction (Abdin, 2016) or the role of financial development activities in response to consumption and income inequality (Lassoued, 2018; Saidu & Marafa, 2020).

In these prior studies, the magnitude and direction of the impact of financial development on poverty and consumption per capita, among others, were computed using econometric methods such as panel data regression analysis (Inoue, 2019). The analyses involved, among others, regressing the log of consumption per capita on the log of financial development, controlling for relevant factors such as gross domestic product (GDP) per capita, inflation, investment, and human capital (Mohieldin et al., 2019). The magnitude of the effect is usually estimated from the coefficient on financial development, while the sign of the coefficient indicates the direction of the impact (Abdin, 2016; Seven & Coskun, 2016).

Drawing from the McKinnon conduit effect model, it has been averred that as an economy develops its financial system, financial exclusion rate decreases and the poor people benefit from formal financial intermediation through channels of credit and money (Dauda & Makinde, 2014), and this further closes inequality gaps (consumption and income) (Inoue, 2019; Mohieldin et al., 2019). This study extends the McKinnon conduit effect model to the context of financial development, financial exclusion and welfare elements from the perspectives SSA. Welfare elements herein refer to the poverty and its associated events of consumption per capita, consumption inequality and poverty in multidimensional fashion.

Theory of Active Financial Development

The theory of active financial development posits that financial institutions are key in providing financial services to the population

(Gloukoviezoff, 2007). It places significance on the setting up of financial institutions such as banks, insurance companies and financial markets, as tools for spreading the habit of engaging in financial dealings among the people (Kirui, 2013). This theory articulates that financial development precedes economic development. It states that when people are equipped with all apparatus of financial instruments, they will take financial decisions that will enable them participate fully in the financial system (Gunarsih et al., 2018). Once adequate financial needs of people are legitimately met by the financial system, the people will start building upon that, and this economic entitlement and empowerment of the people will in course reinforce financial development (Ageme, Anisiuba, Alio, Ezeaku & Onwumere, 2018).

Most of the financial inclusion strategies being envisaged and implemented by the leading commercial banks in Ghana under the direction of Bank of Ghana are based on the spirit of this theory (Asante-Gyabaah, et al., 2015). Opening up of Zero-balance accounts is an attempt to offer financial products to the hitherto unbanked people with a view to attract them to the world of finance; hence, reducing the rates of financial exclusion. It should, thus, be noted that this theory underpins this research work, as the developments on the African continent are done based on the theory of active financial development, and it is the economist way of looking at the financial development (Mohieldin et al., 2019).

The Individualistic Theory of Poverty

The individual, according to this theoretical perspective, is the cause of her or his poverty because she or he is lazy. This perspective grew out of the belief in the colonial days that poverty was the natural result of individual defects in an aspiration or ability (Saidu, & Marafa, 2020). The individualistic theorists draw on the argument that through hard work and informed choices, the poor could have avoided or remedied their problems. For instance, digital financial exclusion choices made by individuals could render them poor. Other scholars within this theoretical lineage indicated that apart from the laziness labelled against the poor, another attribute of the cause of poverty is the low intelligence of the poor (Bradshaw, 2006).

Beliefs of this nature partly accounted for the emergence of the Eugenics movement or Puritanical Humane Society in the nineteenth century. The Eugenics movement advocated for the need to sterilise individuals who possess abilities. Green and Hulme referred to Douglas' (1901) essay on the link between leprosy and poverty in medieval England when leprosy was as regarded as a contagious disease warranting the expulsion of lepers. A belief that was influenced largely by changes in social attitudes, particularly changes in tolerance towards the poor. This is because there is no increase in mortality rates in areas affected by leprosy during this period that warranted the treatment of the lepers (Douglas 1991, cited in Green & Hulme, 2005).

Green and Hulme (2005), therefore, argued that similar ideas about poverty persist in the society where the poor are identified with "a dangerous

moral degradation, as in contemporary United States political mythologies about the 'underclass" (Green & Hulme, 2005). The crux of this perspective, which is sometimes referred to as the “Flawed Characters' was captured in the Puritanical Humane Society's conviction that misery was ordained “by a just and inflexible law of Providence” to accompany vice (Saidu, & Marafa, 2020). The perspective is also known as the Social Darwinian Theory of Poverty, which is grounded in Charles Darwin's evolutionary exposition in which he postulated that creatures that could not withstand the prevailing conditions in the process of their evolution possessed feeble qualities and would eventually die off. Herbert Spencer is believed to have also blamed the poor for their poverty and in such similar line of reasoning coined the phrase, 'The survival of the fittest' (Black's Academy, 2002). The poor through digital financial inclusion could avoid poverty.

Assessing this theoretical perspective at this stage reveals its apparent weakness. For instance, digital exclusion exists not because the poor do not use it but because it is not accessible. To use digital financial services, the digital financial services user must have an existing bank account which they own (or third-party accounts with approved permission to use them), and should have available funds in their accounts to make cash payments or to receive revenue via digital platforms including mobile devices, personal computers or the internet (Ozili, 2018b). “Survival of the fittest” seems to convey the message that animals (including humans) that are unfit to face the stern, competitive conditions of the world die off completely, thereby leaving behind the capable ones. However, in the case of poverty, instead of the poor dying off completely or drastically their

number is steadily escalating. This study is with the strong conviction that with the appropriate measures, the "lazy" poor people who are supposedly poor due to their laziness can be purged of their laziness to get out of poverty through digital inclusion.

Again, this current study believes that individuals who are labelled as being lazy may be lazy because they are socially excluded from the much-needed means, which smothers their innate initiatives, to attain their goals. This, the study believes financial exclusion has played a major role. With digital financial inclusion such as mobile money, ATM, and other e-payment can remedy the situation. The "lazy individuals" must be identified and assisted with capital and other essential opportunities to either commence a trade or learn a profession and could be assisted (through education) regularly using digital financial services. The relationship between digital finance and financial inclusion is the premise that a large amount of the excluded population owns a mobile phone, and that the provision of financial services via mobile phones and related devices can improve access to finance for the excluded population (World Bank, 2014). With this, greater supply of digital finance has positive effects for financial inclusion, all other things being equal; implying a positive correlation between the use of digital finance and access to formal financial services (Ozili, 2018a) to reduce poverty.

Subjecting the individualistic theory to a theological explanation, some theorists argued that people who found themselves in unfortunate conditions, for instance, digital financially excluded and including the poor, are atoning for the sins or the sins of their parents. Contrasting this, they argued further that those

who are wealthy including, digital included financially and good health are those favoured by God. In assessing this argument, the researcher agrees that it is true that God favours some above others. However, the so-called favours and misfortunes could be trials in disguise to determine who the genuine servants are among His creatures.

Further on the individualistic theory, the neoclassical economists argued that all people have their set of abilities to be able to maximise their well-being by investing in those abilities. If some individuals chose and acted otherwise which failed to improve their well-being, then such individuals, according to the economic concept of human capital, should be held solely responsible for their predicament (Saidu, & Marafa, 2020). As convincing as the human capital theoretical argument may appear, one must not be oblivious of the fact that there is hardly any attempt to level the playing ground both within countries and among countries for individuals to have equal access to livelihood opportunities.

There are many areas in Ghana where electricity access is still a challenge and thus banks and other digital financial product cannot operate. In spite of the numerous evidences endorsing the importance of financial sector development which consist capital markets and the banking sector in the less advanced countries, usage of financial services is skewed towards the rich individuals and those who are already better off, neglecting the poor and those who in the remote areas (Singh & Tandon, 2012; Bold, 2011). According to Pomati and Nandy (2020), the highly concentration of financial institutions in urban areas depicts why majority of people are excluded from the financial sector in Ghana. This

study argues that these socially and economically generated inequalities have largely condemned more people to recurrent poverty. Therefore, there is a dire need to ensure an ethnically based redistribution of both the national and global cakes as well as financial services within countries and across countries.

Financial Development

Fundamentally, financial sector development is about overcoming "costs" incurred in a financial system (Kirui, 2013). This process of reducing the costs of acquiring information, enforcing contracts, and making transactions resulted in the emergence of financial contracts, markets, and intermediaries (Asante-Gyabaah, Nathanael Oppong & Idun-Baidoo, 2015). Different types and combinations of information, enforcement, and transaction costs in conjunction with different legal, regulatory, and tax systems have motivated distinct financial contracts, markets, and intermediaries across countries and throughout history (Asante-Gyabaah et al., 2015).

There are five functions of a financial system. These are the production of information ex-ante about possible investments and allocate capital; monitoring of investments and exerting corporate governance after providing finance; facilitation of trading, diversification, and management of risk; mobilisation and pooling of savings; and easing of exchange of goods and services (Ageme, et al., 2018). Thus, financial sector development occurs when financial instruments, markets, and intermediaries ease the effects of information, enforcement, and transactions costs and therefore do a correspondingly better job at providing the key functions of the financial sector in the economy.

It should also be pointed out that financial development has the potential to make financial transactions more accessible and affordable for the unbanked and the under-served (Kirui, 2013). Financial development has the ability of up scaling the financial inclusion agenda. Financial development has evolved over the past decades, with some of the financial development products including but not limited to mobile banking, ATM, telephone banking, and others discussed below. For instance, increasing labour costs in the 1960s placed pressure on labour intensive industries like banking to look towards automating some of their functions. Barclays Bank was the first to envisage the potential of ATMs, and introduced the first ever ATM in 1967 (Asante-Gyabaah et al., 2015).

Initially, ATMs were not very sophisticated, and served only as cash dispensers. Originally, large banks offering an ATM service achieved an advantage over their competitors (Reddy, 2021). There were scant understanding of the customers' needs or expectations and the role of ATMs in banks' retail delivery system was vague (Violano et al., 1992). Marcia Crosland of NCR Corp. (2010) indicated that aside from revenue generation and cost savings, ATMs are becoming the face of many financial institutions. For many consumers, ATMs are becoming the only interaction they have with their banks. ATMs are also becoming a competitive mark for many banks (Gunarsih et al., 2018). Therefore, it is imperative to ensure that the customer's experience with the ATM is safe and secure.

Next, internet banking allows consumers to access their bank and accounts to undertake banking transactions on the internet (Ageme, Anisiuba, Alio,

Ezeaku, & Onwumere, 2018). At an advanced level Internet banking is called transactional online banking, because it involves the provision of facilities such as accessing accounts, transfer of funds, and buying financial products or services online (Sathye, 1999). Nowadays the internet is the main channel for electronic banking. Internet Banking means that banking services such as services introduction, loan application, account balance inquiry, fund transfer and so forth are provided by a bank through the Internet (Ageme et al., 2018).

Internet banking has evolved into a "one step service and information unit" that promises great benefits to both banks and customers (Asante-Gyabaah, et al., 2015). It is important to remember that internet Banking is different from PC Home Banking. The obvious difference is that Internet Banking is browser-based, whereas PC Home Banking requires customers to install a software package assigned by the bank on their PC. Moreover, PC Home Banking allows customers to do their banking services only on PCs that have been installed the assigned software package.

On the other hand, SMS banking is a technology-enabled service offering from banks to its customers, permitting them to operate selected banking services over their mobile phones using SMS messaging (Asante-Gyabaah, et al, 2015). SMS banking services are operated using both push and pull messages. Push messages are those that the bank chooses to send out to a customer's mobile phone, without the customer initiating a request for the information. Typically push messages could be either mobile marketing messages or messages alerting an event which happens in the customer's bank account, such as a large

withdrawal of funds from the ATM or a large payment using customer's credit card (Ageme et al., 2018; Peevers et al., 2008).

Pull messages are those that are initiated by the customer, using a mobile phone, for obtaining information or performing a transaction in the bank account. Examples of pull messages for information include an account balance enquiry, or requests for current information like currency exchange rates and deposit interest rates, as published and updated by the bank (Barnes, 2003). The bank's customer is empowered with the capability to select the list of activities (or alerts) that he/she needs to be informed. This functionality to choose activities can be done either by integrating to the internet banking channel or through the bank's customer service call centre (Asante-Gyabaah et al., 2015).

Also, telephone banking is a service provided by a financial institution, which allows its customers to perform transactions over the telephone. Most telephone banking services use an automated phone answering system with phone keypad response or voice recognition capability. To guarantee security, the customer must first authenticate through a numeric or verbal password or through security questions asked by a live representative (Balachandher et al., 2001). With the obvious exception of cash withdrawals and deposits, it offers virtually all the features of an automated teller machine: account balance information and list of latest transactions, electronic bill payments, funds transfers between a customer's accounts, etc.

Usually, customers can also speak to a live representative located in a call centre or a branch, although this feature is not always guaranteed to be offered

24/7 (Asante-Gyabaah et al., 2015). In addition to the self-service transactions listed earlier, telephone banking representatives are usually trained to do what was traditionally available only at the branch: loan applications, investment purchases and redemptions, cheque book orders, debit card replacements, change of address, etc. Banks which operate mostly or exclusively by telephone are known as phone banks. They also help modernize the user by using special technology. This makes it possible for a customer of the bank to know account related information over a telephone.

Tele-banking (telephone banking) can be considered as a form of remote or virtual banking, which is essentially the delivery of branch financial services via telecommunication devices where the bank customers can perform retail banking transactions by dialling a touch-tone telephone or mobile communication unit, which is connected to an automated system of the bank by utilizing Automated Voice Response (AVR) technology (Balachandher et al., 2001). According to Usman et al. (2021), tele-banking has numerous benefits for both customers and banks. As far as the customers are concerned, it provides increased convenience, expanded access and significant time saving.

On the other hand, from the banks' perspective, the costs of delivering telephone-based services are substantially lower than those of branch-based services. It has almost all the impact on productivity of ATMs, except that it lacks the productivity generated from cash dispensing by the ATMs. For, as a delivery conduit that provides retail banking services even after banking hours (24 hours a day) it accrues continual productivity for the bank. It offers retail banking services

to customers at their offices/homes as an alternative to going to the bank branch/ATM. This saves customers time, and gives more convenience for higher productivity.

Furthermore, the concept of mobile banking became known from the mobile industry and the practitioner arena with remarkably little academic literature. Diniz, de Albuquerque and Cerney (2011) showed that the majority of literature is based on developed world cases on mobile payments, with little or no reference to mobile money as a developmental tool. Specifically, it became crystallised as a payment system based on mobile phones after the first two "Mobile Money Summits" in 2008 and 2009 (Maurer, 2012). It is also referred to as a suite of financial services offered through mobile phones and other handheld mobile devices (Asamoah, Takieddine & Amedofu, 2020).

Jenkins simply defined it as money that can be accessed and used via mobile phone (Jenkins, 2008). The key services included in the mobile money domain are person-to-person money transfer (domestic and international remittances); phone top-up (paying of credit units); mobile payment for retail transactions (including payment of bills) and mobile banking (Palaon, Wiryono, & Faturohman, 2020). These services include the capability of turning a mobile device into a business tool, substituting or complementing banks, ATM and credit cards (Varshney & Vetter, 2002).

World Bank (2014) grouped mobile money into different types of financial services as mobile finance, mobile banking and mobile payments. Mobile finance includes credit, insurance and savings services. Mobile banking

can be transactional or informational. Mobile payments range from payment made from person-to-person, government-to-person, and business-to-business. These types of financial services have traditionally belonged to commercial banks or microfinance institutions. Hughes and Lonie (2007) proposed that services such as bill payment, salary payment and local and international remittances could be included in mobile money.

These added features and services are viewed by financial analyst as providing banking services to the unbanked. Through the pay bill features available through mobile money services it is now possible to pay for electricity and water, digital television, parking fees and several other services. This is a rising trend among many consumers especially those in urban settings. The use of mobile money to pay bills is chiefly among wealthier, urban customers (Zutt, 2010). Must and Ludewig (2010) traced the rise of mobile money to the rapid and worldwide penetration of mobile phones back to 1999.

However, mobile phone enabled commerce (m-commerce) or services may have started as early as 1997 when mobile phone enabled Coca Cola vending machines and mobile phone banking services were introduced in Finland. Earlier documented mobile commercial services include a Philippine mobile operator's launch of SMART money in 1999. By the year 2000, mobile money technology had started to spread to include several other countries. Later GLOBE Telecom launched G-cash in 2004 (Wishart, 2006). Bharti Airtel launched their mobile money transfer pilot project in India in 2007 (Bosi, Celly & Joshi, 2011).

Weber and Darbellay (2010) and Dias and McKee (2010) have sub-divided mobile money into mobile banking (m-banking) and mobile payment (m-payment) models in SSA region which they described as additive and transformative models respectively. Ehrbeck (2012) found that emerging collaboration between banks and mobile network operators (MNOs) in Sub-Saharan Africa (SSA) is a marked indication of a positive move towards financial inclusion for the 80 percent of the Africa's unbanked population.

Bold et al. (2012) also found that in SSA the use of mobile phones for mobile money services is the main driving force behind the recent progress made towards financial inclusion. These papers explained that the additive models allow bank account owners to use their mobile phones to access their existing bank accounts and associated services such as chequing account balances, transfer funds between accounts or view cheque images while the transformative models allow the unbanked to access financial products without existing bank accounts, mainly through their mobile phones based on services provided by mobile money operators, microfinance institutions and non-bank agencies.

Dias and McKee (2010) asserted that mobile subscribers in Kenya and South Africa who do not have bank accounts are now using mobile money for banking-related transactions such as bill payment, payroll deposits, international remittances, loan receipts and payments, airtime purchases, groceries, bus tickets and a whole range of other financial services. Etim (2013) emphasised that mobile phone owners have actually exceeded the number of people who own bank accounts in SSA region confirming the effectiveness of the transformative models

as a tool to help include the unbanked in the formal financial industry. Jack and Suri (2011) and Martinez and Mckay (2011) analysed M-PESA growth trend and noted that M-PESA gained 2.37 million subscribers in the first year of implementation and in a 2008 survey of households in Kenya; about 43 per cent indicated they used M-PESA. The study was repeated in 2009, and nearly 70 per cent of households were found to be M-PESA users.

Financial Exclusion

Several factors contribute to slower economic growth and overall development of citizens in a country. Poverty, unemployment, illiteracy, corruption and many others are among such factors. Today, some of the most critical concerns to world leaders, and most discussed issues, are financial exclusion and poverty alleviation. Financial exclusion dominated in early discussion by geographers who were concerned about limited physical access to banking services as a result of bank branch closures (Leyshon & Thrift, 1995). Later in 1999, the term financial exclusion seems first to have been used in a broader sense to refer to people who have constrained access to mainstream financial services (Kempson & Whyley, 1999).

Leyshon and Thrift (1995) referred to financial exclusion as those processes that serve to prevent certain social groups and individuals from gaining access to the financial system. To them, exclusion may vary over time but, they believe that the financial system has an inherent tendency to discriminate against the poor and disadvantaged groups in the society (Leyshon & Thrift, 1995). The definition of financial exclusion was further broadened by the work of Kempson

et al. (2000) to include the following aspects within the confines of exclusion: exclusion arising out of assessing the risk and coming up with appropriate products to the poor people; exclusion that occurs because of mismatch in the cost of providing service to the customers in relation to the income arising from the same product; exclusion of people by the financial institutions by not offering or reaching them with their products and; self-exclusion where people voluntarily believe that they will be denied the access of financial products.

Sinclair (2001) opined that financial exclusion can either be defined from a narrow or broader view. From a narrow perspective according to them, financial exclusion can be defined as such exclusion from particular sources of credit, and other financial services including insurance, bill-payment services, and accessible and appropriate deposit accounts. In the wider sense, the term was used to denote factors which have the effect of shutting out of the less well off from mainstream money services (Sinclair, 2001). European Commission (EC) (2008) also defined financial exclusion as process whereby people encounter difficulties accessing and or using financial products appropriate to their needs and prevent them to lead a normal social life in the society or country in which they live or belong (EC, 2008).

This definition brings to bare some important elements in the concept of financial exclusion. The first element relates to challenges in accessing financial services in some remote areas. The second element of the concept covers difficulty in the use of available services. People might have access to the service but have difficulties in using it. Therefore, they end up not using it. A third

element is that the service is appropriate. This implies that the products offered by these financial institutions provide the service that the customer requires and is suitable for the customer's needs. The final element of the definition is that financial exclusion contributes to the process of overall social exclusion as studied. This concept presents challenges in terms of measurement, as more often than not research focus measurement on access but not use which is one of the gaps in this current study.

According to Pradeep (2019), defining financial exclusion is a very complex task as many academicians, practical researchers, economists and financial analysts have attempted to define it in divergent ways. He posited that financial exclusion could be under two broad craniums: One, based on banking experts' perceptions of defining financial exclusion associated primarily with their commitment to fulfill the target of attaining percent financial inclusion as directed by Central Banks, and the other based on how financial economists define it in a way as to connect the issue of financial exclusion with other broad fundamental issues like social and economic exclusion. The definition from the banking experts conveys a very narrow but practically relevant meaning of financial exclusion whilst the latter defines it from the perspective of a theoretical background encompassing all dimensions of financial exclusion and its intertwining with other core areas like social and economic exclusion. These two definitions serve the purpose of a fundamental researcher in a better way.

Financial service exclusion

The need for financial services and the difficulty with accessing financial products have been increasingly recognised in the literature (Kumar, 2013). Alongside banking exclusion, credit exclusion, savings exclusion and insurance exclusion, it has been widely acknowledged in the financial exclusion literature, non-use of financial service constitutes some level of financial exclusion (Gloukoviezoff, 2007). This refers to the non-use of financial services like ATM, chequebook, electronic banking, E-zwich etc., resulting from either their unavailability or costs associated with usage. Literature has it that lack of availability rather than lack of affordability could be the barrier to using financial services (Kumar, 2013). This indicates that service exclusion is a phenomenon that affects the collective rather than the individual level with services being unavailable to some sections of society or in some areas. Service exclusion in this respect plays a role in processes of financial and social exclusion occurrence in the society.

Within the financial exclusion literature, supply of financial services does not imply access, neither does access entails use of a service (Gloukoviezoff, 2007). Hence, service exclusion needs to be understood from the perspective with unrestricted use of services at one end and non-use at the other. Thus, service exclusion has consequences for individual social and economic life. In Ghanaian context, both supply side and demand side barriers have both been recognised as responsible for low level of access to financial services (Osei-Assibey, 2009). Supply side constraints like poor banking infrastructure, low resource base of

credit purveying institutions, security-based lending procedures, lengthy and cumbersome formalities, low level of financial literacy amongst others are still dominant in the sector.

Furthermore, the various financial service exclusions such as the banking exclusion, credit exclusion, savings exclusion and insurance exclusion are explained. The term banking exclusion refers to lack of access to or use of a bank account and the associated financial transactions (Demirguc-Kunt et al., 2018; Russell et al., 2011). Currently, many financial transactions between different economic actors (being personal, corporate, or state) are carried out between bank account via electronic transfers, either with or without paper support. In both developed and developing nations alike, access to bank account is seen as universal need to propagate some economic development (Demirguc-Kunt et al., 2017).

Access to a bank account facilitates an individual to store money safely until it needs to be withdrawn; availing of credit; converting cheques into cash; receiving payments of funds such as salaries, pensions or social assistance (electronically); paying for goods and services other than in cash; paying bills electronically; making remittances (Al-Hussainy et al., 2008). However, it is not enough to have access to account to be qualified as financially included. Ineffective use of cheque books, ATM cards, electronic banking, and E-zwich, all contributes to exclusion from the financial services and has such bad effects on social inclusion. Cheque books can be classified as non-digital exclusion whilst,

ATM cards, electronic banking and E-zwich can be classified under digital exclusion.

On the other hand, credit exclusion has been defined to refers to exclusion from affordable and appropriate credit facilities, mostly loans in other parts of the world (Demirguc-Kunt et al., 2017, 2018; Demirgüç-Kunt & Klapper, 2012). Exclusion from credit facilities can arise from different, and sometimes overlapping, barriers. An example is that an individual may not be able to access credit, following the risk assessment process (Russell et al., 2011). In another jurisdiction the conditions attached to financial products, such as the rate of interest or terms of the loan, make financial product inappropriate to use by some groups (Kempson & Whyley, 1999; Collard, Kempson, & Whyley, 2001; Atkinson, McKay, Collard, & Kempson, 2007).

Further, credit exclusion can leave individuals with no option but to source funds outside the formal financial system to satisfy their financial service needs. Many a time, this can mean high interest credit from moneylenders or some microfinance institutions and, thus, can result in individuals experiencing heavy burdens of debt. This also has a knock-on effect on a person's mental well-being, as the consequences of over indebtedness can include stress, and a sense of insecurity (Balmer et al., 2006; Pleasence & Balmer, 2007).

Regarding savings exclusion, there are a number of issues identified in the literature. According to European Commission (EC, 2008), the nature of credit and bank exclusion are of different dimension as compared to savings exclusion (Russell et al., 2011). The report highlighted that the problem with savings

exclusion is not with access but rather the condition attached to the product, the difficulty in using the product and the lack of knowledge about its use. Further, people that are associated with saving exclusion are usually confronted with the problem of document identification; complexity of procedures in account opening; cost associated with account usage and as a consequence sacrifice the benefit brought forth by a deposit account (Russell et al., 2011).

Some other reasons include (i) lack of money to save (ii) lack of habit to save money in a bank (iii) unwilling to deal with the banks due to negative past experience or prejudice. Thus, households inability to save comes with the very problems which confront them, mostly the lack of employment or business earning entity to generate income (Russell et al., 2011). This stress the relevance of providing microcredit for poor households to enable them invest in income generating activities from which they can then save the returns for further investment opportunities.

With regards to insurance exclusion, access to insurance has received a great deal of attention in financial exclusion debates. In literature, access to insurance facilities is less central to measures of financial exclusion than banking exclusion. However, the consequence of not having this service is nonetheless severe. This leaves households with no security or flexibility for unexpected events and no assets for the future, which can also lead to poverty in the old age (Kempson & Whyley, 1999; Collard & Kempson, 2006; Kumar, 2013). Again, insurance is essential in the organisation of modern societies and has become mandatory for some entities, for example individuals and companies in motor

vehicle operations. However, there is no clear definition of what types of insurance is essential for the market so that individuals without these products will automatically fall into the financial exclusion classification or pool.

Poverty

Having looked at financial exclusion and theories of financial exclusion, it is imperative to examine poverty since it has been established in the literature that, financial exclusion leads to poverty. According to the United Nation report in 2016, about one in eight people lived in extreme poverty, nearly 800 million people suffered from hunger, the births of nearly a quarter of children under five had not been recorded, 1.1 billion people were living without electricity, and water scarcity affected more than 2 billion people (World Health Organisation, 2016). Poverty is widely used and meaningful concepts in all countries in the world (Gordon, 2006). The Sustainable Development Goal 1 of the United Nations call for an end to it in all its manifestations, including extreme poverty, over the next 15 years. All people everywhere, including the poorest and most vulnerable, should enjoy a basic standard of living and social protection benefits. Although some member countries are doing well at it, there still exist more to do.

World Health Organisation defines poverty in pure economic terms as when a family's income fails to meet a nationally established threshold. However, this threshold differs across countries. Typically, it is measured with respect to families and not the individual, and is adjusted for the number of persons in a family (World Health Organization, 2016). It further posits that Economists often seek to identify the families whose economic position (defined as command over

resources) falls below some minimally acceptance level. In the works of Nunes (2008), three important trends have emerged in the debate in defining, measuring and looking at the policy implications of poverty. They include, choosing poverty lines, choosing poverty measures and making the fine distinction and determining the relationship between inequality and poverty.

Poverty can be said to exist in a given society when one or more persons do not attain a level of material well-being deemed to constitute a reasonable minimum by the standards of that society (Martin, 1992). Saying that poverty exist is only the first step; for many purposes, including policy analysis, one must also say how much poverty exists. Poverty comparisons may be either qualitative or quantitative, according to Martin (1992). The most common approach to measuring poverty, according to Chamhuri, Karim and Hamdan (2018), is quantitative, money-metric measures which use income or consumption to assess whether a household can afford to purchase a basic basket of goods at a given point in time. The basket ideally reflects local tastes, and adjusts for spatial price differentials across regions and urban areas in a given country (Chamhuri et al. 2018). Money-metric methods are widely used because they are objective, can be used as the basis for a range of socio-economic variables, and it is possible to adjust for differences between households, and intra-household inequalities.

As stated in Ravallion, Chen and Sangraula (2009), the widely used $1 a day poverty line was set for World Development Report 1990. A consensus emerged in the international development community on this standard for measuring extreme poverty in the world, and it became the basis of the first

Millennium Development Goal, to halve the 1990s $1 a day poverty rate by 2015. Absolute poverty line is one that has a fixed value over time. When measuring the welfare function, the poverty line is absolute in the space of welfare where poverty comparisons of two individuals are treated in the same way if they are the same level of welfare (Nunes, 2008).

In contrast with the absolute approach, Townsend (1979) developed the relative approach as an alternative measure to poverty, breaking with the anterior definitions of poverty (Nunes, 2008). An upper bound for poverty line anchored to certain basic capabilities is also ideal to make poverty measurements comparable over time and space. Ultimately, a maximum admissible poverty line is ideal to best count the poor and to have a fairly good idea of the progress of anti-poverty programs (Townsend, 2014). The relative definition of poverty refers to poverty not as some absolute basket of goods but in terms of the minimum acceptable standard of living applicable to a certain member state and within a person's own society. Several problems arise from both absolute and relative poverty lines.

There are a number of quite different conceptual approaches to the measurement of poverty and well-being at the individual level (Martin, 1992). Approaches differ in terms of the importance the analyst attaches to the individual's own judgments about his or her well-being. They also differ in of the importance attached to the essentially materialist idea of standard of living versus less tangible but possibly no less important concepts such as rights (Martin, 1992). This implies that a multidimensional measure of poverty which includes

consumption, asset ownership, education, health, and standard of living will really give a good measure of poverty.

Moreover, given the dramatic rise of inequality in recent times, this suppression is all the more a concern (Saith, 2008) the income inequality gap ratio is increasingly being used, which is defined as the gap between the poverty line and the average income of the poor expressed as a proportion of the poverty line. To Yitzhaki (2002), the decomposition of the between-group component enables one to pinpoint the share of the poor in the population, the poverty gap, and inequality among the poor, from which all the components of a poverty measure can be identified. This is best measured when it comprises the multidimensional nature of it.

Another dimension to measuring poverty is the concept of vulnerability to future poverty. Chaudhuri (2003) explains vulnerability, unlike the other measures of poverty, may be broadly construed as an ex-ante measure of wellbeing, reflecting not so much how well off a household currently is, but what its future prospects are. Poverty, on the other hand, is rather an ex-post measure of a household's well-being (or lack thereof). It reflects a current state of deprivation, of lacking the resources or capabilities to satisfy current needs. Economists, according to Ligon and Schechter (2003), have long recognised that poverty depends not just on its average income but the risk it faces as well, particularly, a household with very extreme expenditures but with no chance of starving might not wish to trade places with a household consumption but greater consumption risk.

Also, Hoddinott and Quisumbing (2010) argued that vulnerability is the likelihood that at a given time in the future, an individual will have a level of welfare below some norm or benchmark. The time horizon and welfare measure are general. One could think of vulnerability pertaining to the likelihood of being poor next year, in 10 years' time, or being poor in old age. Although vulnerability assessments typically express welfare in terms of consumption, and the norm or benchmark as the poverty line, the definition of vulnerability is sufficiently general so as to encompass many dimensions of well-being. Chaudhuri (2003), Ligon and Schechter (2003), Hoddinott and Quisumbing (2010) argued for interventions. Other studies argued for the substantial role of institutions (Jutting, 2003). Economic sociology stressed the importance of socio-cultural factors (Knack & Keefer, 1997), political science focused its explanation on political determinants (Brunetti, 1997) and others shed light on role played by geography (Gallup, Sachs, & Mellinger, 1999) and demography (Ralemli-Ozcan, 2002). These all combine determine vulnerability and poverty.

As stated by UN, "People can be said to be in poverty when they are deprived of income and other resources needed to obtain the conditions of life: the diets, material goods, amenities, standards and services – that enable them to play their roles, meet their obligations and participate in the relationships and customs of their society" (Chambers, 2006). As an illustration, in both rural and urban Ghana, men associate poverty with a lack of material assets, whereas for women, poverty is defined as food insecurity. Generational differences emerged as well. Younger men in Ghana consider the ability to generate an income as the most

important asset, whereas older men consider status connected to a traditional agricultural lifestyle (Besley, 1995; Chambers, 2006).

Financial Development and Consumption per Capita

There are sceptical views on whether financial development can lead to a broadening of access to finance by the poor, especially at early stages. Some argued that it is primarily the rich and politically connected who would benefit from improvements in the financial system (Haber & Musacchio, 2004). As such, greater financial development may only succeed in channelling more capital to a selected few. Thus, it is an open question whether financial development will reduce income disparities even if it boosts aggregate consumption.

Some scholars indicated that this will lead a nonlinear relationship between finance and income distribution. Greenwood and Jovanovic (1990) showed that the interaction of financial and economic development can give rise to an inverted U-shaped curve of income inequality and financial intermediary development. At early stages of financial development, only a few relatively wealthy individuals have access to financial markets and hence higher-return projects. With aggregate economic growth, however, more people can afford to join the formal financial system, with positive ramifications on economic growth. With sufficient economic success, everyone can participate in the financial system and enjoy the full range of benefits such as reducing poverty.

Greenwood and Jovanovic (1990) further reported that improvements in the financial system may not automatically lead to the poor having greater access to finance, and this provides justifications for public sector interventions in the

forms of various microfinance schemes and SME credit programmes. However, Greenwood and Jovanovic (1990) did not acknowledge the fact that theoretically, there are good reasons why the availability of credit may be more adverse for smaller enterprises and the informal sector (Ozili, 2018a). Also, the authors did not appreciate the fact that fixed costs associated with loan appraisal, supervision, and collection are nontrivial, and that SMEs and microenterprises are also less able to provide collateral against their loans, further diminishing lenders' incentives to lend to them when considering adverse cost implications associated with possible loan defaults (ADB, 2009).

Ho and Ikye (2017) sought to empirically assess the causal linkages between financial development, economic growth, and poverty reduction in China by controlling for structural breaks. Specifically, they used the autoregressive distributed lag (ARDL) bounds testing approach. They tested the trickle-down hypothesis for China during the period 1985–2014. They utilised two standard proxies for financial development, namely: the domestic credit to private sector by banks as percentage of GDP, and money and quasi money as percentage of GDP; annual percentage change in real GDP per capita to proxy economic growth; and a standard proxy for poverty reduction namely: the household final consumption expenditure per capita growth.

By accounting for structural breaks in their empirical specifications, they found overwhelming support for the trickle-down hypothesis at the national level. That is, they found financial development to cause economic growth, which in turn causes poverty reduction in China at the national level. Nevertheless, Ho and

Ikye (2017) did not support their study with relevant theories to ensure that the findings of their study are understood within a given context. For instance, studies on the relationship between financial development and consumption per capita employed the individualistic theory (Bradshaw, 2006) or the theory of active financial development (Singh & Tandon, 2012; Bold, 2011; Martinez & Mckay, 2011).

Abosedra, Shahbaz and Nawaz (2016) also dealt with the linkages between financial development and poverty reduction in Egypt using data for the period of 1975Q1–2011Q4. The stationarity properties of the variables were tested by applying Zivot–Andrews structural break unit root test. The structural break autoregressive distributed lag-bounds testing approach to cointegration was used to examine long run relationship between the variables. The results of the study showed evidence of cointegration which confirmed the presence of long run relationship between financial deepening, economic growth and poverty reduction.

The results indicated that financial development reduced poverty when domestic credit to the private sector was used as proxy for financial development. The direct channel that financial sector development could lead to enabling the poor to access or broaden their access to financial services, such as credit and insurance-risk services, was therefore confirmed in case of Egypt. Furthermore, the indirect channel where financial sector development contributed to poverty reduction through economic growth was also confirmed for Egypt.

While Abosedra et al.'s (2016) study results showed that the causal relationship between financial development and poverty reduction in Egypt was sensitive to the proxy used to measure these variables, the results showed that the poverty-reduction programmes were desirable in Egypt, not only because they reduced poverty but also because they possibly led to further development of financial sector in long run. Furthermore, the results showed that appropriate reforms aimed at developing a financial sector in Egypt that was well-organised and spread throughout the country could help mitigate poverty by availing more domestic credit to the poor. Despite the fact that the study was logically carried out, the authors did not control for variables such as family size, education level and employment status, among others. This, to some extent, could influence the level of reliability of the findings (Odhiambo, 2010)

Inoue and Hamori (2012) analysed, empirically, whether financial deepening has contributed to poverty reduction in India. Using unbalanced panel data for 28 Indian states and union territories covering seven time periods from 1973 to 2004, the study examined whether financial deepening had any effect on poverty. The explained variable was the poverty ratio, while the explanatory variables were the measure of financial deepening and other conditioning information variables. The study estimated each model using the dynamic panel GMM estimators developed by Arellano and Bond (1991) to deal with the issue of endogeneity. The results indicated that financial deepening significantly decreased poverty, controlling for international openness, inflation rate and economic growth. Though the results were robust to changes in the poverty ratios

in rural areas, urban areas and the whole economy, the focus of the study was limited, as only India was considered.

Sehrawat and Giri (2016) examined the relationship between financial development and rural-urban income inequality in South Asian Association for Regional Cooperation (SAARC) countries using panel data from 1986-2012. The stationary properties were checked by the LLC and IPS panel unit root tests. The paper applied the Pedroni's panel co-integration test to examine the existence of the long-run relationship and coefficients of co-integration were examined by fully modified ordinary least squares. The short-term and long-run causality was examined by panel Granger causality.

The results of the Pedroni co-integration test indicated that there existed a long-run relationship among the variables. The findings suggested that financial development increased rural-urban inequality whereas trade openness reduces rural-urban inequality. The empirical results of panel Granger causality indicated evidence of short-run causality confirmed that economic growth and financial development caused rural-urban income inequality. The study recommended for appropriate economic and financial reforms focusing on financial inclusion to reduce rural-urban income inequality in SAARC countries. Financial policies geared toward agriculture and rural population should be adopted to reduce the prevailing rural-urban income inequality in SAARC region. Although the authors considered a number of countries, there was the lack of relevant theoretical backing for the study.

Sehrawat and Giri (2016) examined the contribution of financial development to poverty reduction in 11 South Asian developing countries using panel data set over the time period 1990-2012. The stationary properties were checked by using Levin-Lin-Chu and Im-Pesaran-Shin panel unit root tests. The study applied the Pedroni's panel co-integration test to examine the existence of long-run relationship. The coefficients of co-integration were examined by fully modified OLS (FMOLS) and the causal link was checked by panel causality test.

The empirical results of Pedroni co-integration test confirmed a long-run relationship between financial development and poverty reduction in South Asian developing economies. The findings of FMOLS method confirmed a strong and positive relationship between financial development, trade openness, inflation and poverty reduction. Results of panel causality test indicated that there was a unidirectional causality running from financial development to poverty reduction variable. The study recommended appropriate economic and financial reforms focusing on financial inclusion to reduce poverty in selected South Asian economies. Like Sehrawat and Giri (2016), no underpinning theories were identified in this study.

Jeanneney and Kpodar (2008) also investigated how financial development helps to reduce poverty directly, through the McKinnon conduit effect, and indirectly through economic growth in developing countries. They found that the poor benefits from the ability of the banking system to facilitate transactions and provide savings opportunities, but to some extent fail to reap the benefit from the greater availability of credit. They found that financial

development is accompanied by financial instability, which disproportionately hurts the poor. However, they found the benefits of financial development for the poor to outweigh the costs. In fairly recent studies, there has been evidence of links between financial development and poverty reduction.

Jeanneney and Kpodar (2011) again investigated how financial development helped to reduce poverty directly through a distributional effect, beyond its indirect effect through economic growth. First, the study runs regressions using OLS. Then, to take into account country-specific effects and address the issues of endogeneity, measurement errors, and omitted variables, the study used the System GMM (the dynamic panel generalised method-of-moment) estimator with panel data.

The results obtained with data for a sample of developing countries from 1966 through 2000 suggested that the poor benefit from the ability of the banking system to facilitate transactions and provided savings opportunities (through the McKinnon 'conduit effect') but to some extent failed to reap the benefit from greater availability of credit. Moreover, financial development was accompanied by financial instability, which was particularly detrimental to the poor. Nevertheless, the benefits of financial development for the poor outweighed the cost. These said, it should be pointed out that Jeanneney and Kpodar (2011) did not explain how financial development, through poverty, could influence consumption per capita.

Using the data of Chinese provinces from 2001 to 2007, Jinzhong (2009) applied the system GMM estimator to analyse the impact of financial

development on income distribution and poverty. The data was a panel data from Chinese provinces. The results demonstrated that China's financial development disproportionately benefits the poor, lowers income inequality. About 31 percent of the income growth of the poor could be attributed to distribution effect of finance, and the remaining was caused by growth effect of finance. Otherwise, there was no evidence to support the inverted-U-shaped relation between financial development and income distribution. Financial development would intensify the poverty gap in the provinces where the ratio of non-agricultural industries is high. As could be seen from the study, the author did not employ any underpinning theories or the conduit through which financial development may affect income distribution and poverty, despite the fact that theories enhance the quality and findings of research findings (Bradshaw, 2006).

Kiendrebeogo and Minea (2016) estimated the contribution of financial development to poverty alleviation in the CFA Franc Zone (13 countries). To mitigate small sample problem, the study used the Bias-corrected least squares dummy variable (LSDV) dynamic panel data technique. Results based on a panel of CFA Franc Zone countries showed that financial development was associated with a drop in the proportion of poor population. Next, financial development reduced the extent to which the income of individuals fell below the poverty line. Moreover, in some cases, the effect of financial development on poverty may be subject to nonlinearities. Finally, financial instability or unstable financial development leading to crises may mitigate the favourable effect of financial development on poverty reduction. These findings were robust to the use of

alternative measures of financial development and held after controlling for a potential simultaneity and a small sample bias.

Akhter and Daly (2009) examined the role of financial development on poverty reduction in 54 developing countries using Fixed Effect Vector Decomposition Model (FEVD). The study found that financial development was conducive for poverty reduction but the instability accompanying financial development was detrimental to the poor. They also posited that there was a positive relationship between financial development and financial instability in those countries. One of the weaknesses of their model, however, was that they did not consider simultaneity bias in the model which can lead to endogeneity problems.

Odhiambo (2010) analysed the causal relationship between financial development and poverty alleviation in Zambia from 1969 to 2006. The author examined the effect of three proxies for financial development—M2/GDP, private credit/GDP, and domestic money bank assets—on per capita consumption, a proxy for poverty levels. Using a bivariate causality test based on an error correction model, the study found that financial development seemed to cause poverty reduction when private credit and domestic money bank assets were used, while the reverse causality was found when M2/GDP was used.

Furthermore, Uddin, Shahbaz, Arouri, and Teulon (2013) investigated the relationship between financial development, economic growth and poverty reduction in Bangladesh using quarter frequency data over the period of 1975-2011. The issue was of importance for developing economics, since the role of

financial sector in mobilising and allocating savings into productive investments. All variables were tested for their order of integration using the ADF and Zivot-Andrews structural break tests. The results showed that the variables were integrated at I (1). The study then applied a simulation based on the ARDL approach to cointegration by incorporating structural breaks stemming in the series for long run relation. The empirical findings indicated that long run relationship between financial development, economic growth and poverty reduction existed in Bangladesh. The diagnostic tests showed that the underlying assumptions of the statistical model were fulfilled.

Zahonogo (2017) investigated how financial development affected poverty indicators in developing countries. The study implemented this analysis with a poverty model using data from 42 Sub-Saharan African countries and covering the period 1980-2012. The study employed the System Generalized Method-of-Moment (GMM) that is appropriate to control country specific effects and the possible endogeneity issues. The empirical evidence showed that there indeed existed a financial development threshold below which financial development had detrimental effects on the poor and above which financial development could be associated with less poverty.

The evidence then pointed an inverted U curve type response and the findings were robust to changes in poverty measures and to alternative model specifications, suggesting the non-fragility of the linkage between financial development and poverty for sub-Saharan African countries. The findings were promising and support the view that the relation between financial development

and poverty reduction was not linear for sub-Saharan African countries. Nevertheless, the study did not draw on relevant theories or frameworks such as the McKinnon conduit to examine the relationship between financial development and poverty indicators.

In another study, Fowowe and Abidoye (2013) examined the effect of financial development on poverty and inequality in African countries. The study applied the Systems GMM estimator of Arellano and Bover (1995) and Blundell and Bond (1998) that assumes that first differences of the instruments are uncorrelated with the fixed-effects parameters which increases the number of possible instruments that can be used in estimating the parameters of the model. The empirical results indicate that financial development has not had a significant effect on poverty and inequality in African countries. The results confirm the deficiencies in African financial systems and highlight the fact that more efforts need to be done to improve access of poor households and small and medium enterprises to financial services.

It could be seen from the review that, though almost all the related studies considered financial development, there is a dearth of studies directly focused on the relationship between financial development and consumption per capita. Besides, most of the prior authors did not underpin their studies with relevant theories. Considering these, there is the need to carry out a study that investigates the relationship between financial development and consumption per capita in a sub-Saharan African country, within the framework of relevant theories.

Financial Exclusion and Consumption Inequality

The relationship between financial exclusion (non-digital financial exclusion and non-digital financial exclusion) and consumption inequality appears to be a new area with very limited literature available. Majority of the extant empirical studies either focused on consumption inequality and concepts other than financial exclusion, or financial exclusion and variables other than consumption inequality. For instance, Blundell, Pistaferri and Preston (2008) assessed the relationship between consumption inequality and partial insurance, and reported a disjuncture between income and consumption inequality, with some partial insurance of permanent shocks. Though Blundell et al. (2008) considered consumption inequality, the only element relating to financial exclusion was the partial insurance. This notwithstanding, a line could be drawn between insurance and consumption inequality, as exclusion from insurance is one of the indicators of the overall level of financial exclusion among people.

Similarly, it could be inferred from Bartiaux (2021) that financial exclusion has a connection with levels of consumption in a society. Bartiaux, in an attempt to intersect exclusion from consumption practices, investigated inequalities in a consumerist society, and reported that individuals of medium and upper social classes seemed to have access to more finance than those in lower social classes. However, it should be stated that Bartiaux did not empirically test the relationship between financial exclusion and consumption, as his analyses were more of descriptive type than inferential. Besides, the study was not backed by any theory.

Li et al. (2020) looked at the impact of digital finance on household consumption and found that digital inclusive finance could promote household consumption. They further reported, among other things, that digital finance positively correlated with food, clothing, house, maintenance, medical care, and education and entertainment expenditures. Apparently, looking at their finding from a different perspective, one would state that individuals excluded from digital finance might find it difficult to take care of these expenditures related to consumption; thus, exacerbating consumption inequality. Nevertheless, no information relating to the fact that financial exclusion or digital exclusion predicts consumption inequality was found in their study.

In another study, Corrado and Corrado (2017) documented that affordable and equitable access to financial products for all households and entrepreneurs is pivotal to long-term consumption and investment. This suffices to say that financial inclusion may improve consumption equality in society. On the flipside, consumption inequality can be inferred to have an association with financial exclusion, as Corrado and Corrado further posited that unequal consumption, and growth and development are propelled by less inclusive finance. Despite the fact that their study was conducted outside Ghana, the study did not explicitly determine whether financial exclusion significantly influences consumption inequality. This means that there is a gap in extant literature to fill in this regard.

Also, some of the existing empirical studies considered consumption inequality and income inequality in the light of poverty, digital financial inclusion and financial inclusion (Park, & Mercado, 2015; Luo, & Li, 2022; Pal, & Pal,

2014). For instance, Park and Mercado (2015) showed, among other things, that per capita income is correlated with financial inclusion in developing Asia, and that financial inclusion significantly reduces poverty and lowers income inequality as well. Moreover, Luo and Li (2022) intimated that intensive usage of finance products has larger effects on lowering consumption inequality. Again, Pal and Pal (2014) reported a link between income inequality and inequality in financial inclusion. Though inferences could be drawn from these prior findings to make a case for the effect of financial exclusion on consumption inequality, these inferences could not serve as a reliable replacement for the potential outcomes of a study empirically assessing the effect of financial exclusion on consumption inequality.

In other studies, poverty, wealth inequality and financial exclusion (Tiwari, Goli, Siddiqui & Salve, 2022), and consumption inequality and income inequality (Aguiar & Bils, 2015), were investigated. Tiwari et al., in their study, opined that higher wealth accumulation as well as its fair distribution, and lower poverty level could result in lesser exclusion from formal financial services, as individuals might have access to both formal financial services and informal financial sources for borrowing, among others. Next, Aguiar and Bils reported consumption inequality to have a close link with income inequality, and this could possibly have implication for financial exclusion (Russell, Maître & Donnelly, 2011).

From the review, it could be gathered that majority of the prior related studies focused on the concept of consumption inequality and its association with

variables other than financial exclusion. Others looked at financial exclusion in the light of variables other than consumption inequality. Those that included both variables of interest, instead of the effect of financial exclusion on consumption inequality, analysed the relationship between consumption inequality and some elements of financial exclusion. Besides, to the best of knowledge of the researcher, no study has yet assessed the effect of financial exclusion (digital inclusion and non-digital inclusion) on consumption inequality, taking into account the elements of digital and non-digital exclusions. These indicate that there was a gap in existing literature. It was based on this that the present study sought to analyse the effect of financial exclusion on consumption inequality in Ghana.

Financial Exclusion and Poverty

Adewale (2014) examined the relationship that exists between the latent variables of financial exclusion (credit, savings, and remittances) and sustainable livelihood assets (social capital, natural capital, physical capital, and human capital) among some poor Muslim households in Ilorin, Kwara State, Nigeria. Data elicited via survey questionnaire administered on poor Muslim households was analysed based on both factor analysis and structural equation modelling. The results indicated that the lack of financial inclusion significantly and statistically impeded the acquisition of the livelihood assets. The invariance analysis also revealed that both gender and educational attainment do not moderate the hypothesised structural model. The relatively small sample size and coverage of study area are major limitations to generalising the findings. Nonetheless, the

findings implied that financial inclusion strategies in Nigeria and perhaps in other Muslim majority areas should be located within a broader sustainable livelihood framework.

Ofeh and Thalut (2018) examined the relationship that existed among the latent variables of financial exclusion and poverty reduction among some smallholder rice farmers in Ndop, Ngoketunjia Division in the North West Region of Cameroon. Data elicited via survey questionnaire administered on a sample of 206 households was analysed based on both factor analysis and structural equation modelling. The results indicated that financial exclusion was negatively related to poverty reduction. Therefore, a unit increase in the level of financial exclusion would exacerbate the level of poverty by seven percent.

The findings indicated that financial exclusion among rice farmers in Ndop significantly and statistically exacerbated the level of poverty. The study recommended that the Cameroon government should adopt policies that encourage financial inclusion in the area of rice cultivation, since financial inclusion has the tendency of promoting inclusive growth and development. However, just as the study conducted by Ofeh and Thalut (2018), no theory was employed, and this might influence the overall quality and reliability of the findings (Russell et al., 2011).

Pal and Pal (2012) examined income-related inequality in financial exclusion in India. The authors applied the concepts of concentration curves and concentration index in the context of financial exclusion and econometric analysis using a representative household-level survey data set which was linked to state-

level factors. The authors' analysis produced interesting results which indicated that: financial exclusion was a severe problem for households across all income groups in India even though financial exclusion was disproportionately higher among the relatively poor households compared to households of higher incomes.

Income-related inequality in financial inclusion varied significantly across sub-national regions, nonetheless about one half of the urban households are financially excluded. There was evidence that credit policies specifically directed at the rural sector has been effective in promoting financial inclusion among rural households compared to urban households. The authors also noted that income-related inequality in financial inclusion is not synonymous to income inequality. What is not clearly articulate in this otherwise interesting and insightful study is the most effective/efficient means through the government should tackle the problem of financial exclusion in the entire country (India).

Anwar, Uppun and Reviani (2016) investigated the role of financial inclusion on poverty reduction in Indonesia. The main method used for the study was the simultaneous equation modelling. This method was used to correct for the by bi-causality between financial inclusion and poverty. In all, data from 31 provinces from 2005 to 2013 was used for the study. Per the findings, financial inclusion has a negative effect on poverty. However, a major limitation of this study is that, the author did not indicate how financial inclusion was measured. Like Ayyagri and Hoseini (2013) who examined finance and poverty in India also found similar results (i. e. that financial inclusion has insignificant effect on poverty). However, contrary to Uppun and Reviani (2016), in correcting the

problem of endogeneity, the study used the instrumental estimation technique. The study also used a wider data (i. e. 1983-2005). However, financial inclusion was captured with bank penetration. This form of one-dimensional measurement has been criticized by many writers.

Koku (2015) conducted a cross-disciplinary review of the literature on financial exclusion in order to provide a place where one could have a bird's eye view of the academic activities that have been happening in the area. According to the study, researchers in economic geography and urbanisation seemed to have contributed significantly to the growing literature on financial exclusion. The persistence of the problem despite efforts to combat it calls for innovative thinking on the part of marketing scholars and financial institutions on how to serve the unbanked.

Cámara and Tuesta (2014) confirmed earlier results that financial exclusion led to extreme difficulties that were associated with more weak groups of people such as women, persons living in countryside areas and young persons and the poor. They showed that in terms of financial products, loans and mortgages there seemed to be better improved drivers of financial inclusion than saving products. On the aspect of the enterprises, Yu, Jia, Li and Wu (2022) emphasised that rigidity and education stood out as important features for financial inclusion. They claimed that for persons excluded from the financial system, elements such as age, gender, education and income level seem to disturb opinion of the hurdles to financial inclusion. On the aspect of policy, the writers noted that credentials of distinct characteristics that could affect financial

inclusion offers useful observed proof for crafty policies that help more inclusive financial systems.

Using 35 countries and almost 35,000 individuals, Li and Song (2021) explored determinants as well as the effect of financial exclusion on poverty in Sub-Saharan Africa. The study employed Treatment Effects version of the Heckman Sample Selection Model and Propensity Score Matching (PSM) for robustness checks. The results of the Treatment Effect Model revealed that those whose relative did not own an account, and those who have no other sources of funds such as (family/friends, employers and money lenders) were more likely to be poor.

However, being a female and borrowing from stores were less likely to reduce poverty. The net wealth benefit derived from financial inclusion (thus use of accounts, savings, withdrawals and access to credit) significantly reduced poverty. Verifying the ―Treatment Effects using the PSM, the study found that financial inclusion has a larger welfare benefit for the poor than their non-poor counterparts in all the financial inclusion indicators used. Since financial inclusion was found to have a significant poverty reducing effect, the study recommended that governments of Sub-Saharan African countries should mainstream financial inclusion in their poverty reduction strategies and programmes.

As in developing countries, Carbo, Gardener, and Molyneaux (2007) observed that financial exclusion was "invariable experienced by the poorer members of society" even though they were in developed countries. The

percentage of the adult population, in Europe, who did not have bank account, for example was stunning: 22.4 percent in Italy, 17.9 percent in Greece, 16.8 percent in Ireland, 16.7 percent in Portugal, 13.5 percent in Austria and 10.5 percent in the UK. With regard to the consequences of financial exclusion, the researchers observed that while the problem of financial exclusion was not new, its effects were becoming increasingly serious.

For example, the lack of access or not having a bank account made it difficult for the poor to receive income and to make payment, or to receive credit that they sorely needed to help them navigate the troughs and peaks of household budget. As a result, the poor resorted to alternatives to the traditional financial institutions such as money-lenders, payday loans, pawnshops that charge very high rates. Other problems encountered by the poor as a result of exclusion were inability to obtain insurance coverage. They also faced social exclusion because they literally lived on the margins of society.

Also focusing on the USA, Joassart-Marcelli and Stephens (2010) argued that previous studies on financial exclusion in the USA examined the relationship between exclusion and individual characteristics such as culture, education and ability to speak English, income, legal status with very little attention directed at geographic dimensions of banking. The study focused on the Greater Boston area in 2000. The data used in the study on immigrant groups comprised poverty rates, income, unemployment, the ability to speak English, homeownership, family type, race and ethnicity.

Further analysis using multivariate regression and by controlling for socio-economic factors such as ethno-racial and land use characteristics showed a more complicated picture of the problem of financial exclusion. It showed that accessibility to financial institutions particularly bank branches including ATMs was positively correlated with proportion of immigrants and minorities in the neighbourhood; as the proportion of minorities in tracts where foreign-born households lived increased, access to the traditional financial institutions decreased; specific immigrant groups experienced additional barriers primarily because of where they lived. The results of this study suggested that race, class and immigration status overlay other factors such as neighbourhood dynamics and location to determine financial access.

Unlike previous studies which examined the financial exclusion in the UK and the USA, Solo (2008) directed her attention to the problem of financial exclusion in Latin America and asserted that in spite of several studies on the topic only a few examined how financial exclusion affects economic development, and in particular the development of urban communities where it is felt most severely. In an attempt to fill this gap, the researcher investigated the predicament of the unbanked in major cities in Latin America – Bogota, Colombia, Mexico City, Mexico, and many cities in Brazil.

The study collected data from a representative sample of 1,500 households taken from census groups. Even though surveys were the primary means through which the data were collected, they were supplemented by focus group studies conducted in Mexico City. The study showed that approximately 65-85 percent of

households in these countries had no access to any formal financial institution. These excluded households, in general, have lower incomes and lower educational levels than those of the general population. Furthermore, the excluded households comprised predominantly of minorities and immigrants who depended on the informal sector and often lived in informal settlements. It showed that the underdeveloped financial sector hindered accessibility of financial services at the household level which can in turn limit economic growth and poverty alleviation.

Further analysis of the data collected by Solo (2008) shed light on the macroeconomic side of the problem of financial exclusion. It showed that the underdeveloped financial sector hindered accessibility of financial services at the household level which can in turn limit economic growth and poverty alleviation. The data analyses showed that there were increasing costs on the poor to make payments, to save and borrow than it was on their banked fellow citizens. For example, in Mexico, cash transactions could cost up to five times more than payments by cheque and up to 15 times more than electronic payments.

Conversely to financial exclusion, Gunarsih, Sayekti, and Dawanti (2018) in Indonesia investigated the impact of financial inclusion on poverty alleviation, using descriptive statistics. Financial inclusion was measured by number of office banks per 1000 thousand adults, number of ATM machines in per1000 thousand adults, number of office bank per 1000km, number of accounts third party funds per 1000 adults. The results indicate that increase in these financial indicators decrease the poverty incidence. Abimbola, Olokoyo and Farouk (2018), also

studied whether financial inclusion is a catalyst for poverty alleviation in Nigeria, using multiple regression models.

The study reported that the average current and savings account balance, average number of deposit money bank customers, average loan size to the agricultural sector have positive and significant impact on poverty alleviation. On the other hand, the study also reveals that cost of borrowing has negative impact of poverty alleviation. A cursory view of the above review portrays that most of the studies conducted are mostly country specific and the little once conducted on cross country concentrate mostly on developing countries, this study will contribute to literature by considering Sub- Saharan Africa which has been considered a major habitat of the poor. This implies that poverty is associated with financial exclusion.

Ageme, Anisiuba, Alio, Ezeaku, and Onwumere (2018) assessed the effect of financial inclusion on poverty reduction in Nigeria. The study used quarterly spanning from 2009 first quarter to 2014 fourth quarter. Financial inclusion was measured by volume of transactions via ATMs and internet banking, and volume of credit to the rural populace as proxies for financial inclusion. The study used the Johansen cointegration test to determine whether there is a long run relationship between financial inclusion and poverty. The findings reveal that ATMs inclusion channel and deposit money bank credit to the rural populace have significant positive effect on poverty reduction, whereas web based/internet banking channel and microfinance credit exert negative impact on poverty reduction.

Negative effects ascribed to internet banking channel may not be unconnected with the low literacy level especially among the banking public. Hence fewer percentage of adult banked population in Nigeria use the web channels to access financial services compared to the ATMs that have continued to attract wider usage and acceptance. The results of Johansen cointegration test indicates the existence of long-run equilibrium relationship between financial inclusion and poverty reduction however, speed of adjustment based on the ECM shows that 71 percent of deviation from equilibrium path is corrected every quarter. Diagnostic tests confirm the stability and correctness of our model.

Sanya and Olumide (2017) in their study of financial inclusion as a tool of poverty alleviation in Ekiti, using multiple regression. Reported that financial inclusion is an efficient and significant tool of combating poverty and it create employment especially in the rural areas housing the majority of unemployed population. They further reveal that age, marital status, income level, religion, financial discipline, use of bank products and services, distance from financial services providers, household size access to political contract and gender have significant impact on poverty alleviation.

Some studies reveal that digital financial products such as mobile money has proved to be a scalable method to provide financial services in developing countries, with data from several African countries including the work of Must and Ludewig (2010) verifying this argument. Erickson (2010) asserted that mobile money can serve as a poverty reduction tool in his study dubbed mobile money: cell phone banking in developing countries. In their work, Morawczynski

and Pickens (2009) and Mas and Morawczynski (2009) explored the economic and social impacts of M-Pesa in Kenya.

Morawczynski and Pickens (2009) found ethnographic evidence that M-Pesa has changed the savings behaviour, the pattern of remittances, and has increased rural livelihoods. Yao (2018) utilised unique data from a survey conducted in rural Mozambique to investigate the effect of the use of mobile money, an innovative and accessible banking service, on the growth of total factor productivity. The results of the estimation showed that improved access to input through marketing visits was associated with an increase in Total Factor Productivity, but the mobile money trainings taken separately was not effective in improving farm productivity. Further, the study looked at the effect of various socioeconomic variables on productivity growth.

In another study, Donovan (2011) looked at M-Pesa in Kenya in an attempt to find the impact it had on human freedom. He concluded that a relationship of networks of social interactions, the need and desire to coordinate financially with friends, relatives and businesses, and progressive desertion of other alternatives like banks and Western Money Union led to a form of power that acts on all Kenyans both users and non-users of M-Pesa. In addition, mobile money significantly impacts on the ability of a household to spread risks as a result of reduced transaction costs compared to households without mobile money who are likely to suffer a drop-in consumption when hit by a negative income shock (Jack & Suri, 2011).

Kirui (2013) find that m-payment use increased the levels of commercialisations by 37 percent, compared with non-users, input use by $42 and income from farming activities by $224. Kikulwe et al. (2014) concluded that m-payment use is associated with increases in spending on inputs (except mineral fertiliser), commercialisation (19 percent) and profits (35 percent). Similarly, Sekabira and Qaim (2016) found that m-payment users are more likely to sell coffee to buyers in higher value markets rather than local traders, enabling them obtain 7 percent higher prices for their coffee. This helps them to reduce poverty among the farmers. Sekabira and Qaim (2016) attributed less of a role to remittances but rather to other off-farm income sources, such as running small-scale businesses in trade, transportation and handicrafts, which are facilitated by m-payments.

Cobla and Osei-Asibey (2018) investigated how the use of the mobile money technology among students affects their spending behaviour. They applied ordinary least squares regression technique by using a random sample of 506 students from the University of Ghana. The findings suggested that active use of mobile money services has significant influence on students spending behaviour. On a monthly basis, students who use mobile money spend on the average 20 Ghana Cedis more than their colleagues who do not use mobile money. Students who use both mobile money and ATMs jointly spend nearly 13 Ghana Cedis more than their counterparts who use either of them. The implication of this finding is that digital financial technology which provides easy access to money can increase welfare of students. The authors therefore conclude that

technological growth should not be curtailed given the numerous benefits technologies accrue to society.

Aker et al. (2011) used an experimental design to study the impact of Zap in a conditional cash transfer program in Niger. Their study found that Zap has reduced the cost of funder's distribution and recipient's collection, provided more privacy, and potentially changed intra-household decision making, which they said has led to the observed consequence changes in in poverty reduction. Batista and Vicente (2023) looked at the introduction of mKesh in Mozambique. The primary intervention was training a group of people to use the technology. They used experimental survey design to look at secondary outcome effects of mKesh on consumption and investment.

Kimenyi and Ndung'u (2009) assessed the expansion of the Kenyan financial services to include digital financial services and investigated the lessons that can be learned from mobile phone banking in Kenya. The work revealed that digital financial inclusion through mobile money transfers facilitates payment for services of which labour is no exception. Per the study, prompt payment of weekly labour in remote parts of Kenya has led to a transformation of lives (reduction in poverty) in Kenya, particularly in rural regions. This transformation was said to be in the right direction and suggested that the people of rural areas can now readily afford to pay for their needs on time and can increase their spending on goods and services. This means that those that are digital financial exclusion were not able to increase spending on good and services.

Wang and He (2020) attempted to study the effects of digital financial inclusion on farmers' vulnerability to poverty in China, using survey data on 1900 rural households. Vulnerability to poverty, here defined as the likelihood of poverty in the future, was measured by the Asset-Based Vulnerability model. In their survey, the proportion of farmers using digital financial services was 35.63 per cent. The study estimations showed that farmers' use of digital financial services had positive effects on reduction in their vulnerability. The study also found that such effects relied mainly on improvement in farmers' ability to cope with risk; that is, alleviating their vulnerability induced by risk. Further investigation revealed that digital financial services provided by ICT companies had a larger impact on farmers' vulnerability than that provided by traditional banks. The lessons learned from China's digital financial inclusion are valuable for other developing countries where financial exclusion looms large.

Jack and Suri (2014) illustrated that Kenyan households use *M-PESA* to solicit remittances from their networks of family members and friends at lower transactional costs and that these funds significantly safeguard recipient households against consumption declines when hit by weather and illness shocks. There is also anecdotal evidence that the mobile money platform provides a convenient platform for incremental saving, which can change the financial behaviour of households by reducing wasteful expenditure and shifting away from risky informal saving platforms like burying money in the ground and keeping cash at home (Morawczynski & Pickens, 2009).

Other pathways through which mobile money-based remittances contribute to welfare improvements among rural households are the relaxation of credit constraints faced by farmers, enabling them to commercialise their farming activities and increase farm incomes (Kikulwe et al., 2014). This is quite vital especially given that farmers often lack the required collateral to obtain credit from traditional banks and microfinance institutions such that remittances are an invaluable alternative source of funding for the purchase of agricultural inputs. The rapid expansion of mobile money services is therefore expected to transform economies as it is readily adopted in a wide range of sectors including finance, health, agriculture, education and business (World Bank, 2014).

In Uganda, a panel data analysis of households by Munyegera and Matsumoto (2016) found that that mobile-money usage had a positive impact on reducing poverty. According to the study, households with access to m-payment recorded an increase per capita semi-durable and increased in consumption (measured by food consumption), health, education, semi-durable items, and contributions to socio-cultural functions. This is attributed to digital financial services user households receiving more frequent more recurrent and higher amounts of remittances than non-user households. Aker and Wilson (2013), using a randomized control trial experiment with a government cash transfer programme.

In addition to the primary and secondary data collected at the first stage, during the second stage the study collected data from savings group members in each village. This included a baseline survey of members' socio-demographic

characteristics, savings patterns, mobile phone and mobile money access, and migration in August 2012, as well as follow-up surveys with the same household members on the individual and household's registration status, mobile money usage, and savings patterns. The study found that using mobile money reduced costs for both the organization that made the transfers and the recipients. The recipients used the costs saved to reduce the depletion of assets.

Suri, Jack and Stoker (2012), who used household panel data to analyse the impact on risk sharing in Kenya; they showed that mobile money users could smooth their consumption due to remittances received in times of economic shocks. Using a unique survey instrument covering nearly 2,300 households over 2008–2010, this study first documented the lightning-fast adoption of mobile money in Kenya, which was faster than most documented modern technologies in the United States. The study then presented evidence on how this innovation allowed households to respond better to unexpected adverse health events. The study found that in the face of these events, users of mobile money were better able to tap into remittances to finance additional health care costs without having to forego necessary expenditures on education, food, and other consumption needs.

In another quantitative study, Mbiti and Weil (2011) examined how M-Pesa was used as well as its economic impacts. Analysing data from two waves of individual data on financial access in Kenya, the study found that increased use of M-Pesa lowered the propensity of people to use informal savings mechanisms such as ROSCAS, but raised the probability of their being banked. The study used

aggregate data to show that mobile money use has positive effects on different economic indicators, including employment and poverty reduction.

Yang and Fu (2019) built an evolutionary game model to analyse the equilibrium strategies of inclusive financial institutions and the poor in poverty reduction activities to find the answers. As there is a high incidence of poverty and serious financial exclusion in rural areas of China, the study tested the poverty reduction effectiveness of inclusive financial development on the poor with different labour capacity in rural China from 2010 to 2016 based on survey data of China Family Panel Studies and relevant statistics collected from 21 provinces.

The study found that there were differences in poverty alleviation effects of inclusive financial development among the poor with different labour capacities; if financial institutions targeted the service precisely to the working-age population in rural areas, they would achieve the dual goals of maintaining institutional sustainable development and alleviating poverty; and the development of inclusive finance in aspects of permeability, usability, and utility can significantly reduce multidimensional poverty. Therefore, to further improve the multidimensional poverty reduction performance and stimulate the endogenous motivation of the poor, it is necessary to strengthen the support for financial resources served to the working-age population, and to improve the development of rural inclusive finance in aspects of quality and affordability.

Coulibaly and Yogo (2016) also studied the effect of financial services on poverty reduction in developing countries, using random and fixed effect model. However, contrary to earlier studies, this study examined the issue from the

macro-perspective. The study reported that improving access to financial services significantly reduce poverty, especially in countries battling with the macroeconomic instability. It was also reported in the study that barriers to financial inclusion have positive effect on poverty and that increasing access to financial services to the low-income earners can reduce the number of working poverties.

Park and Mercado (2015) extended the existing literature on financial inclusion by focusing on examined Financial Inclusion, Poverty, and Income Inequality in Developing Asia. They constructed a financial inclusion indicator to assess a number of macroeconomic and country specific factors affecting the level of financial inclusion for 37 selected developing economies in Asia. The finding showed that per capita income, rule of law, and demographic characteristics have significant effect on financial inclusion in developing Asia. The results further revealed that financial inclusion significantly reduces poverty; and also lowers income inequality.

From the review, it became clear that majority of the existing studies focused on more developed and industrialised countries, with sub-Saharan African countries marginalised despite the fact that the subregion has to grapple with high rates of both digital and non-digital financial exclusion. Moreover, there is limited knowledge of how digital financial exclusion and non-digital financial exclusion influence multidimensional poverty, as most of the prior studies paid more attention to poverty not looked at from multiple perspectives.

Summary of Literature Review

From the review, a number of gaps have been identified. First, although almost all the related empirical studies reviewed looked at financial development, the focus had mostly been on the relationship between financial development and concepts other than consumption per capita, despite the fact that a relationship could been inferred between financial development and consumption per capita based on the assertions of the theory of active financial development (Gloukoviezoff, 2007). Second, taking into account the review of extant empirical literature, there was a modicum of evidence of the relationship between financial exclusion and consumption inequality.

More specifically, throughout the in-depth review, the researcher did not come across any empirical study on the effects of digital and non-digital exclusion on consumption inequality, despite the fact that the arguments advanced by the theory of active financial development, the individualistic theory of poverty and the conduit effect theory suggested a link between these variables. Third, it became evident from the review that sub-Saharan Africa had not been extensively explored, in terms of issues of financial development, financial exclusion (digital and non-digital), consumption per capita, and consumption inequality, despite the unfavourable levels of these issues in the subregion (Danquah et al., 2017; Danquah et al., 2020).

Moreover, extant literature did not look at the link between financial development, financial exclusion and elements of welfare from the perspectives of eclectic of relevant theories, such as theory of active financial development, the

individualistic theory of poverty and the conduit effect theory. This implies that the findings of most of the existing empirical studies lack quality and strong theoretical backing, as well as limited in applicability (Grant & Osanloo, 2014).

Conceptual Framework

The conceptual framework for this study used two main independent variables – financial development and financial exclusion – and three dependent variables, consumption per capita, consumption inequality and multidimensional poverty. The independent variables have been recognised in literature to have influence on consumption per capita, consumption inequality and poverty (Park & Mercado, 2015; Yang & Fu, 2019; Bartiaux, 2021). The relationships between the variables are presented in Figure 2.

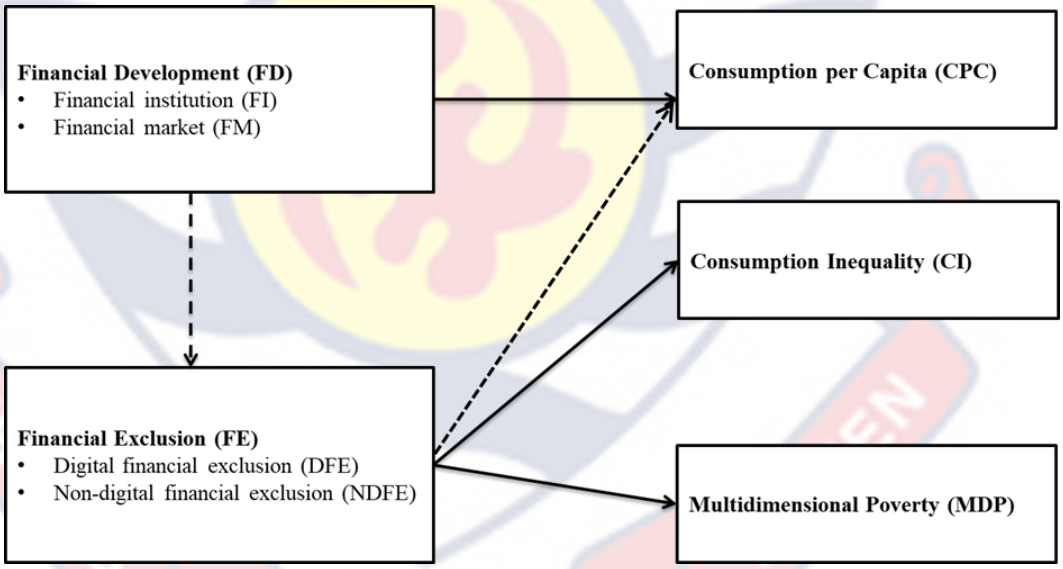

Figure 2: Conceptual framework
Source: Author's construct (2023)

The broken arrow shows the link between financial development and financial exclusion, which, in this study, was regarded as the base link, since available data has confirmed a low rate of financial development, hence high rates

of financial exclusion in Sub-Saharan Africa (IMF, 2020). The next broken arrow connecting financial exclusion to consumption per capita acknowledges the fact that both digital and non-digital financial exclusion may influence consumption per capita, since a link could be drawn between these aspects of exclusion and the other elements of welfare (i.e., consumption inequality, and multidimensional poverty). Nonetheless, the study could not explore this potential relationship due to non-availability of data on financial exclusion across the Sub-Saharan African countries.

The third arrow shows the straight-line relationship between financial development and consumption per capita. The third path represents the relationship between financial exclusion and consumption inequality. Finally, the effect of financial exclusion on multidimensional poverty is shown by the arrow running from financial exclusion to multidimensional poverty. The argument of the present study, considering the conceptual framework, is that if financial development high, consumption per capita will be positively affected. Similarly, high rates of financial exclusion are expected to worsen consumption inequality and multidimensional poverty.

Chapter Summary

This chapter presented a review of related literature. Specifically, the chapter reviewed the McKinnon Conduit Effect theory, the theory of active financial development, and the individualistic theory of poverty. Further, key concepts of financial development, financial exclusion, and poverty were reviewed. Related empirical studies have also been critically reviewed. The

analysis of the literature showed that there was a dearth of studies on the interplays between financial development and consumption per capita, financial exclusion and consumption inequality, and financial exclusion and multidimensional poverty in the SSA region. The present study addressed this gap by focusing on these interplays.

CHAPTER THREE

RESEARCH METHODS

Introduction

The study examined the effects of financial development on consumption per capita, and financial exclusion on consumption inequality and multidimensional poverty. This chapter presents methods used in examining the effect of financial development on consumption per capita of sub-Saharan Africa, the effect of financial exclusion (digital and non-digital) on consumption inequality in Ghana and the effect of financial exclusion (digital and non-digital) on multidimensional poverty in Ghana. The research design, data source, theoretical model specification, empirical model specification, explanation of the study variables, and post estimation test method are all covered in this chapter.

Research Design

Due to its suitability for measuring the quantitative aspect of this study, the survey design was used (Anwar et al., 2016). Through surveys, features of a large population may be investigated, and an accurate sample of the population can be drawn. Also, the positivist school of thought was used in this study. Validity, dependability, objectivity, and precision are the criteria that positivists employ to assess the accuracy of quantitative investigations (Park, Konge & Artino, 2020). Therefore, the findings of this study were based on a scientific technique of inquiry.

Population, Sample and Sampling Techniques

The population for this study comprised all 53 countries in sub-Saharan Africa (World Bank, 2020). However, the sample size was made up of 26 countries, due to availability of data. Consequently, the criterion sampling technique was applied where only countries with a complete data set on financial development, digital financial exclusion, non-digital financial exclusion, multidimensional poverty, consumption per capita, and consumption inequality. These countries were Benin, Botswana, Burkina Faso, Cape Verde, Cameroon, Congo Republic, Cote D'Ivoire, DR Congo, Equatorial Guinea, Gabon, Ghana, Guinea, Guinea Bissau, Kenya, Malawi, Mali, Mauritania, Mauritius, Mozambique, Nigeria, Rwanda, Senegal, South Africa, Tanzania, Togo and Uganda.

Data Sources and Description

The study used data from the seventh round of Ghana Living Standard Survey (GLSS7), World Bank Development Indicators (WDI), and the International Monetary Fund (IMF). The Ghana Living Standards Survey (GLSS) is a multi-purpose household survey that gathers information on a wide range of living conditions, including employment, education, health, and household spending on both food and non-food goods. The sections of the dataset that were used for the analysis include the household level – poverty file, section 2 data on education, section 7 on household characteristics and section 12 on household financial transactions. The major variables of interest from GLSS7 were financial exclusion (cross-sectional), consumption inequality (cross-sectional) and

multidimensional poverty (cross-sectional), and these helped in achieving research objectives two and three.

Additional variables drawn from the GLSS7 and used as covariates include age, sex of the respondents, household size, location, educational level, marital status, job status, religion, and the area. The WDI and IMF served as sources for data for the research objective one. Specifically, data on financial development (from 1980 to 2020) was obtained from the International Monetary Fund (IMF), and the dataset contained information on aggregated financial development, financial institutions, financial markets, depth of financial institutions, financial institutions access, financial institutions efficiency, depth of financial market, financial market access and finally financial market efficiency across the Sub-Saharan African countries involved in the study. Consumption per capita data, spanning a period of 11 years (2005-2015), was obtained from the WDI.

It should be pointed out that the data used was an open data available online. This means that any individual may have access to it, as there is no restrictive policy. Nonetheless, the researcher ensured that the integrity of the data was maintained. Besides, the researcher ensured rigorous management and curation of the data to ensure that it was suitable for analysis. The final dataset was safely stored on a USB-drive and kept in a safe by the researcher for future access and reference.

Measurement of Variables

The key variables used in this study were financial development, consumption per capita, financial exclusion, consumption inequality, and multidimensional poverty. Macroeconomic variables of inflation, corruption, real gross domestic product, trade to GDP, and tax have also been argued to influence consumption per capita (Ho & Ikye, 2017; Odhiambo, 2010). Aside financial exclusion, sex, household size, marital status, age, location, education, and employment status have been argued to affect poverty and consumption inequality (Bartiaux, 2021); thus, have been controlled for. Summary of these variables, their operational definitions, dimensions, measurements, and their justifications are displayed in Table 1.

Table 1: Variables and Measurements

Constructs	Operational definition	Role	Dimensions	Measurements (dimensions)	Measurements (main constructs)	Justifications
Financial development (FD)	Level of improvement in access to, depth and efficiency of financial institutions and markets	IV	• Access [financial market (FMA) & financial institution (FIA)] • Depth (FMD&FID) • Efficiency (FME&FIE)	• FID = bank credit to private sector in %GDP • FIA = bank branches/100,000 adults • FIE = banking sector net interest margin • FMD = stock market capitalisation/GDP • FMA = total number of issuers of debts/100, 000 adults • FME = stock market turnover ratio	Aggregation of FID, FIA, FIE, FMD, FMA & FME	Baiardi & Morana, 2017; Kelimeler & Sınıflandırması, 2022; Svirydzenka, 2016
Consumption per capita (CPC)	The average level of consumption per person of a specific country.	DV			Average consumption expenditure in US dollars	Pal & Pal, 2014; Perugini & Tekin, 2022
Financial exclusion (FE)	Multiple deprivations of a household head in the ownership and usage of the financial products used in the measurement of financial exclusion	IV	• Digital financial exclusion (DFE) • Non-digital financial exclusion (NDFE)	• DFE = Combined account ownership, credit access & health insurance utilisation • NDFE = combined ATM, E-zwich, E-banking & mobile money account usage	Aggregation of DFE & NDFE	Imai et al., 2010; Danquah et. al., 2020; Demirguc-Kunt et al., 2018

Table 1 Continued

Constructs	Operational definition	Role	Dimensions	Measurements (dimensions)	Measurements (main constructs)	Justifications
Consumption inequality (CI)	Unequal distribution of consumption levels (expenditure) among households within a population.	DV			Gini index (I) = $\underbrace{\sum_{g=1}^{G} \phi_g \varphi_g I_g}_{Between} + \underbrace{\bar{I}_g}_{Within} + \underbrace{R}_{Overlap}$ Where: ϕ_g is the household share of group g φ_g the consumption shares of g $\bar{I}_g$ is the between group inequality R_g is the residue implied by the group consumption overlap	Pal & Pal, 2014; Park & Mercado, 2015; Bartiaux, 2021; Luo & Li, 2022
Multidimensional poverty (MDP)	Deprivation of income, education, health, access to basic services, housing, nutrition, sanitation, and social inclusion.	DV	• Education • Health • Living standards (water, improved sanitation, electricity, flooring, cooking fuel & assets)		Multidimensional poverty index (MPI)	FINCA International, 2021; GSS, 2020
Inflation	Sustained increase in the general price level of goods and services in an economy over time	CV			Consumer price index	Abosedra et al., 2016; Sehrawat & Giri, 2016
Corruption	Improper use or abuse of public resources for private benefits	CV			Corruption perception index	WGI (World Bank)

Table 1 Continued

Constructs	Operational definition	Role	Dimensions	Measurements (dimensions)	Measurements (main constructs)	Justifications
Real gross domestic product (RGDP)	A measure of the total value of all final goods and services produced within an economy over a specific period, adjusted for inflation	CV			Natural logarithm of RGDP	Ho & Ikye, 2017
Trade to GDP (TradeGDP)	Total trade (exports plus imports) as a percentage of a country's (GDP).	CV			(Total trade/GDP)*100%	Kiendrebeogo & Minea, 2016
Tax	Level of tax generation in a country	CV			Natural logarithm of tax	Uddin et al., 2013
Sex	Gender of household head	CV		Male = 1 Female = 0 (reference)	Dummy	Author transformation
Household size	Number of people in a household	CV			Number of people/household	Author transformation
Marital status	Marital status of household head	CV		Married = 1 Other categories (divorced, consensual union, not married and single) = 0	Categorical	Sehrawat & Giri, 2016
Age	Age of household head	CV			Years	Author transformation
Location	Locality of household	CV		Urban = 1 Rural = 0	Dummy	Author transformation
Education	Educational level of household head	CV		No education = 0 (reference) Primary education = 1 JSS/MSLC =1 Secondary = 1 Higher = 1	Categorical	Author transformation
Employment status	Whether household head is engaged in economic activity	CV		Public = 0 (reference) Private = 1 Self = 1 Unemployed = 1	Categorical	Author transformation

Note: IV=independent variable, DV = dependent variable, CV = co-variate
Source: Author's construct (2023)

Data Analysis and Model Specifications

The study comprised three research objectives and five corresponding hypotheses. The first objective/hypothesis looked at the relationship between financial development and consumption per capita. The second objective/hypotheses considered the effects of financial exclusion (digital and non-digital) on consumption inequality, whilst the third objective/hypotheses looked at the effects of financial exclusion (digital and non-digital) on multidimensional poverty. How each objective was achieved or hypothesis tested has been discussed in detail below.

Financial development and consumption per capita

To achieve the first objective, which sought to determine the effect of financial development on consumption per capita, and test the corresponding hypothesis, several analyses were conducted considering the fact that panel data were used. First, descriptive statistics using mean, standard deviation, minimum and maximum were conducted to assess the overall distribution of the data. With respect to consumption per capita, the statistics obtained were benchmarked against World Bank's (2014) thresholds where consumption per capita below $2.97, between $2.97 and $8.44, between $8.44 and $23.03, and above $23.03 are classified as 'lowest', 'low', 'middle' and 'higher', respectively. Similarly, financial development and its indicators or dimensions were benchmarked against an average score of 50% where scores below 50% were deemed low level of development, whilst scores above 50% indicated high level of financial development (Hao, Wang & Lee, 2020).

Second, variance inflation factors (VIFs) were computed for the independent variables (Consumption per capita, inflation, corruption, tax, trade to GDP, and real gross domestic product) included in the model to ensure that issues of multicollinearity are kept at bay, and the maximum value obtained was 4, implying that there was no issue of multicollinearity (Shrestha, 2020). Also, Breusch-Godfrey Lagrange multiplier test was run to check for autocorrelation and the p-value obtained was greater than 0.05, indicating no autocorrelation across the variables included in the regression model (Uyanto, 2020).

Third, to deal with issues of endogeneity, the Durbin-Wu-Hausman test was conducted to choose between fixed and random effect for the regression model estimation (Hausman, 1978; Kennedy, 2008). The test statistics produced was in favour of the fixed effect model, as the null hypothesis that the 'random effect is the preferred model' was rejected at a p-value of 0.019. Moreover, several instrumental variables were introduced to further curb endogeneity issues (Anderson, 2022; Wooldridge, 2015). These instrumental variables were consumption per capita, inflation, corruption, tax, trade to GDP, and real gross domestic product, predicated on prior suggestions (Ho & Ikye, 2017; Odhiambo, 2010), and the fact that they showed unrelatedness to the error term.

Specifically, to achieve the objective and test the corresponding research hypothesis, the regression analysis, estimated by the fixed model, was used. Nonetheless, as stated earlier, the Durbin-Wu-Hausman test was used to test both the fixed and random effects models; thus, these models have been elaborated. With the random effects model, the individual-specific effect or variation across

entities assumes a random variable; that is the unobserved heterogeneity is uncorrelated with the explanatory variables used in the model, and it is theoretically specified as follows (Baltagi, 1985; El-Osta & Mishra, 2005; Kaltsas, Bosch, & McGuirk, 2008).

$$Y_{it} = \gamma_0 + X'_{it}\gamma + (\alpha_i + v_{it}) \quad (1)$$

Where: $\gamma_0$is the constant term, α_i represent the individual-specific random effect or a period not included in the regression, and the errors are independent and identically distributed with zero mean and constant variance, $v_{it} \sim i.i.d(0, \delta^2{}_v)$. It is assumed in the random effect model that α_i is independently distributed of X_{it}.

In the composite error term of a one-way random effect model, α_i is assumed independent of the traditional error term v_{it} and the regressors. This assumption is not necessary for a fixed effect model. The random effect model as presented in the equation;

$$y_{it} = \gamma_0 + X'_{it}\gamma + (\alpha_i + v_{it}) \quad (2)$$

Where: $\alpha_i \sim IID(0, \sigma^2{}_\alpha)$ and $v_{it} \sim IID(0, \sigma^2{}_v)$. The covariance elements of $Cov\,(\varepsilon_{it}, \varepsilon_{js}) = E\,(\varepsilon_{it}\varepsilon'_{js})$ are ${\sigma_\alpha}^2 + {\sigma_v}^2$ if $i = j$ and $t = s$, and ${\sigma_\alpha}^2$ if $i = j$ and $t \neq s$. Therefore, the covariance structure of the composite errors is $\Sigma = E\,(\varepsilon_i \varepsilon'_i)$ for individual i and the variance-covariance matrix of the entire disturbances or errors (V) are:

$$\Sigma = \begin{bmatrix} {\sigma_\alpha}^2 + {\sigma_v}^2 & {\sigma_\alpha}^2 & \dots & {\sigma_\alpha}^2 \\ {\sigma_\alpha}^2 & {\sigma_\alpha}^2 + {\sigma_v}^2 & \dots & {\sigma_\alpha}^2 \\ \vdots & \vdots & \vdots & \vdots \\ {\sigma_\alpha}^2 & {\sigma_\alpha}^2 & \dots & {\sigma_\alpha}^2 + {\sigma_v}^2 \end{bmatrix} \quad (3)$$

And

$$V = I_n \otimes \Sigma = \begin{bmatrix} \Sigma & 0 & \dots & 0 \\ 0 & \Sigma & \dots & 0 \\ \vdots & \vdots & \vdots & \vdots \\ 0 & 0 & \dots & \Sigma \end{bmatrix} \text{..} \quad (4)$$

A random effect model is estimated by the GLS when the covariance structure is known and by FGLS when the covariance structure of the composite error is unknown. The empirical random effect model based on the expression in equation 2 is expressed as;

$$Expend_{it} = \gamma_0 + \gamma_1 FD_{it} + (\alpha_i + v_{it}) \text{..} \quad (5)$$

Where: *Expend* represents consumption per capita of a country, *FD* represents financial development. On the other hand, the fixed effect (FE) model allows an arbitral correlation α_i and X'_{it}. That is the unobserved heterogeneity is correlated with the explanatory variables.

$$Y_{it} = \alpha_i + X'_{it}\gamma + v_{it} \text{..} \quad (6)$$

Where: α_i is a fixed effect specific to the individual or the time that is not included in the regression, and the errors are independent and identically distributed with zero mean and constant variance, $v_{it} \sim IID(0, \delta^2{}_v)$. The fixed-effect model controls all time-invariant differences between individuals so that the estimated coefficients of the fixed-effect models cannot be biased due to omitted time-invariant characteristics such as culture, religion, gender, race, etc.

The fixed effect model can be estimated using different approaches. These are First Differenced (FD) estimator, the Least Square Dummy Variable (LSDV) and the Within Estimators. The Least Square Dummy Variable LSDV uses dummy variables, whereas the "within" estimation does not. These approaches produce identical parameter estimates of regressors. The "between" estimation fits

a model using individual or time means of dependent and independent variables without dummies.

The LSDV is widely used because it is relatively easier to estimate and interpret. However, this LSDV becomes problematic when there are many individuals (or groups) in panel data. If T is fixed and $n \to \infty$ (n is the number of observations and T is the number of time periods), parameter estimates of regressors are consistent but the coefficients of individual effects, $\gamma_0 + \alpha_i$, are not (Baltagi, 2008). The "within" estimation does not need dummy variables, but it uses deviations from the group (or time period) means. That is, "within" estimation uses variation within each individual or entity instead of a large number of dummies. The "within" estimation as given in equation 7 is,

$$\left(y_{it} - \bar{y}_i\right) = \left(x_{it} - \bar{x}_i\right)'\gamma + \left(\varepsilon_{it} - \bar{\varepsilon}_i\right) \quad (7)$$

Where: $\bar{y}_i$ is the mean of the dependent variable (DV) of the individual (group), $\bar{x}_i$ represent the means of the independent variables (IVs) and $\bar{\varepsilon}_i$ is the mean of errors of the group. In the "within" estimation, the incidental parameter problem is no longer an issue. The parameter estimates of regressors in the "within" estimation are identical to those of LSDV. The 'within' estimation reports the correct sum of squared errors (SSE) in a model. The "within" estimation, however, has several disadvantages.

First, data transformation for the "within" estimation wipes out all time-invariant variables (gender, ethnic group & race) that do not vary within the entity (Kennedy, 2008). Besides, the "within" estimation produces incorrect statistics. Finally, the R^2 of the "within" estimation is not correct because the intercept term

is suppressed. The "between groups" estimation uses variations between individual entities (groups). Specifically, this estimation calculates group means of the dependent variable and the independent variables and thus reduces the number of observations. The between estimation, therefore, is stated in the equation below as;

$\bar{y}_i = \alpha_i + \bar{x}_i + \bar{\varepsilon}_i$ ..... (8)

Where: $\bar{y}_i$ is the mean of the dependent variable, $\bar{x}_i$ represent the means of independent variables and $\bar{\varepsilon}_i$ is the mean of errors of the group. Therefore, the empirical fixed effects models are expressed as;

$$Expend_{it} = (\gamma_0 + \alpha_i) + \gamma_1 FD_{it} + \gamma_2 inflation_{it} + \gamma_3 corruption_{it} + \gamma_4 RGDP_{it} + \gamma_5 TradeGDP_{it} + \gamma_6 Tax_{it} + v_{it} \quad \text{..... (9)}$$

Where: *Expend* represent consumption per capita of a country, *FD* represents financial development, *inflation* represents the rate of inflation within the period, *corruption* represents the level of corruption in the country, *RGDP* represent the real gross domestic product, *Trade-GDP* represents trade to GDP ratio, and finally, *Tax* represents tax level in the country.

Financial exclusion and consumption inequality

The second research objective, which sought to determine the effects of financial exclusion (digital and non-digital) on consumption inequality, was analysed using regression techniques estimated by the Ordinary Least Square (OLS). The application of the OLS was subject to the assumptions underlying the Classical Linear Regression Models (CLRM). The OLS dealt with the relation between the dependent variable Y_i (consumption inequality) and the independent

variables X_i digital and non-digital financial exclusion such that the conditional mean function is specified as:

$$E\left(y_\iota/_{Xa\iota}\right) = \acute{X}\beta \quad (10)$$

and the resultant estimator ($\hat{\beta}$), which satisfied the basic assumption underlying the classical regression model was given as:

$$\hat{\beta} = min \sum_{i=1}^{n} \left(\left(E\left(y_\iota/_{X\iota}\right) - \acute{X}\beta\right)^2\right) \quad (11)$$

Where: $\hat{\beta}$ is the estimator under OLS that minimised the conditional mean function. The estimator, which is the sum of the error squared, is assumed Best Linear Unbiased Estimator (BLUE) under the Classical Linear Regression Model (CLRM) (Cameron & Trivedi, 2005). Under this assumption, it was ensured that the model was not only linear in parameters but also with an error term that was both serially uncorrelated and homoscedastic.

The empirical model specification can thus be specified as:

$$CI_i = \beta_0 + \beta_1 NDFE_i + \beta_2 DFE_i + \beta_3 age_i + \beta_4 sex_i + \beta_5 marital\ status_i + \beta_6 education_i + \beta_7 employment_i + \beta_8 hhsize_i + \beta_9 location_i + \varepsilon_i \quad (12)$$

Where: CI is consumption inequality, NDFE is non-digital financial exclusion, DFE is digital financial exclusion, β_0 is the constant parameter, β_1 is the change in CI for a unit change in household head NDFE, β_2 is the change in CI for a unit change in household head DFE, β_3 is the change in CI for a unit change in the household head's age, β_4 is the change in CI for a household head being a male or female, β_5 is the change in CI of household head for a unit change in household head's marital status, β_6 is the change in CI for a unit change in household's level

of education, β_7 is the change in CI household head for a unit change in the employment status of household head, β_8 is the change in CI of household head for a unit change in household size, β_9 is the CI of the household head for a unit change in the locality (rural-urban) of household head, while ε_i present the error.

Aside the regression analysis to determine the effects of non-digital and digital financial exclusion on consumption inequality, descriptive statistics of mean, standard deviation, minimum and maximum were also computed. A score of one indicates total financial exclusion whiles zero shows complete inclusion (Demirguc-Kunt et al., 2018; FINCA International, 2021). In like manner, in terms of consumption inequality (Gini), a score of one indicates complete consumption inequality whilst an average score of zero indicates no consumption inequality gap (Bartiaux, 2021; Luo & Li, 2022).

Financial exclusion and multidimensional poverty

The third research objective, which sought to determine the effects of financial exclusion (digital and non-digital) on multidimensional poverty, was analysed using regression techniques estimated by the Ordinary Least Square (OLS). The application of the OLS was subject to the assumptions underlying the Classical Linear Regression Models (CLRM). The OLS dealt with the relation between the dependent variable Y_i (consumption inequality) and the independent variables X_i digital and non-digital financial exclusion such that the conditional mean function is specified as:

$$E\left(y_i/_{Xai}\right) = \acute{X}\beta \quad \text{(13)}$$

and the resultant estimator ($\hat{\beta}$), which satisfied the basic assumption underlying the classical regression model was given as:

$$\hat{\beta} = min \sum_{i=1}^{n} \left(\left(E\left({}^{y_i}/_{X_i} \right) - \acute{X}\beta \right)^2 \right) \ldots \quad (14)$$

Where: $\hat{\beta}$ is the estimator under OLS that minimised the conditional mean function. The estimator, which is the sum of the error squared, is assumed Best Linear Unbiased Estimator (BLUE) under the Classical Linear Regression Model (CLRM) (Cameron & Trivedi, 2005). Under this assumption, it was ensured that the model was not only linear in parameters but also with an error term that was both serially uncorrelated and homoscedastic.

The empirical model specification was specified as:

$$MDP_i = \beta_0 + \beta_1 NDFE_i + \beta_2 DFE_i + \beta_3 age_i + \beta_4 sex_i + \beta_5 marital\ status_i + \beta_6 education_i + \beta_7 employment_i + \beta_8 hhsize_i + \beta_9 location_i + \varepsilon_i \ldots \quad (15)$$

Where: *MDP* is multidimensional poverty, NDFE is non-digital financial exclusion, DFE is digital financial exclusion, β_0 is the constant parameter, β_1 is the change in MDP for a unit change in household head NDFE, β_2 is the change in MDP for a unit change in household head DFE, β_3 is the change in MDP for a unit change in the household head's age, β_4 is the change in MDP for a household head being a male or female, β_5 is the change in MDP of household head for a unit change in household head's marital status, β_6 is the change in MDP for a unit change in household's level of education, β_7 is the change in MDP household head for a unit change in the employment status of household head, β_8 is the change in MDP of household head for a unit change in household size, β_9 is the

MDP of the household head for a unit change in the locality (rural-urban) of household head, while ε_i present the error.

Aside the regression analysis to determine the effects of non-digital and digital financial exclusion on multidimensional poverty, descriptive statistics of mean, standard deviation, minimum and maximum were also computed. A score of one indicates total financial exclusion whiles zero shows complete inclusion (Demirguc-Kunt et al., 2018; FINCA International, 2021). In similar manner, in terms of multidimensional poverty, a score of one indicates extreme poverty across the poverty dimensions, whilst an average score of zero indicates no multidimensional poverty (Bartiaux, 2021; Li et al., 2020; Luo & Li, 2022).

CHAPTER FOUR

EFFECT OF FINANCIAL DEVELOPMENT ON CONSUMPTION PER CAPITA IN SUB-SAHARAN AFRICAN COUNTRIES

Introduction

This chapter examines the effect of financial development on consumption per capita. The chapter is presented in five main sections. The first section focuses on summary statistics of the key variables. The second section displays the trends of consumption per capita across sub-Saharan African countries. Next, the adjusted effect of financial development on consumption per capital, giving cognisance of other macroeconomic variables is considered. The third section presents discussion of static panel results. Finally, summary of the hypothesis tests, results, decisions, and conclusions are presented.

Descriptive Statistics and Analysis

Table 4 provides summary descriptive statistics relating to twenty-five (25) countries in SSA for the period 2006 to 2016. The table indicates the central tendency and measure of variability. The mean values indicate the average value of the variables used in the overall model. The standard deviation also captures the distribution of data around the average value. It also shows the closeness of data to the mean value over the period under consideration. More so, the spread of the data is indicated by the range and this is measured by the maximum and minimum values of the variables. The range is an indicator of the level of

variations in the variables. The larger the range values, the higher the level of variations in a variable.

Table 2: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Expend (US dollars)	6.823	0.869	5.392	8.826
FD	0.156	0.117	0.031	0.618
FDI	4.731	6.099	-4.02	50.018
FI	0.252	0.141	0.061	0.743
FID	0.134	0.181	0.004	0.895
FIA	0.108	0.13	0.005	0.6
FMA	0.055	0.145	0	0.593
FME	0.029	0.069	0	0.433
Inflation	6.136	5.774	-2.248	34.695
Corruption	28.199	13.629	2	64
RGDPG	4.731	3.622	-9.11	18.869
Trade GDP	73.731	27.941	20.723	165.646
Tax	40.521	10.816	21.571	93.904
Observation	277			

Source: Author's construction (2023).

The statistics indicate that the mean value of Household final consumption expenditure per capita (Expend) for the sampled countries over the period is 6.823 US dollars with values ranging from a maximum and a minimum score of 8.826 and 5.392 respectively showing not much level of variations. The standard

deviation value 0.869 of Household final consumption expenditure per capita (Expend) is lower than the mean value showing that there is not so much variability in the variable.

On the independent variables side, financial development (FD) averages 0.156 units within the period across the sample. Also, within the period, the minimum and maximum financial development (FD) scores are 0.031 and 0.618. On the scale of 100, the mean value of financial development shows that about 16 percent of financial development is seen in SSA with the highest level of development being about 62 percent. The summary shows that the mean value for financial institutions (FI) which captures access, depth and efficiency is 0.252 representing about 25 percent. The standard deviation of financial institution is 0. 141 while the minimum and maximum values are 0.061 and 0.743 respectively.

For the depth financial development (FID), the mean value is 0.134 and the standard deviation is 0.181 and the variable ranges from 0.004 to 0.895 in the sub-Saharan Africa. The average value of Access to financial Institutions (FIA) is 0.108 unit. The standard deviation is recorded as 0.13 with the minimum and the maximum values of 0.005 and 0.6 respectively. With regards to access to financial markets, the study indicates that the average value is 0.055 and the standard deviation is 0.145. The minimum value is zero and the maximum value is 0.593 respectively.

For efficiency of financial market, the mean value is 0.029 and the maximum and minimum values are recorded as zero and 0.433 respectively with a variation from the mean value indicated as 0.069. The average value of inflation

is 6.136 and the standard deviation is 5.774 with the minimum and maximum values of -2.248 and 34.695 respectively. The mean value of corruption is 28.199 and the minimum and maximum values are 2 and 64 respectively. The standard deviation is 13.629. This value is lower than the mean value which indicates that there is no much variability in the corruption level in SSA.

Real Gross domestic product growth (RGDPG) averages 4.731 percent while the variable ranges from -9.11 percent and 18.869 percent respectively with a variability of 3.622 percent in SSA. The mean value of trade openness to GDP (Trade to GDP) is 73.731 and the minimum and maximum values are 20.723 percent and 165.646 percent respectively. Finally, the study shows that the average value is 40.521 percent while it ranges from 21.571 percent to 93.904 percent respectively. This shows that tax values in SSA are relatively high. As a way of beginning analysis, the study shows the trends of household consumption expenditure per capita (dependent variable) in Figure 3. From the figure, most of the countries show upward trends in household consumption per capita in SSA. This implies that poverty is likely to be reduced all other things being equal.

Trends of consumption per capita across Sub-Saharan African countries

Figure 3: Consumption per-capita across countries

Source: Authors' Construct (2023)

Effect of Financial Development on Consumption Per Capita

The first objective specifically sought to determine the effect of financial development on consumption per capita. The outcome of the analysis conducted in this regard is present in Table 3.

Table 3: Effect of Financial Development on Consumption Per Capita

Variables	(1) Expend	(2) Expend	(3) Expend
Inflation	-0.002	-0.002*	-0.002
	(0.001)	(0.001)	(0.001)
Corrupt	0.008***	0.008***	0.006***
	(0.001)	(0.001)	(0.001)
RGDPG	-0.005***	-0.005***	-0.003**
	(0.001)	(0.001)	(0.001)
TradeGDP	-0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.001)
Tax	0.007***	0.006***	0.006***
	(0.002)	(0.002)	(0.002)
FD	1.257***		
	(0.370)		
FI		0.717***	
		(0.225)	
FID			1.987***
			(0.370)
FIA			0.116
			(0.213)
FMA			-0.177
			(0.390)
FME			-0.249
			(0.215)
Constant	6.176***	6.210***	6.220***
	(0.096)	(0.093)	(0.091)
Observations	277	277	277
R-squared	0.405	0.402	0.473
Number of countries	26	26	26

Source: Author's calculation (2023)

Table 3 shows a step wise regression result of the effect of financial development variables on consumption per capita in Sub-Saharan Africa. In model 1, the study includes the broader measure of financial development (FD). Its coefficient is 1.257 and it is statistically significant at one percent. This implies

that a unit increase in financial development increases household consumption per capita by 1.257 units, ceteris paribus. As household consumption per capita increases, poverty is also expected to decrease (Aker & Wilson, 2013). In model 2, the study includes financial institutions (FI) and its coefficient is 0.717.

This is also statistically significant at one percent. It implies that consumption per capita increases as financial institutions also develop (Yang & Fu, 2019). From model 3, the depth of financial institutions (FI) has also been introduced and the result shows that as financial institutions grow deeper (FID), it tends to increase household consumption per capita by 1.987 units, ceteris paribus. However, the results as evident in model 3 indicate that the other financial development variables like access to financial institutions (FIA), access to financial markets (FMA) and efficiency of financial markets (FME) are insignificant.

Inflation remained negative in all the three models. However, it is statistically significant only in the model 2. This implies that household consumption per capita reduces as inflation hikes. As this happens, poverty is expected to increase as inflation raises the cost of living and erodes the value of assets. In this case the poor becomes vulnerable in periods of high inflation, ceteris paribus. Corruption on the other hand maintains positive and statistically significant results irrespective of the models. From the measurement of the corruption variable, a higher scale implies less corruption. It therefore follows that as the value of corruption increases (for which corruption is minimised), household consumption per capita increases throughout. This follows that when

corruption is minimised, resources which would have been lost would be used to provide essential goods and services in the economy for citizens to benefit. Eventually, the consumption pattern improves which consequently helps reduce poverty, all other things being equal.

For real GDP growth rate, the results indicate negative and statistically significant effect on household consumption per capita throughout the three models. Household consumption per capita reduces as real GDP growth rate increases. As consumption per capita falls, poverty is expected to increase, ceteris paribus (Matsumoto, 2016). What this implies is that the kind of growth in SSA is not supportive of good economic activities. This could plausibly be due to the fact that factors necessary for GDP growth in SSA are very costly and in most cases are imported and because of this, the cost of GDP growth outweighs the yielded benefits from the factors of production.

Finally, tax revenue shows positive and statistically significant effect on household consumption per capita in all the three models indicating that as tax revenue increases, consumption per capital increases and hence poverty reduces, ceteris paribus. This is possible because revenue generated could be used as transfer payment to the poor and the vulnerable in the society. As the poor access this transfer payments from the governments, they will be able to purchase essential goods and services for consumption and consequently reduce poverty, all other things being equal (Li et al., 2020).

Discussion of Static Panel Results: Fixed and Random Effect

Table 4 shows the results of the static panel models, specifically the random and fixed effect models. In deciding between which of the two models is efficient, the Durbin-Wu-Hausman test was carried out. The null hypothesis of the Durbin-Wu-Hausman test is that the random effect is the preferred model. From the results, the null hypothesis was rejected since the p-value associated with Durbin-Wu-Hausman test was 0.019. This is lower than the alpha level of 5 percent and hence the null hypothesis is rejected in favour of the alternative hypothesis which states that the fixed effect is the preferred model. Table 5 shows the results for fixed effect and random effect. From the output, the coefficient of financial development was 1.257.

This coefficient is statistically significant at one percent level of significance since the [$p < 0.01$]. This implies that a unit increase in financial development results in an improvement in household consumption per capita by 1.257 units, ceteris paribus. Using household consumption expenditure per capita, this result implies that an increase in financial development results in an increase per capita consumption by 1.257 units, all other things being equal. This is the case because intuitively, an improvement in the financial sector makes it easier to access credit to enhance economic activities (Al-Hussainy et al., 2008; Beck, 2007; Demirguc-Kunt & Klapper, 2012).

Once households are able to access credit, they will be able to undertake projects that will translate into their welfare and hence poverty is reduced. Also, from the table, the coefficient of corruption (corrupt) is 0.008. This coefficient is

statistically significant at one percent level of significance. This implies that a unit increase in corruption leads to an increase in household consumption expenditure by 0.008 unit all other things being equal. This could be possibly explained by the fact that a reduction in corrupt practices tend to promote economic activities which goes a long way to stimulate economic activities which eventually makes goods and services available for consumption. As household consumption expenditure increases, poverty are minimised in the long run all other things being equal.

For tax revenue, the result shows that its coefficient is 0.007 and it is statistically significant at one percent ($p < 0.01$). This implies that a unit increase in tax revenue increases household consumption expenditure by 0.007 units, ceteris paribus. This is the case because when taxes are mobilised and used well in the economy by providing essential goods and services to the citizenry, welfare improves leading to reduction in poverty all other things being equal.

The study now turns to the discussion of the GMM results (Table 4). This is important because it serves as a robust estimation to the static panel models of fixed and random effect. More importantly, this method deals with the correction of issues of endogeneity which is likely to cause bias in the estimates of the static panel model. It is documented in literature that poverty has some level of persistence in natures and for that matter it is necessary a dynamic model is employed to deal with that persistence such that the previous values of the dependent variable is used as instrument to control for the endogeneity issues.

From the result of the GMM, the lagged value of household consumption per capita is included in the model. The coefficient of the previous value of household consumption per capita is 0.891. This is statistically significant at one percent since the p-value of [p-value = 0.000 < 0.001]. This follows that a unit increase in the previous value of the household consumption per capita increases its current values. As household consumption per capita increases, all other things being equal, poverty is expected to reduce (Beck & Demirguc-Kunt, 2009). This is because an increase in household consumption pattern implies that the welfare of people has improved, all other things, as this happens poverty is likely to be reduced.

For financial development, the result showed a statistically insignificant negative relationship with consumption per capita ($\beta = -0.052$). This implies that financial development and household consumption per capita were negatively related, though the relationship was insignificant. Thus, as financial development increases, household consumption reduces, ceteris paribus. However, as pointed out earlier, this coefficient was statistically insignificant and suggested that the relationship between financial development and per capita consumption was a static phenomenon rather than dynamic. Similarly, inflation has a negative but insignificant effect on household consumption per capita. The corruption variable (corrupt) has coefficient of 0.001. This is positive and a statistically significant at ten percent significance level. This is because the p-value associated with coefficient of corruption is less than ten percent. This implies that a percentage

increase in corruption increases household consumption per capita by 0.001 units, all other things being equal.

For tax revenue, its coefficient is 0.004. This coefficient is positive and statistically significant at ten percent. This implies that a percent increase in tax revenues increases household consumption per capita by 0.004 units, ceteris paribus. This, in turns, goes a long way to reduce poverty, all other things being equal.

Table 4: Decision between Fixed and Random effect

	(1)	(2)	(3)
	Fixed	Random	GMM
Variables	Expend	expend	Expend
L.expend			0.891***
			(0.041)
FD	1.257***	1.811***	-0.052
	(0.370)	(0.356)	(0.316)
Inflation	-0.002	-0.002	-0.000
	(0.001)	(0.001)	(0.001)
Corrupt	0.008***	0.007***	0.001*
	(0.001)	(0.001)	(0.001)
RGDPG	-0.005***	-0.005***	0.000
	(0.001)	(0.002)	(0.002)
TradeGDP	-0.000	0.000	-0.001
	(0.001)	(0.001)	(0.001)
Tax	0.007***	0.008***	0.004*
	(0.002)	(0.002)	(0.002)
Constant	6.176***	6.052***	0.626***
	(0.096)	(0.139)	(0.222)
Observations	277	277	251
R-squared	0.405		

Source: Author's calculation (2023)

Summary of Hypothesis Tested, Results, Decision, and Conclusion

This section presents a summary of the hypothesis tested, the outcomes, decisions, as well as the conclusions drawn. The first research hypothesis is

"*There is a statistically significant positive effect of financial development on consumption per capita in sub-Saharan African countries*". The study failed to reject this hypothesis and concluded that financial development significantly and positively affects consumption per capita. The summary of the test is shown in Table 5.

Table 5: Summary of Hypothesis Tested, Results and Conclusions

Hypothesis statement	Results *Regression coefficient*	Decision	Conclusions
H_1: There is a statistically significant positive effect of financial development on consumption per capita in sub-Saharan African countries.	$\beta = 1.257$ $P < 0.05$	H_1 Failed to reject	Statistically significant positive effect of financial development on consumption per capita in sub-Saharan African countries.

Source: Author's construction (2023)

Chapter Summary

This chapter focused on how financial development influences consumption per capita in sub-Saharan African countries. The analysis showed that financial development is relevant for consumption per capita, as it was revealed that financial development significantly influences consumption per capita. However, with respect to the key dimensions of financial development,

only financial institution and financial institution depth had significant effects on consumption per capita, with financial institution access, financial market access and financial market efficiency having no significant effect on consumption per capita in sub-Saharan African countries.

CHAPTER FIVE

DIGITAL FINANCIAL EXCLUSION AND CONSUMPTION INEQUALITY

Introduction

This chapter examines the effect of financial exclusion on consumption inequality. The chapter is presented in four sections. The first section focuses on summary statistics of non-digital financial exclusion, digital exclusion, financial inclusion inequality, consumption inequality, and demographic characteristics of the respondents. The second section displays inferential statistics examining the adjusted effect of financial exclusion on consumption inequality. Moreover, the adjusted effect of financial exclusion on consumption inequality, giving cognisance of settlement type – rural and urban, and the sector of employment of household heads – public, private, self and unemployed, is considered. The third section presents discussion of the results. Finally, summary of hypotheses tests is displayed.

Summary Statistics

This section displays summary statistics for non-digital financial exclusion, digital exclusion, financial inclusion inequality (Figini), consumption inequality (Gini), and demographic characteristics of respondents. The statistics were carried out using mean, standard deviation (Std. dev.), minimum (Min), and maximum (Max) scores. The results are shown in Table 6.

Table 6: Summary Statistics of Variables

Variable	Mean	Std. dev.	Min	Max
Financial exclusion	0.4152	0.4928	0	1
Digital Exclusion	0.3972	0.5018	0	1
Figini	0.5834	0.1218	0.187	0.951
Gini	0.3747	0.0744	0.208	0.635
Age	46.5426	16.0313	15	99
Male	0.6819	0.4658	0	1
Hhsize	4.1263	2.8741	1	28
Married	0.5411	0.4983	0	1
Urban	0.4278	0.4948	0	1
Education				
None	0.2939	0.4556	0	1
Basic	0.4874	0.4999	0	1
SHS	0.0995	0.2994	0	1
Training	0.0486	0.2150	0	1
Poly	0.0195	0.1383	0	1
University	0.0512	0.2204	0	1

Observation = 12,974
Note: *Figini = Financial inclusion inequality score; Gini = Consumption inequality score; Hhsize = Household size; SHS = Senior High School*
Source: Author's calculation (2023)

From the results displayed in Table 6, it could be observed that both non-digital financial exclusion and digital financial exclusion had the same percentage point (pp) across the respondents. Specifically, about 41.5 percentage point (pp)

of the respondents was non-digital financially excluded, while 39.7 pp of the respondents was digitally excluded. Again, the results showed that, averagely, financial inclusion inequality was almost 60 pp among the respondents, with the highest inclusion inequality rate marked at a whopping 95.1 pp. Similarly, consumption inequality rate was shown to be about 37.5 pp among the respondents.

Further, the average age of the respondents was documented at about 47 years, with the oldest respondent being 99 years old. More than half of the respondents are males (68.2 pp), with the remaining being females (31.8 pp), and each family had an average of four (4) members. With regards to marital status, about 54.1 pp of the respondents were married at the time of this study. Majority of the respondents were rural dwellers, with only about 42.8 pp residing urban centres. In terms of education, about 29.4 pp did not have any form of academic qualification or education at the time of the study; about 48.7 pp completed only basic school; barely 10 pp had their highest level of education being senior high school; and about 4.9 pp, 2.0 pp and 5.1 pp had their highest education levels being training college, polytechnic and university, correspondingly.

Next, district level financial inclusion inequality and consumption inequality could be seen in Figure 4. It should be stated that darker colours indicate that a district is more unequal while lighter colours indicate that a district is more equal, in respect of financial inclusion and consumption, respectively. Specifically, the map on the left side displaying the district level financial inclusion inequality indicates that inequality is higher in districts in northern

Ghana, compared to districts in southern Ghana. Particularly, Lawra, Sissala, Saboba Chereponi, Zabzugu Tatali, Nkwanta, Wenchi, and Fanteakwa were some of the districts with high financial inclusion inequality rates, with North Tongu, Ho, Kpandu, Dangbe West and Dangbe East having low inequality rates. This implies that majority of individuals in the high inequality districts are highly excluded financially, and the reverse holds true for the districts with low inclusion inequality rates.

In similar manner, consumption inequality appears to be more in the districts found in the northern sector of Ghana, as well as those in the mid-section as shown in Figure 4. Interestingly, both financial inclusion inequality and consumption inequality rates appear to be high in districts in the Upper West and Northern regions, with most of the districts recording low consumption inequality found in the southern sector of the country. The maps showing the district level financial inclusion inequality and consumption inequality are presented in Figure 4.

sector of employment of public employment, private employment, self-employment and unemployment (Table 9).

Table 7: Effect of Financial Exclusion on Consumption Inequality

Variables	(1)	(2)
Age	-0.0003***	-0.0004***
	(0.0000)	(0.0000)
Male	0.0036**	0.0039**
	(0.0016)	(0.0015)
Married (No=0)	0.0105***	0.0104***
	(0.0015)	(0.0015)
Education (none=0)		
Basic	-0.0274***	-0.0281***
	(0.0015)	(0.0015)
SHS	-0.0212***	-0.0221***
	(0.0024)	(0.0023)
Poly	-0.0170***	-0.0173***
	(0.0031)	(0.0031)
University	-0.0178***	-0.0172***
	(0.0042)	(0.0042)
Employment (public=0)		
Private	-0.0164***	-0.0170***
	(0.0030)	(0.0030)
Self	-0.0110***	-0.0122***
	(0.0029)	(0.0029)
Unemployed	0.0077**	0.0062**
	(0.0031)	(0.0031)
Household size	0.0011***	0.0011***
	(0.0003)	(0.0003)
Urban	-0.0217***	-0.0218***
	(0.0013)	(0.0013)
Non-digital financial exclusion	0.0058***	
	(0.0014)	
Digital financial exclusion		0.0097***
		(0.0015)
Constant	0.4087***	0.4062***
	(0.0038)	(0.0038)
Observations	12,974	13,086
R-squared	0.0951	0.0966

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
Note: *SHS = Senior High School*
Source: Author calculation (2023)

Table 7 presents the result of the covariates of financial exclusion, as well as the results of the effect of financial exclusion and consumption inequality. Three things are apparent from the results. First, most of the covariates in model one (Table 7, column 2) correlated negatively with consumption inequality and were all significant at one percent level, except for gender and unemployment which showed a significance level of five percent. Also, it appeared that older people are better off, as far as consumption inequality is concerned (-0.0003, Table 7, column 2, row 2). Again, it is better being a female than a male, in terms of consumption inequality (0.0036, Table 7, column 2, row 4). Moreover, people with any level of education appeared to experience low level of consumption inequality compared to their counterparts with no education (Table 7, column 2, rows 8-14).

Surprisingly, consumption inequality appeared to be significantly low among people employed in sectors other than the public sector (private = -0.0164; self-employed = -0.0110). Also, larger family size appears to correlate positively with increasing consumption inequality levels (0.0011). Besides, one would be more comfortable being in an urban centre (-0.0217) than a rural area, as far as consumption inequality is concerned, all being equal. The directions and the significance levels of the effects of all the covariates on consumption inequality persisted in the second model (Table 7, column 3). Further, apart from household size whose effect magnitude (0.0011) remained the same through the two models, the other covariates recorded a mix of increase and decrease in magnitude of effects.

Next, on the main relationship under study, the results showed that financial exclusion, both non-digital (0.0058, Table 7, column 2) and digital (0.0097, Table 7, column 3), positively influence consumption inequality levels. It should also be stated that the effects of both the digital and non-digital financial exclusion were statistically significant at the one percent level. Also, the first adjusted model explained about 9.5 percent of the total variation in consumption inequality whilst the second model explained about 9.7 percent. This means that, to a considerable extent, financial exclusion is a noteworthy determinant of consumption inequality among people of Ghana. Specifically, a unit increase in non-digital financial exclusion would lead to a 0.0058 increase in consumption inequality, all other things being equal. In like manner, a unit increase in digital financial exclusion would lead to a 0.0097 increase in consumption inequality levels. Additionally, Table 8 displays the results on the effect of financial exclusion on consumption inequality, taking into account settlement types – urban and rural.

Table 8: Effect of Financial Exclusion on Consumption Inequality: Rural-Urban

	(1)	(2)	(3)	(4)
Variables	Rural		Urban	
Age	-0.0004***	-0.0004***	-0.0003***	-0.0003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Male	0.0036	0.0042*	0.0036*	0.0037*
	(0.0024)	(0.0023)	(0.0020)	(0.0020)
Married (No=0)	0.0137***	0.0135***	0.0059***	0.0061***
	(0.0023)	(0.0022)	(0.0020)	(0.0020)
Education (None==0)				
Basic	-0.0335***	-0.0339***	-0.0149***	-0.0155***
	(0.0020)	(0.0020)	(0.0022)	(0.0022)
SHS	-0.0219***	-0.0227***	-0.0138***	-0.0145***
	(0.0041)	(0.0040)	(0.0030)	(0.0029)
Poly	-0.0183***	-0.0174***	-0.0081**	-0.0088**
	(0.0055)	(0.0056)	(0.0038)	(0.0037)
University	-0.0206**	-0.0204**	-0.0095*	-0.0088*
	(0.0088)	(0.0087)	(0.0048)	(0.0048)
Employment (public=0)				
Private	-0.0087	-0.0093*	-0.0218***	-0.0224***
	(0.0056)	(0.0056)	(0.0035)	(0.0035)
Self	-0.0027	-0.0040	-0.0151***	-0.0160***
	(0.0051)	(0.0051)	(0.0034)	(0.0034)
Unemployed	0.0254***	0.0241***	-0.0111***	-0.0129***
	(0.0055)	(0.0055)	(0.0038)	(0.0038)
Household size	0.0009***	0.0009***	0.0012***	0.0011***
	(0.0003)	(0.0003)	(0.0004)	(0.0004)
Non-digital financial exclusion	0.0073***		0.0022	
	(0.0019)		(0.0019)	
Digital financial exclusion		0.0135***		0.0059***
		(0.0024)		(0.0018)
Constant	0.4028***	0.3978***	0.3843***	0.3832***
	(0.0059)	(0.0059)	(0.0047)	(0.0047)
Observations	7,424	7,481	5,550	5,605
R-squared	0.0858	0.0869	0.0310	0.0324

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Source: Author's calculation (2023)

From Table 8, it could be seen that apart from the male group and private employment, all the other demographic variables showed significant effects on consumption inequality across all the models. Specifically, the magnitude of the effect of age on consumption inequality remained the same across models one and two (-0.0004). Besides, the effect size of age in models three and four showed consistency (-0.0003). Nevertheless, the significance level of the effect of university fell from 5 percent for models one (Table 8, column 2) and two (Table 8, column 3) to 10 percent for models three (Table 8, column 3) and four (Table 8, column 4). Again, the significance level of the effect of private sector employment improved from 10 percent in model two (Table 8, column 3) to one percent in models three (Table 8, column 4) and four (Table 8, column 5).

With respect to the effect of non-digital financial exclusion on consumption inequality, it was revealed that an increase in the level of non-digital financial exclusion would lead to a significant increase in the level of consumption inequality among people in rural areas (0.0073). Similarly, as digital financial exclusion level increases, the level of consumption inequality among rural dwellers is exacerbated (0.0135). Again, digital financial exclusion showed a positively significant effect on consumption inequality levels among people at urban centres (0.0059). Nonetheless, the relationship between non-digital financial exclusion and consumption inequality among urban dwellers was insignificant (Table 8, column 4).

Another thing that could be observed from the results displayed in Table 8 is that the magnitude of the effect of digital financial exclusion on consumption

inequality among urban dwellers decreased by 0.0076 – from 0.0135 among rural dwellers to 0.0059 among urban dwellers. Comparatively, it can be said that people in rural areas are more likely to suffer consumption inequality than their counterparts in urban centres when they face digital financial exclusion. Again, the effect of financial exclusion on consumption inequality, with regards to the sector of employment of household heads is presented in Table 9.

Table 9: Effect of Financial Exclusion on Consumption Inequality: Sector of Employment of the Household Head

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Public employee		Private employee		Self employed		Unemployed	
Age	-0.0004	-0.0003	-0.0001	-0.0002	-0.0003***	-0.0003***	-0.0005***	-0.0005***
	(0.0003)	(0.0003)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Male	-0.0089	-0.0099	-0.0006	0.0000	0.0060***	0.0066***	0.0056	0.0049
	(0.0064)	(0.0065)	(0.0038)	(0.0038)	(0.0020)	(0.0020)	(0.0037)	(0.0036)
Married (no=0)	0.0064	0.0056	0.0091***	0.0094***	0.0094***	0.0092***	0.0135***	0.0134***
	(0.0059)	(0.0060)	(0.0034)	(0.0034)	(0.0020)	(0.0020)	(0.0039)	(0.0039)
Education (none=0)								
Basic	-0.0100	-0.0111	-0.0178***	-0.0184***	-0.0283***	-0.0281***	-0.0363***	-0.0373***
	(0.0069)	(0.0072)	(0.0039)	(0.0039)	(0.0020)	(0.0019)	(0.0034)	(0.0034)
SHS	-0.0124	-0.0120	-0.0134***	-0.0138***	-0.0216***	-0.0215***	-0.0303***	-0.0326***
	(0.0083)	(0.0082)	(0.0046)	(0.0046)	(0.0034)	(0.0034)	(0.0063)	(0.0062)
Polytechnic	0.0063	0.0056	-0.0197***	-0.0199***	-0.0272***	-0.0258***	-0.0149**	-0.0188***
	(0.0068)	(0.0068)	(0.0067)	(0.0066)	(0.0047)	(0.0048)	(0.0075)	(0.0073)
University	0.0175*	0.0176*	-0.0135*	-0.0129*	-0.0247***	-0.0230***	-0.0379***	-0.0394***
	(0.0101)	(0.0101)	(0.0075)	(0.0074)	(0.0075)	(0.0074)	(0.0084)	(0.0083)
Household size	-0.0002	-0.0003	0.0013*	0.0012	0.0008**	0.0008***	0.0017***	0.0016***
	(0.0012)	(0.0012)	(0.0007)	(0.0007)	(0.0003)	(0.0003)	(0.0006)	(0.0006)
Urban	-0.0084	-0.0083	-0.0186***	-0.0183***	-0.0166***	-0.0160***	-0.0382***	-0.0396***
	(0.0054)	(0.0056)	(0.0032)	(0.0032)	(0.0017)	(0.0017)	(0.0032)	(0.0031)
Non-digital financial exclusion	0.0504**		0.0029		0.0032*		0.0102***	
	(0.0235)		(0.0032)		(0.0017)		(0.0031)	
Digital financial exclusion		0.0095*		0.0076***		0.0104***		0.0070*
		(0.0054)		(0.0028)		(0.0020)		(0.0041)
Constant	0.4047***	0.4021***	0.3803***	0.3775***	0.3951***	0.3889***	0.4317***	0.4328***
	(0.0121)	(0.0121)	(0.0068)	(0.0068)	(0.0042)	(0.0042)	(0.0069)	(0.0073)
Observations	912	916	2,180	2,199	7,238	7,281	2,644	2,690
R-squared	0.0299	0.0242	0.0405	0.0436	0.0739	0.0768	0.1696	0.1675

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1Note: *SHS = Senior High School*
Source: Author's calculation (2023)

From the results displayed in Table 9, it could be observed that it is only in models 5 and 6 that all the effects of demographic characteristics were significant. Also, most of these characteristics were negatively related to consumption inequality. This implies that those whose household heads are self-employed are more likely to experience low level of consumption inequality, as the level of these characteristics increase. Additionally, both digital financial exclusion (0.0504) and non-digital financial exclusion (0.0095) have significant correlations with consumption inequality among people whose household heads are employed in the public sector. Similarly, among people whose household heads are self-employed, consumption inequality appears to increase as both digital (0.0104) and non-digital (0.0032) financial exclusion levels increase.

Again, as non-digital financial exclusion increases, consumption inequality among people whose household heads are unemployed increases (0.0102). In like manner, as digital financial exclusion (0.0070) increases among people whose household heads are unemployed, consumption inequality sees increase in level, all being equal. Further, no significant effect of non-digital financial exclusion was recorded on consumption inequality among households whose heads were employed in the private sector. Digital financial exclusion, on the other hand, appeared to associate positively with consumption inequality among households whose heads were private sector workers.

Specifically, non-digital financially excluded households whose heads are public sector workers seemed to have experienced the highest consumption inequality rate (0.0504), compared to households whose heads are self-employed

(0.0032) and unemployed (0.0102). With respect to digital financial exclusion, digitally excluded households whose heads are self-employed appeared to experience the highest rate of consumption inequality (0.0104), relative to those whose heads are unemployed (0.0070), privately employed (0.0076) and publicly employed (0.0095).

Discussion

Overall, the findings do not seem out of the ordinary as the prior statistics had already shown a potential strong connection between financial inclusion inequality and consumption inequality (Figure 4) – the districts shown to have high financial inclusion inequality appeared to have high consumption inequality. This, to some extent, suggests that districts that are financially excluded are likely to experience high consumption inequality. Particularly, three key outcomes worth discussing. The first has to do with the general effect of financial exclusion on consumption inequality. The second is about the effect of financial exclusion on consumption inequality, with respect to settlement type. The third has to do with the effect of financial exclusion on consumption inequality, taking into account sector of employment of household head.

Considering the reported relationship between financial exclusion and consumption inequality, it suffices to say that societies with majority of their residents being financially excluded are likely to experience high consumption inequality. Thus, getting involved in both non-digital and digital financial transactions and activities might help improve the financial statuses of these individuals by making them have enough to spend on food, clothing, house,

maintenance, medical care, education and entertainment; thereby reducing the level of consumption inequality.

Further, individuals who are financially excluded are more likely to suffer poverty, compared to those who are financially included (Adewale, 2014). This, among other things, is because financially excluded individuals may find it difficult to take advantage of loan facilities (Ofeh & Thalut, 2018). Consequently, they may not be able to afford basic goods and services as would those who are financially included; hence, culminating a widened consumption gap. This corroborates the findings of Bartiaux (2021) and Li et al. (2020). Bartiaux argues that financial exclusion has a link with the level of consumption in a society, and that individuals of medium and upper social classes seem to have access to more finance than those in lower social classes. In other words, it could be said that as financial exclusion rate increases, consumption inequality might increase as well, further exacerbating inaccessibility to many forms of financial products.

In like manner, Li et al. (2020) aver that there is a relationship between digital inclusive finance and household consumption. This implies that, to a considerable extent, financial exclusion might influence in consumption inequality. Again, Corrado and Corrado (2017) intimate that unequal consumption could lead attributed to financial exclusion. Similarly, Park and Mercado (2015) document that financial inclusion influences per capita income, which was stated to have related to consumption. Moreover, Luo and Li (2022), and Pal and Pal (2014) opine that inequality in financial inclusion is associated with income inequality – which is defined to include consumption inequality.

Next, taking into account the effect of financial exclusion on consumption inequality, with respect to settlement type, it was found that consumption inequality was higher among people in the rural areas who are financially excluded than those in the urban centres. This was possibly due to the fact that rural areas were not really monetised, as those in the rural areas lack access to financial institutions, financial products and services; hence, making it difficult for the rural dwellers to receive and make payment via digital platforms, and to receive credit that they may really need to help them take care of their household budgets (Carbo et al., 2007).

Consequently, these rural area dwellers resort to individual money-lenders, payday loans and pawnshops that charge very high rates which only exacerbate the level of poverty; thus, increasing the level of consumption inequality among the rural dwellers (Gunarsih et al., 2018). In line with this finding, Li and Song (2021) posit that rural dwellers are less likely to have accounts, savings, withdrawals and access to credit, hence widening the consumption inequality gap between rural and urban dwellers. Again, the finding corroborates Joassart-Marcelli and Stephens (2010) who documented that accessibility to financial institutions, specifically bank branches and ATMs, is relatively higher in urban centres than rural areas; thereby, causing higher consumption inequality in among rural dwellers than urban dwellers. Similarly, Ofeh and Thalut (2018) reported that an increase in the level of financial exclusion would result, among other things, in inequality in society.

In addition, in respect of the effect of financial exclusion on consumption inequality, taking into account sector of employment of household head, the findings revealed that households whose heads are public sector workers and those whose heads are unemployed are more likely to experience consumption inequality in the presence of both non-digital and digital financial exclusion. On the other hand, increase in financial exclusion among households whose heads are either self-employed or privately employed only leads to a considerable increase in consumption inequality. This finding is not out of the ordinary as self-employed and privately employed individuals appear to have full control over their financial choices; thus, they are more likely to get financially included, leading to a modest consumption inequality.

Thus far, there is paucity of extant literature on the effect of financial exclusion on consumption inequality, specifically including participants based on the sector of employment of their household heads. Nonetheless, as stated earlier, increased financial exclusion, in any form, may increase consumption inequality among any group of respondents (Joassart-Marcelli & Stephens, 2010). It could be seen from the discussion so far that from all indications, financial exclusion significantly affects consumption inequality, and as financial exclusion rates increase, consumption inequality rates are expected to increase.

Summary of Hypothesis Tested, Results, Decision, and Conclusion

This section presents a summary of the hypotheses tested, the outcomes, decisions, as well as the conclusions drawn. The second research hypotheses are "*There is a statistically significant positive effect of digital financial exclusion on*

consumption inequality" and "*There is a statistically significant positive effect of non-digital financial exclusion on consumption inequality*". The study failed to reject these hypotheses, concluding that digital and non-digital financial exclusion significantly and positively affect consumption inequality. The summary of the test is shown in Table 10.

Table 10: Summary of Hypotheses Tested, Results and Conclusions

Hypotheses statement	Results *Regression coefficient*	Decision	Conclusions
H_{2a}: There is a statistically significant positive effect of digital financial exclusion on consumption inequality.	*$\beta = 0.0058$* $P < 0.05$	H_{2a} Failed to reject	Statistically significant positive effect of digital financial exclusion on consumption inequality.
H_{2b}: There is a statistically significant positive effect of non-digital financial exclusion on consumption inequality	*$\beta = 0.0097$* *$P < 0.05$*	H_{2a} Failed to reject	Statistically significant positive effect of non-digital financial exclusion on consumption inequality.

Source: Author's calculation (2023)

Chapter Summary

This chapter discussed results on the effect of financial exclusion on consumption inequality. The analyses, among other things, revealed that both consumption inequality and financial inclusion inequality were high in districts

found in the northern part of Ghana, with districts found in the southern sector of Ghana experiencing lower levels of consumption inequality and financial inclusion inequality. Moreover, as financial exclusion increases, consumption inequality increases. The findings suggested that the higher the rate of financial exclusion, the higher the level of consumption inequality among people.

CHAPTER SIX

DIGITAL FINANCIAL EXCLUSION AND MULTIDIMENSIONAL POVERTY

Introduction

This chapter examines the effect of financial exclusion on multidimensional poverty. The chapter employed two definitions of exclusion; the non-digital financial exclusion which comprises exclusion in account ownership, credit and insurance, and digital financial exclusion which consists of access to electronic-zwich account, electronic-banking, use of e-zwich and mobile money. The chapter was presented in four main sections. The first section presented summary statistics of financial exclusion as well as the aggregate index of non-financial exclusion and digital financial exclusion. The second section displayed inferential statistics examining the effect of financial exclusion on multidimensional poverty. The third section presented discussion of the results. The fourth section displays the summary of hypothesis tests and conclusions.

Summary Statistics

This section displays the summary statistics of financial exclusion (account credit and insurance) as well the aggregate index of non-digital financial exclusion and digital financial exclusion. The summary statistics for e-zwich account ownership and use, and electronic banking are not presented as the variations across the districts are almost the same, portraying high level of exclusion from the usage of these digital platforms. The summary statistics were carried out using mean, standard deviation (Std. dev.), minimum (Min.) and

maximum (Max.) scores, as well as scatterplots and histograms. The results based on district level are displayed in Table 11 (and Appendix A).

Table 11: Summary Statistics at the District Level

Variables	Mean	Std. dev.	Min	Max
Account	0.694	0.140	0.250	1
Credit	0.964	0.032	0.855	1
Insurance	0.764	0.214	0.143	1
Mobile money account	0.898	0.118	0.250	1
ATM	0.931	0.082	0.574	1
E zwich	0.994	0.016	0.867	1
E banking	0.994	0.019	0.846	1
E-Zwich account	0.995	0.017	0.783	1
NDFE	0.548	0.191	0.000	1
DFE	0.838	0.128	0.250	1
MPI	0.341	0.107	0.124	0.747

Observation = 214

Source: Author's calculation (2023)

Note: *NDFE equals non-digital financial exclusion. DFE equals digital financial exclusion. MPI equals multidimensional poverty index.*

From Table 11, there are four noticeable points. First, financial exclusion is high across the districts. Specifically, about 69.4 percentage points (pp) of the respondents at the district level are without bank account with the maximum level of exclusion occurring in Tatale Sangule districts (100 pp) and the minimum of 25

pp in Krachi West and 30 pp Tema metropolitan. Further, 96.4 pp of the respondents at the districts level have never got access to credit, with minimum 85.5 pp occurring in Bia West which is extremely high. Furthermore, about 76.4 pp of the respondents at the district level have no insurance coverage, with minimum of 14.3 pp, 17.6 pp, 18.8 pp and 19 pp occurring in Kumbugu, Dormaa Est, Krachi West and Ada East, respectively.

Again, it is interesting to note that with the widespread usage of mobile money services in Ghana, about 89.8 pp of the respondents at the district level are without mobile money account with a minimum of 25 pp occurring in Krachi West. Overall, non-digital financial exclusion (composite index of account, credit, insurance) represents 54.8 pp at the district level with the highest 100 pp occurring in Tatale Sangule and the minimum occurring in Karchi West. Digital financial exclusion represents 83.8 pp at the district level with a minimum of 25 pp in Karchi West district. These statistics portray a salient point that financial exclusion is high across the districts.

Second, the variations in the level of financial exclusion differ significantly across the districts. For instance, the percentage of individuals without bank account is as high as 100 pp in Tatale Sangule, 98.8 pp in Saboba, 96.8 pp in Zabzugu, Wa East and 96.6 pp in Wa East to as moderate as 25 pp in Krachi West, 30 pp in Tema Metropolitan, 34.1 pp in Awutu Senya and 36.4 pp in South Municipal with similar pattern across the districts for credit access, insurance access as well as the uses of the digital platforms. Third, although the level of financial exclusion is high at the district level with about 83.8 pp when

compared to non-digital financial exclusion 54.8 pp, the level of digital exclusion is much higher.

Fourth, financial exclusion seems to have a positive relationship with multidimensional poverty index (MPI). Specifically, the highest non-digital financial exclusion occurred in the Tatale Sangule (100 pp), Saboba (98.8 pp) and Zazugu (96.8 pp). The corresponding multidimensional poverty for these three districts is 61.1 pp, 63.7 pp and 72.5 respectively. On the flip side, the lower level of non-digital financial exclusion, Krachi West (0.00), Ada East (14.3 pp) and Sunhum Municipal (15.9 pp) respectively had a corresponding multidimensional poverty figure at 32.7 pp, 37.2 pp and 22.9 pp. This relationship is confirmed by the scatter plot of financial products and multidimensional poverty in Figures 5-7. An important question is whether this relationship between FE and MPI will hold after controlling for other important correlates of financial exclusion.

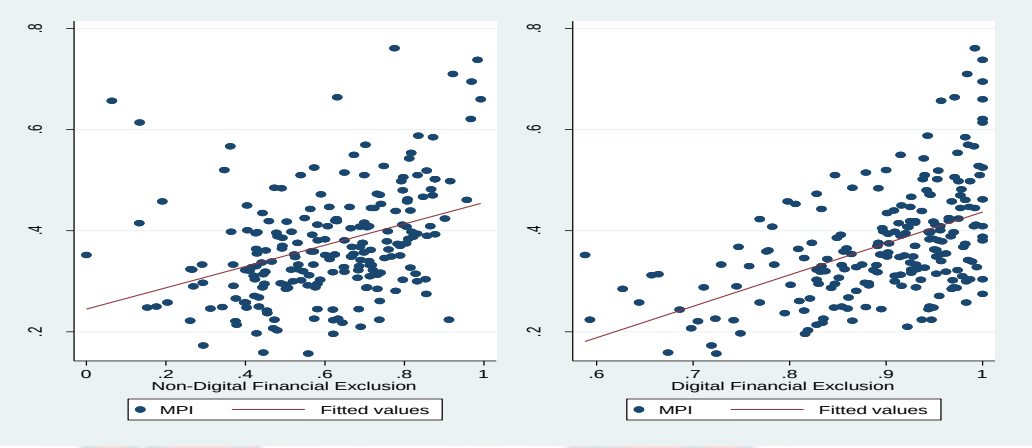

Figure 5: A scatter plot of NDFE and DFE on Multidimensional poverty

Source: Author's construction (2022)

Figure 6 also showed how account exclusion, credit exclusion, insurance exclusion and Ezwich account exclusion correlate with multidimensional poverty.

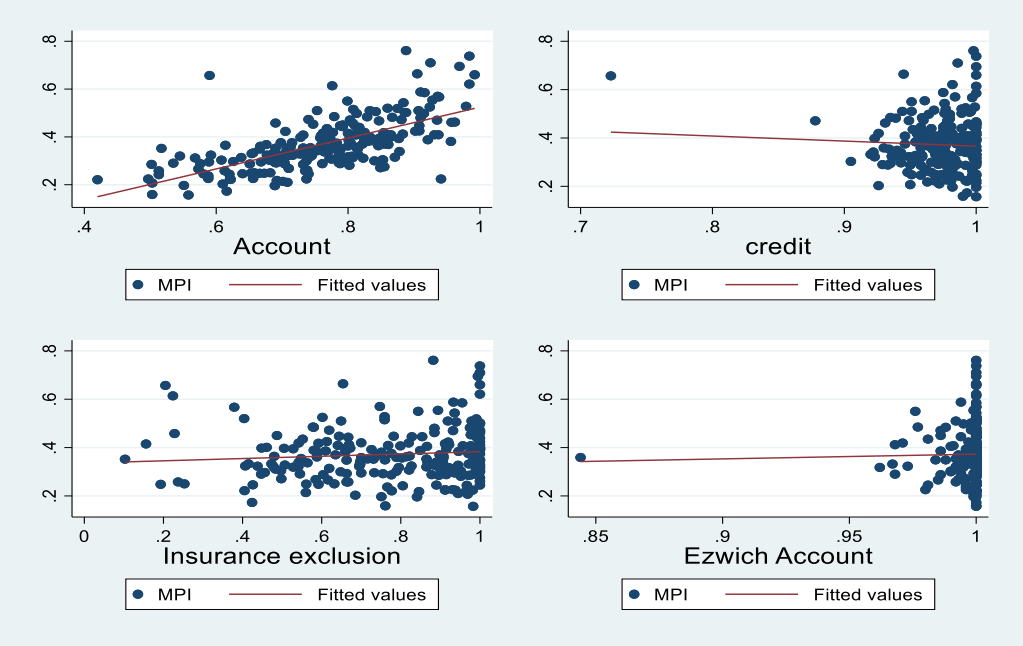

Figure 6: Account, credit, insurance and Ezwich account exclusion on Multidimensional poverty

Source: Author's construction (2023)

Figure 7, on the other hand, displayed a scatter plot showing how ATM, e-zwich use, e-banking and mobile money relate with multidimensional poverty.

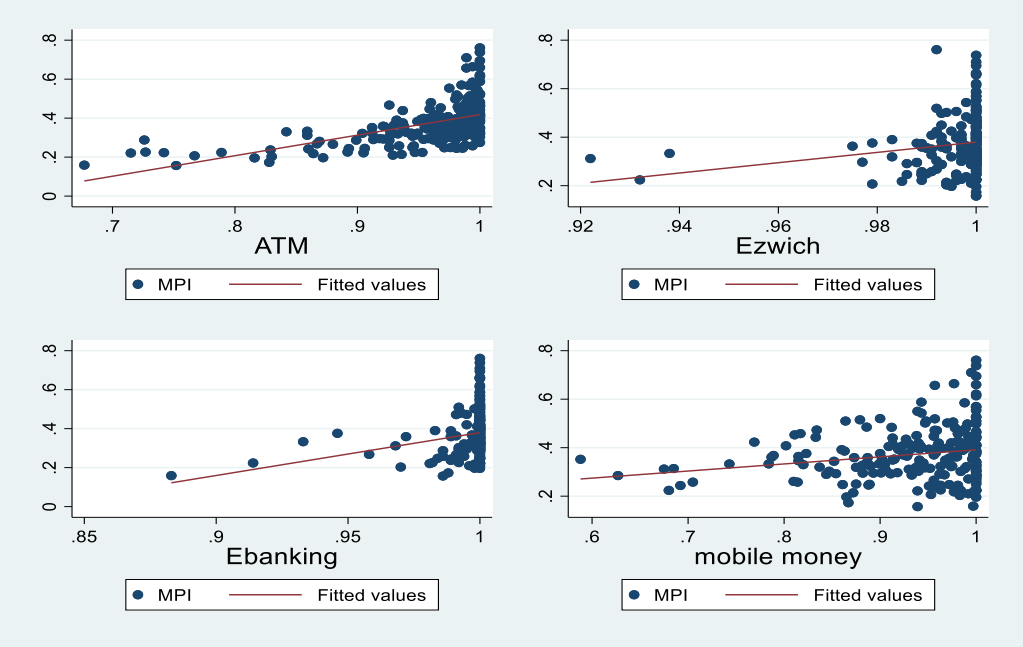

Figure 7: A scatter plot of ATM, Ezwich use, E-banking and Mobile money on Multidimensional Poverty

Source: Author's construction (2023)

Again, Table 12 gives a summary of the financial product at the regional level. It can be seen from the results that Northern region has the highest level of account exclusion, about 84.3 pp. This is followed by Upper West (81.7 pp) and Upper East (71.5 pp) respectively. Greater Accra has the lowest level, about 49.7 pp. With respect to credit exclusion, all the regions demonstrated the availability of credit constraints. The variation in insurance exclusion is not so different from the pattern observed from the other financial products, with the highest occurring in Western region. Mobile money usage is still a problem across the regions. For non-digital financial exclusion, the lowest occurs in Greater Accra with the

highest in Upper West. Digital financial exclusion is much worse with the highest in Western and Upper West regions.

Table 12: Summary Statistics of Selected Financial Product by Region

Region	Account	Credit	Insurance	Mobile money	NDFE	DFE
Western	0.698	0.948	0.863	0.957	0.602	0.923
Central	0.617	0.932	0.764	0.791	0.482	0.736
Greater Accra	0.497	0.978	0.788	0.895	0.41 2	0.683
Volta	0.682	0.961	0.685	0.799	0.480	0.765
Eastern	0.671	0.965	0.666	0.912	0.476	0.839
Ashanti	0.688	0.981	0.798	0.908	0.581	0.842
Brong Ahafo	0.699	0.965	0.755	0.944	0.545	0.903
Northern	0.843	0.973	0.849	0.955	0.733	0.912
Upper East	0.715	0.962	0.721	0.842	0.520	0.817
Upper West	0.817	0.972	0.730	0.965	0.612	0.923
Total	0.694	0.964	0.764	0.898	0.548	0.838

Note: *NDFE equals non-digital financial exclusion. DFE equals digital financial exclusion*

Source: Authors calculation (2023)

Additionally, it becomes evident from the results that respondents are financially excluded based on reasons. Specifically, with regards to reasons for not having bank account, more than twice the percentage of respondents who attribute their exclusion to lack of regular income (16.8 pp) ascribe their exclusion to unspecified reasons (38.07 pp). It is also revealed that 29 pp do not have bank

account because they do not enough money or income. Interestingly, 13.44 pp either find having bank account unnecessary or just not interested in having one, and 1.87 pp claim that they are not aware of one. Moreover, few others do not have bank account because they find the process of obtaining an account cumbersome (0.44 pp), and that the financial institutions are located far away (0.39 pp).

Moreover, generally, in respect of education levels of respondents, more respondents with JSS/MSLC education seem to have many reasons for not having bank account than those with primary, secondary, higher and no education. Specifically, 57.0 pp of respondents who claim they do not have bank accounts because financial institutions are far away falls within the JSS/MSLC education category, whilst 29.2 pp, 10.3 pp, 3.2 pp and 0.4 pp are in the primary, secondary, no education and higher education, correspondingly. Similarly, majority of the respondents who claim they do not have bank accounts because the process is cumbersome are those in the JSS/MSLC education category (52.4 pp), with the least number being those with no education (0.8 pp). The results are displayed in Figures 8 and 9.

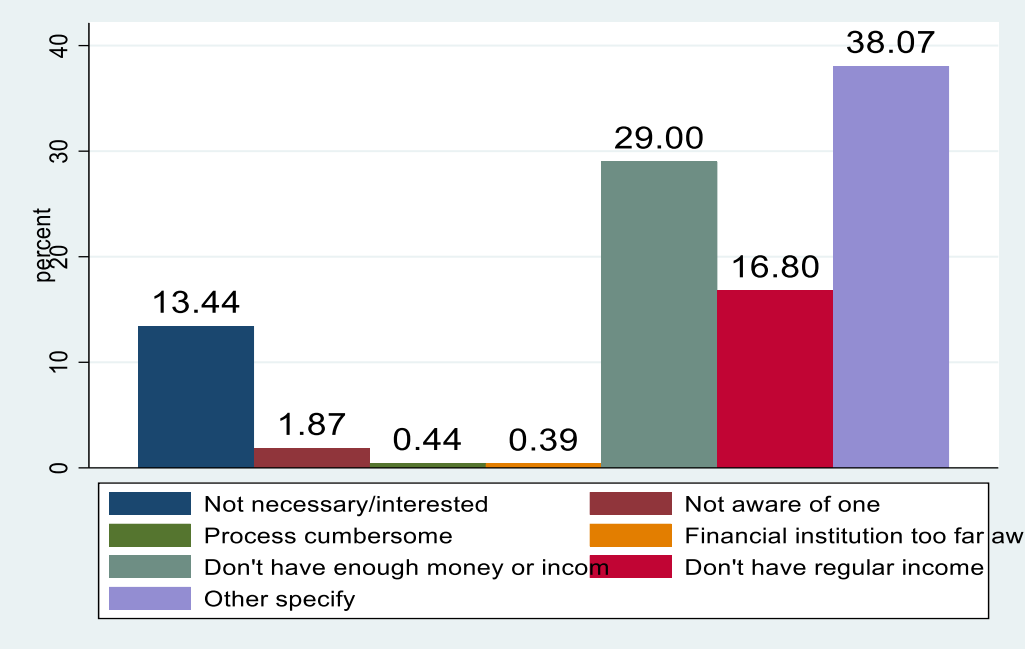

Figure 8: Reasons for not having bank account

Source: Author's construct (2023)

The succeeding figure showed proportions of the respondents against various reasons for not having account, taking into account their level of education.

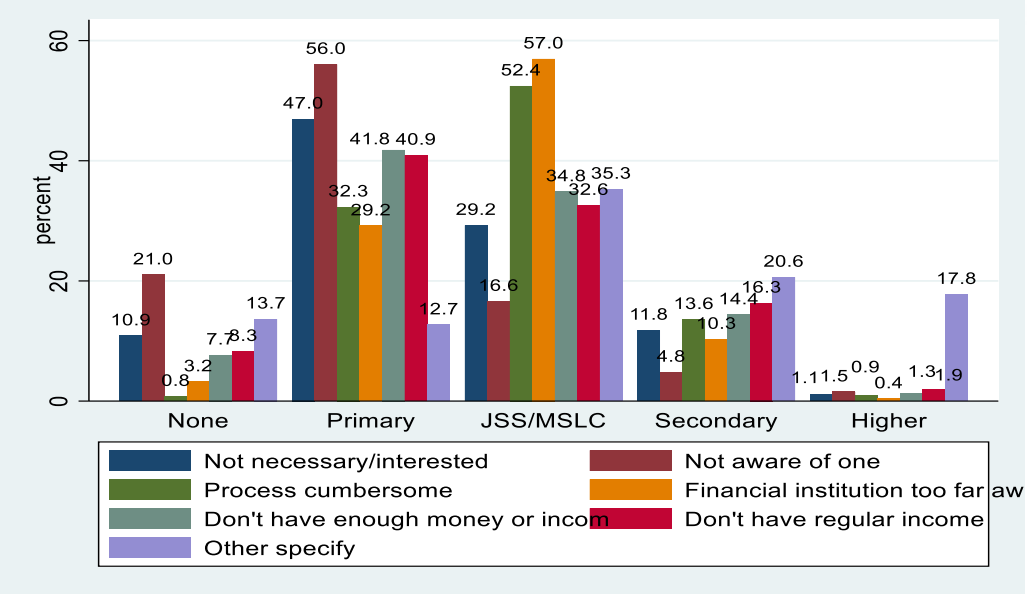

Figure 9: Reasons for not having account by level of education

Source: Author's construct (2023)

Again, the respondents gave a number of reasons for not trying to obtain loan. From the results displayed in Figure 6, most of the respondents intimate that there is no need obtaining loan (66.49 pp). Further, as others claim that they are not trying to obtain loan because they cannot obtain the amount needed (2.70 pp), some are not trying due to demand for collateral (2.35 pp). About 2.7 pp, which is about 14.49 times the percentage of respondents who are not trying to obtain loan due to the fact that they already have too much debt, are of the view that interest rates are too high. Besides, 16.7 pp do not state any specific reasons for not trying to obtain loan.

Further, by level of education, it appears that majority of those who subscribe to reasons of too high interest rate (45.5 pp), demand for collateral (45.9 pp), having too much debt already (44.2 pp) and inability to obtain the needed amount (39.7 pp) are respondents with JSS/MSLC education, with the least number of respondents across almost all the reasons advanced being those with no education. The results can be seen in Figures 9 and 10.

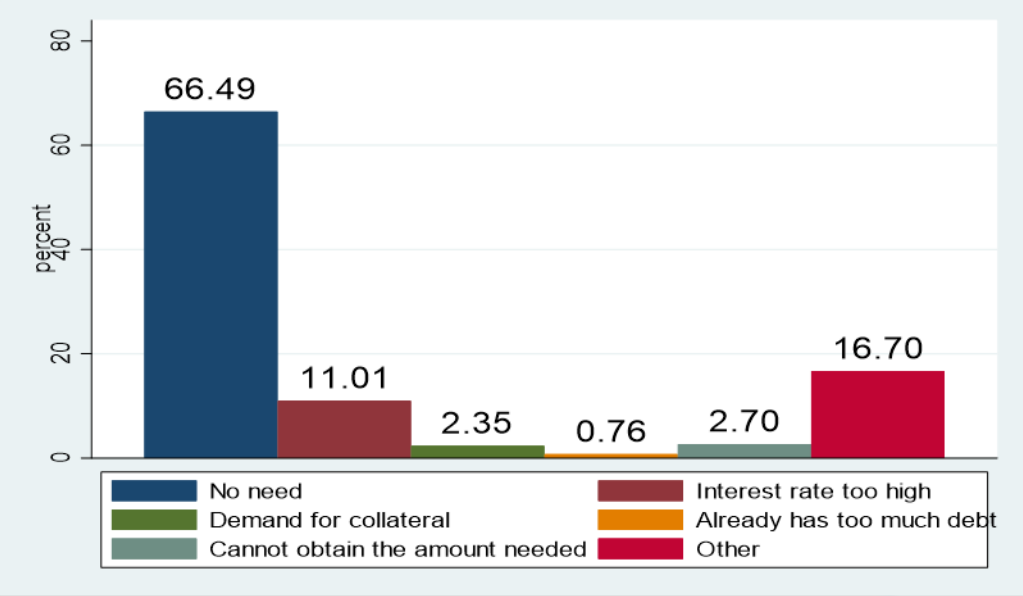

Figure 10: Reasons for not trying to obtain loan

Source: Author's construct (2023)

Figure 11 presented percentages of respondents against the reasons for not trying to obtain loan, taking cognisance of their educational level.

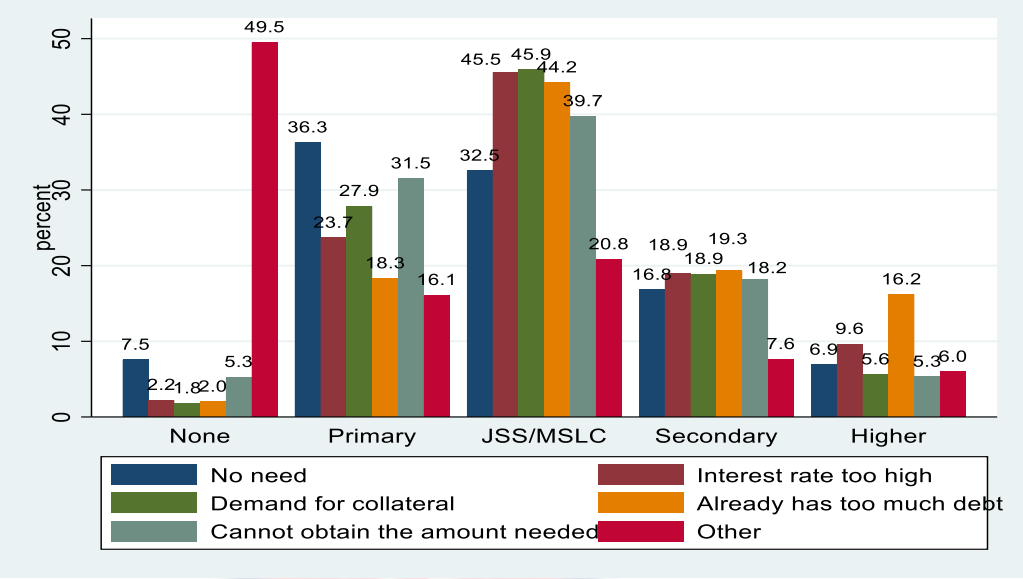

Figure 11: Reasons for not trying to obtain loan by level of education

Source: Author's construct (2023)

Furthermore, the results reveal that financial institutions refuse respondents loans due to the fact that some could not provide collateral (24.37 pp), or get guarantors (13.89 pp). Also, 3.27 pp, 26.50 pp, 8.05 pp, and 7.49 pp are refused loan due to previous debt problems, low income or salary, amount applied for is too high, and inappropriate purpose of loan, respectively. About 16 pp of the respondents did not state any specific reasons for which they are refused loan. Besides, by level of education, all the respondents who are refused loans due to the fact that the amount applied for is too high (100 pp) or because of previous debt problems happen to be those with JSS/MSLC education. In like manner, all the respondents refused loans due to inappropriate purpose of loan belong to the primary education category (100 pp). On the other hand, respondents with higher education seems to have been refused loans mainly due to inability to provide collateral (17.5 pp), though their percentage is still below that of JSS/MSLC (41.0 pp) and primary education (25.3 pp). The results are presented in Figures 12 and 13.

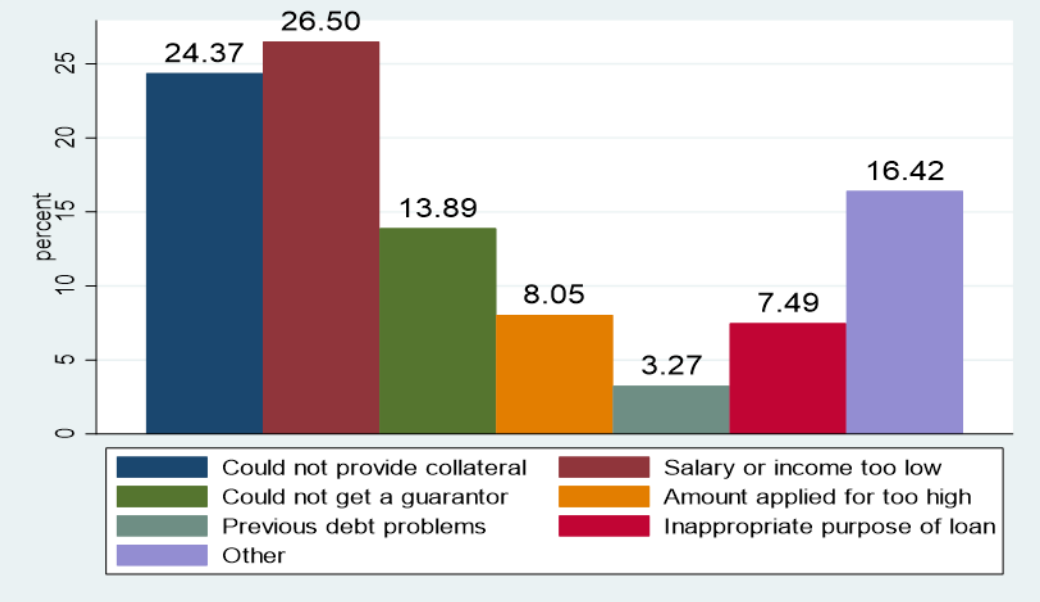

Figure 12: Reasons why loan was refused

Source: Author's construct (2023)

Figure 13 displayed percentages of respondents against the reasons why they were refused loans, taking into consideration their level of education.

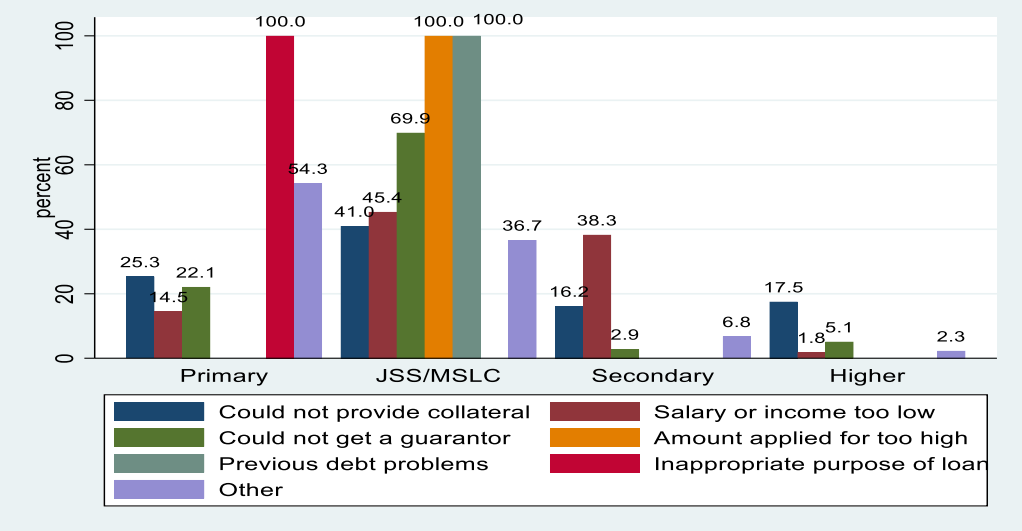

Figure 13: Reasons why loan was refused

Source: Author's construct (2023)

In addition, in respect of why respondents are excluded from financial product of insurance, various reasons are given. As some of the respondents find insurance unnecessary (16.06 pp), others claim insurance companies are deceptive (1.39 pp). About 16.30 pp just do not know what insurance is, and 31.05 pp claim they cannot afford it. Also, the respondents who state they are not having insurance because compensation is inadequate are 31.89 pp less than those who reported no specific reasons for not having insurance (33.22 pp).

In terms of levels of education, overall, more respondents in the JSS/MSLC education category appear to have many reasons for not having insurance, followed by those with primary education, then those in the secondary education category, and those with higher education came next, with those with no education having relatively fewer number of respondents across the various reasons for not having insurance. For instance, 39.4 pp of respondents with JSS/MSLC education do not see having insurance necessary, compared with 20.5 pp, 19.8 pp, 9.5 pp and 4.9 pp for primary, secondary, higher and no education respondents, respectively. Nonetheless, in terms of knowledge about insurance, more (47.8 pp) respondents with primary education appear not to know what insurance is, relative to 32.9 pp, 10.1 pp, 8.8 pp, and 0.6 pp for JSS/MSLC, no education, secondary and higher education, respectively. These results are summarised in Figures 14 and 15.

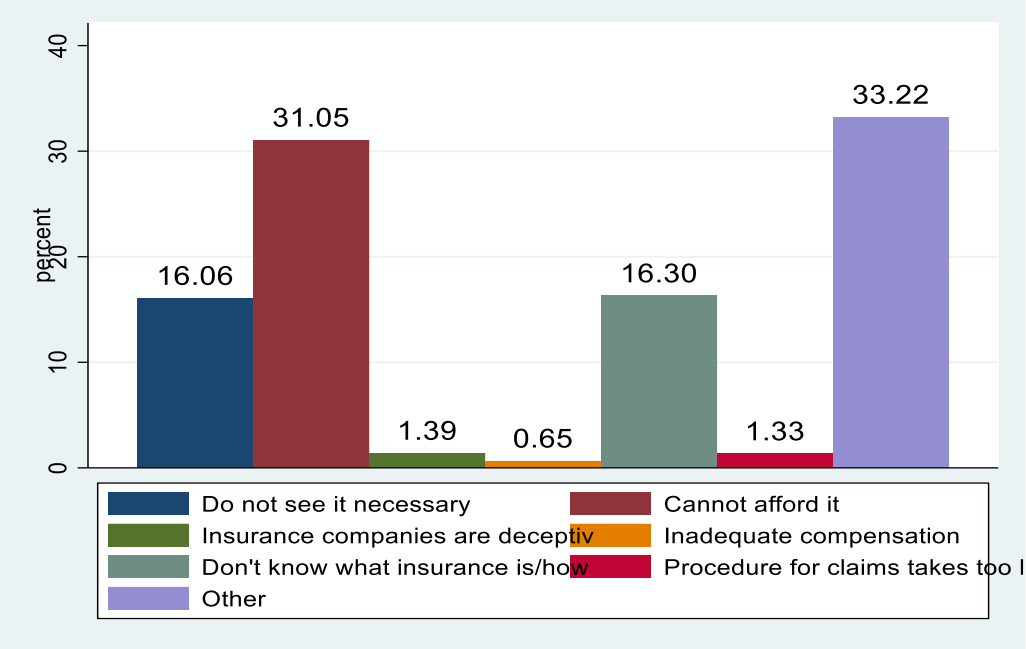

Figure 14: Reasons for not having insurance

Source: Author's construct (2023)

Figure 15 showed percentages of respondents by level of education against the reasons for not having insurance.

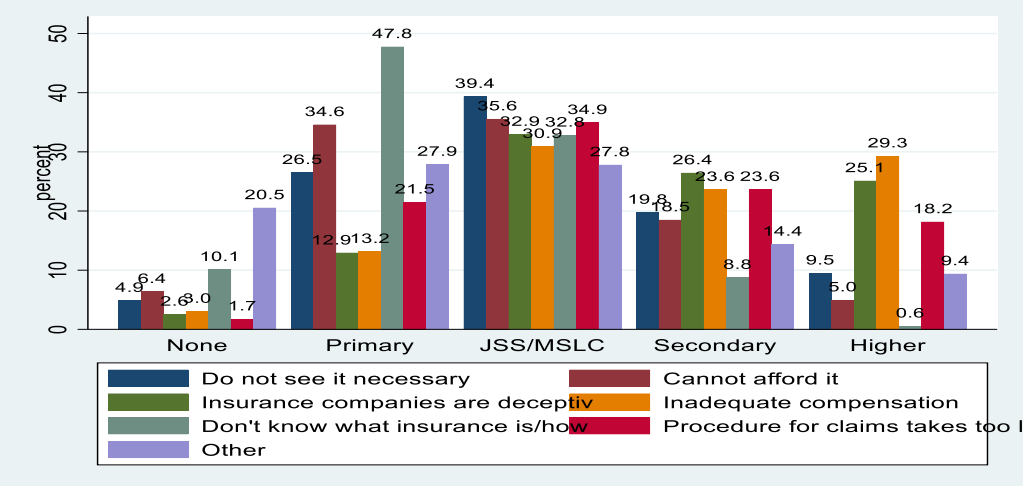

Figure 15: Reasons for not having insurance by level of education

Source: Author's construct (2023)

Next, the summary statistics of the outcome and control variables used in the regression analysis is presented in Table 13. Besides, summary of indicators – captioned under education, health and living standards – used in measuring multidimensional poverty index is displayed in Appendix B. From the Table 3, the descriptive shows that about 32.3 pp of the respondents is multidimensionally poor at the individual level. Again, non-digital financial exclusion is observed in two out of every three financial products. That of the digital financial product is even worse.

Moreover, many individuals are excluded from the digital financial platforms and this is observed in four out of five digital financial products. On average, the age of the respondents is about 30 years with a median age of 25 years. Females represent about 48.4 percent in the sample whereas respondents who are married represent about 30 pp. Household size is about six (6) members on average while urban dwellers represent 44.1 percent. Further, respondents with primary education are about 3.2 times that of respondent with higher education. While that of JSS/MSLC and secondary is about 5.0 times and 2.3 times that of respondents with higher education respectively. Furthermore, private sector employment represents about 15.3 pp while self-employed is about 58.8 pp. The respondent who reported unemployed in the sample is about 17.9 pp. Further, microfinance had an average of 7.76 while savings loans represented 18.8 per the sample.

Table 13: Summary Statistics of Dependent and Control Variables

Variable	Mean	Std. dev.	Min	Max
MPI	0.323	0.193	0	1
NDFE	0.523	0.499	0	1
DFE	0.817	0.387	0	1
Age	29.759	15.980	12	99
Female	0.484	0.50	0	1
Household size	5.546	3.331	1	28
Married	0.302	0.459	0	1
Urban	0.441	0.497	0	1
Education				
Primary	0.275	0.446	0	1
JSS/MSLC	0.432	0.495	0	1
Secondary	0.202	0.402	0	1
Higher	0.086	0.280	0	1
Employment				
Private E.	0.153	0.360	0	1
Self employed	0.588	0.492	0	1
Unemployed	0.179	0.384	0	1
Microfinance	7.769	15.063	0	63
Savings and loans	18.793	38.079	0	204

Source: Author's calculation (2023)

Financial Exclusion and Multidimensional Poverty

Table 14 presents the result of the covariates (first stage) of non-digital financial exclusion and digital financial exclusion in addition to OLS and two-stage results of the effect of NDFE and FE on multidimensional poverty. Two things can be pinned out of the results. First, factors that affect NDFE also affect DFE with almost the same size but different magnitudes. All else equal, age of the

individual is negatively correlated with NDFE (0.055) but positively correlated as age increases with a turning point of about 55 years and this is significant at one percent (Table 14, column 1 & 4).

That is, DFE is negatively correlated with a coefficient of about (0.0943) with a turning point of about 47 years. Being a female is positively correlated with both NDFE (0.015) and DFE (0.127), with significance of one percent for DFE. Large family size is positively correlated with financial exclusion with DFE being about 1.9 times that of NDFE. Married individual is negatively correlated with financial exclusion, with NDFE being about 3 times that of DFE and these correlates are statistically significant at one percent level. Further, all level of education is negatively correlated with financial exclusion when compared to individuals that have no education. Similarly, individuals that are employed in other sectors than the public sector have positive association with both NDFE and DFE.

Next, Table 14 shows the effect of financial exclusion on multidimensional poverty. Specifically, columns 2 and 3 show that of NDFE, and columns 5 and 6 show that of DFE. Two things are directly observable. First, financial exclusion (both NDFE & DFE) increases multidimensional poverty. That is, NDFE(DFE) increases MPI by 0.118 (0.175) at one percent significance level. Second, there is a difference in the magnitude between the OLS estimates and the two-stage estimates. While the effect of NDFE on MPI by the OLS is estimated to be 0.031, the two-stage estimates the coefficient by 0.118 and thus is the preferred model. Again, while the effect of DFE by the OLS estimates the

coefficient to be 0.018, the two-stage estimates the coefficients by 0.175 and thus the two-stage is the preferred model here also. Thus, this chapter has not only provided the evidence of the relationship between FE and MPI but has also demonstrated that, after controlling for all important covariates of MPI, the two-stage estimator reduces the downward bias of the OLS estimates by 0.087 and 0.157 for NDFE and DFE, respectively.

Further, age affects MPI positively by 0.004 (0.004) for NDFE(DFE) but then deceases MPI at an additional year of age with a turning point around about 20 years for both NDFE and DFE. Being a female decreases MPI by 0.016 and 0.222 respectively for NDFE and DFE at one percent significance level. Large household size increases MPI by 0.17 and 0.16 respectively for NDFE and DFE. Education level significantly decreases MPI when compared with individuals without education and in fact public sector workers are better-off than workers in other sectors of the economy all else equal.

Table 14: Effect of Financial exclusion on Multidimensional Poverty

	(1)	(2)	(3)	(4)	(5)	(6)
	NDFE		MPI	DFE		MPI
VARIABLES	First stage	OLS	Two-Stage	First stage	OLS	Two-stage
Age	-0.0548***	0.0021***	0.0039***	-0.0943***	0.0018***	0.0043***
	(0.0025)	(0.0003)	(0.0004)	(0.0033)	(0.0003)	(0.0003)
Age square	0.0005***	-0.0000***	-0.0001***	0.0010***	-0.0000***	-0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Female	0.0153	-0.0163***	-0.0167***	0.1268***	-0.0168***	-0.0222***
	(0.0161)	(0.0018)	(0.0018)	(0.0192)	(0.0018)	(0.0019)
Household	0.0154***	0.0170***	0.0166***	0.0296***	0.0171***	0.0163***
	(0.0026)	(0.0003)	(0.0003)	(0.0034)	(0.0003)	(0.0003)
Married (others=0)	-0.2350***	0.0031	0.0099***	-0.0718***	0.0012	0.0053**
	(0.0218)	(0.0023)	(0.0027)	(0.0235)	(0.0023)	(0.0026)
Urban (rural=0)	-0.2104***	-0.0873***	-0.0795***	-0.0873***	-0.0893***	-0.0822***
	(0.0185)	(0.0019)	(0.0023)	(0.0215)	(0.0019)	(0.0021)
Education (None=0)						
Primary	-0.1648	-0.0147	-0.0104	0.0312	-0.0165	-0.0181
	(0.1132)	(0.0149)	(0.0127)	(0.1507)	(0.0148)	(0.0132)
JSS/MSLC	-0.3419***	-0.1018***	-0.0920***	-0.2455	-0.1049***	-0.1018***
	(0.1128)	(0.0148)	(0.0128)	(0.1497)	(0.0147)	(0.0131)
Secondary	-0.5823***	-0.1635***	-0.1461***	-0.6194***	-0.1677***	-0.1511***
	(0.1138)	(0.0149)	(0.0130)	(0.1505)	(0.0148)	(0.0133)
Higher	-1.3916***	-0.1877***	-0.1506***	-1.3413***	-0.1936***	-0.1313***

Table 14: Continued

	(0.1178)	(0.0150)	(0.0141)	(0.1519)	(0.0149)	(0.0137)
Employed (public=0)						
Private	0.1961***	0.0663***	0.0630***	0.0215	0.0671***	0.0642***
	(0.0384)	(0.0036)	(0.0041)	(0.0391)	(0.0036)	(0.0042)
Self	0.2495***	0.0796***	0.0744***	0.1832***	0.0801***	0.0686***
	(0.0345)	(0.0033)	(0.0037)	(0.0358)	(0.0033)	(0.0038)
Unemployed	0.3696***	0.0742***	0.0654***	0.1110***	0.0761***	0.0656***
	(0.0377)	(0.0036)	(0.0042)	(0.0399)	(0.0036)	(0.0042)
MFI	0.0036***			0.0093***		
	(0.0010)			(0.0009)		
Savings and loans	-0.0027***			-0.0059***		
	(0.0004)			(0.0004)		
Non-digital financial exclusion		0.0308***	0.1180***			
		(0.0020)	(0.0121)			
Digital financial exclusion					0.018***	0.1746***
					(0.002)	(0.0062)
Constant	1.3671***	0.2911***	0.2022***	2.6989***	0.3035***	0.1390***
	(0.1273)	(0.0161)	(0.0189)	(0.1684)	(0.0161)	(0.0161)
Athrho	-0.3631***			-0.6537***		
	(0.0506)			(0.0271)		
Lnsigma	-1.8826***			-1.8500***		
	(0.0103)			(0.0064)		
Observations	28,042	28,042	28,042	28,042		28,042
		0.4231				0.4189

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Author's calculation (2023)

Discussion

This finding is not surprising, as a number of prior studies have shown evidences of the relationship between financial exclusion and poverty (Adewale, 2014; Ageme et al., 2018; Anwar et al., 2016; Ayyagri, & Hoseini, 2013; Ofeh, & Thalut, 2018; Pal, & Pal, 2012; Sanya, & Olumide, 2017). Nevertheless, only few prior related studies considered, specifically, the relationships between the individual factors of financial exclusion – NDFE and DFE – and multidimensional poverty (Erickson, 2010; Munyegera, & Matsumoto, 2016; Must, & Ludewig, 2010; Yao, 2018). In Ghana, studies on this subject are woefully limited, let alone controlling for the demographic variables included in the present study. Thus, using the OLS, and controlling for demographic variables of age, sex, education, household size and marital status, among others, this chapter assessed the effect of financial exclusion (non-digital and digital) on multidimensional poverty, and two key results became evident.

First, the findings showed that higher levels of non-digital financial exclusion positively influence multidimensional poverty. This implies that the more people are excluded from non-digital finance, such as account ownership, credit and insurance, the more the incidence of multidimensional poverty in Ghana. Interestingly, the effect of non-digital financial exclusion on multidimensional poverty was more likely to increase in the presence of potential confounders. This was evident in the results, as even after full adjustment for relevant independent variables and covariates, the robustness of the effect persisted with a slight but significant increase.

It should be pointed out that, ordinarily, if one thinks of non-digital financial inclusion to have reduction effects on poverty, it is, thus, not out of the ordinary that non-digital financial exclusion increases levels of multidimensional poverty among people. Commonly, in Ghana, it is relatively easier for people who own accounts to contract loans or secure financial assistance from financial institutions than people without accounts in any form. Ownership of, say, bank accounts gives creditors some level of confidence, as the expectation is that monies paid through these accounts to individuals can easily be tracked due to availability records.

Considering the foregoing, it is not surprising that people without account ownerships find it difficult to access credit facilities from financial institutions. For instance, an individual engaged in a small business and needs loan to expand the business so that the living conditions of his/her household can be improved may not be able to get the loan due to the fact that this individual does not operate an account with any financial institution. The result is, in the long run, poverty will deepen in this household. Also, one common experience in Ghana is the ownership of mobile money accounts. People who have actively operated mobile money accounts with telecommunication companies in Ghana for a considerable period of time qualify for a credit facility at monthly interest rate of 10 per cent, with a 12 per cent penalty in case of default.

This implies that people without active mobile money accounts cannot take advantage of this, even in their toughest moments. Taking this into account, it appears that the more people are excluded from these non-digital financial

platforms, the more likely they are to suffer financial downturns; thus, pushing many down the poverty level. This is to say that in the absence of financial resources, low-income individuals are faced with hardships progressing adversely towards healthy and sustainable life.

Further, it can be contended that people are financially excluded due to their socio-economic status, and because they cannot meet requirements of the formal banking and insurance institutions and these were even evident in the results displayed in Figures 5, 7, 10 and 12. This poses a great challenge to the population, as many groups of people are unable to participate in the financial sector. Eventually, financial exclusion prevents these groups from accessing the resources they need to expand their businesses, pay for higher education, or undertake any other actions that could help them work their ways up and achieve quality life.

Next, the findings have indicated that increased levels of digital financial exclusion positively affect multidimensional poverty. This means that if the number of people who are excluded from digital financial platforms increases, the likelihood that multidimensional poverty indices – across areas of health, education, and standard of living – will increase is high. It could also be seen from the results that this effect of digital financial exclusion on multidimensional poverty was even more conspicuous in the presence of demographic factors (i.e., covariates), as size of the effect increased significantly.

This outcome was not unexpected, taking into account the current system of things where technology is leading the way. This is to say that, if an individual

is behind time, as far as technology or digitalisation is concerned, such individual is likely to be on the flipside of many things. Presently, by mere observations, it seems majority of financial institutions – especially banks – in the Ghanaian communities are unwilling to lend money to people who do not have access to digital platforms, such as e-zwich, electronic banking and mobile money, among others. It is likely this is not far different from experiences in other parts of the world (Adewale, 2014; Ofeh, & Thalut, 2018). Apart from the comfort digitalisation offers, there is the assurance of security (Uppun, & Reviani, 2016); hence, many financial institutions would like to give loans to deserving clients via secured and traceable platforms.

Consequently, people without access to these digital platforms are automatically excluded; thus, cannot benefit from loans and advances from these financial institutions (Carbo et al., 2007; Li & Song, 2021). To many people, when this happens, a lot of economic activities will be left undone. In the long run, if the people do not get the needed assistance from any other sources, the likelihood of life becoming difficult increases (Ageme et al., 2018), as they may not be able to make ends meet, let alone afford the costs associated with good health and education. Ultimately, multidimensional poverty is bound to be experienced due to the exclusion from digital finance platforms.

From the discussion thus far, everything points to the fact that financial exclusion influences multidimensional poverty and that multidimensional poverty will persist among the people of Ghana if financial exclusion net continues to widen. Essentially, it could be said that the issue of financial exclusion is, to a

large extent, rooted in the geographical locations of the people, as well as the people's level of education. This has been substantiated by the outcomes of the summary statistics where people located far from business centres or cities seemed to be highly financially excluded compared to their counterparts in the cities (Table 3), and also in line with Koku (2015) and Joassart-Marcelli and Stephens (2010). It is not uncommon to encounter people without mobile money accounts, bank accounts or access to credit in the rural areas, compared to urban centres. It is, thus, not surprising that poverty level is high in the rural areas compared to the urban centres (Ageme et al., 2018; Morawczynski, & Pickens, 2009; Pal, & Pal, 2012; Sanya, & Olumide, 2017; Wang, & He, 2020; Yao, 2018), and this, per the present findings, could be ascribed to financial exclusion.

With regards to the level of education, people who are highly educated or have an appreciable level of education seem to embrace technology more easily, compared to those with low or no education, all being equal. This means that the educated is likely to have more appreciation for digital finance than the non-educated. Considering this, it appears common to register high levels of multidimensional poverty among non-educated than the educated (Yu, Jia, Li & Wu, 2022; Joassart-Marcelli, & Stephens, 2010). This is because less or non-educated group of people are more likely to be financially excluded due to their inability to fully appreciate the benefits of and requirements for both digital and non-digital financial platforms (Figures 4, 6, 8 and10) (Yu, Jia, Li & Wu, 2022).

Overall, these findings corroborate the findings of a number of prior empirical studies (Adewale, 2014; Ageme et al., 2018; Carbo et al., 2007; Yu et

al., 2022; Gunarsih et al., 2018; Joassart-Marcelli, & Stephens, 2010; Ofeh, &Thalut, 2018). For instance, Adewale (2014) reports that lack of financial inclusion significantly and statistically impeded the acquisition of livelihood assets in Kwara State, Nigeria. In other words, this means financial exclusion may lead to inability of individuals to acquire assets required to improve their livelihoods, or alleviate their level of poverty. Similarly, Ageme et al. (2018) reveal that financial inclusion has significant positive effect on poverty reduction in Nigeria. In like manner, Yu, Jia, Li and Wu (2022) intimate that financial exclusion leads to extreme financial difficulties among people.

Additionally, Carbo et al. (2007) argue that the effects of financial exclusion is becoming increasingly serious, as lack of access or not having a bank account makes it difficult for the poor to receive income and to make payment, or to receive credit that they really need to help them take care of their household budgets. Consequently, the poor resort to alternatives to the conventional financial institutions, such as money-lenders, payday loans, pawnshops that charge very high rates which only exacerbate the conditions of the poor. Gunarsih et al. (2018) also aver that decrease in financial exclusion decreases the incidence of poverty. Li and Song (2021) posit that use of accounts, savings, withdrawals and access to credit significantly reduced poverty. Again, Joassart-Marcelli and Stephens (2010) state that accessibility to financial institutions, specifically bank branches and ATMs, correlate positively poverty reduction. Further, Ofeh and Thalut (2018) reveal that an increase in the level of financial exclusion would worsen the level of poverty.

Next, with respect to the specific effect of digital financial exclusion on multidimensional poverty, the present finding upholds many prior studies. Specifically, the finding supports Jack and Suri (2011), Must and Ludewig (2010), and Erickson (2010) who assert, among other things, that mobile money serves as a tool for poverty reduction – as through the use of mobile money, the level of financial exclusion may decrease, culminating in reduction of multidimensional poverty. Also, the use of M-Pesa, a digital platform, was reported to have changed the savings behaviour, the pattern of remittances, and has increased rural livelihoods in Kenya (Donovan, 2011; Mas, & Morawczynski, 2009). Similarly, Sekabira and Qaim (2016) find the use of m-payment to have decreased poverty in Kenya.

This finding also corroborates the finding that the use of mobile money and ATM improves livelihoods and welfare of a people (Cobla, & Osei-Asibey, 2018). The finding can further be associated with Aker et al. (2011), and Batista and Vicente (2023) who document the use of Zap and mKesh to have positively influenced poverty reduction in Niger and Mozambique, respectively. In similar manner, this finding is line with the findings of prior studies which reveal that financial inclusion has led to transformation of lives, and hence reduction in poverty (Kimenyi, & Ndung'u, 2009; Munyegera, & Matsumoto, 2016; Suri et al., 2012; Wang, & He, 2020).

As evident in the foregoing discussion, the present finding appears to be in line with many prior findings. Nevertheless, findings of few prior studies disagree with the present finding, as they suggest that financial exclusion neither

significantly nor positively influences poverty (Anwar et al., 2016; Ayyagri, & Hoseini, 2013; Yu et al., 2022). Anwar et al. (2016) report a negative relationship between financial exclusion and poverty. Ayyagri and Hoseini (2013) find financial inclusion to have a negative effect on poverty in Indonesia. In like manner, Yu, Jia, Li and Wu (2022) report, among other things, that web based/internet banking channel and microfinance credit exert negative impact on poverty reduction. These contrasting findings might be due to the fact that these studies were conducted outside Ghana, and the social and economic conditions of those countries might have influenced the outcomes of the studies.

On the whole, based on the present finding and that of many prior studies, one should appreciate the fact that financial exclusion is a noteworthy antecedent of multidimensional poverty. Theoretically, this relationship seems logical as it appears to be in line with the assertions of a number of poverty-related theories. For instance, as posited by the individualistic theory of poverty, individuals can be blamed for their own poverty. According to the individualistic theory, people are poor because they are lazy (Schiller, 1998). This implies that certain values and norms cultivated by individuals may influence their motivation and desire to get onto financial platforms. If these values and norms are more of laziness, it may make the individuals find financial inclusion unnecessary; thus, making them make no conscious efforts to get financially included. Consequently, these individuals become excluded financially, and may not have access to credit facilities, among others. Ultimately, poverty level is exacerbated.

Similarly, other theorists are of the view that some people are poor because society discriminates against them (Islam, 2005; Schiller, 1998). The argument is that this group of people has little access to education, jobs, housing, etc. It was even evident in the summary statistics (Figures 5, 7, 9 and 11) that majority of those who appeared financially excluded were those with low or no education, as well as had no access to financial institutions. Therefore, it is not surprising that the structural theory of poverty links incidence of poverty to inequality and discrimination in society (Islam, 2005). Considering these, it suffices to say that inequality and discrimination in the Ghanaian society may transmit into financial exclusion. Thus, it is not out of the ordinary that increased levels of financial exclusion have been found to worsen multidimensional poverty in Ghana.

Summary of Hypothesis Tested, Results, Decisions, and Conclusions

This section presents a summary of the hypotheses tested, the outcomes, decisions, as well as the conclusions drawn. The third research hypotheses are "*There is a statistically significant positive effect of digital financial exclusion on multidimensional poverty*" and "*There is a statistically significant positive effect of non-digital financial exclusion on multidimensional poverty*". The study failed to reject these hypotheses and concluded that both digital and non-digital financial exclusion significantly and positively affect consumption inequality. The summary of the test is shown in Table 15.

Table 15: Summary of Hypotheses Tested, Results and Conclusions

Hypotheses statements	Results *Regression coefficient*	Decision	Conclusions
H_{3a}: There is a statistically significant positive effect of digital financial exclusion on multidimensional poverty.	*$\beta = 0.018$* *$P < 0.05$*	H_{3a} Failed to reject	Statistically significant positive effect of digital financial exclusion on multidimensional poverty.
H_{3b}: There is a statistically significant positive effect of non-digital financial exclusion on multidimensional poverty	*$\beta = 0.0308$* *$P < 0.05$*	H_{3a} Failed to reject	Statistically significant positive effect of non-digital financial exclusion on multidimensional poverty.

Source: Author's calculation (2023)

Chapter Summary

This chapter presented and discussed results on the effect of financial exclusion on multidimensional poverty. It was revealed that both non-digital and digital financial exclusion have significant positive effect on multidimensional poverty. Overall, increased levels of financial exclusion were reported to be associated with high levels of multidimensional poverty. These findings appeared to be in agreement with the findings of many prior empirical studies. To alleviate multidimensional poverty, there would be the need for financial development to

ensure that everyone gets access to financial institutions and their products, irrespective of location.

CHAPTER SEVEN

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The main purpose of this study was to assess the effects of financial development on consumption per capita and financial exclusion on consumption inequality and multidimensional poverty. This chapter presents the summary, key findings, conclusions, recommendations and suggestions for further studies. The summary focuses on the background issues, the main purpose of the study, specific objectives, research approach, design and analytical tools and results. The key findings and conclusions present a summary of the main results, and the implication of the results, respectively. Recommendations section suggests actions to be applied by some specific bodies and individuals. Finally, the suggestion for further studies section provides areas where further studies are required.

Summary

The study was organised into seven chapters. The first chapter presented the introduction of the study and the background. The background highlighted the need for financial development in Sub-Saharan Africa countries with Ghana being no exception, and expounded on issues of financial exclusions within the Sub-region with main focus on Ghana. Chapter one also presented the problem statement of the study. This study dwelled on the fact that financial development in Sub-Saharan Africa is relatively low in comparison with Asia, Europe and

Northern America and Caribbean, and the consequent lack of significant empirical studies examining the relationship between financial exclusion, poverty and inequalities. Three main objectives were analysed in each empirical chapter.

The first objective was to examine the effect of financial development on consumption per capita in Sub-Saharan Africa. The second objective was to determine the effect of financial exclusion on consumption inequality in Ghana, and the third objective was to analyse the effect of financial exclusion on multidimensional poverty in Ghana. The Chapter One also looked at the significance of the study, the limitation and delimitation and ended with how the rest of the chapters are structured. Chapter Two reviewed relevant literature for the study. It looked at theories of financial development and growth, financial exclusion and inequality and financial exclusion and poverty. Empirical reviews on financial development and consumption per capita, financial exclusion and inequality and financial exclusion and poverty were also done to establish the gaps in the extant literature.

Chapter Three presented the methods used for analyses. This was done sequentially with the three main empirical chapters. Specifically, the methods for the effect of financial development of income per capita provided the data source, the definition for the financial development, financial market and financial institution. This was followed by theoretical model specification of random and fixed effect estimations, variable definitions and Durbin-Wu-Hausman specification test. Next, the methods for the effect of financial exclusion on consumption inequality were discussed. Financial exclusion was grouped under

two main headings, non-digital financial exclusion (account ownership, credit access and insurance) and digital financial exclusion (ATM, E-zwich, e-banking and mobile money).

The dependent variable consumption inequality (Gini) was computed from household consumption expenditure. The measurement for financial inclusion inequality was also presented in this section. Ordinary Least Squares regression methods were used to analyse the data in this section. Both theoretical and empirical model specification were presented, followed by variable definitions and post estimations tests. Next, the methods for the effect of financial exclusion on multidimensional poverty were presented. Concentrations were primarily on the treatment of potential endogenous relationship using the treatment effect estimations in STATA. Variable definitions, theoretical and empirical model specification as well as post estimations analysis were carried out.

Chapter Four presented the results of the effect of financial development on consumption per capita. The results revealed financial development in Africa is quite low. Specifically, comparing Europe, Asia and pacific, Middle East and central Asia, Africa and Latin America and Caribbean, Africa is among the continent with low level of financial development with Latin America and Caribbean ranking the first. With reference to Africa, the data revealed that Ghana is among the countries with considerable low level of financial development in sub-Saharan Africa. In comparing Kenya, Cote d'Ivoire and Nigeria which are all in West Africa, the results revealed that Ghana's financial development is considerably low in relation to these countries. Moreover, the findings revealed

that the level of financial institutions and financial market development over time have been growing disproportionately at different rate.

The five-year averages showed that there is wide gap between Financial Institutions (FI) development and Financial Market (FM) development in favour of FI; however, FM has been decreasing for the last five years. Again, whereas the financial institution access and depth have had a slow growth over the time, financial institution efficiency has been growing quite well. This is in sharp contrast to financial market efficiency which has experienced a sharp decline for the past five years. Again, using per capita income as a measurement for individual poverty level in SSA, the findings revealed that financial development is positively associated with per capita income.

Specifically, financial development has a positive and significant effect on consumption per capita, indicating that as the level of financial development in the SSA increases, consumption per capita increases across the SSA countries with implicit assumptions that this will induce poverty reduction in SSA. Similarly, the findings revealed that financial institution development and depth of financial institution are positively associated with increases in consumption per capita. Financial market access, depth and efficiency, however, were not statistically different from zero partly due to their low level of development in SSA. The study further confirmed the results of the association between financial development and consumption per capita using static panel for which both the random and fixed effect indicates that the coefficients of financial development is statistically different from zero.

Chapter Five presented the empirical results for the effect of financial exclusion on consumption inequality. The chapter began by comparing the association between financial inclusion inequality and consumption inequality. The findings revealed that there is an association between financial inclusion inequality and consumption inequality. That is as the gap in financial inclusions widens (thus deepening exclusion), consumption inequality also deepens. This shows that financial exclusion leaves households worse off in their ability to consume goods and services. Again, the study shown a strong association between district level financial inclusion inequality and district level consumption inequality. That is districts that experience a wide inequality in financial inclusion (deepening exclusion), the level of consumption inequality at the district is also high.

Further, the study also presented the effect of financial exclusion on consumption inequality. The results revealed that both the digital and non-digital financial exclusion had as positive and statistically significant effect on consumption inequality indicating that as the level of financial exclusion increases in Ghana, consumption inequality widens in the country. All the control variables also had a corresponding sign with consumption inequality. Specifically, age of the respondent had a negative association with consumption inequality. Male headed household are likely to experience a higher level of consumption inequality than female headed households. Level of education actually decreases the level of consumption inequality when compared with household with no

education. Employment level whether public or private decreases consumption inequality.

In contrast, unemployment leads a widening gap in the level of consumption between rich and poor households. Large household size increases the level of consumption inequality while urban resident has a reduction in the level of consumption inequality in the country. Furthermore, the Chapter Five disaggregated the results by location (rural-urban) and by the type of employment. The findings revealed that non-digital financial exclusion has increases consumption inequality in the rural areas but insignificant in the urban areas. On the other hand, digital financial exclusion increased the level of consumption inequality both in the rural and urban areas with adverse effect in the rural areas. Again, with respect to the type of employment, the findings revealed that both non-digital and digital financial exclusion affect consumption inequality but at different magnitudes with wider consumption inequality occurring among households that are self-employed and unemployed.

Chapter Six examined the effect of financial exclusion (non-digital and digital) on multidimensional poverty. Specifically, the chapter examined the correlation between non-digital and digital financial exclusion with multidimensional poverty using scatter plots. The findings shows that financial exclusion is correlated with multidimensional poverty. The chapter further presented descriptive of reasons why some household heads did not try to obtain credit with respective to the reference year of the data collection, why loan

applications were refused, reasons for not obtaining insurance and the reasons for not having a bank account.

The findings show that there is general lack of willingness for households to obtain financial support from financial institutions. Interest on loans also discourage many households from obtaining loans in addition to the demand for collateral. For households that were refused loan, the findings shows that many failed to provide collateral/guarantor for guaranteeing loan repayment. Many households were also refused loans due to low salary or income and the high amount they requested. Again, many households do not have insurance because they do not see it as necessary for the household wellbeing while many also reported that they cannot afford the insurance. Again, the findings show that households that have no education or their education level is basic are usually excluded from either account ownership, credit access and insurance.

In addition, the study used linear regression model to examine the effect of non-digital and digital financial exclusion on multidimensional poverty. The findings show that the coefficient of non-digital and digital financial exclusion is not statistically different from zero in explaining multidimensional poverty status of households both at one percent level of significance. Further, the study solved for the presence of potential endogeneity but employing two-state estimation. Endogeneity in this sense may come from different sources; from functional form misspecification, omitted variable bias etc.

Again, the study also realized that many households are excluded from the financial services due to self-exclusion. However, this study approached the issue

of endogeneity from the supply side omission of variables by introducing the supply of financial product into the model. Comparing the results to the two-stage with the OLS revealed that there was a downward bias for the estimates from the OLS. Thus, the finding shows that non-digital financial exclusion increases the multidimensional poverty status of households and the rate is even higher when digital financial exclusion is taken into effect.

The control variables in the model also had a variant decree of effect on household multidimensional poverty status. Age of the respondent had a non-linear relationship with multidimensional poverty. Larger household size increases multidimensional poverty. Educational level of the household head irrespective of the level had a poverty reduction effect when compared with household heads with no education. Again, the findings show that employment type also placed a key role in determining the multidimensional poverty level of household heads. Specifically, respondent who are unemployed, self-employed and private employment had a higher multidimensional poverty level when compared with households' head who are public employed.

Key Findings

- The first research objective sought to determine the effect of financial development on consumption per capita in SSA. It was revealed that financial development has a significantly positive effect on consumption per capita in SSA.

- The second objective was to examine the effect of financial exclusion (digital financial exclusion and non-digital financial exclusion) on consumption inequality. The results showed that both digital and non-digital financial exclusions significantly and positively affect consumption per capita.
- The third objective sought to analyse the effect of financial exclusion (digital financial exclusion and non-digital financial exclusion) on multidimensional poverty. The results indicated that both digital and non-digital financial exclusions significantly and positively affect multidimensional poverty.

Conclusions

Based on the findings, the study makes the following conclusions. First, the study concludes that financial development in SSA is quite low. Further, the study concludes that the level of growth of financial institutions and financial market development have disproportionate growth within the country. The growth of financial institutions (FI) and that of financial markets (FM) differ significantly, as seen by the five-year averages, with FI considerably surpassing FM during the past five years. Once more, access and depth have increased slowly over time, despite the fact that financial institution efficiency has been growing very rapidly. Contrasting sharply with this is the financial markets' deteriorating efficiency during the prior five years.

Furthermore, the study concludes that financial development is positively correlated with consumption per capita, again using per capita income as a yardstick for gauging personal poverty levels in SSA. Particularly, financial development has a positive and significant impact on per capita income, showing that as the level of financial development in the SSA rises, per capita income rises across the SSA countries, with implicit expectations that this will result in a decrease in poverty in the SSA. Similarly, the study concludes that growth in per capita income is correlated with the depth of financial institutions.

Again, the study concludes that there is a link between consumption inequality and financial inclusion inequality. That is as household consumption inequality increases when the gap between financial inclusion and exclusion widens. This demonstrates how households who are financially excluded have less purchasing power of consumer goods and services. The study concludes that male headed households are more likely than female headed households to face higher levels of consumption inequality. The degree of consumption inequality actually declines when compared to households without schooling. Employment levels in the public or private sector minimise consumption inequality.

In contrast, unemployment widens the difference between the spending levels of wealthy and poor households. Large household sizes increase consumption inequality. The study concludes that while rural areas' consumption inequality is less affected by non-digital financial exclusion, urban areas are more affected by it. The digital financial exclusion, on the other hand, had a negative effect on both urban and rural area consumption inequality. Further, self-

employment and unemployment experience wider consumption inequality, and that both non-digital and digital financial exclusion have an effect on consumption inequality.

Moreover, the study further concludes that households are generally unwilling to seek financial assistance from financial institutions. In addition to requiring collateral, interest rates on loans deter many households from applying for loans. The results indicate that many of the households for whom a loan was denied did not offer collateral or a guarantor to ensure loan repayment. Further, due to their low income or wage and the huge loan amount they asked, several households also had their loan requests denied. A large number of households lack insurance because they do not view it as essential to their well-being. A large number of households also said that they could not afford the insurance. Once more, the results demonstrate that households with no education or with only a minimum level of education are typically not account owners.

It was also concluded that non-digital and digital financial exclusion influence multidimensional poverty. The study also concludes that a large number of households are denied access to financial services as a result of their localities. Large household size increases multidimensional poverty. Further, educational level had an impact in reducing poverty. Again, employment status also played a significant impact in predicting the multidimensional poverty level of household heads. The study concludes that the unemployed, self-employed, or in private employment had a greater multidimensional poverty level when compared to public employed households' heads.

Recommendations

Based on the findings from the study, the following recommendations are proposed:

1. Financial development is paramount for the growth and development of African countries of which Ghana is no exception. Since the study revealed that financial development is associated with increases in consumption per capita in Sub-Saharan African countries, it is, therefore, recommended that leaders of African countries make an effort to develop their financial institutions and financial markets to stimulate the level of growth desired for their nations.
2. Improve Access to Financial Services: The Bank of Ghana should expand access to formal financial services for underserved populations by encouraging banks and other financial institutions to establish more physical bank branches, developing mobile banking networks, and promoting financial technology solutions. It should also encourage financial institutions to adopt inclusive practices and offer affordable financial products tailored to the needs of low-income individuals. Integrate environmental, social and governance principles into the design and delivery of these services, ensuring sustainability and responsible financial practices.
3. Social Development: The Government of Ghana through the Ministry of Social Protection and Ministry for Housing, Ministry for Gender and Social Protection should initiate programmes that focus on social

development by promoting inclusive and equitable access to education, healthcare, housing, and other basic services. By investing in social infrastructure and programmes, companies and governments can enhance human capital and provide opportunities for economic empowerment. This includes initiatives such as vocational training, microfinance, and support for small and medium-sized enterprises, which can create jobs and lift people out of poverty.

Suggestions for Further Studies

Future researchers should consider a panel study of financial exclusion to provide more plausible explanation to why some respondents choose to be excluded from the financial services.

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APPENDICES

A: Summary Statistics of some Financial Product by District

District	Region	Acount	credit	Insurance	mobile money	NDFE	DFE	MPI
Suaman	Western	0.514	1.000	1.000	0.943	0.514	0.914	0.216
Bia West	Western	0.491	0.855	0.951	0.767	0.480	0.738	0.267
Prestea-Huni Valley	Western	0.520	0.953	0.824	0.895	0.422	0.788	0.327
Wassa Amenfi East	Western	0.717	0.973	0.990	0.936	0.707	0.936	0.365
Bia East	Western	0.947	0.895	0.842	1.000	0.737	1.000	0.437
Bibiani/Anwiaso/Bekwai	Western	0.691	0.995	0.567	0.923	0.413	0.893	0.332
Wassa Amenfi Central	Western	0.885	0.897	0.630	1.000	0.483	0.994	0.463
Jomoro	Western	0.801	0.974	0.457	1.000	0.364	0.980	0.280
Bodi	Western	0.844	0.953	1.000	0.922	0.812	0.922	0.306
Nzema East Municipal	Western	0.795	1.000	1.000	1.000	0.795	0.970	0.363
Ellembele	Western	0.618	0.929	0.967	1.000	0.618	0.954	0.264
Sefwi Wiawso	Western	0.829	0.946	0.891	0.939	0.769	0.899	0.343
Sefwi Akontombra	Western	0.687	0.996	0.931	0.900	0.646	0.860	0.305
Ahanta West	Western	0.741	0.946	0.977	0.992	0.717	0.985	0.439
Juaboso	Western	0.577	1.000	1.000	0.953	0.577	0.930	0.326
Shama	Western	0.623	0.856	0.840	1.000	0.570	0.972	0.297
Aowin	Western	0.757	0.919	0.950	0.961	0.748	0.910	0.323
Wassa Amenfi West	Western	0.581	0.930	0.798	0.975	0.467	0.951	0.276
Tarkwa Nsuaem Municipal	Western	0.652	0.965	0.705	0.994	0.476	0.943	0.331
Mpohor Wassa East	Western	0.763	0.960	0.858	1.000	0.711	0.972	0.422
Sekondi Takoradi Metropolitan	Western	0.632	0.960	0.941	0.988	0.622	0.873	0.194
Upper Denkyira West	Central	0.717	0.954	1.000	0.946	0.707	0.870	0.391
Agona West Municipal	Central	0.685	0.932	0.686	0.827	0.507	0.777	0.309
Effutu Municipal	Central	0.467	0.934	0.985	0.556	0.467	0.525	0.254
Awutu Senya East Municipal	Central	0.341	0.975	0.961	0.433	0.341	0.433	0.259
Awutu Senya	Central	0.598	0.957	0.770	0.701	0.435	0.701	0.320
Twifo/Heman/Lower Denkyira	Central	0.606	0.936	0.885	0.822	0.568	0.758	0.293
Ajumako/Enyan/Esiam	Central	0.661	0.900	0.535	0.829	0.364	0.759	0.307
Abura/Asebu/Kwamankese	Central	0.763	0.978	0.641	0.901	0.452	0.847	0.313
Twifo-Ati-Mokwa	Central	0.775	0.948	0.957	0.898	0.775	0.852	0.341
Gomoa East	Central	0.520	0.963	0.916	0.591	0.448	0.566	0.282
Assin North	Central	0.584	0.908	0.718	0.818	0.402	0.763	0.284
Agona East	Central	0.638	0.923	0.798	0.809	0.532	0.682	0.339
Cape Coast Metro	Central	0.394	0.941	0.663	0.596	0.324	0.505	0.236
Gomoa West	Central	0.781	0.932	0.876	0.958	0.666	0.901	0.328
Komenda/Edina/Eguafo/Abirem	Central	0.545	0.951	0.575	0.651	0.398	0.636	0.321
Ekumfi	Central	0.652	0.900	0.976	0.807	0.652	0.750	0.300
Mfantsiman Municipal	Central	0.405	0.893	0.413	0.767	0.201	0.612	0.249
Asikuma/Odoben/Brakwa	Central	0.834	0.922	0.545	1.000	0.454	0.983	0.325
Upper Denkyira East Municipal	Central	0.646	0.887	0.555	0.960	0.359	0.927	0.367
Assin South	Central	0.728	0.903	0.834	0.939	0.590	0.877	0.391
Ledzokuku-Krowor Municipal	G. Accra	0.585	0.991	0.904	0.947	0.566	0.767	0.205
Kpone Katamanso	G. Accra	0.503	1.000	0.981	0.919	0.503	0.637	0.124
East Municipal	G. Accra	0.413	0.986	0.785	0.996	0.413	0.570	0.141
South Municipal	G. Accra	0.364	0.976	0.924	0.554	0.338	0.425	0.195
Ga Central Municipal	G. Accra	0.369	0.932	0.974	0.935	0.340	0.596	0.192
Adenta Municipal	G. Accra	0.476	1.000	0.886	1.000	0.476	0.587	0.263
West Municipal	G. Accra	0.397	0.982	0.788	0.930	0.351	0.732	0.221
La-Nkwantanang-Madina	G. Accra	0.491	0.969	0.917	1.000	0.478	0.610	0.205
La Dade-Kotopon Municipal	G. Accra	0.501	1.000	0.640	0.960	0.378	0.767	0.234
Shai Osudoku	G. Accra	0.651	1.000	0.665	0.899	0.502	0.862	0.277
Ada East	G. Accra	0.714	1.000	0.190	0.810	0.143	0.810	0.372
Ningo Prampram	G. Accra	0.591	0.927	0.510	0.905	0.334	0.840	0.281

Ada West	G. Accra	0.595	0.946	1.000	0.676	0.595	0.676	0.324
Tema Metropolitan	G. Accra	0.300	0.990	0.749	0.997	0.272	0.582	0.187
Accra Metropolitan	G. Accra	0.502	0.975	0.775	0.945	0.401	0.716	0.217
Ashaiman Municipal	G. Accra	0.504	0.980	0.915	0.841	0.494	0.752	0.275
North Tongu	Volta	0.636	1.000	0.972	0.693	0.636	0.684	0.412
Akatsi South	Volta	0.745	0.973	0.472	0.892	0.387	0.857	0.289
Ho Municipl	Volta	0.612	0.950	0.830	0.967	0.580	0.762	0.192
South Tongu	Volta	0.656	0.917	0.933	0.841	0.625	0.780	0.308
Kpando Municipal	Volta	0.583	0.920	0.238	0.822	0.179	0.798	0.236
Ketu South Municipal	Volta	0.643	0.952	0.701	0.837	0.469	0.796	0.309
Biakoye	Volta	0.606	0.937	0.903	0.634	0.515	0.634	0.405
Hohoe Municipal	Volta	0.643	0.923	0.446	0.831	0.235	0.739	0.298
Ho West	Volta	0.740	0.989	0.750	0.865	0.561	0.837	0.318
Kadjebi	Volta	0.742	0.925	0.538	0.884	0.417	0.865	0.396
Akatsi North	Volta	0.794	0.971	1.000	0.853	0.794	0.853	0.389
Krachi Nchumuru	Volta	0.832	0.950	0.950	0.866	0.782	0.866	0.530
Ketu North	Volta	0.678	0.989	0.690	0.770	0.467	0.756	0.367
Nkwanta North	Volta	0.903	0.992	0.356	1.000	0.326	0.976	0.527
Krachi West	Volta	0.250	0.938	0.188	0.250	0.000	0.250	0.327
North Dayi	Volta	0.535	0.965	0.957	0.560	0.535	0.551	0.235
Krachi East	Volta	0.635	0.926	0.950	0.702	0.591	0.665	0.377
South Dayi	Volta	0.565	0.989	0.984	0.674	0.554	0.608	0.358
Jasikan	Volta	0.558	1.000	0.235	0.705	0.181	0.673	0.411
Afadjato South	Volta	0.807	0.946	0.473	0.989	0.378	0.936	0.267
Central Tongu	Volta	0.762	0.983	0.816	0.849	0.644	0.849	0.391
Keta Municipal	Volta	0.701	0.965	0.757	0.864	0.482	0.818	0.268
Agotime Ziope	Volta	0.931	1.000	1.000	0.966	0.931	0.966	0.427
Nkwanta South	Volta	0.733	0.966	0.524	0.769	0.393	0.755	0.337
Adaklu	Volta	0.770	0.967	0.469	0.885	0.339	0.842	0.374
Atiwa	Eastern	0.655	0.981	0.628	0.771	0.512	0.752	0.317
Kwahu West Municipal	Eastern	0.633	1.000	0.563	0.847	0.330	0.787	0.212
East Akim Municipal	Eastern	0.706	0.933	0.885	0.956	0.674	0.908	0.274
Akyemansah	Eastern	0.737	0.976	0.898	0.912	0.683	0.891	0.293
Birim North	Eastern	0.720	0.955	0.788	0.965	0.655	0.916	0.332
Fanteakwa	Eastern	0.805	0.959	0.621	1.000	0.553	0.904	0.333
Birim Central Municipal	Eastern	0.569	0.968	0.863	0.860	0.531	0.825	0.329
New Juaben Municipal	Eastern	0.525	0.902	0.671	0.975	0.424	0.744	0.187
Kwahu South	Eastern	0.493	1.000	0.583	0.551	0.319	0.518	0.250
Upper West Akim	Eastern	0.682	0.957	0.908	0.897	0.626	0.897	0.366
Afram Plains South	Eastern	0.912	0.982	0.805	1.000	0.726	1.000	0.382
Birim South	Eastern	0.645	0.935	0.906	0.819	0.607	0.797	0.322
Asuogyaman	Eastern	0.499	0.991	0.424	0.819	0.256	0.616	0.160
Yilo Krobo	Eastern	0.725	0.902	0.702	1.000	0.477	0.951	0.273
Kwahu East	Eastern	0.680	1.000	0.470	0.725	0.389	0.715	0.351
Denkyembour	Eastern	0.458	1.000	0.833	0.766	0.458	0.766	0.292
Lower Manya Krobo	Eastern	0.604	0.944	0.544	1.000	0.340	0.793	0.239
Kwahu North	Eastern	0.932	0.983	0.569	1.000	0.563	1.000	0.321
Ayensuano	Eastern	0.802	0.970	0.611	0.977	0.484	0.913	0.399
Akwapim North	Eastern	0.638	0.935	0.401	0.989	0.314	0.805	0.283
Nsawam Municipal	Eastern	0.747	0.905	0.508	1.000	0.400	0.939	0.278
Suhum/Kraboa/Coaltar	Eastern	0.601	1.000	0.261	1.000	0.159	0.917	0.229
Akwapim South	Eastern	0.560	0.960	0.960	1.000	0.560	0.680	0.224
West Akim Municipal	Eastern	0.623	0.971	0.413	0.907	0.250	0.890	0.309
Kwaebibirem	Eastern	0.595	0.971	0.870	0.964	0.497	0.900	0.297
Upper Manya Krobo	Eastern	0.892	1.000	0.632	1.000	0.586	1.000	0.510
Asante Akim South	Ashanti	0.752	1.000	0.871	0.908	0.735	0.816	0.360
Ahafo Ano South	Ashanti	0.673	0.946	0.537	0.947	0.397	0.929	0.329
Amansie Central	Ashanti	0.790	1.000	0.715	0.917	0.621	0.895	0.333
Afigya Kwabre	Ashanti	0.531	0.969	0.636	0.793	0.343	0.755	0.242
Ejisu-Juaben Municipal	Ashanti	0.716	0.969	0.812	0.862	0.639	0.786	0.299

Bosome Freho	Ashanti	0.786	1.000	1.000	1.000	0.786	0.881	0.444
Kumawu	Ashanti	0.686	0.965	0.837	0.898	0.625	0.843	0.282
Ahafo Ano North	Ashanti	0.862	1.000	1.000	0.970	0.862	0.955	0.413
Asokore Mampong Municipal	Ashanti	0.556	0.987	0.797	0.897	0.441	0.749	0.262
Amansie West	Ashanti	0.700	0.963	0.925	1.000	0.644	0.962	0.263
Atwima Nwabiagya	Ashanti	0.581	0.964	0.539	0.844	0.279	0.830	0.238
Adansi South	Ashanti	0.820	1.000	0.929	1.000	0.773	0.988	0.373
Mampong Municipal	Ashanti	0.522	0.957	0.443	0.827	0.284	0.784	0.221
Sekyere Afram Plains	Ashanti	0.789	1.000	1.000	1.000	0.789	1.000	0.272
Bekwai Municipal	Ashanti	0.605	1.000	0.830	1.000	0.551	0.730	0.167
Kumasi Metropolitan	Ashanti	0.457	0.977	0.741	0.819	0.354	0.664	0.181
Offinso North	Ashanti	0.916	1.000	0.832	1.000	0.808	1.000	0.376
Sekyere Central	Ashanti	0.726	0.967	0.919	1.000	0.726	0.897	0.254
Atwima Kwanwoma	Ashanti	0.515	0.905	0.460	0.934	0.273	0.803	0.296
Bosumtwe	Ashanti	0.543	0.975	0.674	0.787	0.380	0.723	0.245
Offinso South Municipal	Ashanti	0.732	0.978	1.000	0.756	0.732	0.756	0.250
Adansi North	Ashanti	0.755	0.976	1.000	0.976	0.731	0.906	0.369
Asante Akim North	Ashanti	0.826	0.978	1.000	1.000	0.826	1.000	0.273
Atwima Mponua	Ashanti	0.693	1.000	0.643	0.972	0.408	0.910	0.385
Obuasi Municipal	Ashanti	0.672	0.995	0.880	0.971	0.623	0.842	0.217
Kwabre	Ashanti	0.574	1.000	1.000	0.736	0.574	0.644	0.337
Asante Akim Central Municipal	Ashanti	0.778	0.969	0.938	1.000	0.747	0.846	0.251
Sekyere South	Ashanti	0.735	1.000	0.618	0.765	0.471	0.765	0.389
Sekyere East	Ashanti	0.672	1.000	0.564	0.760	0.432	0.760	0.296
Tano South	BA	0.688	0.986	0.873	0.949	0.617	0.921	0.336
Pru	BA	0.806	0.992	0.474	0.987	0.380	0.948	0.342
Kintampo South	BA	0.784	0.948	0.984	0.915	0.748	0.908	0.469
Atebubu-Amantin	BA	0.761	0.988	0.927	0.956	0.721	0.946	0.462
Asutifi	BA	0.715	0.985	0.979	0.954	0.715	0.864	0.325
Asutifi South	BA	0.760	0.963	1.000	1.000	0.732	0.907	0.400
Techiman North	BA	0.621	0.912	1.000	0.968	0.621	0.968	0.312
Dormaa East	BA	0.672	1.000	0.780	0.873	0.521	0.845	0.290
Berekum Municipal	BA	0.591	0.956	0.597	0.968	0.385	0.934	0.234
Wenchi Municipal	BA	0.840	0.983	0.493	0.943	0.400	0.916	0.366
Jaman North	BA	0.644	0.986	0.972	0.986	0.644	0.911	0.213
Tain	BA	0.760	0.949	0.819	1.000	0.678	0.984	0.404
Techiman Municipl	BA	0.584	0.957	0.634	0.936	0.387	0.858	0.296
Asunafo North Municipal	BA	0.547	0.959	0.707	0.824	0.359	0.747	0.300
Sunyani Municipal	BA	0.507	0.953	0.422	0.906	0.235	0.792	0.187
Jaman South	BA	0.658	0.941	0.248	1.000	0.199	0.970	0.236
Sene West	BA	0.662	0.961	0.850	1.000	0.662	0.937	0.246
Sene East	BA	0.823	0.891	0.955	0.955	0.823	0.955	0.414
Dormaa West	BA	0.882	1.000	0.176	1.000	0.147	1.000	0.607
Tano North	BA	0.602	0.949	0.823	0.813	0.497	0.785	0.323
Nkoranza North	BA	0.728	0.987	0.970	0.959	0.728	0.929	0.407
Banda	BA	0.913	1.000	0.870	1.000	0.870	0.913	0.203
Kintampo North Municipal	BA	0.681	1.000	0.995	0.893	0.680	0.886	0.298
Asunafo South	BA	0.702	0.963	0.793	0.935	0.622	0.887	0.440
unyani West	BA	0.604	0.951	0.544	0.944	0.323	0.866	0.265
koranza South	BA	0.603	0.975	0.965	0.834	0.603	0.817	0.306
Dormaa Municipal	BA	0.728	0.932	0.527	1.000	0.408	0.991	0.303
Zabzugu	Northern	0.968	1.000	1.000	1.000	0.968	1.000	0.725
East Mamprusi	Northern	0.866	1.000	0.979	0.948	0.866	0.914	0.411
East Gonja	Northern	0.756	0.979	0.873	0.877	0.657	0.856	0.536
Tamale Metropolitan	Northern	0.746	0.961	0.895	0.976	0.712	0.847	0.269
Bunkpurugu-Yonyo	Northern	0.869	0.995	0.659	0.983	0.612	0.971	0.437
Mamprugo Moaduri	Northern	0.826	0.913	1.000	1.000	0.783	0.957	0.481
Saboba	Northern	0.988	1.000	1.000	1.000	0.988	1.000	0.637
North Gonja	Northern	0.773	0.955	1.000	1.000	0.773	0.818	0.303
Central Gonja	Northern	0.809	0.973	0.842	0.987	0.673	0.851	0.403

Tolon	Northern	0.859	1.000	1.000	1.000	0.859	0.915	0.393
Karaga	Northern	0.898	1.000	0.974	1.000	0.898	1.000	0.620
Savelugu-Nanton	Northern	0.810	0.953	0.511	0.891	0.452	0.848	0.418
Chereponi	Northern	0.907	0.984	0.835	1.000	0.775	0.940	0.747
Sagnarigu	Northern	0.704	0.955	0.764	0.941	0.599	0.800	0.295
Nanumba South	Northern	0.926	1.000	1.000	0.990	0.926	0.955	0.699
Yendi Municipal	Northern	0.884	0.988	0.948	0.972	0.867	0.950	0.336
Sawla-Tuna-Kalba	Northern	0.752	0.989	0.954	0.938	0.752	0.915	0.445
Kumbugu	Northern	0.714	0.857	0.143	0.905	0.048	0.905	0.647
Tatale Sangule	Northern	1.000	1.000	1.000	1.000	1.000	1.000	0.611
West Gonja	Northern	0.842	0.978	0.592	0.975	0.483	0.941	0.401
West Mamprusi	Northern	0.692	0.961	0.631	0.705	0.513	0.705	0.467
Gushiegu	Northern	0.889	0.957	0.816	1.000	0.730	0.970	0.523
Kpandai	Northern	0.872	0.975	0.959	0.919	0.812	0.907	0.490
Mion	Northern	0.931	0.936	0.722	0.957	0.695	0.931	0.595
Bole	Northern	0.749	0.993	1.000	0.880	0.749	0.849	0.472
Nanumba North	Northern	0.877	1.000	0.983	0.985	0.860	0.971	0.513
Builsa North	Upper East	0.688	0.923	0.964	0.845	0.676	0.845	0.332
Kassena-Nankana West	Upper East	0.744	0.983	0.985	0.853	0.744	0.850	0.406
Pusiga	Upper East	0.850	0.996	0.311	0.862	0.268	0.862	0.495
Garu-Tempane	Upper East	0.737	0.949	0.545	0.793	0.418	0.777	0.462
Bawku Municipal	Upper East	0.753	0.939	0.549	0.906	0.407	0.859	0.355
Builsa South	Upper East	0.762	0.967	1.000	1.000	0.762	0.994	0.226
Kassena-Nankana East	Upper East	0.637	0.937	0.956	0.845	0.623	0.819	0.301
Binduri	Upper East	0.762	0.959	0.497	0.869	0.367	0.844	0.417
Bongo	Upper East	0.634	0.960	1.000	0.691	0.629	0.682	0.473
Talensi	Upper East	0.665	0.972	0.904	0.771	0.628	0.742	0.472
Bawku West	Upper East	0.771	0.967	0.616	0.853	0.494	0.826	0.446
Nabdam	Upper East	0.717	0.972	0.440	0.895	0.351	0.853	0.444
Bolgatanga Municipal	Upper East	0.569	0.981	0.607	0.767	0.395	0.672	0.251
Sissala West	Upper West	0.841	0.985	1.000	0.944	0.841	0.932	0.369
Lawra"	Upper West	0.791	0.959	0.667	0.957	0.550	0.906	0.333
Nandom	Upper West	0.819	0.954	0.667	0.992	0.601	0.964	0.318
Wa East	Upper West	0.966	0.997	0.738	1.000	0.724	0.989	0.516
Sissala East	Upper West	0.703	0.945	0.955	0.879	0.692	0.840	0.363
Daffiama Bussie Issa	Upper West	0.817	0.962	0.605	0.943	0.501	0.919	0.422
Nadowli	Upper West	0.882	0.985	0.590	1.000	0.537	0.978	0.356
Wa West	Upper West	0.864	0.988	0.889	1.000	0.812	0.921	0.505
Jirapa	Upper West	0.859	0.957	0.639	0.986	0.542	0.935	0.355
Lambussie Karni	Upper West	0.779	0.972	0.620	0.970	0.476	0.935	0.353
Wa Municipal	Upper West	0.668	0.986	0.657	0.945	0.455	0.835	0.290

Source: Author's calculation (2023)