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The Changing Pattern of Healthcare Financing in Sub-Saharan Africa: Implications for Health Outcomes

M. Femi Ayadi[1*] and Akanni O. Lawanson[2]

1. Healthcare Administration Program, School of Business, University of Houston-Clear Lake, Houston, TX, USA
2. Department of Economics, University of Ibadan, Ibadan, Nigeria

*Corresponding author: M. Femi Ayadi, ayadim@uhcl.edu

Abstract

Background: The healthcare financing landscape of sub-Saharan Africa (SSA) has been characterized in recent years by a changing mix of funding mechanisms to enhance the health status of the population.

Methods: Using data from World Development Indicators, World Governance Indicators, and World Health Organization databases (1995 – 2014), this study employs the two-step difference generalized method of moments estimation to examine the implications of the changing pattern of healthcare financing on health outcomes in thirty SSA countries. The model considers life expectancy, infant, and under-5 mortalities as health outcomes and tracks their responses to variations in healthcare financing from public expenditures, private (out of pocket) expenditures, insurance, and external funding (donor) sources.

Findings: A ten percent increase in share of funding of health insurance in total health expenditure (THE) increases life expectancy by between 2.5 and 5.6 percent, and decreases under-five mortality by between 0.16 and 0.24 percent. A ten percent increase in share of government expenditure on health in THE has the potential of increasing life expectancy by about 5 percent, while the interaction of government expenditure and an institutional variable shows a positive impact. An increase in share external funding in THE results in an increase in life expectancy and a decrease in both infant and under-five mortality. Out of pocket expenditure as a share of THE has no potential to promote the health of SSA population across all health outcome estimations.

Conclusions: There is need for SSA countries to build strong institutions to promote efficient healthcare systems.

Keywords: Healthcare Financing; sub-Saharan Africa; Health Outcomes; Public Healthcare Expenditure; Private Healthcare Expenditure

Introduction

The concern of how and where to finance optimum healthcare remains a contextual challenge for Sub-Saharan African (SSA) countries. Despite an economic growth rate of 5.5 percent experienced by SSA countries in the last 15 years, the poverty and health challenges confronting the continent continues to persist. Of the 702 million people (9.6% of the global population) living in extreme poverty in 2015, SSA countries harbors about 35% of the poor subsisting on less than $1.90 per day (1). SSA countries are plagued with poor health outcomes, while accounting for the least share of world healthcare spending.

Health outcomes in SSA have improved since year 2000, but further improvement is required (2). The levels of health outcomes in SSA are still relatively low compared to other regions of the world (3). SSA accounts for more than one quarter of the total global disease burden and about 70 percent of the people living with HIV/AIDS. In 2014, SSA's average life expectancy, maternal mortality, infant mortality, and under-5 mortality were 58.6 years, 510 per 100,000 live births, 56.4, and 83.2 per 1,000 life birth, respectively, compared to the Asian average of 67 years, 28 per 100,000 live births, 19.9, and 23, per 1,000 life birth, respectively. While communicable diseases remain the primary health issues in SSA, it has witnessed an emergence of non-communicable diseases. SSA accounted for 89% of all estimated 214 million global malaria cases in 2015 and still faces challenges of people getting newly infected with HIV (4). Goal 3 of the Sustainable Development Goals (SDGs) focuses on universal health coverage, with the aim of ending epidemics of major communicable diseases and reducing non-communicable and environmental diseases. While mobilizing resources to achieve the universal health coverage objective for SSA countries is necessary, the method of financing adopted will be crucial to the realization of this goal. The Abuja Declaration of 2001 committed to 15% percent of government budget to health, yet, most countries have not met that target (5). While most countries of the world allocate double-digit percentage of their GDP to healthcare, the best performing among SSA countries commit less than 7% of GDP to health, with majority spending less than 5% on healthcare. 16.14% of the world population reside in SSA, yet it accounts for less than 1% of global total healthcare expenditure (THE) (1). These inadequate resources have typically been responsible for the poor health status in SSA. Households and governments have traditionally shouldered the bulk of healthcare financing responsibility, complemented by external resource assistance.

Increasing public health expenditure is one of the options pursued to attain better health outcomes in Africa (6), but it appears not sustainable. Dwindling government revenue has weakened political will to commit more public resources to healthcare. Although public health spending has received most attention, healthcare systems in SSA are financed through a mixture of public, private and donor sources (7). On average, more than half of THE in SSA is accounted for by households' out-of-pocket spending, which often is as a result of catastrophic healthcare spending, and causes huge financial burden that negatively affects the welfare of households. In some SSA countries, the household shoulders more than two-thirds of THE. The last two decades have witnessed a significant shift to alternative means of financing and purchasing healthcare services, of which social health insurance has been prominent. Ghana and Rwanda's Health Insurance Schemes have recorded some success (8-10), while South Africa, Nigeria, Tanzania, Kenya,

and Ethiopia all have adopted National Health Insurance Schemes. Countries with weak social insurance protections have been shown to foster fluctuations in mortality rates compared to those with more extensive programs (11).

The health financing landscape of SSA has been characterized in recent years by a changing mix of funding mechanisms aimed at enhancing the health status of the population. The approach that different countries adopt to finance and provide health services raises important issues of equity and efficiency. Although health spending can affect health outcomes, the efficiency with which countries are able to transform their spending into better health outcomes varies significantly, and depends on the adopted mechanisms and their proportional mix. The objective of this study is to examine the implications of the changing healthcare financing pattern on health outcomes in selected SSA countries, taking into account the role of political, legal, and economic institutional rules. Institutional arrangements can influence the movement and coverage of healthcare resources, determining equity in access and improvements in health status. Poor institutional arrangements induce inadequate performance of health financing systems. Specifically, this study seeks to determine the relative contribution of the different health financing mechanisms to the advancement of health outcomes in SSA. While existing studies in the literature have focused on the direct link between health expenditure and health outcomes with mixed results (12-16), the attention of this study is drawn to the dynamic and differing effects of financing mechanisms and the efficiency with which resources are utilized to produce health outputs.

The investigation of healthcare expenditure and health outcomes has been ongoing (1, 17), with the assertion that public spending on health is important for improving health outcomes of the poor as they are more likely to obtain healthcare from publicly provided facilities (18). A distinction is often made between public and private expenditure on healthcare (12), linking these financing measures to better health outcomes (13, 19, 20) or economic growth. A number of studies have argued that an increase in public health expenditures may result in a decrease in private health expenditure and resulting in poorer health outcomes (1, 17, 21-23). Private health expenditure can promote efficient utilization of resources in producing healthcare, but hinders equity in distribution or access to healthcare (24, 25). Evidence from the literature do not favour out-of-pocket (OOP) payments as a means of healthcare spending. OOP increases the chance of mortality among disadvantaged groups by reducing healthcare demand through price rationing. Where there are associated improvements in health status from OOP payments, poor persons and those who are very ill are possibly exempted from such payment mechanism (19).

The unexpected, negative and sometimes insignificant effects of health expenditure on health status particularly for public spending follow from the role of institutions in the effectiveness and efficiency of healthcare spending. Studies have shown that there are interferences of existing institutional structures on the effectiveness and efficiency of healthcare spending and hence on health status (13, 26-28). In some cases, with existence of poor institutions, changes in health financing system may turn out to be inappropriate or counterproductive despite good intentions and political commitment (29). Recent empirical evidence of the role of institutions on healthcare spending show that policies and institutions alone account for as much as 23% cross-country differences in public health expenditures (30). Earlier studies concluded

that corruption resulted in poor health outcomes, (31, 32) or less efficient use of public health expenditure (27), and countries with permanent democracy had higher life expectancy and lower infant deaths than otherwise (26, 33, 34). However, Hu and Mendoza (35) showed insignificant effects of the interaction of public spending and governance quality on health status.

Health insurance affects healthcare utilization, disease treatment, self-reported health, and mortality (36). Expansion of health insurance coverage is associated with higher rate of having a usual source of care and being able to afford care (37, 38), factors typically associated with better health outcomes. Evidence shows that coverage expansions lead to greater access to primary care (39, 40), more ambulatory care visits, increased use of prescription medications (41), and better medication adherence (39). Other studies found a negative relationship between private health insurance and mortality (42, 43).

Health outcomes can be measured as improvement in life expectancy (17), or mortality rates. These measures only partially reflect the health status of a population and it is difficult to identify feedbacks and causality links between health expenditures and health outcomes (44). Given that risks associated with child birth and life in the first year of an infant are reduced by better healthcare facilities, infant mortality has been considered to be a more typical and reliable health outcome than life expectancy (1). Infant mortality, under-five mortality and crude death rates are considered to be good indicators of the health status of a population (45).

Methods

We adopt the production function framework in analyzing the relationship between the pattern of financing healthcare and the health outcomes that characterize the health system (46). We use a conventional health production function, which includes health output, total factor productivity, labour force, and capital input. Given that the incentives to patients and providers under each method of financing healthcare differs and results in different efficiency and equity implications, the final healthcare output is affected, though the quantities of labour and capital remain the same. Thus, the total factor productivity of the health output function is assumed to be influenced by the type or mix of methods of financing adopted in the health system. The health financing mix is the proportion of each financing mechanism in THE. There is an interaction in the health sector of countries driven by a combination of market forces and policy interventions. While public expenditure on health and external funding of healthcare are indicative of policy variables, OOP spending and health insurance expenditure reflects market interaction factors. We consider external funding on healthcare as a policy variable because it is usually not informed by economic gains but rather by government-international relations. We include GDP per capita as an appropriate proxy for standard of living.

A dynamic panel model is thus specified as:

$$H_{it}^{j} = H_{it-1}^{j} + \alpha_1 THEGDP_{it} + \alpha_2 GTHE_{it} + \alpha_3 ETHE_{it} + \alpha_4 OOPEH_{it} + \alpha_5 HTHE_{it} + \alpha_6 GDPPC_{it} + \alpha_7 HBED_{it} + \alpha_8 PHYS_{it} + \alpha_9 IN\square T_{it} + V_{it} \quad (1)$$

Where: H_{it}^{j} = Health Outcomes *j* for country *i* in year *t*

$THEGDP_{it}$ = Total Health Expenditure as a percentage of GDP for country i in year t

$GTHE_{it}$ = Government Health Expenditure as a percentage of Total Health Expenditure for country i in year t

$ETHE_{it} =$ External funding of Health as a percentage of Total Health Expenditure for country i in year t

$OOPTHE_{it} =$ Out-of-Pocket Health Expenditure as a percentage of Total Health Expenditure for country i in year t

$HTHE_{it} =$ Health Insurance Health Expenditure as a percentage of Total Health Expenditure for country i in year t

$GDPPC_{it} =$GDP per capita for country i in year t

$PHYS_{it} =$ Ratio of Physician to population for country i in year t

$HBEDS_{it} =$ Ratio of Bed to population for country i in year t

$INST_{it}$ = Institutional variables; political; perception of corruption, legal; law and order, economic; regulatory quality, informal institution; religion, ethnicity and fragmentation.

H_{it-1}^{j} represents the lagged value of health outcome indicators. The transformed model that eliminates the individual effects, π_i , which is the source of inconsistency in the model is specified in Equation 2 below:

$$\Delta H_{it}^{j} = \delta\left(\Delta H_{it-1}^{j}\right) + \alpha_1(\Delta THEGDP_{it}) + \alpha_2(\Delta GTHE_{it}) + \alpha_3(\Delta ETHE_{it}) + \alpha_4(\Delta OOPEH_{it}) + \alpha_5(\Delta HTHE_{it}) + \alpha_6(\Delta GDPPC_{it}) + \alpha_7(\Delta HBED_{it}) + \alpha_8(\Delta PHYS_{it}) + \alpha_9(\Delta INST_{it}) + \Delta V_{it} \quad (2)$$

This differencing procedure eliminates the individual fixed effects and makes the predetermined variables endogenous. To address the common problem associated with panel data, which is the endogeneity issue, this study adopts the Generalized Method of Moments (GMM). To correct for problems of heteroscedasticity, we use two-step GMM.

Sources of data

The data for the study are from the World Bank World Development Indicators, the World Health Organization database and World Governance Indicators. The variable definitions and the sources of data utilized are presented in Appendix 1. List of countries included is presented in Appendix 2. The study adopted three different measures of health outcomes: Life Expectancy, Infant Mortality, and Under-five Mortality to track the response of health outcomes to variations in the pattern of financing. The sample size was 600 panel observations from 30 SSA countries over the years 1995-2014. The scope of the study is limited to the period under consideration due to data constraint across the countries and the variables of interest. Three institutional variable components were separately used and as basis for an aggregate institutional measure. These are political, economic, and institution dimensions as well as the aggregate measure. Principal Component Analysis (PCA) on the governance indicators was used to solve the problems of irrelevant information. As such, we aggregated six indices into four classifications: (i) political index (political stability and voice and accountability); (ii) economic index (regulatory quality and government effectiveness); (iii) institutional index (rule of law and control of corruption); and an aggregate of all six indices. This classification is consistent with the recent trend in the literature (47, 48).

Results

Descriptive Statistics

The descriptive statistics are presented in table 1. Average life expectancy is 55 years, ranging from 31.6- 74.2 years. Infant mortality rates (IMR) are relatively lower than under-5 mortality. Average infant mortality and under-5 mortality are 71.8 and 116.2 per 1000 live births, respectively. The best performing infant and

under-5 mortality were 12 and 13.9 per 1000 live births, while the worst were 153.4 and 279.5 per 1000 live births, respectively. Private sector on average accounts for more than half (54.6%) of THE. However, the proportion of health expenditure financed through OOP, 40.4% on average, is less than average of government share of 45%. External sources of healthcare funding in SSA accounted for 18.4% of THE. The least share in the funding of health expenditure is accounted for by the health insurance plan, 8.0%, with a minimum of 0.02% in Mali (1996-99) and maximum of 82.8% in South Africa (2014). THE as a proportion of GDP is about 5%, ranging between 2.1% and 13.6%. The institutional framework in SSA countries is generally weak, as all the components and aggregate measures are negative on the average. Health inputs in the region are low. There are on average, 1 bed per 1,000 population, and the highest number of beds per 1,000 populations is less than 4. SSA countries have on average, less than 1 physician per 1,000 populations.

Presentation of Estimation

Results for the dynamic panel Difference GMM for the effects of healthcare spending on each of the three health outcome measures: Life Expectancy, Infant Mortality, and Under-five Mortality are presented in Tables 2, 3, and 4, respectively. Each table contains eight different model specifications. Model 1 controls for inclusion of aggregate governance index only. Models 2, 3 and 4 controls for inclusion of economic, political, and institutional indices, respectively. Models 5, 6, 7 and 8 controls for the interaction of healthcare spending with aggregate governance, economic, political and institution indices, respectively. The controls are meant to determine whether there are variations in findings.

Table 1: Descriptive Statistics

Life Expectancy Estimation

Table 2 shows the life expectancy results. THE as a percentage of GDP is positive and statistically significant in three models, with coefficients ranging from 0.084 and 0.091, implying that a one percent increase in THE as a percentage of GDP would improve life expectancy by between 0.08 and 0.09 percent. This result is similar to Farag et al. (13) showing that healthcare spending generally improves health outcome.

Government expenditure on healthcare is significant in two models, implying that a one percent increase in the share of government expenditure on health in total health expenditure has the potential of increasing the life expectancy by about 0.05 percent. In addition, the interactive variable of government expenditure on health with institution is statistically significant and positive in the fifth model, suggesting strong institutional base support as fundamental to realizing effective government spending on health.

External financing of health is significant in two models, with coefficient ranging between 0.0101 and 0.0109. This reflects the role of external funding of health in influencing the health outcomes positively. This implies that a one percent increase in external share of total health expenditure would result in around 0.01 percent increase in life expectancy.

The health insurance variable is positive and statistically significant in all models, except two. The coefficients ranged between 0.0255 and 0.0557, which implies that one percent increase in the share of the funding of healthcare through health insurance in the total health expenditure, increases life expectancy of the countries by

VARIABLES	No of Observations	Mean	Std. dev.	Min	Max
Out of Pocket Exp	600	40.42	16.85	3.719	79.72
Govt/THE	600	45.00	14.02	13.59	81.76
External/THE	600	18.42	15.19	0.0265	73.78
Health Insurance/THE	600	7.980	15.85	0.0208	82.80
Priv health Exp/THE	600	54.66	14.27	18.24	86.41
THE/GDP	600	5.352	2.068	2.085	13.63
GDP Per Capita	600	1,675	2,358	182.7	11,926
Aggregate Index	600	-0.538	0.570	-1.749	0.867
Economic index	600	-0.555	0.528	-1.700	1.080
Political index	600	-0.498	0.717	-2.054	0.983
Institutional index	600	-0.561	0.560	-1.554	0.959
Life Expectancy	600	55.11	7.296	31.63	74.19
Under-5 Mortality	600	116.2	52.72	13.90	279.5
Infant Mortality	600	71.81	27.79	12.20	153.4
Hospital Beds/1,000	600	1.054	0.794	0.100	3.499
Physicians/1000	600	0.159	0.212	0.008	1.057

between 0.25 and 0.56 percent. The variable for economic growth, GDP per capita is statistically significant in three models. The coefficient ranges between 2.21 and 2.81. This reinforces the relevance of the size of the economy in dictating availability of resources for the health sector. Three of the four institution variables' coefficients are statistically significant, but signed contrary to a priori expectation. The inclusion of the interaction variables is generally insignificant for all the models, except for government and OOP interaction variables in the fifth and eighth models, respectively. Out-of-pocket expenditure is insignificant in all life expectancy estimations. This implies that the influence of the share of OOP spending in total health expenditure on life expectancy in SSA is not significantly different from zero.

Infant Mortality and Under-five Mortality Estimations

The results from both infant mortality and under-5 mortality estimates are presented in table 3 and 4. In the infant mortality estimates, THE as proportion of GDP is statistically significant in two models. The coefficients of between -0.0148 and -0.0126 implies that a one percent increase in the proportion of the national income devoted to healthcare, will result in a decline of between 0.13 and 0.15 percent in IMR. For the under-five estimates, none of the coefficients is statistically significant.

The share of government expenditure on health in THE is statistically significant in one model for infant mortality. This implies that increase in the share of government funding of health in the countries has a reverser effect on infant mortality.

Table 2: Life Expectancy Dynamic Panel Data Analyses-Difference GMM

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
L.le	0.889 [0.0451] (0.000)	0.866 [0.0507] (0.000)	0.875 [0.0438] (0.000)	0.907 [0.0503] (0.000)	0.972 [0.0485] (0.000)	0.951 [0.0808] (0.000)	0.955 [0.0679] (0.000)	1.020 [0.0647] (0.000)
Oopeh	0.0137 [0.0229] (0.550)	0.00588 [0.0244] (0.810)	0.00397 [0.0219] (0.856)	0.0273 [0.0255] (0.284)	-0.0203 [0.0226] (0.370)	0.00755 [0.0291] (0.796)	-0.00691 [0.0214] (0.747)	-0.0160 [0.0191] (0.402)
thegdp	0.0913 [0.0469] (0.051)	0.0692 [0.0426] (0.104)	0.0836 [0.0438] (0.056)	0.0839 [0.0335] (0.012)	0.0340 [0.153] (0.824)	0.230 [0.248] (0.355)	0.113 [0.112] (0.313)	0.0789 [0.0852] (0.355)
gthe	0.0184 [0.0150] (0.217)	0.0115 [0.0159] (0.472)	0.0166 [0.0147] (0.259)	0.0241 [0.0153] (0.116)	0.0463 [0.0208] (0.026)	0.0458 [0.0335] (0.172)	0.0363 [0.0295] (0.218)	0.0454 [0.0199] (0.022)
ethe	0.0101 [0.00488)] (0.039)	0.0109 [0.00598] (0.068)	0.00883 [0.00540] (0.102)	0.00818 [0.00502] (0.103)	-0.00427 [0.0157] (0.786)	0.00569 [0.0187] (0.761)	-0.00277 [0.0129] (0.830)	-0.00770 [0.0121] (0.525)
hthe	0.0525 [0.0244] (0.031)	0.0444 [0.0243] (0.067)	0.0557 [0.0234] (0.017)	0.0545 [0.0233] (0.019)	0.0263 [0.0160] (0.100)	0.0351 [0.0186] (0.060)	0.0255 [0.0183] (0.165)	0.0393 [0.0148] (0.008)
lngdppc	2.225 [1.223] (0.069)	2.813 [1.196] (0.019)	2.205 [0.942] (0.019)	1.911 [1.221] (0.117)	0.406 [1.137] (0.721)	0.555 [2.004] (0.782)	0.781 [1.720] (0.650)	-0.799 [1.534] (0.602)
lnst	-0.742 [0.357] (0.038)				-3.268 [3.175] (0.303)			
lhbeds	0.594 [1.021] (0.561)	0.775 [1.209] (0.522)	-0.0148 [0.902] (0.987)	0.583 [0.986] (0.554)	-0.503 [1.054] (0.633)	0.0274 [1.030] (0.979)	-0.00893 [1.075] (0.993)	-0.0985 [0.634] (0.877)
lphys	-0.542 [0.334] (0.104)	-0.472 [0.346] (0.172)	-0.586 [0.296] (0.047)	-0.475 [0.403] (0.238)	0.00977 [0.400] (0.981)	-0.0121 [0.598] (0.984)	-0.222 [0.361] (0.539)	0.148 [0.282] (0.600)
oopehinst					-0.00475 [0.0469] (0.919)			
gtheinst					0.0782 [0.0415] (0.059)			
etheinst					-0.0112 [0.0252] (0.656)			
htheinst					0.00657 [0.0275] (0.811)			
thegdpinst					0.0291 [0.202] (0.886)			
ecoind		-0.996 [0.394]				-6.769 [4.263]		

		(0.012)				(0.112)		
polind			-0.207 [0.311] (0.506)				-2.845 [0.561] (4.895)	
instind				-0.647 [0.294] (0.028)				-3.866 [0.204] (3.047)
oopehecoind						0.0334 [0.0551] (0.545)		
gtheecoind						0.0743 [0.0500] (0.137)		
etheecoind						0.00272 [0.0251] (0.914)		
htheecoind						0.0268 [0.0267] (0.316)		
thegdpecoind						0.230 [0.291] (0.429)		
oopehpolind							0.0103 [0.0590] **(**0.862**)**	
gthepolind							0.0533 [0.0705] (0.450)	
ethepolind							-0.0119 [0.0198] (0.547)	
hthepolind							0.0213 [0.0256] (0.406)	
thegdppolin							0.108 [0.141] (0.441)	
oopehinstind								- 0.00919 [0.0413] (0.824)
gtheinstind								0.0764 [0.0345] (0.027)
etheinstind								-0.0134 [0.0193] (0.486)
htheinstind								-0.0196 [0.0280] (0.484)
thegdpinstind								0.103 [0.121] (0.398)
Observations	540	540	540	540	540	540	540	540

Number of crossid	30	30	30	30	30	30	30	30
Hansen_test	24.60	23.22	25.10	19.63	15.74	14.22	21.86	15.89
Hansen Prob	1	1	1	1	1	1	1	1
AR(1)_test	1.406	1.122	1.443	1.757	0.828	0.518	0.276	0.690
AR(1)_P-value	0.160	0.262	0.149	0.0790	0.408	0.605	0.783	0.490
AR(2)_test	0.386	1.058	0.332	1.049	0.363	-0.241	0.0932	0.748
AR(2)_P-value	0.700	0.290	0.740	0.294	0.717	0.809	0.926	0.454
No. of Instruments	112	112	112	112	113	113	97	97
Note: the p-values are presented in curly parentheses () while the standard errors presented in squared parentheses [].								

The share of external funding of total health expenditure are negative and statistically significant in four models for both infant mortality and under-five mortality. The external financing coefficients ranges between -0.00024 and -0.00028 for infant mortality and -0.00039 and -0.00050 for under-five mortality, which implies that a one percent increase in the share of external financing of health in total health expenditure causes infant mortality and under-5 mortality to decline by between 0.0024 and 0.0028 percent, and between 0.0039 and 0.0050 percent, respectively.

The health insurance variable is statistically significant in three of the under-five estimated models. The coefficients are between -0.0016 and -0.0024, which implies that a one percent increase in the share of health insurance in total health expenditure, would lead to a decline of between 0.016 and 0.024 percent in under-five mortality.

The effect of economic growth and the share of OOP expenditures on infant and under-five mortalities are not significantly different from zero. The coefficients of the institutional variable are generally insignificant, except for political measure of institution, which has a coefficient of -0.0195. This suggests that a one percent increase in institutional efficiency on the political terrain has the potential of reducing infant mortality by about 0.2 percent.

Discussion

The peculiarity of the health sector structure across countries may prevent similar outcomes from the same financing mechanism. Therefore, it is crucial to empirically determine which financing mix best work for SSA countries, if the resources channeled to the health sector are to have the desired impact on population health. Our results show that as SSA countries commit more of their national income to healthcare, the life expectancy would improve. The non-significance of the economic growth variable in the infant mortality and under-five mortality estimates points to the non-inclusive growth experience in the SSA countries. While the economies of most countries have been growing in the last one to two decades, the poverty incidence has equally been on the increase. Thus, for economic growth to impact health outcomes significantly, policy efforts that promote poverty reduction should be pursued.

The activities and supports of external donors appears to be yielding an impact on

Table 3: Infant Mortality Dynamic Panel Data Analyses-Difference GMM

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
L.lnifm	0.989 [0.0132] (0.000)	0.987 [0.0129] (0.000)	0.989 [0.0150] (0.000)	0.987 [0.0136] (0.000)	0.974 [0.0172] (0.000)	0.982 [0.0246] (0.000)	0.978 [0.0160] (0.000)	0.966 [0.0234] (0.000)
oopeh	9.12e-05 [0.000262] (0.728)	4.39e-05 [0.000314] (0.889)	0.000174 [0.000294] (0.554)	9.84e-05 [0.000263] (0.708)	0.000986 [0.000948] (0.298)	0.000677 [0.000899] (0.452)	0.000436 [0.000338] (0.197)	0.000867 [0.000842] (0.303)
thegdp	-0.00168 [0.00183] (0.359)	-0.00179 [0.00178] (0.314)	-0.00111 [0.00161] (0.489)	-0.00182 [0.00178] (0.306)	-0.0106 [0.00840] (0.208)	-0.0148 [0.00687] (0.032)	-0.00516 [0.00447] (0.248)	-0.0126 [0.00607] (0.038)
gthe	-0.000344 [0.000245] (0.160)	-0.000293 [0.000268] (0.275)	-0.000377 [0.000221] (0.088)	-0.000333 [0.000262] (0.205)	-0.000708 [0.00101] (0.481)	-0.00109 [0.00117] (0.350)	-0.000524 [0.000672] (0.436)	-0.000483 [0.000695] (0.487)
ethe	-0.00027 [0.000128] (0.036)	-0.00026 [0.000127] (0.045)	-0.00024 [0.000133] (0.078)	-0.00028 [0.000135] (0.040)	-0.00043 [0.000580] (0.454)	-0.00045 [0.000479] (0.344)	-0.000237 [0.000280] (0.399)	-0.000264 [0.000821] (0.748)
hthe	-0.000503 [0.000626] (0.422)	-0.000562 [0.000671] (0.402)	-0.000760 [0.000788] (0.335)	-0.000532 [0.000656] (0.417)	-0.00078 [0.000792] (0.323)	-0.00066 [0.000635] (0.299)	-0.000865 [0.000773] (0.263)	-0.000918 [0.000889] (0.302)
lngdppc	-0.00793 [0.0204] (0.697)	-0.0138 [0.0170] (0.416)	-0.00209 [0.0204] (0.918)	-0.00971 [0.0188)] (0.606)	-0.00434 [0.0183] (0.813)	-0.00672 [0.0258] (0.794)	-0.00581 [0.0125] (0.642)	-0.00847 [0.0269] (0.753)
inst	-0.00324 [0.00882] (0.713)				-0.00410 [0.194] (0.983)			
lhbeds	-0.0156 [0.0253] (0.538)	-0.0209 [0.0273] (0.443)	-0.0115 [0.0259] (0.656)	-0.0161 [0.0285] (0.572)	0.00675 [0.0300] (0.822)	-0.0134 [0.0378] (0.723)	0.00996 [0.0303] (0.742)	0.0134 [0.0373] (0.720)
lphys	0.0153 [0.0107] (0.150)	0.0115 [0.0116] (0.322)	0.0128 [0.00906] (0.157)	0.0124 [0.0101] (0.220)	0.00769 [0.0126] (0.543)	0.00629 [0.0133] (0.637)	0.00963 [0.00980] (0.326)	0.00903 [0.0116] (0.436)
oopehinst					0.00151 [0.00239] (0.528)			
gtheinst					-0.000140 [0.00226] (0.951)			
etheinst					-0.000362 [0.000713] (0.612)			
htheinst					0.00100 [0.00176] (0.570)			
thegdpinst					-0.0118 [0.0121] (0.327)			
ecoind		0.00988 [0.00775] (0.202)				0.150 [0.203] (0.460)		
polind			-0.0106 [0.00817] (0.196)				-0.000446 [0.104] (0.997)	
instind				0.00144 [0.00485] (0.766)				0.0624 [0.122] (0.608)
oopehecoind						0.000502 [0.00203] (0.804)		

gtheecoind						-0.00121 [0.00211] (0.565)		
etheecoind						-0.00044 [0.000608] (0.465)		
htheecoind						-0.00105 [0.00329] (0.749)		
thegdpecoind						-0.0193 [0.0116] (0.098)		
oopehpolind							0.000585 [0.00102] (0.567)	
gthepolind							-0.00017 [0.00143] (0.904)	
ethepolind							-6.3e-05 [0.00038] (0.867)	
hthepolind							0.000941 [0.00171] (0.582)	
thegdppolin							-0.00567 [0.00558] (0.310)	
oopehinstind								0.000816 [0.00169] (0.628)
gtheinstind								-0.00029 [0.00142] (0.839)
etheinstind								-0.00019 [0.00103] (0.854)
htheinstind								0.00057 [0.00123] (0.642)
thegdpinstind								-0.016 [0.00727] (0.024)
Observations	540	540	540	540	540	540	540	540
Number of crossid	30	30	30	30	30	30	30	30
Hansen_test	25.48	24.38	25.63	26.22	17.68	19.60	17.96	18.94
Hansen Prob	1	1	1	1	1	1	1	1
AR(1)_test	-0.0283	0.0520	-0.0693	-0.0214	-0.635	-0.552	-0.430	-0.540
AR(1)_P-value	0.977	0.959	0.945	0.983	0.525	0.581	0.667	0.589
AR(2)_test	-1.080	-1.064	-1.100	-1.092	-1.337	-1.395	-1.052	-1.118
AR(2)_P-value	0.280	0.287	0.271	0.275	0.181	0.163	0.293	0.264
No. of Instruments	143	143	143	143	143	143	143	143
Note: the p-values are presented in curly parentheses () while the standard errors presented in squared parentheses [].								

the health of the SSA people. In most SSA countries, child healthcare services are often championed by development partners, spearheading immunization of children and care for the vulnerable. Virtually all countries benefit from external assistance healthcare financing, especially with regards to child-killer diseases. While SSA countries can draw on the opportunity of external funding, it is not advisable to rely on it as the main source of funding healthcare, as it is subject to the prevailing economic circumstances of the donor country or foundation. The general insignificance of the government-financing variable may not be unconnected with the existence of minimal health spending focus on infant by governments of SSA countries. Spending more to increase hospital staff may not reduce under-five and infant mortality if the quality and quantity of the network of roads prevents the population from easily accessing hospitals (49, 50). Increasing government expenditures on heath is not necessarily going to improve health outcomes unless the increase is accompanied by policies and institutional arrangements that correctly identify inter, and intra-sectoral needs and allocate funds appropriately.

Though the health insurance variable appeared to be the best-performed variable among all the financing mechanisms, the variable is not statistically significant in infant mortality estimates. This implies that the impact of health insurance is not significant on the health status of infants in SSA. It however suggests stronger positive effects of increase in health insurance on life expectancy compared to other forms of healthcare spending particularly external support. Despite its infancy, health insurance financing mechanism appears to be driving effective use of resources to promote health status of the population in SSA. The results of the effect of the share of health insurance on life expectancy strengthen arguments for positive effect of healthcare spending on health status (12, 13, 19). Wider coverage of the healthcare insurance should be pursued by governments through the provision of the enabling environment and increased enrolment of beneficiaries, to take advantage of the risk pooling opportunity that health insurance offers.

With between half and two-third of SSA living below the poverty threshold, the burden of having to pay for their healthcare expenses may not result in positive health outcomes. This explains the poor performance of the share of OOP in THE in all the estimations. There is a need to shift the burden of healthcare funding off households.

The institution variable appears to reflect the poor state and functionality of institutions in these countries. The results support the assertion of the relevance of institution to the outcomes from the healthcare system of countries (26-32). The current constitution of the institutions in SSA appears to be working contrary to the objectives of promoting positive health outcomes. This implies that the institutional framework in SSA countries is yet to be fully developed to facilitate more effective delivery of healthcare services.

Conclusion

This study reveals that different methods of health financing have differing effect on the health outcomes of SSA. Our findings show that the shares of external financing and private health insurance in THE significantly impact health outcomes of SSA countries, while the share of government expenditure mildly contribute to health outcomes. On the other hand, the share of OOP expenditure in THE is generally insignificant and non-

Table 4: Under-5 Mortality Dynamic Panel Data Analyses-Difference GMM

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
L.lnu5m	0.983 [0.0180] (0.000)	0.983 [0.0201] (0.000)	0.987 [0.0189] (0.000)	0.981 [0.0229] (0.000)	0.990 [0.0242] (0.000)	1.007 [0.0347] (0.000)	1.000 [0.0259] (0.000)	0.975 [0.0323] (0.000)
oopeh	0.000514 [0.000869] (0.554)	0.000304 [0.00114] (0.791)	0.000553 [0.000782] (0.480)	0.000239 (0.000923) [0.7950]	0.000724 [0.488] (0.00104)	0.00163 [0.00120] (0.175)	0.000656 [0.00116] (0.573)	0.00116 [0.000914] (0.205)
thegdp	-0.000167 [0.00221] (0.940)	-0.00120 [0.00193] (0.534)	5.24e-05 [0.00190] (0.978)	-0.00104 [0.00188] (0.580)	-3.72e-05 [0.0101] (0.997)	-0.00689 [0.00942] (0.464)	-0.00123 [0.00482] (0.799)	-0.00570 [0.00436] (0.190)
gthe	-0.000421 [0.000639] (0.510)	-0.000499 [0.000696] (0.474)	-0.000272 [0.000579] (0.638)	-0.000511 [0.000667] (0.443)	-0.00233 [0.00224] (0.297)	-0.00105 [0.00131] (0.422)	-0.00104 [0.00104] (0.316)	-0.00159 [0.00148] (0.282)
ethe	-0.00048 [0.000179] (0.008)	-0.00049 [0.000182] (0.007)	-0.00039 [0.000197] (0.046)	-0.00050 [0.000195] (0.011)	-0.00012 [0.000618] (0.848)	-0.00052 [0.00144] (0.719)	-0.00049 [0.000682] (0.470)	-0.00053 [0.000899] (0.554)
hthe	-0.00139 [0.00112] (0.210)	-0.00130 [0.00102] (0.217)	-0.00126 [0.000988] (0.190)	-0.00148 [0.00111] (0.156)	-0.0018 [0.000992] (0.075)	-0.0016 [0.00084] (0.104)	-0.000931 [0.00112] (0.583)	-0.00214 [0.0013] (0.082)
lngdppc	0.0165 [0.0374] (0.659)	0.00868 [0.0347] (0.803)	0.0162 [0.0270] (0.550)	0.000660 [0.0488] (0.989)	-0.00133 [0.0278] (0.962)	0.0433 [0.0777] (0.578)	0.0212 [0.04377] (0.628)	-0.0212 [0.05746] (0.712)
inst	-0.0216 [0.0201] (0.283)				0.120 [0.254] (0.636)			
lhbeds	0.0540 [0.0490] (0.271)	0.0467 [0.0501] (0.351)	0.0577 [0.0439] (0.189)	0.0476 [0.0459] (0.300)	0.0174 [0.0403] (0.666)	0.0215 [0.0375] (0.566)	0.0504 [0.0664] (0.448)	0.0242 [0.0407] (0.553)
lphys	0.00167 [0.00961] (0.862)	0.00117 [0.00859] (0.891)	0.000853 [0.0104] (0.935)	-0.000421 [0.0122] (0.973)	0.00139 [0.0115] (0.904)	-0.000988 [0.0143] (0.945)	0.000306 [0.0148] (0.983)	0.0105 [0.0142] (0.457)
oopehinst					5.70e-05 [0.00256] (0.982)			
gtheinst					-0.00384 [0.00456] (0.400)			
etheinst					0.000441			

					[0.000969] (0.649)			
htheinst					0.00341 [0.00295] (0.247)			
thegdpinst					-0.00185 [0.0124] (0.881)			
ecoind		-0.00174 [0.0148] (0.907)				0.000104 [0.180] (1.000)		
polind			-0.0195 [0.0103] (0.060)				0.000203 [0.260] (0.999)	
instind				-0.00530 [0.0132] (0.688)				0.0934 [0.177] (0.597)
oopehecoind						0.00212 [0.00216] (0.327)		
gtheecoind						-0.00127 [0.00220] (0.563)		
etheecoind						-3.88e-5 [0.00198] (0.984)		
htheecoind						0.00188 [0.00238] (0.431)		
thegdpecoind						-0.00898 [0.0127] (0.479)		
oopehpolind							0.000737 [0.00336] (0.826)	
gthepolind							-0.000784 [0.00311] (0.801)	
ethepolind							-0.000125 [0.00109] (0.909)	
hthepolind							-0.000803 [0.00229] (0.725)	
thegdppolin							-0.00310 [0.00501] (0.535)	
oopehinstind								0.000791 [0.00165] (0.631)
gtheinstind								-0.00207 [0.00222] (0.352)
etheinstind								-0.000296 [0.00127] (0.817)

htheinstind								0.00190 [0.00172] (0.271)
thegdpinstind								-0.00948 [0.00622] (0.128)
Observations	540	540	540	540	540	540	540	540
Number of crossid	30	30	30	30	30	30	30	30
Hansen_test	24.25	24.56	21.17	24.40	19.72	22.70	18.55	20.36
Hansen Prob	1	1	1	1	1	1	1	1
AR(1)_test	-0.438	-0.461	-0.448	-0.456	-0.986	-1.053	-0.573	-0.810
AR(1)_P-value	0.662	0.645	0.654	0.649	0.324	0.292	0.567	0.418
AR(2)_test	-1.163	-1.160	-1.166	-1.160	-1.156	-1.162	-1.152	-1.147
AR(2)_P-value	0.245	0.246	0.244	0.246	0.248	0.245	0.250	0.251
No. of Instruments	177	177	177	177	178	178	178	178
Note: the p-values are presented in curly parentheses () while the standard errors presented in squared parentheses [].								

supportive of improving positive health outcomes in the SSA region. There is need for the society to collectively shoulder the health-financing burden to relieve households.

Despite the infancy of health insurance and its very minimal share in THE, the existence of health insurance appears to be important, due to its pooling advantages. There is need for SSA governments to promote health insurance, especially, the compulsory social health insurance scheme as well as community-based health insurance schemes that have been found to be effective, for a wider coverage of the healthcare needs of the population. The existing institutional framework in each country needs to be improved upon for efficient utilization of available resources within the healthcare system. Specifically, governments should consider rebalancing their expenditures in favor of the health sector to scale up domestic resources allocated to health.

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Appendices

Appendix 1: Variable Definition and Data Sources			
Variables	**Definition**	**Period**	**Source**
OOPTHE	Out-of-Pocket Health Expenditure as a percentage of Total Health Expenditure for country i in year t	1995-2014	World Health Organisation (WHO) database
GTHE	Government Health Expenditure as a percentage of Total Health Expenditure for country i in year t	1995-2014	World Health Organisation (WHO) database
ETHE	External funding of Health as a percentage of Total Health Expenditure for country i in year t	1995-2014	World Health Organisation (WHO) database
HTHE	Health Insurance as a percentage of Total Health Expenditure for country i in year t	1995-2014	World Health Organisation (WHO) database
PTHE	Private Health Expenditure as a percentage of Total Health Expenditure for country i in year t	1995-2014	World Health Organisation (WHO) database
THEGDP	Total Health Expenditure as a percentage of GDP for country i in year t	1995-2014	World Health Organisation (WHO) database
LNGDPPC	Log of GDP per capita for country i in year t	1995-2014	World Bank Indicators (2016)
INST	Average of governance Indicators	1995-2014	World Governance Indicators (2016)
ECOIND	Economic Index	1995-2014	World Governance Indicators (2016)
POLIND	Political Index	1995-2014	World Governance Indicators (2016)
INSTIND	Institution Index	1995-2014	World Governance Indicators (2016)
LE	Life Expectancy	1995-2014	World Bank Indicators (2016)
LNU5M	Log of Under-5 mortality rates	1995-2014	World Bank Indicators (2016)
LNIFM	Log of Infant Mortality	1995-2014	World Bank Indicators (2016)
LHBEDS	Hospital beds (per 10,000 population) people)	1995-2014	World Bank Indicators (2016)
LPHYS	Physicians (per 10,000 people)	1995-2014	World Bank Indicators (2016)

Appendix 2: List of Sub-Saharan Countries included in the Study					
S/N	**Country**	**S/N**	**Country**	**S/N**	**Country**
1	Benin	11	Gabon	21	Niger
2	Botswana	12	Gambia, The	22	Nigeria
3	Burkina Faso	13	Ghana	23	Rwanda
4	Burundi	14	Guinea	24	Senegal
5	Cap Verde	15	Kenya	25	Sierra Leone
6	Central African Republic	16	Madagascar	26	South Africa
7	Chad	17	Malawi	27	Tanzania
8	Congo, Rep.	18	Mali	28	Togo
9	Cote d'Ivoire	19	Mauritania	29	Uganda
10	Ethiopia	20	Mauritius	30	Zambia

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