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Health Aid, Public and Private Health spending in Sub Saharan Africa (SSA): New Evidence from Panel Data Analysis.

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Abstract

Background: Health aid plays a vital role in increasing the resources needed to finance the health care sector. Such inflow may reduce public allocation to health regardless of its volatile nature. While findings exist for the effect of health aid on public spending, studies for SSA are few, and not much is known about its effect on private spending particularly for SSA where health payments are mainly funded as Out of Pocket (OOP). This is important because health aid is directed towards the eradication of diseases and targets specific medical issues with the intent to reduce the burden of illness and spending by the poor. This study examines the effect of health aid on public and private health spending for high aid recipient countries in SSA.

Methods: The study used panel data from the periods 2000 to 2015. The Fixed and random effects models were fitted to the data set.

Findings: The results show that a 1% increase in health aid reduces public and OOP health spending by approximately 1.5% and 0.49% respectively. Findings suggest stronger effects on public relative to OOP health spending and overdependence on external finance. This is critical given existing volatility of aid. Aside from the effect of health aid, an inverse relationship was observed between real aggregate income and government health spending.

Conclusion: This suggests government consideration of health care as an inferior good. The results imply that external health financing exerts significant effects on both public and OOP health spending in SSA. There is a need for governments in the region to reduce reliance on external support due to the volatility of such form of spending. Governments of SSA economies should also consider health care as a necessity given the role of health capital on overall economic performance.

Keywords: Health Aid, Public, and Out of Pocket Health spending, Fixed and Random Effects model.

Introduction

Foreign aid is a key financing measure of the savings gap in most economies [1]. In particular, the role of health aid in African economies is vital given the record of high disease burden and prevalence of poverty in the region [2-3]. The Sub-Saharan Africa (SSA) region, for instance, accounts for approximately half of the global population figures living in extreme poverty [4]. This situation prevails alongside poor funding for the health sector. More than half of health spending is through Out Of Pocket (OOP) payments [5]. Public sector payments are low, and in most cases, it is less than the World Health Organization (WHO) recommended level of 5% of GDP [6].

Although health aid enables countries to fill up funding deficiency, such money may induce voluntary reduction of domestic savings and allocations to the health sector [5]. Where this occurs, it becomes a concern as health aid will then be the reason for existing low budgetary allocation to health [7-9]. Where there is a non-proportional increase in government health spending from additional donor contribution to the health sector, health aid is said to be fungible [10]. The fungibility of health aid can be total or partial. Total fungibility occurs when health aid does not induce any increase in public health spending. Partial fungibility, on the other hand, is when aid raises public spending, but this increase is less than the amount of aid provided [10-11]. Cases of partial fungibility of health aid suggest some positive effects on government spending; on the other hand, total fungibility points to a fall in government health spending due to the inflow of health aid. Such instance is suggestive of over-dependence on external assistance [11]. Overdependence on health aid impedes long term health care plans; this is because health aid is volatile. The volatility of health aid stems from the fact that it is associated with multiple causes such as budget cycles, political processes of donor administrations and absorptive capacity constraints of the recipient country [12].

In examining the effect of health aid on health spending, studies have shown the existence of partial [11, 13-14] or total fungibility [7, 15-17]. In a panel data study of 18 countries, Devarajan et al. [13] showed partially fungibility of health aid where a one dollar increase in external funds caused government expenditure to rise by about $0.90. In SSA, findings by Mishra and Newhouse [14] showed an increase of about 7% in public health expenditure where ODA for health is doubled. In a related study, Barkat et al. [11] showed that a 1% rise in health aid would increase government health spending by about 0.13% and 0.05% in low and middle-income SSA countries respectively. This finding suggests higher fungibility or smaller positive effects of health aid on health spending in the middle than low-income SSA countries.

Empirical evidence of an inverse relationship between health aid and public spending are provided by Dodd et al. [15] showing a fall in general government expenditure on health by about 1.86% where there is a 10% increase in donor health projects in Vietnam. In SSA findings by Ssozi and Amlani [16] associated a fall in government health spending by about $0.01 with a $1 rise in foreign health aid. Similar results were obtained by Ke et al. [17] for developing economies. Findings by Farag et al. [7] had also shown that a 1% rise in Official Development Assistance (ODA) induced a fall in public health spending by about 0.027% for upper middle-income countries, 0.04% to 0.09% in lower-middle income countries, and 0.14% to 0.19% in low-income countries. This finding associates more significant fall in public spending for low income than middle and high-income countries with inflow of health aid.

In terms of the effect of health aid on total health spending, findings also remain inconclusive. Murthya and Okunade, [18] showed a positive association of health spending with foreign aid for African countries. On the contrary, Gaag and Stimac, [19] showed no significant relationship between the two.

Aside from the effect of health aid on health care spending, factors influencing health expenditures have been classified into demand and supply-side determinants. Empirical evidence of demand-side determinants includes per capita income, aging of the

population, population's size and gender-specific utilization of health care [20-21] The Supply framework consider the main determinants of health spending as the relative price of health care, public provision and financing, supply of health care personnel and resources, as well as national income and age structure [20- 21]. Considering evidence for other determinants of health care spending, studies often combined both the demand and supply side approach based on the availability of data. Using panel data analysis for Finland and in a two way fixed effect model, results by Nguyen et al [22] suggests key determinants of per capita total health expenditure to include the proportion of elderly, the rate of disability pensions, the employment-to-population ratio, the municipal tax rate, the state reimbursements of prescription medicines and private dental care, income, and population density. In another panel study for developed economies, Samadi and Rad [23] showed significant effects of GDP per capita, the proportion of population below 15 and above 65 years old, number of physicians and urbanization on health care spending in the Economic Cooperation Organization (ECO) Countries. In a similar study, Hosoya [24] showed that for the Organization for Economic Corporation and Development (OECD) countries, determinants of health care spending includes income measured using GDP. Other socioeconomic variables such as female labor force participation and the rate of unemployment were also seen as relevant. Findings by Boachie et al. [25] suggest that real GDP, life expectancy, and crude birth rate were the most significant variables affecting public health expenditure in Ghana. Khan et al. [26] also show a significant effect of income on health care spending in Malaysia. Population structure was also significant in terms of persons below 15 years of age and above 65. Similar variables were seen as significant determinants of health spending in the study by Barkat et al., [11].

The empirical evidence for the effect of health aid on health spending suggests an ambiguous relationship between health care spending and health aid. Differences in literature findings of the effect of external financial assistance on domestic health spending have been linked with the level of economic development and how health aid is channeled into the economy [7-8, 17]. The current study is motivated by the inconclusive debate on the relationship between health aid and health spending. Rather than group countries by income levels, the study adopts a different approach by examining the effect of health aid on health spending for countries with similar characteristic in terms of receiving high external inflows. The intent is to show how health for such countries affects health spending. Besides, studies mainly provide findings for the effect of health aid on public health spending. Not much is known about the effect of health aid on private spending particularly for SSA where health payments are mainly funded as OOP. This is because the objective of health aid is directed towards eradication of diseases and targets specific medical issues with the intent to reduce the burden of illness and spending on health especially by the poor [27]

This study is hence set out to empirically examine the effect of health aid on both public and private health spending for high health aid recipient countries in SSA.

The following null hypotheses were tested; (1) there is no significant relationship between health aid and public health expenditure in SSA, (2) there is no significant effect of health aid on OOP health spending in SSA. The first hypothesis is in line with most studies; however, the second has received little attention in the literature.

Methods

Study Framework

The study pooled cross-section and annual time series data from 2000 to 2015 for 5 countries with high external health aid in SSA. Health aid for selected countries accounts for a minimum of 40% of current health spending. Data used for health aid were obtained from the WHO global health observatory data [28]. The data used for other variables in the study were sourced from the Word Development Indicators (WDI) provided by the World Bank [29]

Model

The study made use of a standard panel regression approach, which is commonly applied in the study of the determinants of health care expenditures using the fixed and random effects model. The general specification for the model is stated as:

$$Y_{it} = B_{yxt}\, X_{it} + B_{yzt} Z_i + \pi_i + \mu_{it} \qquad (1)$$

Where Y_{it} is the value of the dependent variable for the $i\ th$ case in the sample at the $t\ th$ time period, X_{it} is the vector of time-varying covariates for the $i\ th$ case at the $t\ th$ time period, B_{yxt} is the row vector of coefficients that give the impact of X_{it} on Y_{it} at time t Z_i is the vector of observed time-invariant covariates for the i th case with B_{yzt} its row vector of coefficients at time t. π_i is a scalar of all other latent time-invariant variables that influence Y_{it} , and ε_{it} is the random disturbance for the $i\ th$ case at the $t\ th$ time period with $E(\mu_{it}) = 0\ and\ E(\mu_{it}^2) = \mu_t^2$

For the fixed effects model, it is assumed that the time-invariant unit-specific effect is correlated with the time-variant explanatory variables X_{it} while the random effects model assumes that the time invariant unit specific effect is uncorrelated with the time variant explanatory variables X_{it} [30]

For this study, the following model specifications were estimated

$$Hexp_{it} = \propto_1 + \beta Haid_{it} + X'_{it} + \varepsilon_{it} \qquad (2)$$

Where $i = 1 \ldots N$ denotes a cross-section index of countries, $t = 1, \ldots, T$ denotes the time-series index. The dependent variable in Equation (1) $(Hexp)$, is two forms of health care spending (public and OOP payments) examined separately on the same set of independent variables. Haid is health aid as a fraction of current health spending. The vector X' corresponds to a set of explanatory (control) variables explained below. ε is the error term. Note that all variables in Equation (1), are expressed as natural logarithms except the variable on the left hand side and the constant. The variables on the left hand side (Public and OOP spending) are already in percentage of current health spending. This implies that we can interpret the estimated coefficients as standard elasticities.

Variables included in the model are identified as central to examining the determinants of health expenditure, particularly in macro studies. Aside inclusion of external support to health, other control variables considered in the study are; real GDP, labour force participation, the proportion of the population aged 65 or over, the proportion of the population aged 14 and below, and total population. Income is commonly considered as a key determinant of health spending. Higher income should ordinarily translate to a rise in health spending, but the magnitude of effect determining whether health is a luxury or necessity remains a constant debate [31-34]. Increase in labour force participation is expected to raise overall health spending. This works through increase tax revenue for the government particularly from formal sector workers and also more earnings for the household translating to higher OOP payments for health. The proportion of individuals below 14 years and aged 65 or over was included to control for the effect of dependents on health care spending. The effect of an increase in the population below 14 years on health spending cannot be determined with certainty. Increase in population 65 years of age and above is expected to raise health spending due to depreciation in health capital stock. A rise in overall population weighs heavily on the existing health care system inducing an expected rise in health spending. This variable is quite significant with African economies having records of high fertility and population growth rates. While public and private health care expenditures are measured as a percentage of current health spending, Income per head is measured as GDP per capita at constant Local currency unit. Health aid is also measured using external aid as a fraction of current health expenditure. The Random effects model was estimated by Generalized Least Squares (GLS) while the fixed effects model was examined using the ordinary least squares within regression. The Hausman specification test was carried out to choose between the random and fixed effects

models. While the results favoured the fixed effects model, findings for the fixed and random effect models were reported for comparison purposes and to allow for robustness of results. Stata statistical software package was used in the analysis.

Table 1: Descriptive Statistics on external health care expenditure spending in SSA

Variable	Mean	Std. Dev	Min	Max
External financial assistance	47.2138	15.29601	15.5	85.1
Government health spending	28.5425	16.05602	6.8	86.5
OOP health spending	21.7325	11.98004	6.7	55.6
Real Gross Domestic Product	968,027.5	1937683	27.3	5853079
Labour force participation	75.40903	11.68265	57.8	87.5
Total population	10,100,000	8079574	139428	2.69E+07
Population age 65 and above	19.06031	19.79054	2.821259	45.04639
Population age 14 and below	28.34806	20.55251	2.662001	46.97504

Table 1 shows that average external health care expenditure as a percentage of current health spending in SSA was estimated to be approximately 47%. Average public and private health care expenditure were estimated to be about 29% and 21% of current health spending, respectively, while GDP per capita at constant local currency unit had a mean of about 968,027.5. On average, the total population was about 10,100,000, while the population between the ages, 0 and 14 years was 28% on average. About 19% of the population were 65 years and above. By implication, the proportion of the working population dominates in the population structure. That is for persons between 15 and 64 years.

Results for the fixed and random effects models are reported in Tables 2 and 3 for public and OOP health spending respectively.

Table 2: Effects of Health aid on Government Health Spending

Variables	GLS-fixed effects model	GLS-random, effects model
Constant	-9.515466(-4.28)***	-8.795451(-4.27)***
External financial assistance	-1.49181(-9.94)***	-1.401111(-13.73)***
Real Gross Domestic Product	-0.0307658(-1.59)	-0.0320958(-1.78)*
Labour force participation	5.908399(9.84)***	5.762788(9.57)***
Total population	-0.512329(-6.54)***	-0.50734(-6.46)***
Population age above 65	0.0521125(0.12)	-0.0432034(-0.11)
Population age 14 and below	0.365374(0.9)	0.2595936(0.71)
R-squared	0.7701	0.7708
corr(u_i, Xb)	-0.2084	0.000
F-Stat./ Wald chi2	F-Stat. 26.75***	Wald chi2(6) = 225.50***
Observations	80	80
Cross section included	5	5

*Note: ***significant at 1%; **significant at 5%; *significant at 10%. T-statistics are reported in parenthesis for a fixed effects model and z for random effects model*

Table 2 shows that increase in total health aid (as a percentage of current health spending) was more likely to reduce public spending on health at 1% significance level. A 1% increase in health aid leads to a reduction in public health spending by approximately 1.5% in the fixed effects model and about 1.4% in the random effects model (Table 2).

Aside from external aid, findings for other variables that significantly influence public health spending include labour force participation and the total population in the fixed and random effect model. GDP is shown to have a significant effect on public spending only in the random effects model. In the fixed and random effect model, a 1% increase in labour

force participation would raise public health spending by about 6%. On the other hand, a 1% increase in total population translates to about 5% fall in the share of public spending as a percentage of current health expenditure. Findings for GDP in the random effects model showed that an increase in income does not translate to rise in public health spending. Where GDP rises by 1%, public health spending would fall by about 0.03%. This is however at a 10% level of statistical significance.

Table 3: Effects of Health Aid on OOP Health Spending

Variables	GLS-fixed effects model	GLS-random effects model
Constant	24.14064(15.45)***	23.29939(14.85)***
External financial assistance	-0.488743(-4.63)***	-0.6013047(-7.73)***
Real Gross Domestic Product	0.028437(2.09)**	0.0381111(2.78)***
Labour force participation	-5.956892(-14.12)***	-5.84497(-12.73)***
Total population	0.4822683(8.76)***	0.4850584(8.1)***
Population age above 65	-0.0570841(-0.18)	0.0621832(0.2)
Population age 14 and below	-0.4591029(-1.61)	-0.3224358(-1.15)
R-squared	0.7701	0.8742
Corr (u_i, Xb)	0.0707	0
F-Stat./ Wald chi2	F-Stat. 99.39***	Wald chi2(6) = 357.25***
Observations	80	80
Cross section included	5	5

Note: ***significant at 1%; **significant at 5%; *significant at 10%. t-statistics are reported in parenthesis for fixed effects model and z for random effects model.

Table 3 shows that increase in total health aid (as a percentage of current health spending) was more likely to reduce OOP spending on health at 1% significance level. A 1% increase in health aid leads to a reduction in OOP health spending by approximately 0.49% in the fixed effects model and about 0.60% in the random effects model (Table 2).

Aside from external aid, findings for other variables that significantly influence OOP health spending includes GDP, labour force participation and the total population in the fixed and random effect model. In the fixed and random effect model, a 1% increase in income, raises OOP spending on health by about 0.03% and 0.04% respectively. A 1% rise in labour force participation would reduce OOP health spending by about 6% in the fixed and random effects model. On the other hand, a 1% increase in total population translates to about 0.5% rise in the share of OOP spending as a percentage of current health expenditure.

Discussion

The findings of the study suggest that health aid is a significant determinant of both public and out of pocket health expenditure in SSA. The results show that with a rise in health aid, public health spending will most likely fall by a proportion higher than the amount of rise in health aid. Similarly, OOP will fall with an increase in health aid but with a far less magnitude relative to the amount of rise in health aid. The result suggests stronger effects of health aid on public relative to OOP health spending. This is critical given high dependence of SSA economies on government provision of health care. There is therefore the suggestive conclusion that the inflow of health aid has some association with low budgetary allocations to health by SSA governments. Also indicated is the public sector over-dependence on external health aid.

The findings were expected as health aid are used for occupying the savings gap in financing health care and hence assist public sector health care funding. This conforms to findings of other studies showing the inverse relationship between health aid and public health spending [7, 15-17]. However, dependence on health aid is risky due to the volatility of aid flow [12]. On the contrary, Devarajan et al. [13], Mishra and Newhouse [14] and Barkat et al. [11] found positive effects of health aid on public health spending.

Difference in findings may be due to the use of countries that have high health aid inflow in SSA.

It must be noted that while the findings of the current study provide evidence showing a fall in public health care expenditure with a rise in external financial assistance to health, this may only be a necessary but not sufficient condition in achieving progress in terms of population health. This is because even though external assistance to health had a similar relationship with public and OOP health spending, the relative impact on the two sources of health expenditure was different. Health spending in SSA is mainly through OOP payments and depends on the ability to pay. Individuals who cannot afford health care will not be able to have access to care provision.

The findings of the study also accentuate the effect of income on health care spending in SSA. The results are indicative of less government allocation to health care with a rise in real per capita GDP. This is suggestive of a perception of health care as an inferior good by governments of SSA economies. This is also seen in falling public spending on health as population increases. This result does not conform to the findings of studies in the literature showing the positive effects of income on health spending [11, 18, 24,]. Variation in the finding of this study can be due to the specific characteristics of the countries selected with high external health aid. There is however strong suggestions that health care is not considered as high priority good in developing economies especially with consistent low government allocation to health in the region.

Unlike government consideration of healthcare, findings of the current study suggest a different perception of health care by individuals and households. With a rise in OOP allocation to health as income rises, it is suggestive that individuals and households consider health care as a normal good. This is also reflected in the rise in OOP spending on health care as the population increases. In this regard, private health care spending, mainly Out of Pocket will only worsen with a rise in poverty levels. The result of the study also suggests an inverse relationship between labour force participation and OOP health spending. This is unexpected but can be linked to psychological and emotional balance that comes from being economically engaged at work so that individuals in the labour force are less likely to have health problems and also spend less on health [35].

The study is limited in the sense that countries considered are mainly recipients of high external health aid. The data for external health aid did not have enough time series observation which would have improved a panel data study like this one. The independent variables used in the models may not be exhaustive. The variables selected are similar to those used in the literature and are based on data availability for the selected countries used in the study. While these limitations may be the basis for future research, they do not invalidate the results of the current study.

Conclusion

The study sought to determine the impact of health aid financing on public and OOP health care spending in SSA. The results provided evidence that financial health aid was associated with a decrease in public and OOP health spending with a relatively larger impact on public spending. The results also showed that while an increase in real per capita GDP did not translate to a rise in public spending on health, the effect is positive on OOP health care payments.

The findings imply that external health care expenditures exert significant effects on both public and OOP health spending in SSA. There is a need for governments in the region to reduce reliance on external support due to the volatility of such form of spending. Governments of SSA economies should also consider health care as a necessity given the role of health capital on overall economic performance.

Declarations

Not applicable

Competing Interests

Not applicable.

Authors' contributions

Not applicable

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