The Moderating Effect of Gender Equality in Reproductive health on the Relationship between Financial Development and Poverty Reduction in sub-Saharan Africa: A Quantile Regression Approach.

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Abstract

This study investigates the potential moderating effect of gender equality in reproductive health on the relationship between financial development and poverty reduction in 36 sub-Sahara African countries from 2000 to 2022, using the Quantile Method of Moments with fixed effects to address endogeneity issues and outliers. The study employs the poverty headcount ratio and poverty gap ratio as poverty indicators while controlling for inflation rate, economic growth, education, income distribution, and government expenditure using data from world development indicators, UNDP, and IMF data banks. The results show that financial development significantly contributes to poverty reduction in sub-Saharan Africa, but this contribution declines as poverty severity increases. Moreover, reduced challenges in women's reproductive health play a vital role in decreasing poverty, and integrating gender equality in reproductive health with financial development improves the relationship between financial development and poverty reduction. The study also concludes that poverty reduction initiatives are more effective when financial development strategies are part of a broader approach that includes women's reproductive health, economic growth, and resource equality.

Keywords: Financial Development; Poverty Reduction; Gender Inequality in Reproductive Health; Sub-Sahara Africa

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1. Introduction

Poverty remains a significant global challenge, affecting millions of people worldwide (Hite & Seitz, 2021). Currently, an estimated 659 million people, equivalent to 8.5% of the global population live below the international poverty line, measured at $2.15 per person per day, 2017 PPP (World Bank, 2023a). The situation is even worse in sub-Saharan Africa, where out of the 22 poorest countries globally, 19 are from sub-Saharan Africa (UNDP, 2023a). According to Sen (1999) and Sachs (2005), high poverty levels are associated with detrimental effects such as diseases, limited personal development opportunities, environmental degradation, and conflicts. Consequently, policymakers, researchers, and development practitioners advocate poverty reduction to improve human well-being worldwide, particularly in sub-Saharan Africa, where the problem is more severe.

Poverty reduction is a multifaceted issue requiring a complex interaction of social, political and economic factors to be managed in a coordinated way (Bastiaensen *et al.,* 2005). According to the United Nations (2023), financial development is among the commonly agreed factors with a significant effect on poverty reduction. In its broad meaning, financial development is the improvement across all dimensions of the financial sector within an economy, including financial depth, access, efficiency, and stability (Svirydzenka, 2016; Mukherjee *et al*., 2021). It acts as a useful mechanism to achieve improved resource mobilization and distribution towards enhanced production of goods and services in an economy (McKinnon, 1973; Shaw, 1973). Studies show that, as a result of financial development, useful financial products such as saving facilities, insurance, credit, and payment mechanisms become easily accessible to individuals and business firms, enabling economic activities to run smoothly (Demirgüç-Kunt *et al.*, 2020; Klapper *et al*., 2016; Ziolo *et al.,* 2021). Easy accessibility to financial products and services becomes essential for underprivileged people as it increases their ability to invest in education and become more productive while attaining useful financial capital through credit facilities. Additionally, it provides a mechanism to manage business and income risks through insurance facilities and hence remain resilient against life adversities, which is vital in reducing poverty (Zhuang *et al*., 2009; Odhiambo, 2009; Abdin, 2016; Ho & Iyke, 2017).

Studies show that community efforts to reduce poverty may be compromised by limited access to economic opportunities among its members (Banerjee & Duflo, 2013; Uzoma *et al*., 2020; Zulher & Ratnasih, 2021; United Nations, 2015; Acemoglu & Robinson, 2012). This is because limited access to economic opportunities tends to create challenges for vulnerable individuals and groups over the extent to which they can use their potential for meaningful economic outcomes. Among the causes of limited access to economic opportunities is gender inequality.

Gender inequality is defined as unequal rights, responsibilities and opportunities between men and women as well as girls and boys based on socially constructed norms, behaviour and roles (UNICEF, 2017; IMF, 2022). It manifests itself within communities in various dimensions including the reproductive health dimension (UNDP, 2010; Permanyer, 2013). According to WHO (2023a) and Mishra (2018), many health systems and interventions especially in sub-Sahara Africa have failed to address the specific reproductive health requirements of women such as family planning, maternal healthcare, access to safe and legal abortion as well as gender-based violence. As a result, there are several disadvantages that women face based on gender that lead to a higher maternal mortality ratio, limited ability of women to contribute to production and high adolescent

birth ratio in the region compared to other regions (WHO, 2022; Maharaj, 2022). For example, in 2020, sub-Sahara Africa alone recorded about 70% of the total global maternal deaths and the highest adolescent birth ratio of over 100 births per 1000 women (WHO, 2022: WHO, 2023c; Maharaj, 2022).

According to Singh *et al.,* 2014; Sully *et al.,* 2020; WHO, 2022; Girum & Wasie, 2017; and Mishra, 2018; unmet reproductive health requirements of women and girls will extend beyond the welfare of individuals to the entire economy by; increasing family costs of living which deplete resources that could be invested, decreasing the ability of women to take active participation in production leading to lower output for an economy, denying women's access to relevant education which decreases the quality and quantity of human capital for the economy, and increasing premature deaths of mothers which deprave communities' opportunity to benefit from female social and economic contributions. This is because women form a large portion of not only the world's population but also of the world's most underprivileged poor population suffering from oppression and discrimination that undermine their valued economic contribution (UNFPA, 2018; Twikirize, 2014; Kristof &WuDunn, 2010; Mishra, 2018). Despite the possibility for the mentioned challenges to negatively affect the ability of communities to exploit economic opportunities including the ones brought by the financial sector development such as increased saving and credit facilities (Demirguc-Kunt & Levine, 2008; Jones *et al.,* 2006; Levine, 2021; Sol Murta & Miguel, 2013) there are limited studies on the way gender equality in reproductive health could shape the Financial development – poverty reduction relationship.

Given the above arguments, this study aims to investigate the potential moderating effect of gender equality in reproductive health on the relationship between financial development and poverty reduction in sub-Sahara Africa. It seeks to explore whether promoting gender equality in reproductive health could complement the financial development–poverty reduction relationship in sub-Saharan Africa, thus strengthening policy measures towards achieving the region's poverty reduction goals.

The study is motivated by three main reasons. First, over the past three decades, sub-Saharan Africa has failed to achieve optimal results in poverty reduction, which is threatening the achievement of the global sustainable development goal number one of ending poverty in all its forms by 2030 (UNDP, 2023a; World Bank, 2022). Second, although there have been substantial records of financial development among sub-Saharan Africa countries over the past three decades (IMF, 2016), the debate on its contribution to poverty reduction in developing countries remains inconclusive since various authors have reported positive, negative, and neutral findings (Jalilian& Kirkpatrick, 2002; Wardana *et al*., 2022; Levine, 2004; Odhiambo, 2009; Jeanneney & Kpodar, 2008; Ho and Iyke, 2017; Nair, 2016; Lemnge & Raphael, 2023; Dhrifi 2013; Kaidi *et al*., 2019; Seven & Coskun, 2016; Bolarinwa *et al*., 2021; Bayar, 2023). Third, although gender inequality in reproductive health has negative effects on the use of financial products and services (Sully *et al.,* 2020; Girum & Wasie, 2017), limited studies exist on how such inequality influences the relationship between financial development and poverty reduction.

The study contributes to the literature in three ways. First, it incorporates aspects of gender equality in reproductive health on the relationship between financial development and poverty reduction which have been given little attention from previous studies in sub-Saharan Africa. Second, it

employs a panel quantile regression method with fixed effects which not only enables the examination of distributional impacts of explanatory variables across the quantiles of the dependent variable unlike previous studies which focused on mean-based estimation techniques (see, Ma & Wang, 2022; Byaro *et al*., 2023a; Cannon, 2018; Zahonogo, 2017; Bolarinwa *et al.*, 2021; Boukhatem, 2016); Donou-Adonsou & Sylwester, 2016; and Kaidi *et al*., 2019); but also helps to address issues of endogeneity among variables conveniently while being robust to outliers (see, Machado and Silva, 2019; Byaro*et al.*, 2023a: Ma & Wang, 2022; Byaro*et. al*., 2023b). Third, the study addresses financial development in its multidimensional nature using the IMF broad-based measure (financial development index) (Svirydzenka, 2016), unlike previous studies whose attention has been limited to narrow-based measures like the ratio of private credit to GDP and bank credit to GDP (see Wardana *et al.*, 2022; Sehrawat & Giri 2016; Ho and Iyke, 2017).

The remainder of this study is organized as follows. Section 2 reviews the literature on financial development and poverty reduction. Section 3 describes the methodology. Section 4 presents the estimated results. Section 5 checks the robustness of the estimated results. Section 6 discusses the estimated results. Section 7 concludes.

2. Literature Review

2.1 Theoretical Literature

Two schools of thought dominate the effects of financial development on poverty reduction: the poverty-reducing effect school and the poverty-reinforcing effect school. The poverty-reducing effect school posits that financial development can help achieve improved resource distribution in an economy, leading to increased quality and quantity of investments, which indirectly benefits the poor through increased employment opportunities and incomes (McKinnon, 1973; Shaw, 1973; Levine, 2004; Zhuang *et al.*, 2009; Park & Mercado, 2015; Odhiambo, 2009). Additionally, financial development can increase the availability of financial services and products like savings facilities, credit, and insurance to decrease the associated transaction costs and hence increase their availability to the poor. When the availability of such facilities enables the poor to secure investment capital, manage investment risks, and finance education plans, financial development contributes directly to poverty reduction (McKinnon, 1973; Shaw, 1973; Jalilian& Kirkpatrick, 2002; Stiglitz, 1994; Zhuang *et al*., 2009; Appiah *et al*., 2020).

The poverty-reinforcing effects school of thought argues that information asymmetry, adverse selection, and moral hazard issues can exacerbate poverty (Stiglitz & Weiss, 1981; Mishkin, 1992; Holden & Prokopenko, 2001; Edelberg, 2004). Information asymmetry is a common characteristic of the financial market (IMF, 1998; Mishkin, 1992) and can force an economic agent to make a less favourable decision for the other party, leading to economic outcomes that increase poverty. For example, limited knowledge of lenders on credit risks of borrowers may lead to a raise in interest rates to prevent less competent borrowers (adverse selection), a decision which may discourage investments and employment and hence increase poverty (Mishkin, 1992; Hasan *et al*., 2022). Additionally, limited information to lenders on borrower's activities (information asymmetry) may induce borrowers to engage in more risky activities, such as investing in other complex projects without notifying the lender (moral hazard), a decision which increases the chance for default (Mishkin, 1992). Hence, to protect from risks of insolvency, lenders may rely on collateral and history of previous loan repayment, which may favour the rich while undermining

the poor, leading to increased income inequality and poverty (Jeanneney & Kpodar, 2008; Jauch & Watzka, 2016).

However, according to Sachs (2005) and Banerjee & Duflo (2013), the effectiveness of poverty reduction initiatives depends mainly on people's ability to use economic opportunities around them. We derive a compelling explanation of the role of improved ability to use economic opportunities from Sen's capability approach theory, which argues that people's achievements are influenced by their capabilities to function in areas of life they have reasons to value (Sen, 1980). Sen believes that human capabilities involve freedoms and the ability to function in areas of interest, which can be promoted with improved health conditions, education, and decision-making power so that individuals can choose and act on various life options based on personal interests and abilities. Pickett & Wilkinson (2010) state that when inequalities exist, the underprivileged group will face significant barriers to effectively using and developing their potential for the betterment of the community. According to Melesse et al. (2020) and Pons-Duran et al. (2019), gender inequality is widespread in sub-Saharan Africa, particularly affecting women in various dimensions, including the reproductive health dimension. Hence, achieving gender equality by increasing women's access to effective family planning, reproductive education, efficient maternal healthcare, safe and legal abortion, as well as control of gender-based violence, can boost women's capabilities for the betterment of the communities they live in. Since financial development involves the creation of economic opportunities (Demirgüç-Kunt *et al.*, 2020; Klapper *et al*., 2016; Ziolo *et al*., 2021), the effects of increased access to women's reproductive health requirements on the relationship between financial development and poverty reduction are worth noting.

2.2 Empirical Literature.

2.2.1 Financial Development and Poverty Reduction

In recent years, the relationship between financial development and poverty reduction has attracted several studies whose results remain inconclusive. Wardana *et al* (2022) conducted a study in Indonesia using the Autoregressive Distributed Lag (ARDL) bound testing approach with data from 1986 to 2018. Based on various measures of financial development, such as domestic credit to the private sector, broad money, and financial development index, they found evidence of an inverse relationship between financial development and poverty levels. Sehrawat and Giri (2016) examined the contribution of financial development (proxied by the ratio of domestic credit to the private sector as a share of GDP and the ratio of money supply to nominal GDP) to poverty reduction in a panel of South Asian developing economies from 1990 to 2012 using the co-integration test. Their findings reveal that financial development has a solid and positive relationship with poverty reduction. Upon investigating the effects of financial development on poverty from 2002 to 2017 in Turkey using simultaneous equation regression, Bayar (2023) reports that financial development significantly reduces poverty. Ho and Iyke (2017) employed the Toda-Yamamoto causality test to investigate the relationship between financial development (proxied by liquid liability as a percentage of GDP or bank domestic credit as a percentage of GDP) and poverty reduction in China from 1985 to 2014. Their study results show a substantial effect of financial development on poverty reduction. In a study conducted by Appiah *et al* (2020) on five African emerging economies using fully modified ordinary least squares (FMOLS) from 1995 to 2015, it was found that financial development proxied by either liquid liability as a percentage of GDP or bank domestic credit as a percentage of GDP is beneficial in reducing poverty. Donou-Adonsou and Sylwester (2016) provided additional insight into the relationship between financial

development and poverty by examining 71 developing countries from 2002 to 2011 using the two-stage least squares (2SLS) techniques. Their findings reveal that, in the case of the dominant formal banking in an economy, the poverty level decreases with progress in financial development.

Contrary to the poverty reduction effects of financial development, other studies provide evidence of the reinforcing effects of financial development. Abdin (2016) found evidence that financial development triggers instabilities that worsen the poverty level in a study conducted in Bangladesh using data from 1974 to 2013. Boukhatem (2016) employed the system GMM regression technique to assess the contribution of financial development to poverty reduction for a panel of 67 low and middle-income countries from 1986 to 2012. His findings reveal that financial development favors the wealthy while undermining the poor, thus exacerbating poverty, due to the requirement for collateral securities by the financial sector in providing loans. González (1994) lends further insights, stating that financial services' benefits are more biased towards people with productive opportunities, making it more challenging for financial development to help people experiencing poverty. Zahonogo (2017) investigated the relationship between financial development and poverty across 42 sub-Saharan African countries using the Generalized Method of Moments (GMM) system. The results unveil the existence of a threshold of financial development, above which the relationship between financial development and poverty levels becomes negative, and below it, the relationship becomes positive.

Furthermore, some studies report no evidence of the contribution of financial development to poverty reduction. Kaidi *et al* (2019) sought to apply a global experience by incorporating a sample of 132 countries using the three-stage least squares method from 1980 to 2014. Their results reveal no significant evidence of the contribution of financial development to poverty reduction. Lemnge and Raphael (2023) examined the effects of financial development on poverty reduction in sub-Saharan Africa from 2000 to 2021 using the Quantile Method of Moments with fixed effects. Their finding reveals that financial development has an insignificant impact on poverty reduction in an economy when extreme poverty falls above 50% of the population. Seven & Coskun (2016) examined the contribution of financial sector development in reducing poverty among emerging countries using dynamic panel data methods from 1987 to 2011. Their findings show that financial development has an insignificant contribution to poverty reduction. In an African study from 1996 to 2015 based on the dynamic system GMM, Bolarinwa *et al* (2021) found no significant effect of the overall financial development on poverty reduction.

2.2.2The Moderating Role of Gender Equality in Reproductive Health

Lack of consensus on the effects of financial development on poverty reduction from both theoretical and empirical literature indicates a need for further enquiry into the matter. Various studies show that women's reproductive health issues affect communities' ability to seize economic opportunities, including the ones created by financial development. For example, Zandberg (2021), based on the nationally representative sample of men and women from the USA, reports that increased access to women's reproductive health care services makes lenders more willing to extend credit to women at affordable rates since it increases the stability of women-led economic activities. Kes *et al* (2015), using a study from Kenya covering the period between 2011 and 2013 found that complications related to pregnancy and childbirth, as well as maternal deaths, create high medical and funeral cost burdens to families leading to decreased ability to save and invest. Kirigia (2006), using a study conducted in the WHO African region, states that maternal deaths

significantly reduce the active labour force in an economy, which negatively affects production and personal savings. Sonfield *et al* (2013), following an extensive literature review made from 2010 to 2012 recommend that the expansion of women's reproductive health services through family planning and control of adolescent births is highly valuable to determine success in various economic opportunities among families since even women's male partners will benefit from delayed/less burden of responsibilities as fathers.

Herrera *et al* (2018), through a study conducted in Madagascar, report that early adolescent motherhood deprives girls of the chance to complete secondary education, thus compromising their education aspirations, which are essential for personal development and future earnings. UNFP (2018), using experiences from Tanzania, reports significant economic losses as a result of girls dropping out of school because of pregnancy-related issues. Kaye (2008), using a longitudinal qualitative study in Uganda, found that most adolescent mothers suffer from anxiety, loss of self-esteem, and difficulty accessing financial, moral, and material support from parents, which affects their ability to effectively use economic opportunities around them. The world Bank (2012), based on experiences from Latin America and the Caribbean, reports that adolescent births not only affect the development of the teen mother due to difficulties in pursuing education for better employment and earnings in the future but also impact the teen mother's parents and siblings due to additional costs imposed if the teen mother and child remain in the household.

Given that financial development creates economic opportunities such as access to capital, improved investment analysis, risk management, access to saving facilities, and support for innovations (Guiso et al., 2009; Demirguc-Kunt & Levine, 2008; Levine, 2021) and that the ability of communities to benefit from economic opportunities depends on individual's capacity to seize them (Banerjee & Duflo, 2013; Sachs, 2005) which can be compromised by unmeat women's reproductive health requirements (Zandberg, 2021; Kes et al., 2015; Herrera & Sahn, 2018; Sonfield et al., 2013), we contend that women's reproductive health status plays a significant role in communities' ability to exploit economic opportunities. Therefore, we argue that improved women's reproductive health can influence the relationship between financial development and poverty reduction.

3. Methodology

3.1 Variables and Measurements

In this study, we use poverty level as the dependent variable, financial development as the independent variable, women's reproductive health as the moderating variable, and some control variables, including inflation, economic growth, income distribution, government expenditure, and human capital.

To measure the poverty level, we employ the Poverty headcount ratio (POVH), which is defined as the percentage of the population living below the poverty line at $ 2.15 a day (2017 PPP) (World Bank, 2023). The measure was selected because it is widely recognized as a proxy for poverty in previous studies (see Singh, 2015; Donou-Adonsou & Sylwester, 2016; Zahonogo, 2017) and aligns with the World Bank's definition of poverty, which is the lack of resources to afford a basic standard of living (World Bank, 1990). However, because the poverty headcount ratio measures the prevalence of poverty and does not account for changes in income levels of the poor, which is essential in measuring poverty reduction, following Kiendrebeogo & Minea (2022) and Zahonogo

(2017), the study employs the poverty gap ratio (POVG) as an additional measure to address the weakness. Poverty gap ratio is defined as the percentage by which the mean income of the poor falls below the poverty line (World Bank, 2023). Therefore, changes in the poverty gap ratio provide insights into the increase and decrease of the mean income of the people living below the poverty threshold.

Following De Haan *et al* (2022) and Bolarinwa *et al* (2021), we proxy financial development using the IMF composite financial development index. The index provides an aggregate measure of the performance of a country's financial institutions and markets based on depth, access, and efficiency (IMF, 2023). Since it considers the multidimensional aspect of the financial systems, including financial institutions and markets (Svirydzenka, 2016), it is superior over narrow-based measures focusing on specific elements of financial development like depth, access and efficiency.

This study employs the UNDP approach to measure gender inequality/equality in reproductive health, which is based on maternal mortality ratio and adolescent birth ratio (UNDP, 2023b). Maternal mortality ratio refers to the annual number of women who die due to pregnancy-related causes, including during pregnancy, childbirth, and within 42 days of pregnancy termination, per 100,000 live births (WHO, 2023b). On the other hand, adolescent birth ratio is the annual number of births in women aged 15 – 19 per 1000 women of the same age (WHO-Monitor, 2020).

We selected control variables based on their relevance in poverty models from previous studies (see Rewilak, 2017; Zahonogo, 2017; Moreno, 2011; Bolarinwa *et al*., 2021) to avoid bias and inconsistent results (see Frolich, 2008). Thus, inflation measured by inflation rate was included to control for the effects of macroeconomic dynamics on poverty with an expectation of a positive sign (see Gyeke-Dako *et al.*, 2022). We also employed economic growth measured by Gross Domestic Product per capita to control for the contribution of income to poverty, expecting a negative sign (see Khullar & Chokshi, 2018). Income distribution measured by the Gini coefficient is included to control for the effects of income inequality on poverty, expecting a positive sign (see Fosu, 2010). Additionally, to head for the redistributive effects of government expenditure, the study employed government expenditure measured by final government consumption expenditure, expecting a negative sign (see Anderson *et al.*, 2018). To control for the contribution of human capital, the study employed achievement in education measured by gross secondary school enrolment, with an expectation of a negative sign (see Moyo *et al.*, 2022).

3.2 Data Sources

Due to limited data availability in sub-Saharan Africa, we employed unbalanced panel data spanning from 2000 to 2022 to facilitate empirical investigation. The countries included were selected based on data availability (refer to Appendix 1 for a list of countries included in the study). We sourced valuable data as follows: financial development from the IMF databank (IMF, 2023), maternal mortality ratio and adolescent birth ratio from the UNDP data bank (UNDP, 2023b), while data for poverty headcount ratio, poverty gap, inflation rate, GDP per capita, Gini coefficient, government final consumption expenditure and gross secondary school enrolment rate, were extracted from World Development Indicators (World Bank, 2023b).

3.3 The Study Model

Following poverty models from Dollar & Kraay (2002) and Rewilak (2017), where poverty depends on financial development along with a set of control variables, the basic model to study the relationship between financial development and poverty for a panel of 36 sub-Saharan African countries is specified as:

$$POV_{it} = \beta_0 + \beta_1 FDX_{it} + \beta_2 MMR_{it} + \beta_3 ABR_{it} + \beta_4 C_{it} + \mu \quad (1)$$

Where POV is the dependent variable (poverty), FDX is financial development index, MMR is the maternal mortality ratio, ABR is the adolescent birth ratio, C is the vector of control variables, μ is the error term, t stands for time in years, and i represent individual countries within the selected region.

To examine the moderation effect of women's reproductive health on the relationship between financial development and poverty, following Zhang & Naceur (2019) and Chang *et al* (2009) we introduce interacting terms so that the targeted relationship is allowed to vary with country characteristics of maternal mortality ratio and adolescent birth ratio accounting for gender inequality/equality in reproductive health. Hence, the regression equation becomes:

$$POV_{it} = \beta_0 + \beta_1 FDX_{it} + \beta_2 GDP_{it} + \beta_3 INFL_{it} + \beta_4 GCE_{it} + \beta_5 MMR_{it} + \beta_6 ABR_{it} + \beta_7 FDX_{it} * MMR_{it} + \beta_8 FDX_{it} * ABR_{it} + \beta_9 GINI_{it} + \beta_{10} ENRL_{it} + \mu \quad (2)$$

Where: POV_{it} represent poverty indicator for country i at time t; $FDX_{i,t}$ represent financial development index; INF represent inflation rate; GDP represents GDP per capita; ENRL represent gross secondary school enrolment; GCE represent general government final consumption expenditure; MMR represent maternal mortality ratio; ABR represent adolescent birth ratio; GINI represent gini coefficient (both for country i at time t); β_1 ....β_{10} represent coefficients of explanatory variables.

3.4 Estimation Techniques

To estimate the moderating effect of gender equality in reproductive health on the relationship between financial development and poverty reduction in sub-Saharan Africa, the study employed the Method of Moments Quantile Regression (MM-QR) with fixed effects by Machado and Silva (2019). The method is advantageous for the following reasons: First, since the use of financial services and products is primarily influenced by income status (Boukhate, 2016; González, 1994), the method of moments quantile regression which is capable of estimating the heterogeneous and distributional effects of explanatory variables across the quantiles of the dependent variable (poverty) would be helpful. Second, since variables used in this study, such as poverty head count ratio, poverty gap ratio and financial development index have significant variations across countries in sub-Saharan Africa where policy differences also exist (World Bank, 2023b; IMF, 2023), we expect outlier issues and endogeneity to be a common problem in the study. Hence, using the method of moments quantile regression technique, which is robust to outliers and capable of addressing endogeneity issues (Ma & Wang, 2022; Machado & Silva, 2019), will help to offer valuable results. Third, some studies assert threshold levels of financial development in its relationship with poverty in sub-Saharan Africa, thus indicating a possibility for a nonlinear relationship (Zahonogo, 2017; Bolariwa, 2021). Since the method of moments quantile regression

can capture nonlinear relationships (Cannon, 2018), it is more suitable for this study. Forth, since the study intends to use unbalanced panel data due to limited data availability, especially for poverty headcount ratio and poverty gap ratio in sub-Saharan Africa, the method of moments quantile regression which is not reliant on distributional assumptions while leveraging insights from the entire distribution using repeated observations in panel data (see Machado & Silva, 2019; Ma & Wang, 2022) is particularly best suited.

According to Machado& Silva (2019), the quantile regression equation of a random variable is given as:

$$P_{it} = \alpha_\tau + \beta_\tau X'_{i,t} + (\delta_i + \theta'_{i,t}\gamma) + \varepsilon_{i,t} \quad (3)$$

Where; P_{it} is the dependent variable of country i at time t; $X'_{i,t}$ is a vector of explanatory variables for country i at time t; $(\alpha, \beta, \delta, \gamma)$ are parameters to be estimated; $(\delta_i + \theta'_{i,t}\gamma)$ is the scale effect capturing additional factors influencing the conditional mean of the dependent variable with the components of individual-specific effects (δ_i) and time-varying effects (θ'). Given the location and scale effect and the conditional quantile regression of a random variable is expressed as:

$$QP_{it}(\tau/x'_{it}) = \alpha_\tau + \beta_\tau X'_{i,t} + (\delta_i + \theta'_{i,t}\gamma) + \varepsilon_{i,t} \quad (4)$$

Where: $QP_{it}(\tau/x'_{it})$ is the quantile distribution of the dependent variable

Taking into account equation 3 for conditional quantile regression and the basic model in equation 2, the method of moments quantile regression equation for estimating the distributional and heterogeneous effects of financial development, along with maternal mortality ratio and adolescent birth ratio, across poverty quantiles is as follows:

$$POV_{it}\left(\tau/x'_{it}\right) = \beta^\tau{}_{it} + \beta^\tau{}_2 FDX_{i,t} + \beta^\tau{}_2 GDP_{i,t} + \beta^\tau{}_2 INFL_{i,t} + \beta^\tau{}_2 GCE_{i,t} + \beta^\tau{}_2 MMR_{i,t} + \beta^\tau{}_2 ABR_{i,t} + \beta^\tau{}_2 FDX * MMR_{i,t} + \beta^\tau{}_2 FDX * ABR_{i,t} + \beta^\tau{}_2 GINI_{i,t} + \beta^\tau{}_2 ENRL_{i,t} \quad (5)$$

Where: τ = the τ^{th} quantile range; $\beta^\tau{}_{it}$ = non-addictive fixed effects; and other variables are defined above.

4. Results and Discussion

4.1 Descriptive Analysis

Table 1 presents summary statistics for the variables used in the study. It indicates that, between 2000 and 2021, while sub-Saharan Africa's mean poverty headcount ratio was 39.6% measured at $2.15 a day (2017 PPP), the mean poverty gap was 15.1%. However, the minimum poverty headcount ratio of 1% and poverty gap of 0 compared to their maximum levels of 95.5% and 58.5%, respectively, indicate a significant variation in poverty severity and incidence across sub-Saharan Africa countries. The average financial development index of 0.14 suggests that sub-Saharan Africa has made progress in developing its financial institutions and markets in terms of depth, access, and efficiency from 2000 to 2022. The minimum value of financial development

index of 0.026 and the maximum value of 0.593 over the same period indicate a substantial variation in the financial sector development across sub-Saharan Africa countries.

The study also reveals that the average maternal mortality ratio and adolescent birth ratio in sub-Saharan Africa between 2000 and 2022 were 553 maternal deaths per 100,000 live births and 108 births per 1000 women aged between 15–19 years, respectively. Furthermore, the minimum level of maternal mortality ratio of approximately 53 deaths per 100,000 live births and adolescent birth ratio of about 24 births per 1000 women aged between 15 – 19 years, compared to their maximum levels of roughly 2480 maternal deaths per 100,000 live births and adolescent birth ratio of around 205 births per 1000 women aged between 15–19 years among countries of sub-Saharan Africa over the same period, indicates significant variations in women's welfare among sub-Saharan Africa countries.

Table 1: Summary Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
Poverty headcount ratio	245	39.619	21.174	.1	91.5
Poverty gap ratio	244	15.086	11.138	0	58.5
Financial development index	792	.143	.108	.026	.593
Gross Domestic Product (log)	792	7.085	.894	5.542	9.302
Inflation rate	765	9.123	30.446	-16.86	513.907
Government consumption expenditure (log)	737	21.216	1.336	17.392	24.973
Maternal mortality ratio	792	553.274	315.959	53	2480
Adolescent birth ratio	792	107.735	38.739	24.31	205.385
Gross secondary school enrolment	515	43.415	23.718	6.197	114.715
Gini coefficient	246	43.098	7.813	29.6	64.8

Source: Authors estimates, (2024)

4.2 Correlation Results

Table 2 presents the matrix of the pairwise correlation between all variables involved in the study. The negative correlation between the financial development index and poverty indicators (poverty headcount ratio and poverty gap ratio) suggests the poverty-reducing effects of financial development. The high correlation between the poverty headcount ratio and the poverty gap ratio indicates that the two should be examined in different models. The correlation between the maternal mortality ratio and the education variable justifies the argument of Nelson *et al* (2018) and Mensch *et al* (2019) that the two are affected by closely related factors. To avoid multicollinearity, we exclude the education variable and include the maternal mortality ratio. Similarly, the interaction terms obtained by multiplying the financial development index and maternal mortality ratio as well as by multiplying the financial development index and adolescent birth ratio seem to highly correlate with the self-standing maternal mortality ratio and adolescent

birth ratio consecutively. Hence, to avoid the negative effect of severe multicollinearity on the results (see, Vatcheva et al., 2016), we exclude maternal mortality ratio and adolescent birth ratio in models with interaction terms.

Table 2: Correlation Coefficients

Variables		**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
Poverty headcount ratio	(1)	1											
Poverty gap	(2)	0.964	1										
Financial development index	(3)	-0.277	-0.287	1									
Gross Domestic Product	(4)	-0.733	-0.649	0.095	1								
Inflation rate	(5)	-0.076	-0.035	-0.097	0.091	1							
Government consumption expenditure	(6)	-0.284	-0.293	0.139	0.52	0.166	1						
Maternal mortality ratio	(7)	0.221	0.268	-0.497	0.054	0.057	-0.105	1					
Adolescent birth ratio	(8)	0.323	0.255	0.02	-0.448	-0.053	-0.006	-0.07	1				
Gross secondary school enrolment	(9)	-0.286	-0.299	0.453	0.086	-0.023	0.153	-0.753	-0.011	1			
Gini coefficient	(10)	0.057	0.144	-0.127	0.39	-0.063	0.302	0.331	-0.312	-0.139	1		
Interaction effect between financial development index and Maternal mortality ratio	(11)	0.223	0.27	-0.5	0.054	0.083	-0.087	0.993	-0.07	-0.749	0.313	1	
Interaction effect between financial development index and adolescent birth ratio	(12)	0.215	0.141	0.35	-0.389	-0.079	0.048	-0.222	0.934	0.116	-0.315	-0.224	1

Source: Authors estimates, (2024)

4.3 Effects of explanatory variables on poverty indicators

Table 3 presents the results of the method of moments quantile regression (MM-QR) analysis, demonstrating the separate effects of explanatory variables on poverty indicators. The findings reveal that an increase in the financial development index is associated with a decrease in both the poverty headcount ratio and poverty gap ratio for all quantiles. This implies that financial development has poverty-reducing effects in sub-Saharan Africa. However, since the coefficients of the relationship between financial development and poverty headcount ratio appear to decline continuously as we move from the lower quantile towards the upper it means that, the poverty-reducing effects of financial development in sub-Saharan Africa decline as the level of poverty increases. The results further show that the maternal mortality ratio and adolescent birth ratio are positively related to poverty indicators. This implies that greater gender equality in reproductive health as a result of improvement in women's reproductive health has a poverty-reducing effect in sub-Saharan Africa. Since the coefficients of the relationship between maternal mortality ratio and poverty indicators increase as we move from the lower quantile towards the upper it implies that the poverty-reducing effects of increased gender equality in reproductive health are higher when the poverty level is also higher and vice versa.

Concerning control variables, the results show that an increase in Gross Domestic Product reduces the poverty headcount ratio and poverty gap ratio, while a higher Gini coefficient and government consumption expenditure increase the poverty headcount ratio and poverty gap ratio. However, the positive effects of government consumption expenditure decline as we move towards the upper quantile of both the poverty headcount ratio and poverty gap ratio, where it becomes insignificant. Finally, the data suggests that changes in the inflation rate have no significant effects on poverty levels in sub-Saharan Africa.

4.4 Effects of Introducing Interacting Variables on Poverty Indicators

Table 4 presents the method of moments quantile regression results for the effects of the interaction term between maternal mortality ratio and financial development as well as between adolescent birth ratio and financial development on poverty indicators. The results reveal that the coefficients of financial development along the lower quantile, median, and upper quantile increase when interacting variables (maternal mortality ratio and adolescent birth ratio) are introduced. For the poverty headcount ratio model, the coefficients of financial development increase from -0.046, -0.042, and -0.037 to -0.054, -0.051, and -0.048 along the lower quantile, median, and upper quantile respectively (refer to table 3 and 4). This implies that, as a result of increased gender equality in reproductive health in sub-Saharan Africa, financial development becomes more effective in reducing the proportion of the population living below the poverty line (poverty incidence). Similarly, for the poverty gap ratio model, the coefficient of financial development increases from -0.020, -0.020, and - 0.021 to -0.021, - 0.023, and - 0.026 along the lower quantile, median, and upper quantile respectively. This implies that, as a result of increased gender equality in reproductive health in sub-Saharan Africa, financial development becomes more effective in reducing the extent of poverty that individuals or households experience (poverty depth).

Table 3: Effects of Explanatory Variables on Poverty Indicators

	Poverty headcount ratio			Poverty gap ratio		
Variables	τ = **0.25**	τ = **0.50**	τ = **0.75**	τ = **0.25**	τ = **0.50**	τ = **0.75**
Financial development index	-0.046***	-0.042***	-0.037***	-0.020***	-0.020***	-0.021**
	(0.011)	(0.010)	(0.012)	(0.006)	(0.007)	(0.009)
Gross Domestic Product (log)	-0.218***	-0.212***	-0.205***	-0.099***	-0.098***	-0.097***
	(0.012)	(0.012)	(0.014)	(0.006)	(0.007)	(0.011)
Inflation rate	-0.052	0.011	0.077	0.006	0.080	0.165
	(0.156)	(0.126)	(0.134)	(0.088)	(0.090)	(0.118)
Government consumption expenditure (log)	0.026***	0.022***	0.017*	0.011***	0.007*	0.002
	(0.008)	(0.007)	(0.009)	(0.004)	(0.004)	(0.005)
Maternal mortality ratio	0.039***	0.044***	0.049***	0.021***	0.026***	0.031***
	(0.014)	(0.012)	(0.013)	(0.007)	(0.007)	(0.009)
Adolescent birth ratio	0.047**	0.043**	0.039*	0.013	0.017	0.022
	(0.024)	(0.020)	(0.021)	(0.011)	(0.011)	(0.013)
Gini coefficient	0.959***	0.880***	0.796***	0.518***	0.517***	0.516***
	(0.127)	(0.120)	(0.138)	(0.060)	(0.068)	(0.090)
Constant	1.043***	1.190***	1.344***	0.438***	0.543***	0.664***
	(0.160)	(0.130)	(0.124)	(0.082)	(0.075)	(0.083)
Observations	226	226	226	225	225	225

Note: *** P < 0.01 and **p < 0.05 and * p < 0.1 show significance at 1%, 5% and 10% respectively.
Standard errors are reported in parentheses.
Source: Authors estimates, (2024)

Table 4: Effects of Interacting Variables

	Poverty Headcount			Poverty Gap		
Variables	τ = **0.25**	τ = **0.50**	τ = **0.75**	τ = **0.25**	τ = **0.50**	τ = **0.75**
Financial development index	-0.054***	-0.051***	-0.048***	-0.021***	-0.023***	-0.026**
	(0.013)	(0.011)	(0.014)	(0.006)	(0.007)	(0.010)
Gross Domestic Product (log)	-0.219***	-0.211***	-0.203***	-0.099***	-0.099***	-0.098***
	(0.012)	(0.012)	(0.014)	(0.006)	(0.007)	(0.011)
Inflation rate	-0.080	-0.011	0.062	-0.013	0.066	0.156
	(0.154)	(0.126)	(0.135)	(0.086)	(0.090)	(0.121)
Government consumption expenditure (log)	0.025***	0.021***	0.016*	0.009**	0.006	0.002
	(0.008)	(0.007)	(0.009)	(0.003)	(0.004)	(0.005)
Gini coefficient	0.950***	0.875***	0.796***	0.511***	0.513***	0.515***
	(0.126)	(0.118)	(0.136)	(0.058)	(0.067)	(0.091)
Interaction effect between financial development index and Maternal mortality ratio	0.009***	0.010***	0.011***	0.006***	0.006***	0.007***
	(0.003)	(0.003)	(0.003)	(0.001)	(0.001)	(0.002)
Interaction effect between financial development index and adolescent birth ratio	0.009*	0.009*	0.009*	0.002	0.003	0.004
	(0.005)	(0.004)	(0.005)	(0.002)	(0.002)	(0.003)
Constant	1.138***	1.270***	1.409***	0.472***	0.583***	0.709***
	(0.153)	(0.124)	(0.123)	(0.077)	(0.073	(0.084)
Observations	226	226	226	225	225	225

Note: *** P < 0.01 and **p < 0.05 and * p < 0.1 show significance at 1%, 5% and 10% respectively.
Standard errors are presented in parentheses
Source: Authors estimates, (2024)

5. Robustness Test

We conducted a robustness test by introducing an additional control variable, governance institutional quality (GOV), to all models to assess model sensitivity upon reducing potential omitted-variable bias. We proxy institutional quality by the average of six institutional measures from Kaufmann *et al*. (1999): control of corruption, rule of law, political stability, voice and accountability, government effectiveness, absence of violence and regulatory quality. The variable is chosen not only because it has been used in previous studies (see Zahonogo, 2017) but also because governance has a significant role to play in determining the achievement of poverty reduction initiatives (Ullah & Majeed, 2023). The robustness results in Tables 5 and 6 show that, despite the institutional quality variable being statistically insignificant in influencing poverty, its inclusion does not alter the main results of the model for both the poverty headcount ratio and poverty gap ratio. Hence, our models are robust and not dependent on particular variable selections.

Table 5: Additional Control Variable on the Effects of Explanatory Variable on Poverty Indicators.

	Poverty Headcount			Poverty Gap		
Variables	τ = **0.25**	τ = **0.50**	τ = **0.75**	τ = **0.25**	τ = **0.50**	τ = **0.75**
Financial development index	-0.042***	-0.036***	-0.030**	-0.018***	-0.016**	-0.013
	(0.011)	(0.010)	(0.013)	(0.006)	(0.007)	(0.009)
Gross Domestic Product (log)	-0.215***	-0.210***	-0.204***	-0.097***	-0.094***	-0.091***
	(0.012)	(0.012)	(0.015)	(0.006)	(0.007)	(0.010)
Inflation rate	-0.057	-0.012	0.035	-0.033	0.042	0.117
	(0.165)	(0.131)	(0.130)	(0.093)	(0.094)	(0.115)
Government consumption expenditure (log)	0.026***	0.022***	0.017**	0.011**	0.006	0.001
	(0.008)	(0.008)	(0.009)	(0.004)	(0.004)	(0.005)
Maternal mortality ratio	0.043***	0.048***	0.052***	0.023***	0.029***	0.034***
	(0.013)	(0.012)	(0.014)	(0.007)	(0.007)	(0.010)
Adolescent birth ratio	0.051**	0.041*	0.031	0.012	0.013	0.015
	(0.024)	(0.021)	(0.023)	(0.012)	(0.012)	(0.017)
Governance institutional quality (log)	0.001	-0.012	-0.024	-0.011	-0.022	-0.034
	(0.017)	(0.018)	(0.023)	(0.010)	(0.017)	(0.026)
Gini coefficient	0.926***	0.873***	0.818***	0.516***	0.537***	0.559***
	(0.130)	(0.126)	(0.147)	(0.063)	(0.075)	(0.102)
Constant	1.030***	1.166***	1.307***	0.414***	0.515***	0.616***
	(0.164)	(0.132)	(0.121)	(0.087)	(0.074)	(0.076)
Observations	217	217	217	216	216	216

Note: *** P < 0.01 and **p < 0.05 and * p < 0.1 show significance at 1%, 5% and 10% respectively.
Standard errors are reported in parentheses.
Source: Authors estimates, (2024)

Table 6: Additional Control Variable on the Effects of Interacting Variables

	Poverty Headcount			Poverty Gap		
VARIABLES	τ = **0.25**	τ = **0.50**	τ = **0.75**	τ = **0.25**	τ = **0.50**	τ = **0.75**
Financial development index	-0.051***	-0.045***	-0.037**	-0.019***	-0.017**	-0.015
	(0.012)	(0.012)	(0.015)	(0.007)	(0.008)	(0.011)
Gross Domestic Product (log)	-0.216***	-0.209***	-0.202***	-0.097***	-0.094***	-0.092***
	(0.012)	(0.012)	(0.015)	(0.006)	(0.007)	(0.010)
Inflation rate	-0.070	-0.046	0.009	-0.050	0.024	0.098
	(0.160)	(0.132)	(0.133)	(0.093)	(0.096)	(0.115)
Government consumption expenditure (log)	0.025***	0.021***	0.016*	0.010**	0.005	0.001
	(0.008)	(0.007)	(0.009)	(0.004)	(0.004)	(0.004)
Gini coefficient	0.915***	0.874***	0.824***	0.509***	0.535***	0.561***
	(0.127)	(0.123)	(0.145)	(0.064)	(0.075)	(0.100)
Governance institutional quality (log)	-0.001	-0.013	-0.029	-0.011	-0.024	-0.037
	(0.017)	(0.018)	(0.024)	(0.011)	(0.017)	(0.026)
Interaction effect between financial development index and Maternal mortality ratio	0.010***	0.011***	0.012***	0.006***	0.007***	0.008***
	(0.009)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
Interaction effect between financial development index and adolescent birth ratio	0.009*	0.008*	0.007	0.002	0.002	0.002
	(0.005)	(0.005)	(0.005)	(0.003)	(0.003)	(0.004)
Constant	1.130***	1.228***	1.351***	0.458***	0.549***	0.640***
	(0.155)	(0.128)	(0.122)	(0.084)	(0.073)	(0.075)
Observations	217	217	217	216	216	216

Note: *** P < 0.01 and **p < 0.05 and * p < 0.1 show significance at 1%, 5% and 10% respectively.
Standard errors in parentheses ( )
Source: Authors estimates, (2024)

6. Discussion

6.1 Financial Development, Gender Equality in Reproductive Health and Poverty.

The negative relationship between the financial development index and poverty indicators shown in Table 5 reveals a significant role of financial development in reducing poverty in sub-Saharan Africa. This is explained by the fact that improved access and availability of financial products and services like saving facilities, credit, insurance and payment mechanisms help people to manage their finances and hence invest in education, health and infrastructures. Note that, since such investments improve the productivity of goods and services for better standards of living, they are highly associated with reduced poverty levels in the community. Also, easy accessibility of efficient credit and saving facilities resulting from financial development provides a means for people to access and accumulate capital useful to start and expand businesses and hence secure better employment and income which is vital in escaping poverty. Additionally, improved access and availability of insurance products resulting from financial development provide a mechanism for people to manage business and income risks and hence remain resilient against life adversities. Furthermore, reduced cost of financial products and services as a result of financial development is expected to lift vulnerable segments of the population out of poverty by providing opportunities for them to save, borrow and invest formally, which is less expensive, safe and more profitable. Such results support the poverty-reducing effects school (see McKinnon, 1973; Shaw, 1973) and the results of several other empirical studies, including Wardana *et al.*, 2022; Giri & Sehrawat, 2015; Bayar, 2023; Ho & Lyke, 2017; Appiah *et al.*, 2020.

The declining coefficient of the relationship between the financial development index and poverty as we move from the lower quantile towards the upper quantile of poverty indicators indicates that the poverty-reducing effects of financial development are higher when the severity of poverty is lower. The implication is that countries with lower levels of extreme poverty offer a greater chance for the poor to benefit from opportunities arising from financial development compared to countries where extreme poverty is greater. The same results were also found by other previous studies, including Lemnge and Raphael (2023) and Boukhatem (2016) asserting that, as the degree of poverty increases in a given population, financial products and services become less accessible to many since the poor can hardly qualify for beneficial products such as credit given the collateral requirements imposed.

The positive relationship between maternal mortality ratio/adolescent birth ratio and poverty indicators in Table 5 reveals that increased gender equality in reproductive health decreases the poverty level in sub-Saharan Africa. This can be explained by the fact that meeting female reproductive health requirements such as effective family planning, appropriate maternal healthcare, safe and legal abortion, and controlling gender-based violence helps to reinforce the community's efforts to reduce poverty (Melesse *et al*., 2020; Kristof & WuDunn, 2010; Chandra-Mouli *et al*., 2021; WHO, 2023a). Similar results were also found in some previous studies, including Herrera & Sahn, 2018; Sonfield *et al*., 2013; and Maharaj, 2022. The key factor for such results is that meeting women's and girls' reproductive health requirements will help to reduce pregnancy-related complications, unwanted pregnancies, and frequent childbearing in the community, leading to increased girls' education, reduced family costs, and increased opportunities for women to work, thereby boosting the community's ability to produce and earn income.

6.2 The Moderating Role of Gender Equality in Reproductive Health

The increased size of the negative coefficient of financial development for all quantiles as a result of the interaction between gender equality in reproductive health and financial development on poverty indicators in Table 4 implies that increased gender equality in reproductive health could generally reinforce the effectiveness of financial development in reducing poverty in sub-Saharan Africa. This means that increased access to efficient family planning services, maternal healthcare, safe abortion, preventive and treatment measures for women's sexually transmitted infections, and freedom from gender-based violence is expected to; decrease family costs of living and make more resources available for investment, increase the ability of women to take active participation in production, enable women to access relevant education to increase the quality and quantity of human capital, and reduce premature deaths of mothers to allow communities to benefit from female social and economic contributions. Through that, opportunities brought by financial development such as increased availability of insurance, credit and saving facilities will rich a wider segment of the population to support increased investments, production and incomes so that individuals and communities can escape poverty. Similar results were also found in other previous studies including Sully *et al.*, 2020; Bloom & Canning, 2003; Herrera & Sahn, 2018; and Sonfield *et al*., 2013.

Moreover, while gender equality in reproductive health is important for enhancing the effectiveness of financial development in reducing poverty, it should be noted that economic growth and income equality also play crucial roles. This is because there is a negative relationship between economic growth and poverty indicators, as well as a positive relationship between income inequality and poverty indicators (Table 4). Similar findings have been reported in previous studies by Zahonogo (2017) and Zhang & Naceur (2019). Furthermore, the positive and statistically significant relationship between government expenditure and poverty indicators suggests that the redistributive effect of government expenditure in SSA is regressive towards the poor. This may be due to the fact that poor countries heavily rely on indirect taxes, which can negatively impact the redistributive effects of government expenditure in the economy, as noted by the World Bank's report (2022).

7. Conclusion and Policy Recommendations

This study examines whether gender equality in reproductive health could moderate the effects of financial development on poverty reduction using data from 36 sub-Saharan African countries from 2000 to 2022. It employed the Quantile Method of Moments (MM-QR) with fixed effects using two poverty indicators, poverty headcount ratio and poverty gap ratio; controlling for inflation rate, economic growth, education, income distribution and Government expenditure. The method of moments quantile regression strategy is suitable for the study due to its capacity to address issues of endogeneity while being robust to outliers. In the study, financial development measured by the financial development index is the leading independent variable, while gender inequality in reproductive health measured by maternal mortality ratio and adolescent birth ratio stands as the moderating variable. Our study employed data from the IMF databank, UNDP data bank and the World Bank. The study's significant contribution is that it incorporates gender inequality/equality in reproductive health on the relationship between financial development and poverty in sub-Saharan Africa which has received little attention from previous studies.

The study's findings demonstrate that financial development has a significant contribution to poverty reduction in sub-Saharan Africa. However, such contribution increases as the level of poverty declines and vice versa. Furthermore, the study reveals that increased gender equality in reproductive health reduces poverty in the region. The interaction between gender inequality in reproductive health and financial development improves the negative coefficient of the relationship between financial development and poverty in sub-Saharan Africa. This finding suggests that gender equality in reproductive health improves the effects of financial development on poverty reduction in the region.

Our findings suggest that policies aimed at poverty reduction in SSA through the financial sector should prioritize the lower-income segment and underprivileged populations, ensuring affordable access to beneficial financial products and services such as credit, savings, and insurance. This will extend the benefits of financial products and services to those segments of the population with the highest prevalence of extreme poverty and hence boost the poverty reduction objective in the region. Additionally, policies aimed at financial sector development should address women's reproductive health needs, including family planning, maternal healthcare, treatment of sexually transmitted diseases, and gender-based violence. By doing so, a larger segment of the underprivileged population will be empowered to take a greater active participation in the economy leading to increased production of goods and services that improves the general well-being of the community. We further recommend that, since economic growth and equality in resource distribution are important to achieve poverty reduction, policy targets for poverty reduction should be coupled with an environment of economic growth and equality in resource distribution for maximum effectiveness.

The study's main limitation is the limited availability of the variables of interest from some economies of sub-Saharan Africa, which prevented us from employing data from all 48 economies of sub-Saharan Africa. However, since most countries in the region share several homogeneous characteristics in areas of interest in this study, including maternal mortality ratio, adolescent birth ratio, and progress in the financial sector, the study's results can still be generalized for the entire region. Additionally, the study employed the broad-based measure of financial development (financial development index), so examining specific dimensions of financial development such as financial depth, access, efficiency, and stability is beyond the scope of this study. Therefore, we recommend further studies on specific dimensions of financial development to determine the most sensitive dimensions of financial development that interact with gender equality in reproductive health to provide more detailed guidance for policy actions.

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Appendix 1: List of countries included in the analysis

S/N	Country	S/N	Country	S/N	Country
1.	Kenya	13.	Sierra Leone	25.	Cameroon
2.	South Africa	14.	Chad	26.	Lesotho
3.	Madagascar	15.	Sudan	27.	Congo, Dem. Rep.
4.	Tanzania	16.	Congo, Rep.	28.	Mali
5.	Mauritania	17.	Togo	29.	Côte d'Ivoire
6.	Uganda	18.	Eswatini	30.	Uganda
7.	Ethiopia	19.	Mozambique	31.	Angola
8.	Namibia	20.	Benin	32.	Gabon
9.	Gambia, The	21.	Niger	33.	Botswana
10.	Nigeria	22.	Burkina Faso	34.	Ghana
11.	Guinea	23.	Rwanda	35.	Burundi
12.	Senegal	24.	Cabo Verde	36.	Guinea-Bissau