

FINANCIAL INCLUSION AND LIFE EXPECTANCY AT BIRTH IN SUB SAHARAN AFRICA

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Abstract

This study examined the effect of financial inclusion on life expectancy at birth in sub-Saharan Africa (SSA). Data for the study covered the period from 2008 to 2023 for 18 SSA countries based on data availability and was obtained from the Financial Access Survey (2025) and the World Development Indicators (2024). The study employed the fixed effect with Driscoll-Kraay standard errors estimation method. The results showed that all the financial inclusion variables used significantly determined life expectancy at birth except for the number of commercial bank branches. Primary school education was not significant however, GDP per capita growth and trade openness were also significant determinants of life expectancy at birth. Effort towards increasing access to ATMs, the number of depositors of savings as well as borrowers from commercial banks should be prioritized to enhance easy financial transactions especially health demand and investment transactions towards improving life expectancy.

Keywords: Life Expectancy at Birth, Financial Inclusion, Healthcare, Sub Saharan Africa, Population Health.

INTRODUCTION

Life expectancy generally shows the status of the population health. People who live long and healthy lives have more productive years and so can contribute to the total output. SSA is characterized by poor population health and this is still a challenge. Many SSA countries still have low life expectancy at birth relative to several emerging and developed countries. For instance, Some Countries in the SSA region still have very low life expectancy at birth. For example, the

World Development Indicators (2024) shows that countries like Eswatini, Lesotho, Nigeria, Zambia, Zimbabwe have low values of life expectancy at birth and as at 2008 the values were 44, 43.5, 50, 53.9 and 46 years respectively. By 2023, the values were 61, 55, 54, 63 and 62 years respectively. The low life expectancy at birth shows the poor health of the population especially in terms of child health, child survival, maternal health and the burden of disease. The importance of population health especially with the working population cannot be overemphasized specifically in SSA where most of the production processes or technologies are labor intensive. Good health status is important for increased production levels and having good population health is an important requirement for making countries to become developed economies.

According to the World Development Indicators (2024), life expectancy at birth in some developed countries like Netherlands, Sweden, United Kingdom and Hongkong as at 2008 was 79, 80.4, 78 and 81.7 years respectively. By 2023, Netherlands, Sweden, United Kingdom and Hongkong still had high numbers such as 82, 83.3, 81.3 and 85.2 years respectively. These values are very high compared to the low values in SSA countries. Life expectancy at birth still remains a challenge that needs urgent and sustained attention in SSA.

The importance of financial inclusion for empowering individuals and household to meet their needs cannot be overemphasized. Despite some efforts to increase financial inclusion in terms of increasing the number of depositors, the number of automated teller machines and the number of commercial bank branches, life expectancy at birth is still characteristically low in SSA.

Although, there are some studies that have examined the effect of financial inclusion on various health outcomes, they did not use life expectancy at birth as a measure of health outcome, which is a broad measure, capturing children, youths and the elderly (for instance, Akeju (2024), Sakanko (2020) and Peter and Omorose (2020)). There are some studies that have examined the effect of financial inclusion on health outcomes but they did not consider the case for SSA despite the huge challenge of low life expectancy at birth in the region. For instance, Gyasi *et al.* (2019), Xiao and Tan (2022), Tian *et al.* (2024) and Acheampong and Tetteh (2024) examined the effect of financial inclusion on health outcomes in Ghana, Kenya, Asia, China and for 121 developed countries respectively. This study therefore examined the effect of financial inclusion on life expectancy at birth for the case of SSA.

LITERATURE REVIEW

Theoretical Review

Grossman (1972) theory of the demand for health argues that health capital differs from other forms of human capital such as education. In particular, it argues that a person's stock of knowledge affects his market and nonmarket productivity, while his stock of health determines the total amount of time, he can spend producing money earnings and commodities. The theory assumes that individuals inherit an initial stock of health that depreciates over time at an increasing rate, at least after some stage in the life cycle-and can be increased by investment.

The Wagstaff (1986) theory of the demand for health states that an individual's demand for health depends on his or her health investments. In this theory, health investments consider all types of health-promoting behavior (consumption of effective medical care, healthy food, etc.) and health-damaging behavior (consumption of cigarettes, alcohol, etc.) as affecting the rate at which health capital depreciates. The health-related behavior of individuals determines their stock, of health capital and ultimately their length of life.

Empirical Review

There are some evidences in the literature for different countries and regions which have shown that financial inclusion significantly explain life expectancy. Acheampong and Tetteh (2024) examined the effect of financial inclusion on population health using a global panel dataset for 121 countries from 2004 to 2020. Employing the ordinary least square and Driscoll-Kraay estimation methods, the results showed that number of automated teller machines, outstanding deposits with commercial banks, outstanding loans from commercial banks and branches of commercial banks had a positive and significant effect on life expectancy, neonatal mortality, under-five mortality and infant mortality. GDP per capita had a positive and significant effect on life expectancy, neonatal mortality, under-five mortality and infant mortality. Trade openness had a positive and significant effect on under-five mortality and infant mortality. Secondary school enrollment rate also significantly increased life expectancy, neonatal mortality, under-five mortality and infant mortality. However, the study did not consider the SSA region.

Xiao and Tao (2022) examined the effect of financial inclusion on health outcomes in Asia from 2007 to 2019. The study used the generalized method of moment and two stage least squares. The result showed that number of automated teller machines had a positive and significant effect on life expectancy at birth. Debit cards had a positive and significant effect on life expectancy at birth. The impact of internet use had a positive and significant effect on life expectancy. Health expenditure had a positive and significant effect on life expectancy at birth. GDP had a positive and significant effect on life expectancy at birth. GDP had a negative and significant effect on death rate. Foreign direct investment had a negative and significant effect on life expectancy at birth. The results showed that digital financial inclusion increases life expectancy but decreases the death rate in Asia. At the same time, financial inclusion positively impacts life expectancy and has a negative impact on the death rate in Asia. However, the study is limited to Asian countries and it has a limited scope.

Popoola (2019) examined the effect of financial inclusion on health outcomes in 36 African countries from year 2004 to 2016. Employing the fixed effect estimator, the result showed that increase in number of depositors with commercial banks had a positive and significant effect on life expectancy in African nations. However, rise in population had a positive and significant effect on life expectancy in Africa. Thus, both African governments and their financial institutions may improve average life expectancy and human capital for more economic development through enhanced financial inclusion. However, the study did not consider the SSA region.

Adediyin (2020) examined the effect of financial inclusion on life expectancy in West Africa from 2010 to 2018. The study employed the dynamic two step generalized method of moment approach. The result showed that commercial bank branches per 100,000 adults, number of automated teller machines per 100,000 adults and number of automated teller machines per 1000 sq.km had a positive and significant effect on life expectancy at birth. Deposit-GDP ratio and loan-GDP ratio also had a positive and significant effect on life expectancy at birth. Private health spending had a positive and significant effect on life expectancy at birth. Access to infrastructure had a positive and significant effect on life expectancy at birth. Access to infrastructure this implies that, on the average, increase in the coverage of financial inclusion would elongate human life. Thus, an improved life expectancy, ceteris paribus, depends on the level of financial inclusion in the region. However, the study did not consider the SSA region and it has a limited period of the study.

Tian *et al.* (2024) examined the effect of digital financial inclusion on residents' health in China from 2015 to 2019. The study used the fixed effect estimation method. The result showed that digital inclusive finance significantly improved the health level of rural residents. Digital inclusive finance had a more significant effect on improving the health of low-income residents and residents in less developed areas, highlighting the inclusive nature of digital inclusive finance. However, the study did not consider the SSA region.

Banerjee *et al.* (2022) examined the effect of financial inclusion on life expectancy and infant mortality rate. It considered 61 countries in developing and transitional economies from 2011 to 2017. Using a two stage estimation method, the results showed that financial inclusion index had a positive and significant effect on life expectancy at birth. The real GDP per capita significantly increased life expectancy while the average years of schooling was not significant. Financial inclusion index significantly reduced the infant mortality rate. Examining the threshold effect of poverty and income inequality, the study found that the effectiveness of financial inclusion for improving health outcomes was greater when there was higher income inequality or poverty in countries. The study concluded that countries with higher financial inclusion had greater life expectancy at birth.

Sakanko (2020) examined the effect of financial inclusion on health outcomes and health services in Nigeria from 2000 to 2019. The study used the auto regressive distributed lag estimation method. The result of the study showed that access to credit had a positive and significant effect on private health expenditure. Access to credit had a positive and significant effect on life expectancy at birth. The number of commercial bank branches had a negative and significant effect on life expectancy at birth and private health expenditure. Deposit to savings ratio had a negative and significant effect on life expectancy at birth and private health expenditure both in the short-run and long-run. Per capita income had a positive and significant effect on life expectancy and private health expenditure. Unemployment had a negative and significant effect on life expectancy at birth and private health expenditure. These studies discussed above have established financial inclusion as a significant determinant of health status and longevity however, the studies did not specifically consider the SSA region.

Some studies have shown the important role of income in determining population health. For instance, examining the effect of income on life expectancy at birth, Pavio *et al.* (2026) also found

that life expectancy increased progressively with higher income percentiles and this was consistent among men and women using 14 billion person-year observations in Spain from 2012 to 2017 from the Spanish Official Statistical Agency. The GDP per capita also significantly increased life expectancy at birth in Tarca *et al.* (2024), Cavmak *et al.* (2024) and Radmehr and Adebayo (2022).

Mhlanga (2025) examined the effect of economic growth on life expectancy in South Africa from 1994 to 2022. The study used the autoregressive distributed lag estimation technique. The results of the study showed that GDP per capita, inflation and imports had a negative and significant effect on life expectancy. Household consumption expenditure, government consumption expenditure health expenditure, innovation, and telecommunications had a positive and significant on life expectancy. However, the study did not consider the effect of financial inclusion and it is limited to south Africa. Abubakar *et al.* (2023) also found inflation to have a reduction effect on life expectancy.

Roffia *et al.* (2023) investigated the determinants of life expectancy at birth in 36 OECD countries using the fixed effect Arellano-Bond estimator. The GDP level was found to have a negative and significant effect on life expectancy. Countries with low GDP levels as well high GDP countries still had reduced life expectancy. Chronic respiratory diseases, alcohol consumption and population also had a negative and significant effect. The labour force participation rate on the otherhand helped to improve life expectancy. The GDP also had a negative and significant effect on life expectancy at birth in Hendrawaty *et al.* (2022).

Shi *et al.* (2022) examined the effect of financial development on health outcomes in selected Asian economies from 1991 to 2019. The study used the auto regressive distributed lag estimation method. The result of the study showed that financial development index had a positive and significant effect on life expectancy in China. Financial globalization had a positive and significant effect on life expectancy at birth in Japan and India. GDP had a positive and significant effect on life expectancy at birth in China and Japan. Current health expenditure had a positive and significant effect on life expectancy at birth in China. Health expenditure had a positive and significant effect on life expectancy at birth in India. Internet use had a positive and significant effect on life expectancy at birth. However, the study is limited to Asia and did not consider the effect of financial inclusion.

Shahbaz *et al.* (2019) examined the effect of financial development, globalization, economic growth on life expectancy in Sub-Saharan Africa from 1970 to 2012. The study used auto regressive

distributed lag estimation method and the results revealed that domestic credit to private sector had a positive and significant effect on life expectancy at birth. Trade openness had a positive and significant effect on life expectancy at birth. Real GDP per capita had a positive and significant effect on life expectancy at birth. Secondary school enrollment rate had a positive and significant effect on life expectancy at birth. However, the study did not consider the effect of financial inclusion and it is limited to Nigeria.

Samaila *et al.* (2024) examined the effect of financial sector development on health outcomes in Nigeria from 1985 to 2022. The study used the auto regressive distributed lag model and the results showed that monetary policy rate and 12-month deposit rate had a negative and significant effect on life expectancy at birth in the short run. Treasury bill rate had a negative and significant effect on life expectancy at birth. It also discovered that liquidity ratio had a positive and significant effect on life expectancy at birth both in the short and long run. However, the study did not consider SSA region and did not consider the effect of financial inclusion.

Akintunde and Olaniran (2022) examined the effect of financial development, public health expenditure on health outcomes in Nigeria from 1981 to 2020. The study used auto regressive distributed lag estimation techniques. The result showed that government expenditure had a negative and significant effect on life expectancy. The effect of ratio to broad money supply and private sector to credit to GDP had a positive and significant effect on life expectancy at birth. private sector to credit to GDP had a negative and significant effect on life expectancy at birth. ratio to stock market capitalization and Chin-Ito index had a positive and significant effect on life expectancy at birth. Inflation rate had a negative and significant effect on life expectancy at birth. However, the study did not consider the effect of financial inclusion and did not consider the SSA region. Hendrawaty *et al.* (2022) also found that domestic credit to private sector had a negative and significant effect on life expectancy in 5 south eastern Asian countries.

Chiappini *et al.* (2022) examined the impact of foreign direct investment on population health for a global set from 1990 to 2019. The study used the ordinary least squares and the fixed effects estimation method and the result showed that GDP per capita, employment rate, foreign direct investment and trade openness had a significant and positive effect on life expectancy at birth. However, the study did not consider the effect of financial inclusion and it did not consider SSA.

FDI also significantly increased life expectancy at birth in Alam *et al.* (2021). Trade openness on the otherhand had a negative and significant effect in Peter and Omorose (2020).

Aalipour *et al.* (2023) examined the effect of foreign direct investment on life expectancy in Iran from 1981 to 2020. The study used the autoregressive distributed lag estimator. The result of the study showed that gross domestic product growth, foreign direct investment, secondary school enrollment rate, urbanization rate, real exchange rate and interest rate had a significant and positive effect on life expectancy. However, the study did not consider the effect of financial inclusion and it did not consider SSA.

Sart *et al.* (2024) examined the impact of education and income inequalities on life expectancy in European union countries from 2010 to 2022. The study used the fixed effects estimation method and the results showed that education inequality index and income inequality index, infant mortality rate and CO₂ emissions had a negative and significant effect on life expectancy at birth. While internet usage and mobile cellular subscriptions and real GDP per capita had a positive and significant effects on life expectancy. However, the study did not consider the effect of financial inclusion and it did not consider SSA. Koulodoum (2023) found that inclusive education significantly improved life expectancy and this was consistent for both male and female life expectancy in 48 SSA countries from 2000 to 2020. Primary, secondary and tertiary education were all positively significant.

Blazquez-Fernandez *et al.* (2018) examined the effect of income inequality on life expectancy in 26 European countries from 1995 to 2014. The study used fixed and random effects estimation techniques. The result of the study showed that the gini coefficient had a negative and insignificant effect on life expectancy. Primary school enrollment rate had a positive and significant effect on life expectancy. Health expenditure variables had a positive and significant effect on life expectancy. The income quintile share ratio had a positive and insignificant effect on life expectancy at birth. GDP per capita had a positive and significant effect on life expectancy at birth. Boachie *et al.* (2018) also found primary school enrollment rate to have a positive and significant effect on life expectancy at birth and infant mortality in Ghana from 1980 to 2014. Oseni *et al.* (2023) examined the effect of fiscal policy on income inequality and health outcomes in SSA from the period of 2010 to 2022. The study used the generalized method of moment estimation technique. The results showed that income tax had a positive and significant effect on infant mortality and life expectancy at birth.

Government health expenditure and population growth had a positive and significantly effect on infant mortality and life expectancy at birth. The effect of carbon emission had a positive and insignificant effect on infant mortality and life expectancy at birth. government health expenditure exerts a positive but insignificant effect on life expectancy.

Other determinants of life expectancy at birth are health expenditure (Nica *et al.*, 2023; Roffia *et al.*, 2023; Acheampong and Tetteh 2024; Aytemiz *et al.*, 2024; Muradov *et al.*, 2024; Tarca *et al.*, (2024); Adebayo *et al.* (2024), Urbanization (Acheampong and Tetteh, 2024), social and educational expenditures (Aytemiz *et al.*, 2024), carbon dioxide emission (Tarca *et al.*, 2024; Radmehr and Adebayo 2022) and temperature (Roffia *et al.*, 2023; Roy, 2024).

METHODOLOGY

The Model

The theory used is the Grossman (1972) theory of the demand for health, which says that the utility function is based on the stock of health. The utility from the demand for health depends on the investments in the stock of health and the consumption of other commodities. The demand for health is a function of income (GDPC), education (PSE) and price of health inputs (INF). The study measures health or health status using life expectancy at birth (LEB).

The study extends the model to consider the effect of financial inclusion measured as number of automated teller machines (NATM), number of commercial bank branches (NCBB), number of depositors with commercial banks (NDCB) and number of borrowers from commercial banks (NBCB). Financial inclusion empowers individuals and households financially by exposing them to opportunities that provide access to financial services and products. These products make payments for health care services easier and provide savings and interest-earning or investment platforms that both poor and rich households can subscribe to and generate more income to meet their health needs. This consequently contributes to improving the health status of the population.

The model is thus presented as:

$$LEB = f(GDPC, PSE, INF, NATM, NCBB, NDCB, NBCB)..... (1)$$

Some control variables were included in the model, such as trade openness (TO) and foreign direct investment (FDI)

The functional form of the model is presented as:

$$\text{LEB}_{it} = \alpha + \beta_1 \text{GDPC}_{it} + \beta_2 \text{PSE}_{it} + \beta_3 \text{INF}_{it} + \beta_4 \text{NATM}_{it} + \beta_5 \text{NCBB}_{it} + \beta_6 \text{NDCB}_{it} + \beta_7 \text{NBCB}_{it} + \beta_8 \text{TO}_{it} + \beta_9 \text{FDI}_{it} + \varepsilon \quad (2)$$

Income is expected to influence how much an individual spends on his or her health. High income individuals are able to invest more on their health and improve their life expectancy. Income is measured in this study using the GDP per capita (GDPC). Educated people are more aware of hygiene and sanitation rules and have a greater efficiency in producing health. They appreciate the use of healthcare services hence can have a greater life expectancy at birth. Education is measured in this study using primary school enrollment rate (PSE). Price is captured using the inflation rate (INF). Financial inclusion empowers individual to be able to afford their consumption needs including health care expenses and other health inputs.

Data and Source

Panel data for 18 SSA countries from 2008 to 2023 was used based on data availability for the variables of interest. The SSA countries are Botswana, Burundi, Cabo Verde, Cameroon, Comoros, Congo Democratic Republic, Eswatini, Ghana, Guinea, Lesotho, Madagascar, Namibia, Nigeria, Rwanda, Seychelles, Uganda, Zambia and Zimbabwe. Data was obtained from the Financial Access Survey (2024) and the World Development Indicators (2024).

RESULTS

Descriptive Statistics

The descriptive statistics of the variables are presented in Table 1. The descriptive statistics presents the mean, standard deviation, minimum, maximum, skewness and kurtosis for the variables. Life expectancy at birth in SSA has a mean value of 61.39 with a maximum value of 77.24 and a minimum value of 43.57. The number of automated teller machines per 100,000 adults in SSA has a mean value of 16.30 with a maximum value of 93.58 and a minimum value of 0.07. The number

of depositors with commercial banks per 1000 adults in SSA has a mean value of 448.53 with a maximum value of 2070.74 and a minimum value of 4.85. The number of borrowers from commercial banks per 1000 adults in SSA has a mean value of 66.16 with a maximum value of 340.26 and a minimum value of 0.51. The number of commercial bank branches per 100,000 adults in SSA has a mean value of 8.29 with a maximum value of 54.45 and a minimum value of 0.47.

Tables 1: Descriptive Statistics

Variables	Mean	Standard Deviation	Minimum	Maximum	Skewness	Kurtosis
Life expectancy at birth	61.39	6.32	43.57	77.24	0.27	3.54
Inflation rate	7.44	7.13	-16.86	43.07	1.65	7.99
Primary school enrollment rate	109.8	18.60	22.26	156.61	-0.34	6.14
GDP per capita growth	1.61	4.38	-20.89	19.51	-0.86	8.75
Number of automated teller machines	16.30	21.27	0.07	93.58	1.88	5.66
Number of depositors from commercial banks	448.53	528.60	4.85	2070.74	1.67	7.79
Number of borrowers from commercial banks	66.16	79.69	0.51	340.26	1.73	4.99
Number of commercial bank branches	8.29	11.48	0.47	54.45	2.55	8.70

Trade openness	76.59	41.39	16.35	222.18	1.35	4.89
Foreign direct investment	3.72	4.80	-1.70	56.29	5.33	52.55

Source: Author's Computation (2026)

Correlation Analysis

The study conducted a correlation analysis to determine the extent of correlation among the variables. The result is presented in table 2 and 3. The result of the correlation analysis showed that some of the variables had a high correlation up to 0.8 and above. For instance, the number of depositors with commercial banks and the number of automated teller machine had a correlation of 0.8017 while the number of borrowers from commercial banks and the number of automated teller machines have a correlation of 0.9011. Therefore, in order to avoid the issue of multicollinearity, these variables were included separately in the regression model.

Table 2: Correlation Matrix

	LEB	NATM	NDCB	NBCB	NCBB	INF	GDPPC	PSE	TO	FDI
Life expectancy at birth (LEB)	1									
Number of automated teller machines (NATM)	0.507	1								
Number of depositors with commercial banks (NDBC)	0.544	0.8017	1							
Number of borrowers from commercial banks (NBCB)	0.4927	0.9011	0.7345	1						
Number of commercial bank branches (NCBB)	0.6835	0.7933	0.773	0.6543	1					
Inflation rate (INF)	0.1522	-0.177	-0.1182	-0.2011	0.1516	1				
Gross domestic product per capita (GDPPC)	0.0035	-0.0744	-0.0321	-0.0854	0.0512	0.0101	1			
Primary school enrollment rate (PSE)	0.2628	0.0533	-0.1332	0.1116	0.0341	-0.0659	-0.1105	1		
Trade openness (TO)	0.2528	0.6133	0.4165	0.5097	0.6779	-0.0536	0.0609	0.0258	1	
Foreign direct investment (FDI)	0.3513	0.3525	0.2485	0.2468	0.5061	0.0847	0.1079	0.1173	0.4891	1

Multicollinearity Test

The multicollinearity test was conducted using the variance inflation factor. The result of the multicollinearity test showed that there is no problem of multicollinearity because all the variables had a variance inflation factor (VIF) that is less than 10. The mean VIF is 3.64. The result is presented in the Table 3. However, since some of the variables had a high correlation up to 0.8 and above

therefore, the number of automated teller machines and other financial inclusion variables were included separately in the regression models to avoid the problem of multicollinearity.

Table 3: Multicollinearity Test Result

VARIABLES	GDDPC	PSE	INF	NATM	NDCB	NBCB	NCBB	TO	FDI
VIF	1.07	1.21	1.10	9.50	4.57	6.11	5.50	2.34	1.57
MEAN VIF	3.64								

Heteroskedasticity Test

The heteroskedasticity test was conducted using the modified Wald test. The result in Table 4 showed that the Chi2 is 2131.08 with a probability of 0.0000 which is significant at 1%. Therefore, the null hypothesis which states that there is no heteroskedasticity was rejected. Therefore, there is the problem of heteroskedasticity.

Table 4: Heteroskedasticity Test Result

Chi2	Prob (chi2)
2131.08	0.0000

Cross-Section Dependence Test

The cross-section dependence test was conducted to determine whether there is the presence of cross-section dependence among the countries in the panel. Cross-section dependence test was conducted using the Breusch-Pagan LM test, the Pesaran Scaled LM test, the Bias-Corrected scaled LM test and the Pesaran CD test. The results obtained showed that all the statistics for the tests were significant at 1%. Therefore, null hypothesis which states that there is no cross-section dependence was rejected. Therefore, there is the presence of cross-section dependence bias. The result is presented in Table 5.

Table 5: Cross-Section Dependence Test

Tests	Statistic	Prob.
Breusch- Pagan LM	1196.612	0.0000
Pesaran Scaled LM	59.83081	0.0000
Bias-Corrected Scaled LM	59.23081	0.0000
Pesaran CD	20.66909	0.0000

Estimated Results and Discussion of Findings

The study employed the fixed effect with Driscoll-Kraay standard errors estimation method in order to control for the problem of heteroskedasticity, cross-section dependence and potential autocorrelation. The financial inclusion variables were included separately in the regression model to control for multicollinearity bias. Therefore, the study estimated four regression models. Model 1 used the number of automated teller machines, model 2 used the number of commercial bank branches, model 3 used the number of depositors with commercial banks and model 4 used the number of borrowers from commercial banks. The results are presented in Table 4.6.

Effect of the Number of Automated Teller Machine on Life Expectancy at Birth

The number of automated teller machine had a positive and significant effect on life expectancy at birth as shown in model 1. Therefore, an increase in the number of automated teller machine that is available for use fully improved life expectancy at birth. This is possible because accessing healthcare require financial transactions such as the payment of medical or hospital bills, and the purchase of prescribed drugs which can be easily done when there is access to cash and transfer using the automated teller machine. Medical equipment and hospital consumables can easily be purchased when individuals prefer to access cash or transfer transactions using an automated teller

machine nearby. The result is similar to Acheampong and Tetteh (2024), Xiao and Tao (2022) and Adediyi (2020).

GDP per capita growth had a negative but insignificant effect on life expectancy at birth. This is possible because a country may record increase in the national income but still lack hospitals, doctors, medical equipment and even health insurance and this is common among most African countries. High priority needs to be given to the health sector so that a substantial proportion of such funds would be directed towards improving population health. The result is contrary to the positive income effect in Grossman (1972) theory of the demand for health. It is also contrary to Pavio *et al.* (2026), Acheampong and Tetteh (2024), Aytemiz *et al.* (2024) and Sart *et al.* (2024).

Inflation rate had a positive but insignificant effect on life expectancy at birth. This is possible when majority of the population are poor and cannot afford health or medical care and hence, they are unable to use health care facilities and they may decide to rely mostly on herbal or traditional medicines. This is contrary to Mhlanga (2025) and Abubakar *et al.* (2023).

Primary school enrollment rate had a negative but insignificant effect on life expectancy at birth. This is possible when the curriculum standard of primary education does not provide enough knowledge on health awareness which is capable of influencing people to improve their hygiene, sanitation and appreciate the use of health or medical care facilities. There is therefore the need for policy strategies to enable individuals acquire more than a primary education for better health production. The result is contrary to Grossman (1972) theory of the demand for health as well as Koulodoum (2023), Blazquez-Fernandez *et al.* (2018) and Boachie *et al.* (2018).

Trade openness had a negative and significant effect on life expectancy at birth. This means that increase in trade openness reduced life expectancy at birth. This may occur because trade in Africa usually tends towards more of import than export. Medical equipment and prescribed drugs and medications are usually more expensive when they are imported than when locally produced in Africa. This makes the utilization of healthcare unaffordable by majority of the people which are poor and vulnerable. The result is similar to Peter and Omorose (2020) but contrary to Shahbaz *et al.* (2019) and Chiappini *et al.* (2022).

Foreign direct investment had a positive but insignificant effect on life expectancy at birth. Foreign direct investment can stimulate economic activity but may not always be invested in sectors that

directly affect health, such as healthcare systems and sanitation. The result is contrary to Aalipour *et al.* (2023), Chiappini *et al.* (2022), Xiao and Tao (2022) and Alam *et al.* (2021).

Effect of the Number of Commercial Bank Branches on Life Expectancy at Birth

The number of commercial bank branches had a positive but insignificant effect on life expectancy at birth as shown in model 2. This is possible when a significant amount of the population are unable to access the use of banks due to long distance of the branches especially in the rural areas. Complex requirements for opening bank accounts can also discourage potential users. The result is contrary to Acheampong and Tetteh (2024) and Adediyani (2020).

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Trade openness had a negative and significant effect on life expectancy at birth. This means that increase in trade openness reduced life expectancy at birth. This may occur because increased trade tends towards more of import than export. Medical equipment and prescribed drugs and medications are usually more expensive when they are imported than when locally produced in Africa. This

makes the utilization of healthcare unaffordable by majority of the people which are poor and vulnerable. The result is similar to Peter and Omorose (2020) but contrary to Shahbaz *et al.* (2019) and Chiappini *et al.* (2022).

Foreign direct investment had an insignificant effect on life expectancy at birth. Foreign direct investment can stimulate economic activity but may not always be invested in sectors that directly affect health, such as healthcare systems and sanitation. The result is contrary to Chiappini *et al.* (2022), Xiao and Tao (2022), Alam *et al.* (2021) and Aalipour *et al.* (2023).

Effect of the Number of Depositors with Commercial Banks on Life Expectancy at Birth

The number of depositors with commercial banks had a positive and significant effect on life expectancy at birth. Thus, an increase in the number of depositors with commercial banks improved life expectancy at birth. This is because individuals are able to save towards healthcare utilization and use such savings to plan for unseen emergencies such as sickness or accidents. Individuals and households with good savings (especially in the form of financial products such as high return yielding fixed deposits, treasury bills amongst others) eventually enjoy some interests and can have something to fall back on when health emergencies arise. The result is similar to Popoola (2019), Acheampong and Tetteh (2024).

GDP per capita growth had a negative but insignificant effect on life expectancy at birth. This is possible because a country may record increase in the national income but still lack hospitals, doctors, medical equipment and even health insurance and this is common among most African countries. High priority needs to be given to the health sector so that a substantial proportion of such funds would be directed towards improving population health. The result is contrary to Pavio *et al.* (2026), Acheampong and Tetteh (2024), Aytemiz *et al.* (2024) and Sart *et al.* (2024).

Inflation rate had a positive but insignificant effect on life expectancy at birth. This is possible when majority of the population are poor and cannot afford health or medical care and hence, they are unable to use health care facilities and they may decide to rely mostly on herbal or traditional medicines. The result is contrary to Mhlanga (2025) and Abubakar *et al.* (2023).

Primary school enrollment rate had a negative but insignificant effect on life expectancy at birth. This is because primary education may not provide enough knowledge on health awareness which is capable of influencing people to improve their hygiene, sanitation and appreciate the use of health or medical care facilities. The result is contrary to Koulodoum (2023), Blazquez-Fernandez *et al.* (2018), Boachie *et al.* (2018) and Grossman (1972).

Trade openness had a negative and significant effect on life expectancy at birth. This means that increase in trade openness reduced life expectancy at birth. This may occur because increased trade tends towards more of import than export. Medical equipment and prescribed drugs and medications are usually more expensive when they are imported than when locally produced in Africa. This makes the utilization of healthcare unaffordable by majority of the people which are poor and vulnerable. The result is similar to Peter and Omorose (2020) but contrary to Shahbaz *et al.* (2019) and Chiappini *et al.* (2022).

Foreign direct investment had a positive but insignificant effect on life expectancy at birth. The amount of foreign direct investment in most SSA countries may not be substantial enough to provide employment and income earning opportunities that empowers any individuals and households financially to be able to afford healthy and balanced diet and other healthcare needs. The result is contrary to Chiappini *et al.* (2022), Xiao and Tao (2022), Aalipour *et al.* (2023).

Table 6: Estimates of Fixed Effect with Driscoll-Kraay Standard Errors

Variables	Model 1 Coefficient(t-statistic)	Model 2 Coefficient(t-statistic)	Model 3 Coefficient(t-statistic)	Model 4 Coefficient(t-statistic)
Number of automated teller machines	0.1273 (5.50) *	—	—	—
Number of commercial bank branches	—	0.2148 (1.69)	—	—
Number of depositors from commercial banks	—	—	0.0038 (8.44) *	—

Number of borrowers from commercial banks	–	–	–	0.0201 (5.67) *
GDP per capita growth	-0.0544 (-1.06)	-0.0822 (-1.62)	-0.0554 (-1.19)	-0.0592 (-1.26)
Inflation rate	0.0055 (0.17)	-0.0078 (-0.23)	-0.0099 (-0.48)	-0.0067 (-0.24)
Primary school enrollment rate	-0.0031 (-0.23)	-0.0114 (-0.79)	-0.0063 (-0.43)	-0.0128 (-0.83)
Trade openness	-0.0414 (-2.23) **	-0.0660 (-3.36) *	-0.0413 (-2.31) **	-0.0493 (-3.32) *
Foreign direct investment	0.0451 (1.61)	0.0027 (0.08)	0.0527 (2.11)	0.0351 (1.22)
Constant	62.7946 (22.05) *	66.1041 (27.20) *	63.4968 (26.64) *	65.2520 (26.77) *

*and ** denote significance at 1% and 5% levels.

Source: Author's Computation (2026)

Effect of the Number of Borrowers from Commercial Banks on Life Expectancy at Birth

The number of borrowers from commercial banks had a positive and significant effect on life expectancy at birth. An increase in the number of borrowers from commercial bank significantly improved life expectancy at birth. This due to the fact that when individuals and households have access to loans, they are able to meet up with expensive medical tests and treatments that save life and improve health status. There can also be increased investment in the health sector and the provision of basic and secondary healthcare services for citizens when there is increased access to loans so that more firms can borrow from banks to provide health services in clinics, hospitals, pharmacies, diagnostic centers and other healthcare facilities within the country. Increased investment in domestic healthcare services make medical care more affordable locally than when

people have to travel to seek healthcare abroad especially in developed countries. The result is similar to Acheampong and Tetteh (2024).

GDP per capita growth had a negative but insignificant effect on life expectancy at birth. This is possible because a country may record increase in the national income but still lack hospitals, doctors, medical equipment and even health insurance and this is common among most African countries. High priority needs to be given to the health sector so that a substantial proportion of such funds would be directed towards improving population health. The result is contrary to Tarca *et al.* (2024), Cavmak *et al.* (2024) and Radmehr and Adebayo (2022).

Inflation rate had a positive but insignificant effect on life expectancy at birth. This is possible when majority of the population are poor and cannot afford health or medical care and hence, they are unable to use health care facilities and they may decide to rely mostly on herbal or traditional medicines. The result is contrary to Mhlanga (2025) and Abubakar *et al.* (2023).

Primary school enrollment rate had a negative but insignificant effect on life expectancy at birth. This is because primary education may not provide enough knowledge on health awareness which is capable of influencing people to improve their hygiene, sanitation and appreciate the use of health or medical care facilities. The result is contrary to Blazquez-Fernandez *et al.* (2018), Boachie *et al.* (2018), Grossman (1972) and Koulodoum (2023).

Trade openness had a negative and significant effect on life expectancy at birth. This means that increase in trade openness reduced life expectancy at birth. This may occur because increased trade tends towards more of import than export. Medical equipment and prescribed drugs and medications are usually more expensive when they are imported than when locally produced in Africa. This makes the utilization of healthcare unaffordable by majority of the people which are poor and vulnerable. The result is similar to Peter and Omorose (2020) but contrary to Shahbaz *et al.* (2019) and Chiappini *et al.* (2022).

Foreign direct investment had no significant effect on life expectancy at birth. This is contrary to Alam *et al.* (2021), Chiappini *et al.* (2022), Xiao and Tao (2022) and Aalipour *et al.* (2023). The amount of foreign direct investment in most SSA countries may not be substantial enough to provide employment and income earning opportunities that empowers individuals and households financially to be able to afford healthy and balanced diet and other healthcare needs.

CONCLUSION AND POLICY IMPLICATIONS

The study concluded that financial inclusion significantly improved life expectancy at birth in SSA. Therefore, policies intended to increase life expectancy at birth should improve the level of financial inclusion by ensuring that the number of automated teller machine made available by banks are not only increased but placed in strategic locations that are nearest to healthcare facilities such as hospitals, pharmacies, medical diagnostic centers in order to facilitate healthcare financial transactions.

Strategies such as providing incentives to increase deposits and savings in commercial banks using high interest rate on savings or fixed deposits and also developing several attractive financial products such as short term but high yielding fixed deposit, treasury bills and other investment opportunities that offer high returns in order to encourage more depositors to save for unforeseen health emergencies should be prioritized. The number of borrowers from commercial banks had a positive effect thus, financial inclusion strategies should intentionally reduce the interest rate for loans that are specifically requested for health care purposes such as health sector investments and unaffordable medical treatments in order to improve health outcomes. Primary school enrollment rate did not significantly improve life expectancy at birth. There is therefore the need for policy strategies to enable individuals acquire more than a primary education for better health production and good population health. GDP per capita growth and trade openness are also significant determinants of life expectancy at birth.

REFERENCES

- Aalipour, A., *et al.*, (2023). The effect of foreign direct investment on improving the life expectancy index in Iran. *Journal of Health Technology Assessment in Action*, 7(2), 1-8. Doi: 10.18502/htaa.v7i2.13818
- Abubakar, M. S., *et al.*, (2023). Impact of macroeconomic variables on life expectancy in Nigeria. *International Journal of Economics & Development Policy*, 6(1), 1-17.
- Acheampong, A. O., & Tetteh, G. K. (2024). Does financial inclusion matter to population health? Insight from a global dataset. *Social Indicators Research*, 172, 1005–1040. <https://doi.org/10.1007/s11205-024-03341-8>.

- Adebayo, T. S., *et al.*, (2024). Effects of health expenditure, death rate, and infant mortality rate on life expectancy: a case study of the United States. *Energy & Environment*, 0958305X241281804. <https://doi.org/10.1177/0958305X241281804>.
- Adediyin, A. R. (2020). Is financial inclusion a determinant of life expectancy? evidence from West African Region. *Studies in Business and Economics (SBE)*, 23(1), 22-37.
- Akeju, K. F. (2024). Financial inclusion, household decision-making, and child health outcomes in Nigeria. *Innovation Journal of Social Sciences and Economic Review*, 6(2), 47–56. <https://doi.org/10.36923/Ijsser.v6i2.262>.
- Akintunde, T. S., & Olaniran, O. D. (2022). Financial development, public health expenditure and health outcomes: evidence from Nigeria. *Journal of Economics and Allied Research*, 7(1), 13-24.
- Alam, M. S., *et al.*, (2021). Rapid rise of life expectancy in Bangladesh: does financial development matter? *International Journal of Finance & Economics*, 26(4), 4918-4931.
- Aytemiz, L., *et al.*, (2024). The long-term effect of social, educational, and health expenditures on indicators of life expectancy: an empirical analysis for the OECD countries. *Frontiers in Public Health*, 12, 1497794. <https://doi.org/10.3389/fpubh.2024.1497794>.
- Banerjee, R., *et al.*, (2023). Does higher financial inclusion lead to better health outcomes? evidence from developing and transitional economies. *Economics of Transition and Institutional change*, 31(2), 363-401. DOI: 10.1111/ecot.12341
- Blázquez-Fernández, C., *et al.*, (2018). Does rising income inequality reduce life expectancy? new evidence for 26 European Countries (1995–2014). *Global Economic Review*, 47(4), 464–479.
- Boachie. K, M., *et al.*, (2018). Public health expenditures and health outcomes: new evidence from Ghana. *Economies*, 6(4), 58.
- Çavmak, D., *et al.*, (2024). Predictors of life expectancy at birth in Türkiye: A longitudinal study. *Turkish Journal of Public Health*, 22(2), 125-135. Doi: 10.20518/tjph.1359711
- Chiappini, R., Coupaud, M., & Viaud, F. (2022). Does attracting FDI affect population health? new evidence from a multi-dimensional measure of health. *Social Science & Medicine*, 301, 114878.
- Financial Access Survey (2025). International Monetary Fund.
- Grossman, M. (1972). On the concept of health capital and the demand for health. *Journal of Political Economy*, 80(2), 223-255.

- Gyasi, R. M., *et al.*, (2021). Financial inclusion and physical health functioning among aging adults in the sub-Saharan African context: *Exploring social networks and gender roles*. *PLoS ONE* 16(6): e0252007. <https://doi.org/10.1371/journal.pone.0252007>.
- Hendrawaty, E., *et al.*, (2022). Economic growth, financial development, energy consumption and life expectancy: fresh evidence from ASEAN countries. *International Journal of Energy Economics and Policy*, 12(2), 444-448.
- Kouladoun, J. C. (2023). Inclusive education and health performance in sub Saharan Africa. *Social Indicators Research*, 165(3), 879-900. <https://doi.org/10.1007/s11205-022-03046-w>
- Mhlanga, M. (2025). The relationship between economic growth and life expectancy in South Africa. *Applied Health Economics and Health Policy* <http://dx.doi.org/10.2139/ssrn.5454074>.
- Muradov, A. J., *et al.*, (2024). Air pollution and life expectancy in the USA: do medical innovation, health expenditure, and economic complexity matter? *Science of The Total Environment*, 946, 174441.
- Nica, E., *et al.*, (2023). The impact of financial development, health expenditure, CO2 emissions, institutional quality, and energy Mix on life expectancy in Eastern Europe: CS-ARDL and quantile regression Approaches. *Heliyon*, 9(11). <https://doi.org/10.1016/j.heliyon.2023.e21084>.
- Oseni, I. O., *et al.*, (2023). The impact of fiscal policy on income inequality and health outcomes in Sub-Saharan Africa Countries. *Economic Insights-Trends & Challenges*, (4), 1-15, <https://doi.org/10.51865/EITC.2023.04.01>.
- Pavía, J. M., *et al.*, (2026). The cost of inequality: income and life expectancy at birth in Spain. *Health Policy*, 105616. <https://doi.org/10.1016/j.healthpol.2026.105616>
- Peter. S. I. & Omorose, O. A. (2020). Financial liberalization and health outcomes in Nigeria: a case of infant mortality. *Kardan Journal of Economics and Management Sciences* 3 (1) 81–105, 2020.
- Popoola, T. O. (2019). Financial inclusion and health shocks: a panel data analysis of 36 African countries. *Asian Journal of Economics and Empirical Research*, 6(1), 45-51.
- Radmehr, M., & Adebayo, T. S. (2022). Does health expenditure matter for life expectancy in Mediterranean countries?. *Environmental Science and Pollution Research*, 29(40), 60314-60326. <https://doi.org/10.1007/s11356-022-19992-4>
- Roffia, P., *et al.*, (2023). Determinants of life expectancy at birth: a longitudinal study on OECD countries. *International Journal of Health Economics and Management*, 23(2), 189-212. <https://doi.org/10.1007/s10754-022-09338-5>

- Roy, A. (2024). A panel data study on the effect of climate change on life expectancy. *PLoS Climate*, 3(1), e0000339. <https://doi.org/10.1371/journal.pclm.0000339>
- Sakanko, M. A. (2020). Impact of financial inclusion on access to health services in Nigeria. *Journal of Economics and Finance*, 4, 346–354.
- Sart, G., *et al.*, (2024). Impact of education and income inequalities on life expectancy: insights from the new EU members. *Frontiers in Public Health*, 12, 1397585. doi: 10.3389/fpubh.2024.1397585
- Samaila, I., Olusegun, E., & Alimi, O. Y. (2024). Financial sector development and health outcomes in Nigeria: a Causality Approach. *Lead City Journal of Economics*, 4(1), 108-128.
- Shahbaz, M., Shafiullah, M., & Mahalik, M. K. (2019). The dynamics of financial development, globalization, economic growth and life expectancy in sub-Saharan Africa. *Australian Economic Papers*, 58(4), 444-479.
- Shi, G., Wang, D., & Altuntaş, M. (2022). Financial development and health outcomes: do financial globalization matter in selected Asian economies? *Frontiers in Public Health*, 10, 843935.
- Țarca, V., *et al.*, (2024). Social and economic determinants of life expectancy at birth in Eastern Europe. *In Healthcare*, 12(11), 1148.
- Tian, L., Han, W., & Tian, W. (2024). Digital financial inclusion and residents' health: evidence from rural China. *Discover Social Science and Health*, 4(1), 45.
- Uddin, I., *et al.*, (2024). Revisiting the determinants of life expectancy in Asia exploring the role of institutional quality, financial development, and environmental degradation. *Environment, Development and Sustainability*, 26(5), 11289-11309. <https://doi.org/10.1007/s10668-023-03283-0>
- World Development Indicators (2024). World Bank.
- Xiao, W., & Tao, R. (2022). Financial inclusion and its impact on health: Empirical evidence from Asia. *Frontiers in Public Health*, 10, 948964.