Does financial inclusion really improve health? Evidence from sub-Saharan Africa?

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Abstract

In sub-Saharan Africa countries, evidence revealed that only 12 percent of all adults have an account with the financial institutions. Similarly, while health indicators have improved greatly in last two decades globally, there is no relative improvement in sub-Saharan Africa region. Therefore, this study specifically established the long-run and short-run impact of financial inclusion on health indicators – infant health and average longevity – in 29 sub-Saharan Africa nations over the period 2007 and 2018. To achieve this, the study utilize panel unit roots, panel causality test, panel co-integration test, and panel regressions. While the causality tests indicated a uni-directional link from financial inclusion to health indicators. It was also found that there is an inverse short-run and long-run effect of financial inclusion on newborn deaths, but positive on average life expectancy. Another important result of the study is the contemporaneous term of seven percent and two percent for life expectancy and newborn deaths, respectively. These indicated that the speed of adjustment of financial inclusion impact is quite slow in responding to any health shocks, such as, COVID-19 in the region. These findings suggest the important of strategies aiming at increasing financial inclusion; these will not only reduce infant deaths, but also enhance longevity both in short-term and long-term in sub-Saharan Africa countries.

Keywords: Financial inclusion, Health, Savings, Development

1 Introduction

Financial inclusion relates to numbers of people (particularly, adults) with access to effective range of appropriate financial services. This concern access to saving, having functional account with financial institution, credit and borrowing (Fungacova and Weill, 2015; Allen, 2016). The term was traced to high poverty and low-income level of wide range of citizens in developing countries particularly in early 2000s.

From this period, both scholars and policy makers began to emphasis on the need to increase the use of financial services to make deposit and receive payments (Demirguc-Kurnt, Klapper and Singer, 2017). Okoroafor, Adeniji and Awe (2018) explained that the concept encompasses easy access to extensive financial products. These products can be personalized towards people's needs including health financing. Perhaps this imply that financial inclusion could improve health (reduce illness and deaths), first, by aiding investment of both current and future health capital, second, by smoothing their consumption 60 percent and thirdly, through managing their financial shock and risks to aid healthcare access. Yet less than of adults globally are financially included. A more worrisome fact is that only 12 percent of all adults in 2014 have an account with the financial institutions in sub-Saharan Africa (SSA) region (Demirguc-Kunt *et al.*, 2017).

Though, some nations in SSA region took several strategies to increase financial inclusion, through the encouragement of the use of digital payments via mobile phones and creation of intermediaries through their apex banks to promote transparency, and limit fraud. However, access to proper financial services in SSA countries is still limited (World Bank, 2019). In terms of health, though health indicators have been improving moderately since the last two decades globally. However, there is no relative improvement of health indicators in SSA region.

Insight from theory indicate that financial inclusion can help improve health (Becker, 1964). Specifically, Novignon, Nonvignon and Athur (2015) explain that an increase in savings and credits could help people to invest in both the current and future health capital, by smoothing their consumption and manage financial shock and risks. In terms of empirics, while several studies focus on health insurance. Others emphasized on unequal access to healthcare in developing countries which constrains longevity and hinder inclusive growth. However, except the studies of Ajefu, Demir and Haghpanahan (2020), Gyari, Adam and Phillips (2019) that analyze the impact of financial inclusion on mental health in Nigeria and Ghana, respectively; there is a big gap in previous studies concerning the quantitative impact of financial inclusion on health, particularly the general health of citizens of SSA countries.

Therefore to inform policy and practice, this paper aims to investigate, using a quantitative approach, whether contemporary- and long-run financial inclusion affect health indicators in 29 SSA countries. The scope of the study is between 2007 and 2018. The rest of the paper is structured as follows: literature was reviewed in section 2, and section 3 focused on the research methodology. The last two sections (4 and 5) presented findings with discussion, and conclude with recommended policies, respectively.

2 Literature

2.1 Stylized Facts on Health Indicators in SSA

Table 1 indicates a comparative average life expectancy (at birth) of SSA and World average. It demonstrates that though longevity trend has been increasing moderately since the last two decades globally. However, there is no relative change in average life expectancy in SSA region. For instance, the statistics merely increased from 31 years to 58 years between 2000 and 2017 in SSA. For World's average the average longevity increased steadily from 67 years in 2000 to 72 years in 2017 (World Bank, 2019). This show that the average life expectancy (at birth) in Nigeria have remained intriguingly unimpressive. Thus, since there is a strong link between socio-economic factors including poverty and health (WHO, 2013). The issues of poor health indicators might be from low financial inclusion in SSA nations.

Table 1: Comparative Average Life Expectancy at birth (total) in SSA and Global average

Year	2000	2005	2010	2015	2016	2017
Region						
Sub-Saharan Africa	31.4	51.3	53.2	55.9	56.0	58.3
World	67.5	68.9	70.5	71.9	72.2	72.4

Source: Compiled from World Bank Development Indicator, 2019

2.2 Theoretical Insights

The impact of financial inclusion on health is entrenched in theory. Of a particular important is the notion by Berker (1963) that individuals invest in themselves and their health. Grossman (1972) also argued that people produce their health by themselves through financial savings and investment.

Thus, given the inter-temporal utility function (U) of a typical individual in SSA nations as:

$$U = U(H, C, Z) \quad (1)$$

where H is the initial or inherited stock of health. While C represents the consumption of health goods and services, such as, food, drinkable water, housing, and others. And Z is the utilization of timely medical care.

In particular, infant deaths and low life expectancy occurs when investments on H, C, and Z is low, and vice versa. Hence, the quality of health of individuals depend on the quantities of H, C, and Z. This then suggest that financial inclusion could improve health (reduce illness and deaths), by aiding investment in health goods and services, timely utilization of healthcare, and smoothing their consumption through managing their health shocks.

2.3 Empirical Literature

Ajefu *et al.* (2020) estimated the impact of financial inclusion on mental health of heads of households in Nigeria. Their study used data from the 2015/2016 Nigerian General Household Survey. The findings indicate that financial inclusion has a strong positive impact on mental health. However, Gyari *et al.* (2019) examined the nexus between financial inclusion, health-seeking behavior and health-related outcomes in older adults in Ghana. The study employed data from a 2016/2017 Aging, Health, Psychological Wellbeing and Health-Seeking Behaviour Study. The results from multivariate logistic regression also show that financial inclusion is positively related with self-reported health. Except the studies of Ajefu *et al.* (2020) and Gyari *et al.* (2019) that analyze the impact of financial inclusion on mental health in Nigeria and Ghana, respectively; the relationship between financial inclusion and general health has been understudied in empirics.

Therefore, this study reviewed other related literatures. For example, Demirgue-Kunt *et al.* (2013a) investigated the relationship between religions and believe on financial inclusion. The study focused on 65 countries with the sample of 65,000 people. Among other things, their result indicated that being a Muslim insignificantly constrains savings and credit in SSA countries. While Findex *et al.* (2015) investigated the determinants of financial inclusion in China. The study indicate that education, incomes and age are more likely influence being financially included. Allenet *et al.* (2016) examined factors accounting for financial inclusion. The result reveal that the likelihood of savings is highly connected with being married and employed.

For literature on developing nations, Demirgue-Kunt *et al.* (2013b) indicated that gender have the likelihood to predict financial excludability. In a similar study, Aterido *et al.* (2013) focused on nine African nations but observed no significant gender discrimination in these nations. However, the contribution of this paper is two-fold. First, it accounts for the short- and long-runs relationship between financial inclusion and health in developing countries, namely SSA nations. This is contrary to those that researched on the impact of financial inclusion on economic growth (Abdul *et al.* 2015; Olaniyi & Adeoye, 2016; Okoroafor *et al.* 2018), and health insurance (Makaka *et al*. 2012; Hor, 2013; Parmar *et al.* 2014; Akazili *et al.* 2014; Williams *et al.* 2017). Second, it handles both the spurious correlation problems and causality bias, which are common in macro-econometrics analysis, especially the studies of Ajefu *et al.* (2020) and Gyari *et al.* (2019).

3 Methodology

3.1 The Model

The explanations of Grossman (1972, 2000) is that general health of individual i (H_i) depreciate over time t; where t ranges from birth-day (t_0) and death-day (t_1). However, investment in health goods and services can offset this depreciation.

Algebraically,

$$H_t = \delta_t H_t + I_t \quad (2)$$

where; H_t denotes the average life expectancy and infant health at current period t; $\delta_t H_t$ represents health outcomes due to health shocks from sick-days and diseases; δ_t is the rate of depreciation in health; and I_t is gross investment on health status. Then, it implies that:

$$\Delta H_t/\Delta t = I_t - \delta_t H_t \quad (3)$$

where $\Delta H_t/\Delta t$ is positive if $I_t > \delta_t H_t$. The implication is general health is improved when there is access to finance either through credit, savings or payments. Conversely, $\Delta H_t/\Delta t$ will be negative anytime $I_t < \delta_t H_t$ (Jacobson, 2000).

Therefore, the Grossman argument implies that:

$$H_{it} = f(FI_{it}) \quad (4)$$

where i is the countries in SSA region (based data availability). And t denotes time periods from 2007 to 2018.

Hence to estimate H_{it}, unlike the studies of Ajefu *et al.* (2020) and Gyari *et al.* (2019) that utilized on self-reported health of adults in Nigeria and Ghana, respectively. This study employ more encompassed health data for all population in any countries. While the first is the infant mortality rate, which is the numbers of newborn deaths recorded in every 1,000 live births. The second health indicator is the average longevity, the average expected life at birth that an infant can live if the health and social patterns in the current period remains the same in the future. Hence, these are important indices of health outcomes (Grepin and Bharadwaj, 2015). This study sourced these data from World Bank (2019).

On the other hand, in agreement with the studies of Findex *et al.* (2015) and Allenet *et al.* (2016), this study utilized the commercial banks branches (per 100,000 adults) as explanatory variable. This is denoted by CB. Furthermore, this study account for the numbers of people with bank account in these banks (per 1,000 adults). The variable is represented by DB. These variables had been judged appropriate for financial inclusion in any countries (Williams *et al.* 2017). In addition to these, this study controlled for the numbers of non-working to working population (dependency ratio) in SSA countries. This is denoted by DR. Thus, the extension of equation (4) is:

$$HO_{it} = f(CB_{it}, DB_{it}, DR_{it}) \quad (5)$$

where health indicators in SSA region are denoted as HO.

Explicitly, equation (5) implies that:

$$HO_{it} = \alpha + \beta_1 CB_{it} + \beta_2 DB_{it} + \beta_3 DR_{it} + \mu_i \quad (6)$$

where $\boldsymbol{\mu}$ represent error term, while $\boldsymbol{\alpha}$ denotes the intercept, β_1, β_2 and β_3 are parameters of the impacts of CB, DB, and DR, respectively. The theoretical expectation of these impact is that both CB and DB will be positively associated with life expectancy but reduces newborn deaths. This is because, it could aid access to timely health finance that enhance medical-care access and other commodities. Conversely, DR is expected to reduce average life expectancy but increase newborn mortality in SSA countries.

3.2 Techniques of Estimation

The study carried out various econometric tests namely panel unit roots, causality tests, and co-integration. However, the main estimation technique for this study is panel regression (Fixed- and Random-effects, and Hausman specification).

Panel unit roots test

To avoid spurious results which may affect the determination of accuracy of the impact of financial inclusion on health indicators in Nigeria due to non-stationarity of data; the study conducted stationarity test by utilizing Levin-Lin-Chu (LLC), as well as the Im, Peseran and Shin (IPS) tests (See Levin, Lin and Chu, 2002; Im, Peseran and Shin, 2003). The methodology of both tests is based on the Augmented-Dickey Fuller (ADF) type specification. One unique difference between LLC and IPS test is that; unlike IPS, the LLC assumed that there are persistence parameters that are common across the cross-sections. This imply that the H_0 for IPS is that there is a common unit root, however, for LLC test, there is individual unit root process.

Panel Causality test

This study tested for causality of the impact between financial inclusion and health indicators. This test is largely needed to explore the transmission mechanism between financial inclusion proxies and health; and health and financial inclusion proxies. It is also worthy of note that the test is key to this paper because in panel analysis, the heterogeneity of nations is key to panel estimations (Venet, 2001).

Panel Co-integration test

Furthermore, the study performs panel co-integration test. The null hypothesis of the test is of no co-integration, that is, the residual (μ) in equation (6) is integration of 1. The implication of this is to conduct long-run impact of the financial inclusion on health.

Panel Regression Models

To estimate the impact of financial inclusion on health in 29 SSA countries[1], this study employed both the Fixed- and Random-Effects. In the latter approach, the composite error term (μ_i) in equation (6) is splits as follows:

$$\mu_i = \alpha_i + u_{it} \qquad (7)$$

where α_i is a set of time-invariant unobserved individual characteristics; for instance, employment status, literacy level and other factors.

While the fixed effects (FE) assumed that there are unobserved impact of financial inclusion on health indicators that is peculiar to each nations in SSA region. That is, α_i varies among each state, but fixed over time. The parameter α_i is a fixed effect for i; it measured the unobserved nation's characteristics (insecurity, poverty, employment rates, and financial policies). The random effects (RE) assume that the unobserved factors associated with citizens in these countries. That is, α_i varies over time. Hence, for the appropriateness of these models, Hausman test as proposed by James Durbin (1954) and Jerry Hausman (1978) was also used.

4 Findings and Discussions

4.1 Preliminary Findings

Table 2 presented the descriptive statistics for this study. It was found that, the commercial bank branches and number of account holders with these banks (proxies for financial inclusion) are 348, respectively. The mean distributions of the commercial bank per 100,000 adults is 5. The result suggest that while there is one commercial bank to 20,000 citizens in SSA region; the mean numbers of account holders in these banks is 241 people.

[1] The 29 SSA countries considered based on data availability were: Angola, Botswana, Burkina Faso, Burundi, Central Africa Republic, Cameroon, Chad, Comoros, Congo Democratic Republic, Congo Republic, Cote d'Ivoire, Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, South Africa, Zimbabwe, Mauritius, and Mozambique,

Table 2: Descriptive Statistics of Variables

Variable	Observations	Mean	Std. Dev.	Min.	Max.
Average Life Expectancy (total)	348	58.78	5.67	42.85	75
Infant Mortality Rate	348	57.42	19.08	12.50	105.9
Commercial Bank Branches	348	4.88	5.68	0.36	78
Numbers of Depositors with Banks	348	240.86	356.89	2.92	1956.04
Dependency Ratio (% of Working Class)	348	82.43	14.37	41.29	107.53

Source: Author, 2020

However, mean of newborn deaths in the region is 57 per 1,000 live births. The mean life expectancy (total) is 59 years. These seem to suggest that health outcomes in the region are performing poorly. Table 3 indicate the correlation of the impact of financial inclusion on health. It was found that there is a negative correlation between infant mortality rate and financial inclusive variables. This is as expected. It is then worthy of note that these preliminary results are important, as they provide a useful guide in the specification of the models.

Table 3: Correlation Matrix

Variable	Life Expectancy	Infant Mortality Rate	Dependency Ratio	Commercial Bank Branches	Depositors with Banks
Life Expectancy	1	-0.8194	-0.4664	0.4656	0.4577
Infant Mortality Rate	-0.8194	1	0.6032	-0.5189	-0.4349
Dependency Ratio	-0.4664	0.6032	1	-0.5282	-0.5546
Commercial Bank Bannches	0.4656	-0.5189	-0.5282	1	0.6272
Depositors with Banks	0.4577	-0.4349	-0.5546	0.6272	1

Source: Author, 2020

The results of heterogeneous models conform to a-priori theoretical expectation for all the coefficient at 1 percent significant level. Next the study tested the stationarity for the variables. These findings are presented in Table 4. The results indicate that all the variables are stationary at level except life expectancy. These was found at least at 10% level for LLC tests. In the case of IPS test, only infant mortality rate and commercial bank branches are stationary at level. However, they become stationary after taking their first difference.

Table 4: Panel Unit Test Results

	Level		**First Difference**	
	LLC	IPS	LLC	IPS
Life Expectancy (LE)	7.31 (1.00)	12.18 (1.00)	-12.5*** (0.00)	-7.78*** (0.00)
Infant Mortality Rate (IMR)	-6.0316*** (0.0076)	0.8413* (0.0999)	-2.4274*** (0.0000)	-0.7506** (0.0265)
Commercial Bank Branches (CBB)	-4.4055*** (0.0000)	-0.9120* (0.0809)	-12.2786*** (0.0000)	-2.1517** (0.0157)
Depositors with Banks (DB)	-6.1153*** (0.0000)	3.3720 (0.9999)	-4.8153*** (0.0000)	2.8886** (0.0981)
Dependency Ratio (DR)	-6.3191*** (0.0000)	4.3701 (1.0000)	-4.8003*** (0.0000)	1.8193** (0.0656)

Source: Author, 2020

Note: (1) Probability values are in parenthesis, (2) ***, **, and * denotes significant at 1%, 5% and 10%, respectively.

4.3 Main Findings

The findings from the panel unit tests then concluded that all the variables are of I (1), then there is need to proceed to co-integration test. Table 5 indicated the existence of one causal link (at least) from financial inclusion proxies (CBB and DR) to health indicators (LE and IMR) suggests the existence of contemporaneous- and long-run impacts.

Table 5: Panel Causality Results

H_0	Obs.	F-Stat.	p-value
LE does not Granger Cause CBB	290	1.7542	0.1749
CBB does not Granger Cause LE	290	2.5725	0.0781
LE does not Granger Cause DB	290	1.7512	0.1754
DB does not Granger Cause LE	290	5.8687	0.0032
IMR does not Granger Cause CBB	290	1.2291	0.2941
CBB does not Granger Cause IMR	290	0.8887	0.4123
IMR does not Granger Cause DB	290	1.5675	0.2104
DB does not Granger Cause IMR	290	2.4837	0.0852

Source: Computed by the Author

The finding from Table 5 clearly indicated that there is a single-causal link. This implies that financial inclusion proxies (CBB and DB) caused health indicators (LE and IMR) without any reverse causation. This result could be that the impact of numbers of commercial bank branches on infant health is instantaneous, particularly by enabling the provision of financial resources and prompt payments for infant health-needs, compared to adult's longevity (LE), which is relatively longer.

Table 6: Co-integration Test Results

Pedroni Residual Co-integration Test	*Within Dimension*	*Panel rho-Sta.*	*Panel PP-Stat.*	*Panel ADF-Stat*
		4.362	*1.2219***	*2.3112****
	Between Dimension	*Group rho-Stat.*	*Group PP-Stat.*	*Group AD*
		6.8105	*-3.0638****	*-1.4168***
Kao Residual Cointegration Test		*ADF*	*Residual variance*	*HAC Variance*
		*-2.6608***	*0.3826*	*0.8968*

Source: Computed by the Author

Note: (1) ***, and ** denotes significant at 1% and 5%, respectively;
(2) HAC means Heteroscedasticity and Autocorrelation Consistent

Findings from co-integration test are presented in Table 6. The Pedroni co-integration result shows the Phillips-Peron (PP) and Augmented Dickey-Full (ADF) statistics for the within and between dimension suggest that the study can reject H_o of no co-integration. Thus, since the majority estimates from Pedroni and Kao Residual Cointegration tests show evidence of cointegration, this study then conclude that there is a stable long-run impact of financial inclusion on health in SSA countries.

Having established the existence of a long-run impact of financial inclusion proxies on health indicators, this study then applies panel estimation models to obtain the long-run estimates. The finding for the pooled mean group and mean group estimates is presented in Table 7. Again, the study found a direct relationship between numbers of depositors with banks and life expectancy. The signs of the coefficients confirm to the study's a-priori expectation. These are also significantly different from zero at the 1% level of significance. In-

crease in access to banking activities (both rural and urban areas of SSA nations) therefore emerge as significant factor to improve average life expectancy in SSA.

Table 7: Long-Run Estimates

Dependent Variable				
	Life Expectancy		Infant Mortality Rate	
Variable	PMG	MG	PMG	MG
Commercial Bank Branches	0.1588***	0.7987***	-0.3027***	-2.5617***
	(0.0368)	(0.0802)	(0.0919)	(0.2148)
Depositors with Banks	0.0134***	0.0177***	-0.0390***	-0.0524***
	(0.0020)	(0.0025)	(0.0050)	(0.0085)
Dependency Ratio	-0.4191***	-0.4194***	1.2877***	1.2455***
	(0.0685)	(0.1244)	(0.1709)	(0.2173)

Source: Computed by the Author

Note: (1) *** denotes significant at 1%; (2) standard errors are in parentheses; and (3) PMG and MG means Pooled Mean Group and Mean Group, respectively

A plausible explanation for these results could be an improved financial inclusion play a vital role in promoting access to savings and payments (Dorfleitner and Roble, 2018). This would enhance timely access to medical-care. However, the dependency ratio (to % of working population) is negatively related to average life expectancy significantly. This clearly suggest the possibility of increase in dependency ratio in SSA to reduce the longevity of her citizens.

The results of the mean group of Table 7 supported the pooled mean group results with only slight difference in magnitude. To explain their effects on longevity in SSA countries, the long-run coefficients of commercial bank branches and account holders in these banks are both significantly difference from zero at the 1% level. The dependency ratio is also related negatively with longevity significantly. This clearly suggest the possibility of increase in dependency ratio in SSA to reduce the average life expectancy of her citizens. These further point to the important roles of financial inclusion to improve average life expectancy but increase in the dependency ratio could reduce longevity in SSA countries.

Table 7 also presents the long-run estimates of the infant mortality rate. Like, the estimates for longevity, the findings both PMG and MG estimations of newborn deaths conform to a-priori theoretical expectation for all the coefficient at at-least 5 percent significant level. As presented in Table 7 of PMG, the number of account holders in banks reduces infant mortality rates. In addition, the study found a direct relationship between numbers of depositors with banks and newborn deaths. The signs also confirm to the expectation of the study at 5% level. The findings then show that increase in access to banking activities (both rural and urban areas of SSA nations) is a significant factor to reduce infant deaths in SSA. Conversely, the dependency ratio is positively related with infant deaths significantly. This implies the possibility of increase in dependency ratio to increase infant mortality rates in SSA region.

The results from MG in Table 7 also supported the PMG results with only slight difference in magnitude. It indicated that the long-run coefficients of commercial bank branches and account holders with these banks are both significantly difference from zero at the 5% level. However, the dependency ratio is positively related with newborn deaths significantly. Clearly, the findings suggest the possibility of increase in dependency ratio in SSA to increase the newborn deaths after birth. The results therefore point to the important roles of financial inclusion to reduce infant mortality rates but reduction in the dependency ratio could increase newborn deaths after their birth in SSA countries. Observably, all the long-run coefficients are correctly signed and statistically significant.

Table 8: Contemporaneous (Short-Run) Model

Dependent Variable				
	Life Expectancy		Infant Mortality Rate	
Variable	PMG	MG	PMG	MG
Commercial Bank Branches	0.0064**	0.0886	-0.0054	-0.0793
	(0.0033)	(0.0681)	(0.0077)	(0.0825)
Depositors with Banks	0.0012**	0.0007	-0.0014	-0.0009
	(0.0004)	(0.0069)	(0.0009)	(0.0010)
Dependency Ratio	-0.0246	-0.01731	0.1582*	-0.0635
	(0.0389)	(0.1244)	(0.0928)	(0.1623)
U (-1)	-0.0853***	-0.0724**	-0.0802***	-0.0975***
	(0.0076)	(0.0219)	(0.0071)	(0.0132)

Source: Computed by the Author

Note: (1) ***, **, and * denotes significant at 1%, 5%, and 10% respectively; (2) standard errors are in parentheses; and (3) PMG means Pooled Mean Group and MG denotes Mean Group

Though the co-integration estimations indicates the long-run impact and estimates, to throw more light into the analysis, the study further estimates the dynamic adjustment called contemporaneous or short-run model. Table 8 shows that the speed of adjustment term (ECM) is negative and also statistically significant for all health indicators (average life expectancy and newborn deaths). Specifically, the estimate of error correction term of -0.07 for life expectancy suggest that about 7% of the adjustment occurs in the period one. For newborn deaths, the term is nearly 2%. Again, this implies that the adjustment occurs in the year one. In all, the speed of adjustment of the impact of financial inclusion on health indicators is quite slow considering health shocks, such as COVID-19.

5 Conclusion and Recommendations

Several evidence have revealed that, sub-Saharan Africa countries experiencing weak financial inclusion. For instance, only 12 percent of all adults in the region have an account with the financial institutions. Similarly, while health indicators have improve greatly in last two decades in other regions of the world, there is no relative improvement in SSA region. Therefore, this study specifically established the long-run and short-run impact of financial inclusion on health indicators – infant health and average longevity – in 29 SSA nations over the period 2007 and 2018. The study employed panel regressions.

The main finding was that there is an inverse Short-run and long-run effect of financial inclusion on newborn deaths, but positive on average life expectancy. Another important result of the study is the contemporaneous term of 7 percent and 2 percent for life expectancy and newborn deaths, respectively. These indicated that the speed of adjustment of financial inclusion impact is quite slow in responding to any health shocks. Some policy lessons are revealed by the above findings is that reduction in longevity and increase in infant mortality rates from dependency ratio effects could negatively impinge on the health outcomes. Besides, it could discourage quality savings and the use of formal financial banking system. Therefore, the important effect of financial inclusion on health outcomes in SSA countries, as found in this study, suggests the need for policy interventions that will encourage savings, and access to credits facilities. The findings also shows, among other things, that financial inclusion associated with general health in both short- and long-run in SSA countries.

Thus, given that extreme health shocks can affect health outcomes in all SSA nations, governments of these countries should take urgent and adequate steps to optimally address the problem. In addressing this issue, more attention should be focused on financial inclusion. Also, sufficient measures should be taken to adequately increase access to savings, and credit.

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APPENDIX

Table A1: Panel Estimates (Dependent Variable: Average Life Expectancy at birth)

	Fixed Effect		***Random Effect***	
Variable	*Coeff.*	*t-stat.*	*Coeff.*	*t-stat.*
Commercial Bank Branches (per 100,000 adults)	0.11*** (0.02)	4.18	0.12*** (0.03)	4.08
Depositors with commercial banks (per 1,000 adults)	0.01*** (0.001)	9.83	0.01*** (0.001)	8.33
Dependency ratio (% of working population)	-0.43*** (0.04)	-9.57	-0.29*** (0.04)	-7.37
Constant	90.41*** (3.81)	23.72	79.7*** (3.52)	22.64
Adjusted R-squared	0.4940		0.4890	
Overall Probability	0.0000		0.0000	
Numbers of Observations	348		348	
Numbers of Countries	29		29	
Hausman Chi-squared	72.63			
Probability>Chi-squared	0.0000			

Source: Own Computation from Stata 13

Note: (1) standard errors are in parentheses
(2) *** denotes significant at 1%

Table A2: Panel Estimates (Dependent Variable: Infant Mortality Rates)

	Fixed Effect		***Random Effect***	
Variable	*Coeff.*	*t-stat.*	*Coeff.*	*t-stat.*
Commercial Bank Branches (per 100,000 adults)	-0.18** (0.07)	-2.68	-0.19** (0.07)	-2.71
Depositors with commercial banks (per 1,000 adults)	-0.04*** (0.003)	-11.52	-0.03*** (0.003)	-9.83
Dependency ratio (% of working population)	1.33*** (0.113)	11.83	1.07*** (0.10)	10.29
Constant	-42.1*** (9.56)	-4.40	-22.02** (9.28)	-2.37
Adjusted R-squared	0.5651		0.5640	
Overall Probability	0.0000		0.0000	
Numbers of Observations	348		348	
Numbers of Countries	29		29	
Hausman Chi-squared	-164.14			
Probability>Chi-squared	0.0249			

Source: Own Computation from Stata 13

Note: (1) standard errors are in parentheses
(2) *** denotes significant at 1%