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The Relationship Between Financial Inclusion and Health Outcomes: Evidence from Nigeria

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Abstract

This study takes up a core aspect of development - health outcome - and examines the nature and extent of the contribution of financial inclusion to this aspect of development in Nigeria. Financial inclusion, which is about participation in economic activities and empowerment for all, promotes the capacity to effectively deploy and utilize life support facilities, thereby yielding positive health outcome and leading to true development. It remains unclear if financial inclusion ultimately yields this much expected developmental goal in Nigeria, hence the study. A specific health outcome was chosen - life expectancy - which is an indicator of how well an organism utilizes its present circumstances and opportunities to facilitate life on earth. On the basis of availability, time series data from 1989 through 2023 were chosen and analyzed using Autoregressive Distributed Lag modeling. It was found that a positive relationship exists between improvements in life expectancy and financial inclusion. Impediments to financial inclusion were thus identified as obstacle to improved health outcomes. It was therefore recommended, among others, that non-bank financial solutions which have already gained acceptability in the country should be expanded and mainstreamed.

Keywords: *Financial inclusion, Life expectancy, Autoregressive distributed lag model, Nigeria*

Background to the Study

It is increasingly recognized that the financial system plays a critical role in the process of economic development. The increasing number of commercial banks and their branches enhance access to financial services that are well suited for low-income earners, capital accumulation, credit creation, investment and entrepreneurship. Access to financial services for the hitherto unserved peoples epitomizes the concept of financial inclusion, which aims to provide financial services for everyone in the society. And with such access, the benefits accruing therefrom, which impact living positively, can be harvested (Gowda, 2020). These benefits are at the heart of development and manifest summarily in the well-being of the individual, part of which is supportive health outcome.

Across the globe, tremendous shifts in financial payment methods have also been taking place, with the use of digital platforms involving mobile banking, online transactions, etc., supplementing and/or supplanting traditional practices like payments by cheques or cash (Tay, Tai & Tan, 2022). These developments have spurred financial inclusion. It is understood that financial empowerment, as a benefit accruing from financial inclusion, is being harnessed by the society. So also, the health aspects of this empowerment. What remains unclear is the extent of the developmental outcomes arising from the empowerment, outcomes such as long-term health benefits, for example, life expectancy at birth.

The improvements in health revealed by the longer life span of people in many countries is a key health gain expected to be powered by financial inclusion and digitalization. Life expectancy generally rises with per capita incomes, thus lending credence to the old notion that economic development is a good medicine. But the high levels of health in a few very poor areas and low life expectancy in a smaller number of relatively wealthy areas demonstrate that the relationship is neither simple nor inescapable. The differences reflect not only variations in income levels, financial inclusion, per capita income, environmental sanitation but also such uncontrollable factors as climate. Financial inclusion is one of the least explored contributors to the phenomenon of living longer on earth. Many researchers such as Musa (2020) have focused on health services in the search for the effects of financial inclusion. Some, such as Naveenan, Liew and Kijkasiwat, (2024), have devised indices using various methods with a view to finding a suitable proxy for financial inclusion. In this study we address the need to isolate and estimate the contribution of financial inclusion to health outcome directly by choosing life expectancy at birth and branches of commercial banks as proxy for health outcome and financial inclusion respectively.

Theoretical Literature

The health capital theory has been linked to the works of Schultz (1961), Becker (1964), and Grossman (1972). Michael Grossman's influential work on health and human capital (Grossman, 1972) provides a framework for understanding how financial inclusion can influence health through direct channels. The Grossman model, based on human capital theory, views health as a durable stock that individuals can build by investing in time and medical care. Investments in health increase the stock of health which naturally deteriorates

over time. Health serves both as a consumer good and an investment: as a consumer good, healthcare spending improves well-being and reduces illness, and as an investment good, it increases the amount of healthy time available for productive activities. Individuals invest in their health until the opportunity cost of producing health equals the return on improved health.

Becker introduced health as a form of human capital that can be invested upon. Grossman linked human capital with the demand for health. His model explained health demand and medical care as it relates with people's wealth constraints, preferences and consumption expenditure over people's lifetime. (Galama, 2011), opined that individuals can spend on their health and stock up their health capital by adding up medical care, food, education, etc. to get better health outcomes. Furthermore, Neo-Materialist theory asserts that a society with a large percentage of people in poor health will also have significant income disparities. The high percentage of the impoverished in society accounts for the general lack of health among the populace. Therefore, income disparity is a result of a number of "neo-material" conditions can have an effect on people's health. (Lynch et al., 2000).

Financial inclusion can directly impact health outcomes in two ways through the Grossman model. First, increased financial inclusion allows individuals to better manage risks from health shocks by utilizing savings and credit for medical services, rather than postponing care due to cost. Second, improved access to savings and credit facilitates investment in education and health, increasing optimal health stocks and improving overall health status.

Empirical Literature

Interest in the intricate relationships between financial inclusion, household decision-making, and health outcomes has been growing. Various cultural, regional, and socioeconomic circumstances point to these connections, and studies have tried to clarify and estimate them. For instance, Ajefu,

Demir & Haghpanahan (2020) selected the household heads in Nigeria and investigated the impact of financial inclusion on their mental health. Geo-referenced financial services data alongside data from the Nigerian General Household Survey (GHS) were used. It was found that financial inclusion has a positive impact on mental health. This finding further supported the benefits of promoting financial inclusion in dealing with depression symptoms and improved health condition. Musa (2020) relied on quarterly time series data from 2000Q1 to 2019Q4 and Auto Regressive Distributed Lag (ARDL) model to investigate how financial inclusion impacts health services in Nigeria. The result showed a positive and statistically significant effect of financial inclusion on access to health services both in the short run and long run. The study recommended the strengthening of financial penetration rather than branch expansion. Arshad and Nawaz (2020) found that financial inclusion reduced child malnutrition, as households with access to financial resources could better manage their children's healthcare needs. Better child nutrition was associated with women having more control over household income, allowing them to allocate resources according to their children's needs.

Immurana *et al* (2021) sought to establish empirically the effect of financial inclusion on population health in Africa, using a sample of 33 African countries and data covering 2004 to 2018. The Principal Component Analysis method was employed to generate a composite financial inclusion index since four indicators including bank branches were selected. Two proxies of health outcomes were also chosen including life expectancy. The Generalised Method of Moments regression was employed. It was found that financial inclusion improves population health in Africa. The study recommended the deepening of financial inclusion as a way of improving population health.

Xlao and Tao (2022) studied the effects of financial inclusion on population health outcomes in the world's fastest growing region, the Asia region. A panel data for Asian countries for the period 2007 to 2019 was used. It was found that financial inclusion positively impacts life expectancy while impacting death rate negatively. The study recommended that the enlargement of financial inclusion should be the responsibility of all stake holders.

Peng and Mao (2023), using data from the China Family Panel and the Digital Financial Inclusion Index of China, found that digital financial inclusion reduces the probability of urban households falling into relative poverty. The study suggested that digital financial inclusion promotes entrepreneurship and financial market participation among urban households. It also indicated that increased income flows could be translated into wealth accumulation, helping households avoid falling into poverty.

Banerjee, Maruta, and Donato (2023) found a direct positive effect of financial inclusion on health outcomes, based on data from 61 developing and transitional economies spanning 2011–2017. The study concluded that financial inclusion is a more effective policy tool in societies with higher poverty and income inequality, as it enables vulnerable populations to invest in health capital and manage risks from health shocks.

Koomson, Kofinti, and Laryea (2024) found that financial inclusion reduces multidimensional child poverty in Ghana, based on findings from the living standards household datasets. Their study pointed out that financial inclusion particularly reduces child poverty among boys and rural children, with the largest impact seen in improving children's living conditions, followed by health- and education-related deprivations.

Naveenan, Liew and Kijkasiwat (2024) focused on how financial inclusion enhances health indices in emerging markets. Financial inclusion index based upon both traditional banking and financial technology (fintech) was devised using the Entropy Weight method and applied. It was found that improvements in financial inclusion in emerging markets led to improved health indices. The study called attention to the understanding of the many-sided advantages of financial and digital inclusion in health policy development in emerging markets.

Acheampong and Tetteh (2024) utilized a data set of 121 countries over the period 2004 to 2020 to establish the global population health effects of financial inclusion. The study found

that financial inclusion improves population health outcomes. The extent of improvement is influenced around different countries by their domestic level of penetration of information and technology penetration as well as socio-economic conditions. The authors recommended policies and strategies capable of boosting financial inclusion. This study goes beyond access to health services as a benefit of financial inclusion. It focuses on life expectancy which, as a specific health outcome, can benefit from financial inclusion in many different ways ranging from basic access to health services to access to information. It also employs data up to 2023.

Research Method.

A linear model was developed to investigate the likely effect of financial inclusion on health outcome. Life expectancy was chosen as the dependent variable and example of health outcome, while as explanatory variable and proxy for financial inclusion, commercial bank branches was chosen. It was considered that opening more bank branches increases the range of potential users of bank financial services thereby advancing the prospects of financial inclusion. Other explanatory variables chosen in line with literature are as follows: per capita income, which indicates the capacity to fund health expenditure, and is itself a basic requirement for accessing health services; urban population growth, which gravely impacts urban infrastructural facilities and other life support services such as sanitation and clean water availability, in a rapidly urbanizing population; and fertility rate, which is a basic population demographic. The following model was estimated:

$$le = \beta_0 + \beta_1 bb + \beta_2 fr + \beta_3 lnpcy + \beta_4 upg + \varepsilon \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where le = life expectancy at birth; bb = commercial bank branches; fr = fertility rate; pcy = per capita income; upg = urban population growth; ln = natural logarithm; β_0 = parameters and ε= stochastic error term.

A priori, life expectancy is expected to relate positively with commercial bank branches and per capita income; negatively with fertility rate, while the relationship with urban population growth is considered indeterminate. Availability and currency of data played a large role in selecting the scope of the study. Data for life expectancy at birth, fertility rate, per capita income and urban population growth came from World Development Indicators, while data for commercial bank branches was obtained from Central Bank of Nigeria Statistical Bulletin. The Auto regressive distributed lag (ARDL) procedure was adopted for the study on the basis of data diagnostic outcomes. Augmented Dickey Fuller (ADF) procedure was used for Stationarity. ARDL bounds test and error correction method were employed to investigate the long run and short run dynamics. Residual and stability diagnostics were carried out using Breusch-Godfrey Serial Correlation LM test, Breusch-Pagan-Godfrey Homoscedasticity test and the Residual Cumulative Sum of Squares tests.

Diagnostic Test Outcomes and Estimation Results

Using the Augmented Dickey Fuller (ADF) Unit Root test procedure, no variable was stationary at level. However, all variables proved to be stationary at first difference (Appendix

1). On account of this outcome, ARDL procedure was selected, producing the following result.

Table 1: Long Run Regression Result

Dependent Variable: Life Expectancy at Birth				
Variable	Coefficient	Std. Error.	t Statistic	Prob.
bb	0.000898	0.000449	1.998193	0.0559
Fr	-6.154682	1.461605	-4.210907	0.0003
Lnpcy	0.159487	3.660311	0.043572	0.9656
Upg	1.455774	0.626025	2.325426	0.0278
C	74.90519	49.50596	1.513054	0.1419

Source: Authors' computation 2025

The ARDL Bounds test approach to co-integration was adopted and produced the result in Appendix 2. This showed that the variables were co-integrated at 5% level of significance. The short run equilibrium was established using the Error Correction Mechanism. The co-integration term had a value of -0.323752 and was highly significant as shown in Appendix 3. There was no indication of serial correlation in the residuals (Appendix 4) and no evidence of heteroscedasticity (Appendix 5). Stability of the residuals was indicated (Appendix 6).

Discussion

From the long run results displayed in Table 1, all explanatory variables proved true to expectation regarding their directions of influence. Bank branches and average income showed positive relationships with life expectancy. This is generally in line with the findings of other researchers (Xlao & Tao, 2022; Banerjee, Maruta, & Donato, 2023). It is probably clear that improved income and financial inclusion empower the individual, making health services affordable and actually available. Fertility rate, a basic population-growth demographic showed a negative relationship with life expectancy. It is also probably clear that tempering the fertility rate reduces the composite burden on parents and guardians, reducing physical, financial and emotional stress and promoting the prospects of healthier, longer lives. Urban population growth turned out to be positive and significant, indicating the relative availability of facilities for improved living found in urban areas in Nigeria, in comparison with rural areas. Although urban slums give rise to challenges peculiar to them, it is in the urban areas that greater prospect of personal income resides as well as the dignity that goes with it. Also, the locational proximity of health facilities.

Commercial bank branches, while marginally significant at the 5% level, and positive in its relationship with life expectancy, was economically trivial. Its statistical significance, which indicates its real effect on life expectancy is an encouragement for policy intervention towards improved economic effect. As financial inclusion widens and deepens, and the financial system itself develops, it is hoped that concrete harnessing of the benefits of financial inclusion by the individual would improve, such that its impact on life expectancy would no longer be

considered trivial. In the heavily under-banked and under-served Nigerian society much more work needs to be done in the area of financial inclusion to attain the desired effect. As expected, fertility rate was not just correctly signed, but also highly significant both statistically and economically. There is a huge room for policy action indicated by this outcome since fertility rate is partly culturally anchored. However, it's challenging effect on the health and economic status of mothers is well established.

Conclusion

On the basis of data availability, time series data from 1989 through 2023 were utilized to investigate the relationship between financial inclusion and health outcome in Nigeria. Analysis was carried out using Autoregressive Distributed Lag modeling. It was found that a positive relationship exists between improvements in life expectancy and financial inclusion. Impediments to financial inclusion were thus identified as obstacles to improved health outcomes.

Recommendation

On the basis of the findings in this study, the following recommendations were made:

i. Bank location agenda akin to the rural banking scheme.
ii. Improvements in non-banking financial solutions

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APPENDIX

Appendix 1

S/No	Variable	ADF Test Statistic	Critical Value 5%	Order of Integration
1	Le	-3.967595	-2.954021	I(1)
2	Bb	-4.944542	-2.954021	I(1)
3	Fr	-3.048783	-2.957110	I(1)
4	lnpcy	-3.823546	-2.954021	I(1)
5	Upg	-5.300558	-2.954021	I(1)

Appendix 2

ARDL Long Run Form and Bounds Test

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	24.25069	9.733410	2.491490	0.0192
LE(-1)*	-0.323752	0.142826	-2.266763	0.0316
BB**	0.000291	0.000110	2.654790	0.0131
FR(-1)	-1.992589	0.557484	-3.574255	0.0013
LNPCY**	0.051634	1.202861	0.042926	0.9661
UPG**	0.471309	0.143266	3.289744	0.0028
D(FR)	2.915271	1.544927	1.886996	0.0700

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BB	0.000898	0.000449	1.998193	0.0559
FR	-6.154682	1.461605	-4.210907	0.0003
LNPCY	0.159487	3.660311	0.043572	0.9656
UPG	1.455774	0.626025	2.325426	0.0278
C	74.90519	49.50596	1.513054	0.1419

EC = LE - (0.0009*BB -6.1547*FR + 0.1595*LNPCY + 1.4558*UPG 74.9052)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	8.733727	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37
			Finite Sample:	
Actual Sample Size	34		n=35	
		10%	2.46	3.46
		5%	2.947	4.088
		1%	4.093	5.532
			Finite Sample: n=30	
		10%	2.252	3.56
		5%	3.058	4.223
		1%	4.28	5.84

Appendix 3

ARDL Error Correction Regression

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FR)	2.915271	0.947190	3.077810	0.0047
CointEq(-1)*	-0.323752	0.041081	-7.880768	0.0000

R-squared	0.499788	Mean dependent var	0.229647
Adjusted R-squared	0.484157	S.D. dependent var	0.269074
S.E. of regression	0.193255	Akaike info criterion	-0.392590
Sum squared resid	1.195119	Schwarz criterion	-0.302804
Log likelihood	8.674036	Hannan-Quinn criter.	-0.361971
Durbin-Watson stat	1.927278		

Appendix 4

Breusch-Godfrey Serial Correlation LM Test:

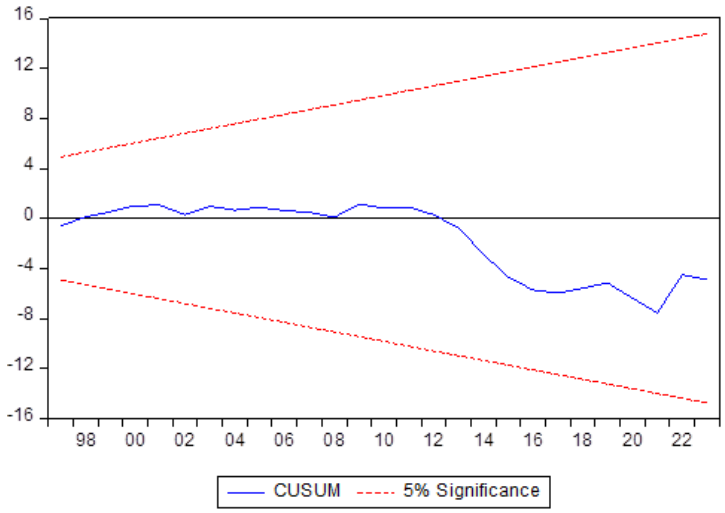
F-statistic	0.351315	Prob. F (2,25)	0.7072
Obs*R-squared	0.929455	Prob. Chi-Square (2)	0.6283

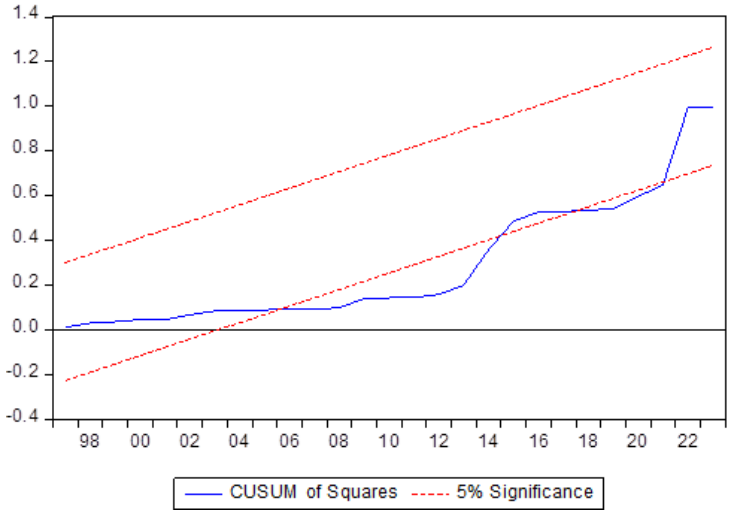
Appendix 5

Heteroskedasticity Test: Breusch -Pagan-Godfrey

F-statistic	1.289308	Prob. F (6,27)	0.2954
Obs*R-squared	7.571969	Prob. Chi-Square (6)	0.2712
Scaled explained SS	6.226668	Prob. Chi-Square (6)	0.3983

Appendix 6

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22
CUSUM of Squares
5% Significance