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MODELING THE DETERMINANTS OF PRIVATE HEALTH SPENDING ACROSS SUB-SAHARAN AFRICAN COUNTRIES: A MACRO LEVEL STUDY

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ABSTRACT

Sub-Saharan African (SSA) countries faced huge health financing burden as out−of−pocket health spending remains the primary source of financing healthcare in the region. The region has experienced rising healthcare costs, with daunting implications on health outcomes. The objective of the study is to investigate the macroeconomic determinants of private health spending across SSA countries. The study used panel data covering 41 countries for the period 2010 to 2018. A dynamic data panel model was estimated using the generalized methods of moments. The result revealed that the proportion of the population above 65 years, HIV/AIDS prevalence rate, malaria prevalence rate, corruption perception index and physician density ratio were the uniform determinants of out−of−pocket as a share of total health spending and private health spending as a share of total health spending. However, inflation rate and per capita income significantly influence out−of−pocket health spending as a share of total health spending. This is among the foremost studies that examined the determinants of private health spending across SSA countries using a macroeconomic approach. The study established the dynamic relationship between macroeconomic variables and private health spending across SSA countries. Effective policy efforts should be directed toward reducing the high inflation rate, tackling high malaria and HIV prevalence rate, strengthening government institutions and tackling corruption, curbing high attrition rate of health workforce in the

region**,** and improving per capita income. Also, governments in SSA should commit themselves to improving the share of health spending in total budgetary allocation.

JEL Classification: H1, H6, H8

Key words: Econometrics, Determinants, Private health spending, Sub-Saharan African countries, General methods of moments

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1. INTRODUCTION

The development literature recognized the place of health in economic growth and development. It is proposed that, other things being equal, healthy workers will be more productive than their unhealthy counterparts because they can work for longer hours and withstand the rigor of hard work (Ehikioya and Mohammed, 2013). According to Ahuru, Osaze and Efegbere (2020), poor health infrastructure, illness and disease shorten the working lives of people, thereby reducing their lifetime earnings. Schultz (1999) postulated that good health impacts positively on children's learning ability resulting in better education outcome, school completion rate, higher average years of schooling and enhanced human capital development (Odoh and Nduka, 2018). Also, Todaro and Smith (2007) revealed that human resources constitute the basis for wealth creation; other forms of resources which include natural and capital resources are simply passive factors of production. Human capital is the active agent that combines other resources in the production process (Ehikioya and Mohammed, 2013). Health problems are by extension related to economic problems and poor health at household level affects productivity and income (Omotor, 2009).

Against this backdrop, various countries and regions of the world have implemented various policy interventions designed to improve health status and increase national productivity. In sub-Saharan Africa (SSA) for the past three decades, several health policies have been implemented aimed at improving access to health services and enhancing health status for the people (Beogo et al., 2016). In 1987, the Bamako Initiative was launched as a strategy to implement an effective primary healthcare system (Uzochukwu, Onwujekwe and Akpala, 2002). The policy emphasized community participation in health facility management, cost recovery

mechanism and sustainable supply of essential drugs. Also, to achieve financial equity in access to healthcare among the poor in the rural and informal sector, the community-based health insurance (CBHI) was introduced, even though it remains largely underdeveloped in several rural communities (Onwujekwe, Uzochukwu, and Okoli, 2010). To guarantee effective primary healthcare systems, other policies were implemented, including pay for performance (P4P) and result-based funding (Kress, Su, and Wang, 2016). All these policies were implemented within the framework of private-sector-led health sector development.

The private sector has since been playing an effective role in health service delivery in SSA (Beogo et al., 2016). In SSA, following the deregulation policy, rapid expansion occurred in the private health sector, which reinforced the already existing traditional public health system (Lorna and Wiseman, 2011). Private health spending exceeds public health spending in the SSA region, showing that individuals have to fund health out-of- pocket. Out-of-pocket health funding exposes households to ''financial catastrophe'' in the absence of financial risk pooling mechanisms such as health insurance (Lorna and Wiseman, 2011). Payment for health directly out-of-pocket may push households into poverty as many households may deplete their resources to fund expensive healthcare bills, and occasionally may borrow. Given the socially-deprivative influence of out-of-pocket healthcare funding it is pertinent to unravel the factors influencing private health spending in SSA.

Extensive review of literature revealed that several studies have examined the determinants of healthcare expenditure. However, several of these studies were country-specific. This study made contributions to the literature in three ways: (i) it examined the macroeconomic determinants of private health spending for 41 countries**:** Mauritius, Mauritania, Nigeria, Eritrea, Saotome, Rwanda, Namibia, Mozambique, Senegal, Sierra Leone, South Africa, Togo, Uganda, Tanzania, Zambia, Niger, Malawi, Madagascar, Liberia, Lesotho, Kenya, Guinea Bissau, Guinea, Ghana, Gambia, Gabon, Ethiopia, Equatorial Guinea, Djibouti, Ivory Coast, Republic of Congo, Congo, Comoros, Central African Republic, Cabo Verde, Cameroun, Burundi, Burkina Faso, Botswana, Benin, Angola. (ii) it focused on private health spending as against previous studies that focused on public health spending (Acka, Sonmez and Yilmaz, 2017; Nghiem and Conelly, 2017; Ehikioya and Mohammed, 2013; Bassey

et al., 2010) (iii) variables such as the proportion of malnourished persons, corruption perception index and government effectiveness were examined for the first time as determinants of healthcare spending.

The findings of the study will be useful in formulating policies to reduce the catastrophic and impoverishing effects of private health spending in SSA. Excessive reliance on out-of-pocket health care is seen as a drawback for achieving universal health coverage (UHC) and may exacerbate poor health outcomes in many settings. Hence, studies of this nature that help reveal factors that drive healthcare cost in SSA will be pertinent in addressing poor healthcare utilization in the region.

2. BRIEF PROFILE FOR SUB-SAHARAN AFRICA (SSA)

2.1 HEALTH EXPENDITURE PATTERN FOR SSA AND OTHER REGIONS

Table 1 decomposed health expenditure into private and public health expenditure per capita. It is easily seen that per capita private health expenditure exceeds per capita public health expenditure for most of the time in SSA even though there is a consistent increase in the public health expenditure share over the period under consideration. For all other regions, per capita public health expenditure exceeds per capita private health expenditure, showing government commitments in making needed investments in healthcare provision. A situation where private health spending outweighs public health spending shows that governments of SSA are not committing enough resources to health sector development. This situation is peculiar to SSA and may give an indication of either government resource constraint in SSA, or government reluctance to commit resources to health sector development. It also points to the pivotal role of the private sector in healthcare provision in SSA (Arthur and Oaikhenan, 2017). This is worrisome given the high poverty incidence in the region and deplorable health outcomes. This may also contribute to a high rate of Out-of-pocket health spending, with its catastrophic and impoverishing effects on African households (Arthur and Oaikhenan, 2017; Onwujekwe et al., 2010;).

TABLE 1

Public and Private Health Expenditure Per Capita for SSA and Other Regions for the Period (2000–2016)

Years	Middle East and North Africa (MENA)		Sub Saharan African (SSA)		East African Pacific (EAP)		Organization for Economic Cooperation and Development (OECD) Countries		World Average	
	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private
2000	137.9	59.16	32.3	60.33	155.1	29.52	1378.2	40.22	320.2	42.15
2001	158.1	57.69	35.9	59.66	167.6	29.89	1495.5	40.38	345.5	42.19
2002	165.5	56.83	31.6	61.63	179.2	30.73	1600.8	40.53	369.4	42.09
2003	167.5	56.35	35.9	63.46	193.0	31.17	1689.2	39.95	389.0	41.49
2004	177.8	56.68	44.9	58.01	207.4	30.91	1791.5	39.27	412.1	40.87
2005	180.4	57.73	46.6	58.15	225.8	31.11	1894.8	39.21	438.1	40.89
2006	202.4	53.51	52.1	54.95	245.4	32.33	2044.9	38.78	475.5	40.48
2007	217.8	52.89	58.2	53.93	271.1	32.15	2155.9	38.34	505.6	40.12
2008	230.2	52.77	59.9	54.00	301.1	32.01	2293.0	37.27	542.5	39.18
2009	275.1	52.89	61.9	52.55	342.9	30.86	2455.0	36.18	590.3	38.15
2010	261.9	56.42	56.7	51.19	370.1	30.64	2542.4	36.22	604.2	38.81
2011	269.5	55.67	59.5	50.25	428.5	29.16	2668.4	35.48	637.5	38.16
2012	260.7	57.49	62.6	50.40	472.4	29.44	2744.2	36.02	664.0	44.88
2013	279.9	54.98	63.7	51.26	516.1	30.82	2871.9	36.22	700.0	41.82
2014	342.4	50.06	64.8	51.86	549.9	31.23	3698.2	20.88	861.8	38.16
2015	363.7	52.21	70.4	51.98	599.6	31.23	3856.4	20.43	904.2	39.66
2016	465.2	50.14	69.1	53.12	627.6	31.68	3998.7	20.14	940.6	39.72

Source: Authors' compilation from WDI dataset; Note: All values are in USD$

2.2 HEALTH OUTCOMES FOR SSA AND OTHER REGIONS

Table 2 compares various health indicators across regions of the world. Health statistics which include gender-specific life expectancy rates at birth, under-five mortality rate, maternal mortality ratio, HIV/AIDS prevalence rate and proportion of the population undernourished are presented. Again, it can be seen that SSA is worse off in terms of health outcomes. Maternal mortality ratio in SSA was estimated to be 534 per 100,000 live births which exceeds the world average of 211 per 100,000 live births. While male life expectancy rate was estimated to be 59.1 years, for female it was estimated to be 62.6 years. This is relatively lower when compared to the world average with male and female life expectancy rates respectively at 70.2 years and 75 years. The under-five mortality rate remains a major challenge in SSA with the 2018 estimates of 78 deaths per 1,000 live births compared to the world average of 39 per 1,000 live births (Table 2).

TABLE 2
Health Outcomes for Sub-Saharan Africa (SSA) and Other Regions of the World

Health outcomes	MENA	SSA	OECD	EAP	World average
Life Expectancy rate (2017 estimates)	73	61	80	76	72
Female Life Expectancy rate (2017 estimate)	75.7	62.6	82.9	78.5	75
Male life Expectancy rate (2017 estimates)	72.2	59.1	77.5	73.4	70.2
Under-five mortality rate (2018 estimates)	22	78	6	15	39
Maternal mortality rate (2017 estimates)	57	534	14	69	211
HIV/AIDS (2018 estimates)	0.1	3.9	0.3	Na	0.8
Undernourishment (2018 estimates)	9	21	3	9	11

Source: Authors' compilation from WDI dataset.
Notes:
1. Maternal mortality ratio is measured as a modeled estimate per 100,000 live births.
2. Under-5 mortality rate is measured as under-5 deaths per 1,000 live births.
3. Life expectancy rate is measured in years.

4. HIV/AIDS prevalence rate measured as HIV prevalence among population aged 15–49
5. Undernourishment is measured by the proportion of the population that is undernourished.

3. LITERATURE REVIEW

Many studies have explored determinants of both public health spending and aggregate health spending for individual countries and different regions of the world. Ang (2010) examined the determinants of healthcare expenditure in Australia for the period (1960-2003). The results showed that income elasticity for healthcare is found to be greater than unity; hence healthcare is a luxury good. Also, demographic structure was found to exert a significant positive impact on healthcare expenditure. Bassey et al., (2010) examined the relationship between levels of government healthcare expenditure and health status in Nigeria for the period (1980-2003). The results revealed that life expectancy rate at birth and literacy rates were negatively correlated with healthcare spending. Das and Martin (2010) explored the determinants of aggregate healthcare expenditure in the USA. Per capita incomes, age of the population, number of practicing doctors, and the ratio of public healthcare spending to total health expenditure were the determinants of healthcare spending. Chaabouni and Abednnadher (2010) who examined the determinants of healthcare spending in Tunisia for the period (1961-2008) found that, a stable long run relationship existed between per capita health expenditure, GDP, ageing population, medical density and environmental quality.

On the other hand, both short and long run results revealed that healthcare is a necessity, but not luxurious good. Ehikioya and Mohammed (2013) explored the determinants of public healthcare spending for the period (1986-2010) in Nigeria. Demand for health in Nigeria is price inelastic. The proportion of the population below 14 years and health spending as a share of the GDP were the determinants of healthcare spending. Samadi and Rad (2013) explored determinants of overall healthcare expenditure in Economic Cooperation Organization (ECO) countries. A long-term relationship was found between health expenditure per capita and GDP per capita, the proportion of the population below 15 years, the proportion of the population above 65 years, number of physicians, and urbanization. All variables have short term relationship except

for the proportion of the population above 65 years. The coefficient of GDP was below one in the model reflecting that healthcare is a necessity. Olaniyan, Onisanwa, and Oyinola (2013) examined healthcare expenditure and GDP in SSA. The results showed that income elasticity of healthcare expenditure was less than unity, hence healthcare was a necessity. Also, majority of the countries have healthcare elasticity of less than one.

Khan, Razali, and Shafie (2016) examined determinants of healthcare expenditure for Malaysia for the period (1981-2014). The results revealed that income, population structure and population growth were the determinants of healthcare expenditure. The estimated income elasticity for healthcare expenditure was 0.99, showing that healthcare was a necessity. The results confirmed a feedback hypothesis between health expenditure and income per capita. Acka et al. (2017) explored the major variables in estimation of health expenditure in OECD member countries. The result revealed that GDP per capita, life expectancy rate at birth, age dependency ratio, number of hospitals, and proportion of the population with a bad perceived health status were the variables in estimating health expenditure. Nghiem and Connelly (2017) also examined the trend and determinants of healthcare expenditure in OECD countries (1975-2004). The study also tested the hypothesis that healthcare expenditure in countries of similar development may converge. The results revealed no evidence of convergence. Also, a key driver of healthcare expenditure was technological progress. The study revealed that healthcare is a necessity and not luxurious good.

Extensive literature review revealed that several of the studies were country-specific studies that explored the determinants of public health spending for specific countries. While a few studies focused on regions, these studies either examined determinants of public health spending or overall healthcare spending. Hence, no previous study explored determinants of private healthcare spending for countries of SSA. This study contributes to filling this gap in the literature.

4. THEORETICAL FRAMEWORK

This study hinged on the theory of health production function. This theory shows the inter-relationships between health care system input and output from the same system given the level of technology. Wagstaff (1986) developed this theory of health in his paper “On demand for health”. The fundamental underpinning of the theory

hinges on the assumption that quality health is the significant most important output from the health system and thus focuses on evaluating how socio-economic factors such as government health expenditure, governance, and other controlled variables mutually interact to affect health outcomes such as maternal and child mortality. The theory views health outcomes as a product of the health care system in society. This theory posits that public policies, program and interventions that are geared toward health care system improvement would undoubtedly lead to decrease in mortality ratios.

The theory is based on four assumptions, one of which is that health is an economic good and individuals demand some units of health good and a bundle of other commodities referred to as consumption goods in order to enhance their well-being. Individuals make decision on the combination of units of both health and consumption goods that will maximize their level of satisfaction. According to Wagstaff (1986), health good or good health is demanded for the pleasure it provides to the individual and efforts are also made to improve their health status through health-enhancing activities. Thus, the second assumption that good health is produced by health inputs.

Besides that, the theory of health production function says that health status is increased by consuming more units of health inputs. This increase in health status is monotone increasing and it explains in part the cross country differences in health outcomes in developing and developed countries. For developing countries, units of health inputs will cause greater units of health outcomes since they are in the early stage of the production possibility curve. However, for developed countries with better health outcomes, consuming more units of health inputs will yield less than proportionate rise in health status in accordance with the law of diminishing marginal productivity. The position of the production possibility frontier is determined by the existing technical knowledge in health and this can be altered by new discoveries in the medical sciences field. However, Wagstaff (1986) states that the production possibility frontier can be shifted by the level of an individual's educational attainment. He claims that the more education or health information a person gets, the more the person produces health efficiently. Educational attainment affects a person's behavior in health production as one embarks on better health-enhancing activities.

Also, with better education, people are better disposed to earning more income and demand more or better health inputs in increasing their health status. Health inputs in this theory are socioeconomic inputs that can affect one's health and it includes medical care, income, food, sanitation, exercise, environment among others. A third assumption of the model is that individuals have a fixed level of income to spend and the fourth assumption is that the individual is faced with a set of prices and factor inputs. Both assumptions serve as a budget constraint to the individual.

Hence, individuals make decision to attain optimal well-being based on the budget constraint and existing health production technology. The theory acknowledges the role of policy interventions in promoting better health outcomes at the societal level as changes in various health inputs will affect parameters that influence the healthlevel. Changes in incomes and prices of health inputs and educational attainment cause changes in health status and this provides a framework for public policy to promote health. Public interventions such as ensuring equitable income distribution, income transfers, price subsidy for health inputs and medical care can foster favorable health outcomes. Prevention and education program are also viable health inputs that can be used for enhancing population health status efficiently. Thus modeling the determinants of private health spending across sub-Saharan African countries dovetails with the Wagstaff's (1986) theory of health production.

4.1 EMPIRICAL SPECIFICATION

In line with the objective of this study, we specified two models based on two proxies for private health spending, which were the share of private health spending in total health spending (PVT/THE), and the share of out-of-pocket health spending in total health spending (OUT/THE). We built on models developed by Khan et al., (2016); Ehikioya and Mohammed (2013); and Omotor (2009) with extension in the variables incorporated

(1) $L1it = \beta_0 + \beta_1 L1i\,(t-1) + \beta_2 RGDPit + \beta_3 PCIit + \beta_4 L2it + \beta 5\, Malit + \beta_6 PDRit + \beta_7 UNDERit + \beta_8 INFLit + \beta_9 GEFF_{it} + \beta_{10} pop < 14it + \beta_{11} pop > 65it + \beta_{12} L3\,it + \beta_{13} CPIit + U1t$

In equation 1, β_0 stands for constant parameter, β_1-β_{13} are estimated parameters. L1 stands for the share of out-of-pocket in total health spending (OUT/THE); RGDP stands for real gross domestic product; PCI stands for per capita income; L2 stands for HIV/AIDS prevalence rate; PDR stands for physician density ratio; UNDER stands for the proportion of malnourished persons; INFL stands for inflation rate; GEFF stands for government effectiveness; $\text{pop} < 14$ stands for the proportion of the population below 14 years; $\text{pop} > 65$ years stands for the proportion of the population above 65 years and L3 stands for the share of public health spending in total health spending (PHE/THE); i stands for cross-sectional units and t for the time period , and U1t stands for error disturbance term.

(2) $L4it = \alpha_0 + \alpha_1 L4i\,(t-1) + \alpha_2 RGDPit + \alpha_3 PCIit + \alpha_4\, L2it + \alpha 5\, Malit + \alpha_6 PDRit + \alpha_7\, UNDERit + \alpha_8 INFLit + \alpha 9 GEEFit + \alpha_{10} \text{pop} < 14it + \alpha_{11} \text{pop} > 65it + \alpha_{12} L3\,it + \alpha_{13} CPIit + U2t$

In equation 2, α_0 is constant parameter, α_1-α_{13} are estimated parameters. L4 stands for the share of private health spending in total health spending (PVT/THE). U2t stands for error disturbance term. All other variables have been defined earlier.

Given the dynamic nature of the panel data, traditional panel data estimation technique will not be appropriate for our analysis for the following reasons: (i) cross sectional effects (ii) lagged dependent variable (iii) potential endogeneity of the explanatory variables (iv) omitted variables. Estimation under these statistical challenges can produce inconsistent and biased estimates of the structural coefficients of the hypothesized relationships specified in the model. Consequently, to obviate these potential problems, an econometric technique based on dynamic panel estimators was used to estimate the model. We adopted the system GMM because it improved the accuracy of the estimation. Diagnostics tests for the validity of the instruments (Sargan tests, Hasen J Test), the overall significance of explanatory variables (coefficient of determination) and autocorrelation (Arellano Bond Tests) were conducted. The summary statistics were presented. The variables were described by presenting their mean, standard deviation, minimum, maximum and Jarque-Bera statistics.

4.2 JUSTIFICATION OF VARIABLES INCLUDED IN THE MODEL

This section discusses the justification for including the variables as regressors in the estimated models. Economic trends influence the health sector and health services delivery cost. In general, economic growth is associated with rising healthcare costs, while economic recession has the opposite effect. Per capita income influence healthcare spending and this has been reported by previous studies (Khan et al., 2016; Olaniyan et al., 2013; Lorna and Wiseman, 2011; Omotor, 2009). According to economic theory, demand for goods and services depends on income.

During periods of inflation, prices of all goods and services including healthcare goods will rise, and as a result people's demand for healthcare services will be affected (Ehikioya and Mohammed, 2013; Wagstaff, 1986). Inflation reduces people's ability to pay for goods and services.

Disease profiles in many low income countries affect healthcare costs (Lorna and Wiseman, 2011). Diseases such as HIV/AIDS and malaria are highly prevalent in SSA, and increase the level of ill-health in the population (Sede and Ahuru, 2017). In SSA, both diseases account for a higher share of household healthcare spending. An existing belief is that people above 65 years demand healthcare more than others because the stock of health diminished with age (Ehikioya and Mohammed, 2013; Ang, 2010; Grossman, 1972). The increase in proportion of people in both sets of age group will no doubt increase private health spending.

Political factors associated with governance effectiveness, bureaucratic quality and corruption influence healthcare costs and private health spending (Lorna and Wiseman, 2011). In a regime with endemic corruption, budgeted health funds are diverted away from the health sector thereby forcing individuals to fund healthcare out of their pockets.

Public health spending is government investment intervention in the health sector. Public health spending either complements or substitutes for private health spending; hence higher public health spending may be associated with lower private health spending (Arthur and Oaikhenan, 2017). The apriori sign is ambiguous.

The supply of health resources can influence both healthcare costs and healthcare expenditure. The number of medical doctors, health facilities and physician density ratio are used to proxy the availability of health resources and by application can determine the

cost of health services (Acka et al., 2017; Chaabouni and Abednnadher 2010).

Finally, health status of a person determines demand for health services and the amount of expenditure incurred on health. In the literature, health status was proxied by mortality rates, life expectancy rates and the proportion of malnourished persons (Acka et al., 2017).

4.3 DATA AND VARIABLES DESCRIPTION

The study used a panel set for 41 SSA countries from 2010 to 2018 from the World Bank World Development Indicators (2018). The 41 SSA countries (based on data availability) and the nine-year period fell within the acceptable panel data rule. The rule implies that the number of cross-sectional units should be more than the time dimension, that is N > T. According to Pesaran et al., (1999), violation of this rule may lead to inconsistent and biased long-run coefficients. The dependent variables are the share of out-of-pocket spending in total health expenditure (OUT/THE), and the share of private health spending in total health expenditure (PVT/THE). The independent variables include inflation rate (INFL), real GDP growth rate (RGDP), per capita income (PCI), corruption perception index (CPI), public health expenditure as a proportion of total health expenditure (PHE/THE), HIV/AIDS prevalence rate (HIV/AIDS), the proportion of population below 14 years (Pop < 14), the proportion of population above 65 years (pop > 65), the proportion of population undernourished (UNDER), and physician density ratio (PDR). A summary of the variables is presented in Table 3.

TABLE 3
Definition of Variables

Variables	Variables Description	Sources of Data
OUT/THE	It measures the share of out-of-pocket health spending in total health spending	WDI, 2018
PVT/THE	It measures the share of total private health spending in total health spending	WDI, 2018

TABLE 3 *(continued)*

Variables	Variables Description	Sources of Data
RGDP	It measures the rate of economic growth. It is expected to improve private health expenditure	WDI, 2018
PCI	It is the average income of the population	WDI, 2018
HIV/AIDS	The proportion of the population (15-45) that is HIV positive.	WDI, 2018
Mal	Measures the prevalence of malaria	World Health Organization Site (2016)
PDR	The number of persons per health personnel in the country based on the population estimates of 2006	World Health Organization Site (2016)
UNDER	It measures the proportion of the population that is malnourished.	WDI, 2018
INFL	Measures the rate of price change, and calculated based on consumer price index.	WDI, 2018
GEFF	Reflects perception of the quality of public services, the quality of civil service and the degree of its independence from political pressure	The worldwide governance indicators
Pop < 14 years	It is the proportion of the population below 14 years.	WDI, 2018
Pop > 65years	It is the proportion of the population above 65 years.	WDI, 2018
PHE/THE	Public health investment is a proxy for health intervention at the government level.	WDI, 2018
CPI	An index used to measure governance effectiveness. It ranges between 1 and 10. Higher scores show higher transparency in governance, while lower score shows lower transparency.	Transparency International (TT)

Source: Authors' Compilation (2020).
WDI: World Development Indicators

5. RESULT

Table 4 presents the descriptive statistics of the variables. The mean share of out-of-pocket health spending in total health spending is 29.02, while the average share of private health spending in total health spending is 30.45. Also, the share of public health spending in total health spending is 24.22. The high standard deviation of out-of-pocket health spending as a share of total health spending suggests a high level of variances in the series of the values among the countries in the sample. The average economic growth rate for the countries is 1.69 with a standard deviation of 4.08, showing poor economic growth performance among SSA countries. Average per capita income for the countries used for the analysis is $1,071 which falls into the low-income countries. The average corruption perception index is 2.48, which reflects the endemic level of corruption among the sampled group. The average physician density ratio is 1.48, which falls below the WHO recommended physician density ratio of 2.30. The average undernourishment rate is 1.48, and the average inflation rate for the countries is 10.48, which is a two-digit inflation rate. Average (HIV/AIDS) prevalence rate and malaria prevalence rate are respectively 2.73 and 318.48. The indicators in the descriptive statistics generally highlight the poor level of social amenities in the SSA region, which accounts for poor health outcomes in the region.

TABLE 4
Descriptive Statistics of Principal Variables

Variables	Mean	Max	Min	Standard Deviation	J.B.	Probability	Number of observations
OUT/THE	29.02	78.67	0.00	23.44	98.78	0.00	369
PVT/THE	30.45	11.05	0.45	1.87	102.70	0.00	369
PHE/THE	24.22	67.51	0.00	19.46	68.91	0.00	369
RGDP	1.69	18.05	-36.56	4.08	18.98	0.00	369
PCI	1071	1987	267	20.89	456.30	0.00	369

TABLE 4 *(continued)*

Variables	Mean	Max	Min	Standard Deviation	J.B.	Probability	Number of observations
POP < 14	39.74	50.26	0.00	9.85	21.78	0.00	369
POP > 65	3.10	11.47	0.00	1.32	14.98	0.00	369
Mal	318.50	679.30	0.20	170.80	140.90	0.00	369
HIV/AIDS	2.73	5.80	1.46	3.42	201.70	0.00	369
CPI	2.48	9.60	4.60	2.50	13.00	0.00	369
PDR	1.48	8.71	1.23	20.34	18.00	0.00	369
UNDER	1.48	2.98	0.87	12.34	19.00	0.00	369
INFL	10.48	11.45	6.34	18.67	21.00	0.00	368
GEFF	2.83	8.73	-0.64	1.96	203.50	0.00	369

Source: Author's computation using Eview-9.0.

The system GMM model proposed by Arellano and Bond's dynamic panel data estimator was used to investigate the determinants of private health spending among SSA countries. The results for both models are presented in Table 5. The diagnostic tests are impressive. Also, the Sargan and Hansen tests of over-identifying restrictions are reported for both models. The Sargan test rejects the null of the instrument validity, but the Hansen test does not. Notwithstanding this, in the case of dynamic models, the Hansen test is found to be more robust, hence the Hansen test informed our decision that the instrument is valid. Furthermore, the first-order serial correlation was rejected, indicating the presence of first-order autocorrelation in both models. This is however expected due to the introduction of lag terms in the model. The second-order serial correlation, however, was rejected. Hence, we estimated the robust standard error.

Examination of the lagged dependent variable for both equations shows that they are both positive and significant. This justifies the use of dynamic GMM in our analysis, and also indicates that OUT/THE and PVT/THE adjust to changes in the explanatory variables with a gestation lag across the estimation structure.

TABLE 5
One Step System GMM for (OUT/THE) and (PVT/THE)

Variables	(OUT/THE)	(PVT/THE)
OUT/THE(-1)	2.98	
	(0.04)**	-
PVT/THE (-1)	-	4.67
	-	(0.09)**
RGDP	1.89	1.45
	(0.89)	(0.8)
PCI	2.67	1.21
	(0.09)**	(0.78)
HIV/AIDS	0.89	13.78
	(0.00)*	(0.03)**
Mal	1.78	5.98
	(0.05)***	(0.06)***
PDR	-0.45	-0.89
	(0.00)*	(0.03)**
UNDER	0.89	1.78
	(0.56)	(0.78)
INFL	-3.78	12.89
	(0.06)***	(0.08)
GEFF	1.78	2.78
	(0.01)	(0.67)
POP < 14	1.89	2.34
	(0.89)	(1.78)
POP > 65	1.45	2.98
	(0.00)*	(0.00)*
PHE/THE	-2.67	-1.98
	(0.89)	(0.78)
CPI	0.98	1.89
	(0.01) *	(0.00)*
Observations	369	369
F(5,38)	63.68***	102.34***
Sargan Test	84.98(0.018)**	57.98(0.08)***

TABLE 5 *(continued)*

Variables	(OUT/THE)	(PVT/THE)
Hansen J Test	35.89(0.993)	87.89(0.882)
First autocorrelation Test(p-value)	-2.56(0.015)**	-2.58(0.021)**
Second autocorrelation Test(p-value)	-0.34(0.856)	-0.48(0.981)

Source: Authors' computation using Eviews 9.0,
Notes: where *, **, *** indicate level of significance at 10%, 5% and 1% respectively. Values in parentheses are probability values

The estimated coefficients revealed that the proportion of the population above 65 years, (HIV/AIDS) prevalence rate, malaria prevalence rate and CPI all significantly and positively influenced both (OUT/THE) and (PVT/THE). PDR significantly and negatively impact on both (OUT/THE) and (PVT/THE). While PCI positively impacts on (OUT/THE), INFL had a negative impact on (OUT/THE). However, RGDP has no significant impact on both outcome indicators, indicating that private health spending across SSA countries is not sensitive to economic growth performance. While this finding contradicts that of Odoh and Ndukah (2018), it conforms to that of Ehikioya and Mohammed (2013).

6. DISCUSSION AND POLICY RECOMMENDATIONS

The results showed that physician density ratio negatively and significantly influences the share of out-of-pocket and private health spending in total health spending. This is because increasing health human resources will drive down healthcare costs and by implication healthcare expenditure. This result contradicts that of Das and Martin (2010), and Samadi and Rad (2013), who reported positive relationship between healthcare spending and the number of doctors. However, Ehikioya and Mohammed (2013) could not indicate significant relationship between healthcare spending and physician density ratio. While the region has significantly produced health personnel, challenges have remained concerning deployment, distribution and retention of health manpower in the region (Omoluabi, 2015). One of the main obstacles to health manpower in the region is brain drain (Omoluabi, 2015). Policies should be implemented that encourage medical personnel retention in the region as this will help reduce healthcare costs and private healthcare spending.

The results also showed that per capita income significantly and positively impacted the share of out-of-pocket health spending in total health spending. This means that higher disposable income increases purchasing power, and this enables people to demand and produce more health with expected outcomes. Higher per capita income means that people will go for better health goods and services, and this will spur favorable health outcomes. This finding conforms to those of Ehikioya and Mohammed (2013), Acka et al., (2017), and Khan et al., (2016). The fact that the demand for healthcare rises when per capita income rises shows that healthcare is a normal good in SSA.

According to the estimated model, inflation rate has a negative and significant impact on the share of out-of-pocket health spending in total health spending. In fact, a unit rise in inflation rate will result in 3.78-unit decrease in the share of out-of-pocket health spending in total health spending. The consequence of inflation is that in rise in the aggregate price level, health goods and services are not exempted. People, therefore, face higher market prices which weaken their purchasing power and this is accompanied by a reduction in demand for and ability to demand health services. This finding supports Wagstaff's (1986) postulation that changes in commodity prices can affect people's healthcare demand behavior and outcomes. However, our result contradicts Omotor (2009), and Ehikioya and Mohammed (2013). These studies reported a positive relationship between healthcare demand and the price of healthcare even though their results were not significant. Governments of SSA countries should implement policies that will help stem the risinginflation rate to positively stimulate regional private health investment.

Malaria and HIV/AIDS prevalence rates both significantly and positively influenced the share of out-of-pocket health spending in total health spending. Both diseases are co-epidemics buffeting SSA (Ahuru and Onwuma, 2020). According to the recent world malaria report in 2018, there were 228 million cases of malaria and 405,000 deaths in 2018, of which Africa accounted for 90% and 94% of the cases and deaths respectively. In all African countries, the cost of treating malaria and HIV/AIDS is beyond the means of the poorest households and given their contributions to impoverishment of vulnerable households, efforts should be intensified in formulating policies and implementing program that will combat these two diseases in SSA (Sede and Ahuru, 2017; Ahuru and Iseghohi, 2018).

Proportion of the population above 65 years old significantly and positively impact on both the share of out-of-pocket and private health spending in total health spending. This is no surprising given that this age group constitutes old people who are already experiencing diminished health stock and as such post higher demand for healthcare (Grossman, 1972; Lorna and Wiseman, 2011). As people get old they become more vulnerable to various illnesses due to their weakening immunity and as such, they will need to always use healthcare services to stay healthy. This finding conforms to the results reported by Das and Martins (2010); Chaabouni and Abednnadher (2010) and Samadi and Rad (2013), who revealed that the higher the proportion of population above 65 years old the higher the healthcare spending. This implies that special health care program should be established for the age group that incurs higher healthcare spending. In several countries policies are implemented that offer free care services to aged people.Governments of countries in SSA may learn from this.

According to the results, the share of public health spending in total health spending has negative coefficients in both models but are statistically insignificant implying that public sector health investment is in adequate to complement private health spending. This scenario is due to the insufficient public contribution to health investment in the region. Evidence has shown that only four countries in Africa have been able to meet the 15% budget allocation to the health sector as agreed in the Abuja Declaration in 2001: Malawi (16.8%), Swaziland (16.6%), Ethiopia (15.7%), and Gambia (15.3%) (World Development Indicators, 2018). Failure on the part of African governments to meet this recommendation is due to lack of commitment and inconsistencies in implementation. According to the World Bank (2016), several countries have either stopped pursuing the Declaration or are not fully implementing the policy. We recommend full implementation of the policy as a viable option for strengthening the health system in Africa.

We noted that the corruption perception index has positive and significant effects on the share of private health spending in total health spending, reflecting those higher levels of corruption drive higher private health spending. With a high level of corruption, government officials will most likely divert budgetary allocation meant for the health sector thereby leaving individuals with the options to fund health care directly out-of-pocket (Omotor, 2009). Countries in SSA should intensify the war against corruption and

money laundering to curb the diverted health sector financial resource problem.

6.1 STRENGTH AND LIMITATIONS

The strength of the study is the large sample observation across several African countries; hence the findings can be generalized for the entire African region. Also, the study is dynamic as the intertemporal relationship between the macroeconomic variables and private health spending for the region was established. However, the study could not explore all possible variables that may influence private health spending for the region. Nevertheless, the study does not suffer from any omission bias.

6.2 SUGGESTION FOR FURTHER RESEACH

We recommend that study should be undertaken to explore the determinants of public health spending in SSA, given that there is no single study on this phenomenon.

7. CONCLUSION

The study examined the various macroeconomic variables that determine private health spending across 41 SSA countries. The findings from the study suggest that inflation rate, physician density ratio, the proportion of the population above 65 years, corruption perception index, malaria prevalence rate and HIV/AIDS prevalence rate are the determinants of private health spending across the SSA countries. High commodity prices reduce private health spending by increasing the prices of health services. We recommend that policies should be articulated that reduce the high cost of inflation, improve retention policy among health workers, enhance government effectiveness, and strengthen public sector institutions, and finally combat the prevalence of HIV/AIDS and malaria in the region. Also, the government of SSA countries should pragmatically follow the Abuja Declaration of expending 15% of budgetary allocation on the health sector.

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