The Impact of Health Expenditures on Health Outcomes in Sub-Saharan Africa

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ABSTRACT

This article investigates the core macroeconomic and social determinants of health expenditures as well as the effect of health expenditures on select critical health outcomes (life expectancy, under-five mortality and maternal mortality) in recent years in sub-Saharan Africa (SSA). The study utilizes data on 46 sub-Saharan African countries covering the period 2000–2015. The results indicate that gross domestic product (GDP) per capita, physician per 1,000 population, population aged above 65 years and under-five mortality rate are the most significant determinants of health expenditure in the region. Overall, health expenditure is less income-elastic, not rising as a portion of GDP in wealthier nations. Health expenditure was found to exert a positive and significant impact on all three health outcomes. Specifically, a 1 percent increase in health expenditure per capita resulted in a 0.5 percent reduction in under-five mortality and a 0.35 percent fall in maternal mortality, while improving life expectancy by 0.06 percent. The results suggest that steady increases in health expenditures over time have the tendency to improve health outcomes in SSA.

Keywords: Health expenditures, health outcomes, sub-Saharan Africa

Introduction

Healthcare financing, whether through private or public means, remains fundamental for the improvement of individuals’ health status the world over. At the macroeconomic level, the amount and growth of health expenditure is determined at least in part by the income (GDP) level of a country. The performance of the health sector is therefore assumed to reflect the size of the income elasticity of healthcare — the greater the size of the economy or the greater the per capita income of a nation, it is often assumed the more is spent on health, necessarily bringing, the argument...
continues, better health outcomes. This article explores key elements of the provisioning of health services in sub-Saharan Africa (SSA), public and private, preventive and curative, from family planning, nutrition and emergency aid designated for health, before turning to provide an assessment of the efficacy of these efforts (The World Bank, 2012).

For a more comprehensive and comparative assessment of health spending across regions and countries, the health expenditures to gross domestic product (GDP) ratio is usually utilized. Changes in health spending to GDP ratios are the result of both fluctuations in the rate of health spending and growth in the economy as a whole. This article therefore highlights the responsiveness of total health expenditures to changes in GDP over time in SSA, as well as the impact of health expenditure on key selected health outcomes, including under-five mortality, maternal mortality and life expectancy. In general, it is true enough that favorable health outcomes reflect to some degree the total amount of health spending, especially if one takes into account the efficiency of any given health system. The best route to providing better care for a health system is to focus on increasing its health outlays on health promotion and preventive measures as the economy expands. Yet despite the global increases in health expenditures, the World Health Organization (WHO) has found that health expenditure has generally received less attention in government budgets in the developing regions of the world, especially those in SSA, where incomes are low and resources are relatively scarce (World Health Organization [WHO], 2010). Consequently, health expenditures in SSA constitute only a small proportion of GDP compared to the situation found in more developed economies. In 2010 for example, health expenditures constituted only about 6 percent of GDP in SSA, while such outlays constituted as much as 13 to 17 percent of GDP in the OECD nations and in North America, respectively.

There is a plethora of existing studies that relate health expenditures to selected health outcomes, many of which seek to predict macro-determinants of these outlays. For instance, Murthy and Okunade (2009) modeled the core determinants of health expenditures in SSA using cross-sectional data from 44 African countries for the year 2001 and concluded that per capita GDP and foreign aid were the main drivers of health expenditures in the region. A key weakness, however, of Murthy et al.’s study is that it was limited to data in the year 2001, and thus could
not consider developments that might have escalated or reduced health expenditures for some of the countries for other years.

Di Matteo (2005) provided further information, modeling the macro-determinants of health expenditure in the US and Canada over the period 1980–1998 and 1997–2000, respectively. The study’s key finding was that technological change in the healthcare market had driven up the costs of healthcare. In a more recent and related study, Bilgel and Tran (2013) investigated the determinants of Canadian provincial health expenditures spanning a period of 28 years. Meanwhile, other studies explored critical determinants of health expenditures in both developed and developing countries (Dreger & Reimers, 2005; Gbesemete & Gerdtham, 1999; Hellinger & Encinosa, 2006; Liang & Mirelman, 2014; Murthy, 2004; Okunade, 2008; Piabuo & Tieguhong, 2017). Studies on the empirical relation between health expenditures and health outcomes abound, particularly for the developed world (see inter alia Baltagi & Moscone, 2010; Erdil & Yetkiner 2009; Nixon & Ulmann, 2006). The field therefore has received considerable scholarly attention, if not for all regions and not for all periods.

Unfortunately, only a few studies had been conducted on SSA, and there exists very little that looks at recent times (see Anyanwu & Erhijakpor, 2007; Arthur & Oaikhenan, 2017; Ashiabi et al., 2016; Novignon, Olakojo, & Nonvignon, 2012). Accordingly, this article seeks to address this gap in our understanding of healthcare issues by looking closely at SSA and focusing on the best recent data to analyze the determinants of health expenditure levels and their overall relationship to health outcomes.

This article employs a combination of descriptive and empirical methods. Based on a review of the literature of the factors that affect health expenditure in SSA, this study considers GDP per capita, physician population and resultant health outcomes, with special attention given to the needs of the population aged 65 and above, carbon emission per capita and its impact on health, as well as HIV/AIDS prevalence in the region.

This article relies upon annual data from 46 countries, covering the years from 1996 to 2015. Data on GDP per capita, physicians per 1,000 population, population aged 65 years and above, carbon emission, HIV/AIDS per capita, health expenditure per capita, under-five mortality, life expectancy and maternal mortality are drawn from the World Development Indicators of the World Bank.
Figure 1. Health Expenditure as Percentage of GDP


**Results and Discussion**

Figure 1 shows variations in national health expenditures as a percentage of total GDP, showing an average of 6.75 percent for 42 of the 48 countries in SSA for which data was available in 2011. Sierra Leone spent the highest percentage of GDP on healthcare, 16.3 percent, followed by Liberia at 15.6 percent, and then Lesotho with 11.7 percent. Rwanda and Uganda followed with expenditures to GDP ratios of 11 percent and 9.3 percent, respectively. Fourteen of the countries, apart from the first five, spent more than the average health expenditure share of GDP for the region, while 18 spent below the average. The countries of Central African Republic, Gabon, Angola, Chad and Eritrea recorded the least health expenditure share of GDP, with percentages of 3.9, 3.5, 3.4, 2.8 and 2.6, respectively. Eritrea recorded the lowest healthcare expenditure to GDP ratio at 2.6 percent.

It is apparent that the relatively high health expenditures in Sierra Leone, Liberia and Rwanda are attributable to the usual post-war reconstruction phenomenon, where more resources, mostly donor-provided, are invested into resuscitating and rebuilding health institutions and recruiting anew a healthcare work force in order to revamp the health systems which had become virtually comatose during the periods of civil war.
Figure 2 depicts the relationship between national health expenditures and maternal mortality. Maternal mortality refers to the death of mothers or expectant mothers because of complications from pregnancy or childbirth. The maternal mortality ratio (MMR) is thus the number of maternal deaths per 100,000 live births per year. From 1990 to 2013 the global maternal mortality rate declined by 45 percent, from 380 deaths to 210 deaths per 100,000 live births, according to UN inter-agency estimates. This translates into an average annual rate of reduction of 2.6 percent. While this is a significant gain, it nonetheless reaches less than half the 5.5 percent rate needed to achieve the three-quarters reduction in maternal mortality targeted for 2015 in Millennium Development Goal 5 (MDG 5) (WHO, 2014).

But, while globally maternal mortality rates have declined, the levels remain unacceptably high in SSA; the region remains responsible for more than half of all global maternal deaths. The SSA region alone accounted for 62 percent (179,000) of all global maternal deaths, followed by southern Asia at 24 percent (69,000). At the country level, just two nations accounted for one-third of all global maternal deaths: India, at 17 percent (50,000 maternal deaths); and Nigeria, at 14 percent (40,000) in 2013. As Figure 2 depicts, for SSA, Sierra Leone recorded the highest MMR of 1,100 deaths, followed by Chad with 980 and Central African Republic at 880 deaths per 100,000 live births.
A few SSA nations have shown progress. Namibia, South Africa and Botswana have been able to achieve the MDG 5 target, with MMRs of 130, 140 and 134 deaths per 100,000 live births, respectively, levels that are still much too high, but at least representing some improvement nevertheless. The high levels of maternal death in some areas of the world reflect inequities in access to health services, highlighting the gap between rich and poor in access to adequate health attention. Almost all maternal deaths (99%) occur in developing countries. The major complications that account for these preventable deaths are severe bleeding (mostly bleeding after childbirth), infections (usually directly after childbirth), high blood pressure during pregnancy (pre-eclampsia and eclampsia), complications from delivery, unsafe illegal abortions and diseases such as malaria and HIV/AIDS during pregnancy. This underscores the importance of having a skilled healthcare worker in attendance at delivery since these complications can often be effectively treated if there is a trained care-giver on hand. Approximately 80 percent of maternal deaths could be prevented if all women had access to essential and timely maternity and basic healthcare services.

Life expectancy at birth measures how long, on average, people will live, based upon a given set of age-specific death rates. Life expectancy has increased significantly over the past few decades in all Organisation for Economic Co-operation and Development (OECD) countries (i.e., the world's more affluent nations), and has risen also in many, if not all, emerging economies. Improvement in living conditions, a reduction of leading risk factors (e.g., smoking rates) and progress in healthcare are the main factors explaining increased longevity. For the first time in history, in 2011, life expectancy on average across OECD countries exceeded 80 years, an increase of 10 years since 1970. The United States, Chile and a number of central and eastern European countries recorded life expectancy at between 75 and 80 years. However, in 2011, life expectancy in SSA averaged 58 years. Little above half of the SSA countries had a life expectancy above the global average of 60.6 years.

The three SSA countries with the highest life expectancies, Mauritius (74), Seychelles (73) and Cape Verde (72), recorded a health expenditure proportion of GDP lower than the 5.9 percent on average (see Figure 3). This amply demonstrates that higher health expenditures alone do not necessarily translate into increased life expectancy. The efficiency of the health system, the overall strength of health resources, in addition to the lifestyle of the population, is what matter most.
Figure 3 indicates that the SSA countries of Mauritius, Seychelles and Cape Verde had the highest life expectancy rate of 74, 73 and 72 years, respectively, but the health expenditure share of total GDP for the three countries was lower than 5 percent in each case. Life expectancy in South Africa is approximately 61 years, suggesting that there has been much less progress in South Africa (due mainly to the epidemic of HIV/AIDS); indeed, in the nation of South Africa life expectancy was relatively higher two decades ago. The fact that Sierra Leone recorded the second highest percentage of total GDP on health expenditure but showed the lowest life expectancy makes plain the message that it takes more than just investing in the health sector to improve in this key health measure. Still, Sierra Leone is a special case of post-war rebuilding. Investments in the health sector there went into physical infrastructure and human capital development and a general strengthening of the health system. It will thus take a while for Sierra Leone to benefit fully from the investments in the health sector.

Higher health spending per capita is generally perceived to be associated with higher life expectancy, although this relationship tends to be less pronounced in countries with the highest health spending per capita. For SSA, Figure 3 shows that although Eritrea spent just 3.3 percent of its GDP on healthcare, it recorded a life expectancy of 64 years, a level quite above the average in SSA and not far from the situation seen in
Sierra Leone, which recorded the highest healthcare expenditure as a percentage of GDP but the lowest life expectancy. Overall, the African countries with lowest life expectancy are Sierra Leone, Lesotho, Angola, Central African Republic, Chad, Mozambique and Somalia where, on average, no one is expected to live beyond 55 years. In conclusion, while health expenditure is perceived to have a direct relationship on health outcomes, this cannot be seen consistently in SSA countries. Other factors such as the prevalence of HIV/AIDS, alcohol consumption and diet also affect health outcomes.

Figure 2 depicts the relationship between health expenditure as a percentage of total GDP and maternal mortality rate. About half of the 48 countries recorded a value below the average rate of 494/100,000 births. Sierra Leone, with the highest maternal mortality rate, also recorded the second highest rate for health expenditure, while Cape Verde, recording the lowest maternal mortality rate, showed a level of health expenditure as a percentage of GDP lower than the overall average for the region.

Figure 4 illustrates the association between health expenditures and under-five mortality per 1,000 births, with an average U5M rate of 75/1,000 births for the region. The pattern is no different from the relationship between health expenditures and maternal mortality. Figure 4 shows Somalia with the worst U5M rate, but the nation can offer no figures on health expenditure. The two countries with the lowest U5M rate, Mauritius (14.6 per 1,000) and Seychelles (14.7 per 1,000), had a health...
expenditure rate of 3.3 percent, well below the overall health expenditure average for the region.

These facts clearly indicate that many other factors beyond national income and total health spending most affect life expectancy, most likely explained by the variations in efficacy of health systems, but above all by the relative prevalence of HIV/AIDS. As of 2012, approximately 35.3 million people were living with HIV globally. Of these, approximately 17.2 million are men, 16.8 million are women and 3.4 million are less than 15 years old. There were about 1.8 million deaths from AIDS in 2010, down from 2.2 million in 2005. SSA is the region most affected. In 2010, an estimated 68 percent (22.9 million) of all HIV cases and 66 percent of all deaths (1.2 million) occurred in this region.

Swaziland recorded the highest HIV prevalence (27.6%) among all SSA nations, with Comoros showing the lowest level, with just 0.1 percent of the population infected (see Figure 5). Overall, about 5 percent of the adult population in the SSA area is infected. Here, in contrast to other regions of the world, women comprise nearly 60 percent of cases. In all, 33 of the 48 countries showed an HIV prevalence rate below the regional average of 5.2 percent, while two countries (Mauritius and Sao Tome Principle) had no record of HIV prevalence. Three out of the first five countries in the region with the highest national health expenditures recorded HIV prevalence rates above the average, while the remaining two (Sierra Leone and Liberia) recorded values below the average. The first two countries with the highest level of HIV prevalence also recorded higher health expenditures, in all probability due to the significant outlays for anti-retroviral drugs and other HIV treatments, as they struggle with the management of the epidemic. South Africa had the largest population of people with HIV than any country in the world, at 5.9 million.

Another epidemic which has the potential to reduce productivity in SSA, reducing GDP by between 1 and 3 percent per year, is malaria. Health expenditure by malaria incidence is shown in Figure 5. The country with the highest incidence of malaria (Malawi) recorded a health expenditure rate above the average rate for the region, and the country with the lowest malaria incidence (Cape Verde) recorded a health expenditure as a proportion of GDP rate of 4.4 percent, well below the regional average. Cape Verde had the highest health expenditure per GDP but a malaria incidence of 188.8 per 1,000 population (just a little above the regional average of 180 malaria infections per 1,000 people). Madagascar, the country in the region with the lowest health expenditure as a proportion of GDP, had a malaria incidence of 104.2 per 1,000
Figure 5.
Health Expenditure and HIV Prevalence

![Graph showing health expenditure and HIV prevalence across different countries.](image)


Figure 6.
Health Expenditure and Malaria Incidence

![Graph showing health expenditure and malaria incidence across different countries.](image)


population, an infection level below the average incidence in the region (Figure 6). It is worth noting that geography and climate play a crucial role in the prevalence of malaria. Mountainous and relatively temperate regions in SSA have lower malaria incidence. This explains why Botswana, South Africa, Eritrea, Seychelles, Lesotho, Comoros and Cape Verde have a prevalence rate of less than 5 percent, compared with countries.
such as Mali (448.6 per 1,000) and Burkina Faso (389.6) and corresponding elevated malaria mortality.

The infant mortality rate for all SSA countries was 51.7, with about half of the countries in the region showing a rate above the average. Surprisingly, the country with the lowest infant mortality rate (Seychelles) and the highest infant mortality (Central African Republic) both showed a percentage of access to improved water above the regional average rate. Angola, with the lowest level of access to portable water, had an infant mortality rate above the average rate, while Mauritius, with the highest level of access to portable water, had an infant mortality rate below the average rate (Figure 7). In general, greater access to water and sanitation (see Figures 8 and 9) considerably improves the survival prospects of infants in the region, but as we have seen, this is just not always the case. Interestingly, the countries with greater access to improved water and sanitation are those that devote a higher proportion of their GDP to health expenditures. Looking at Figure 8 Seychelles, with the highest rate of access to improved sanitation, had the lowest infant mortality rate of 12.1 per 1,000 live births per year. South Sudan, with the worst level of access to improved sanitation, recorded an infant mortality rate (62.7) above the overall regional average. Potable water and sanitation clearly matter, but there are confounding factors that can sometimes muddy the data.

It is also apparent that countries that devote resources to immunization against infant diseases, providing shots for measles and the DPT

![Image](source: Constructed from the World Health Statistics (WHO, 2014).)
vaccine (for diphtheria, pertussis, and tetanus), tend to have better infant health outcomes (see Figures 9 and 10). For instance, Seychelles had the highest rate for DPT immunization as well as the lowest rate for under-five mortality, while Somalia, which recorded the highest under-five mortality rate, had a DPT immunization rate of only 42 percent, significantly below
the regional average of 79.2 percent. Similarly, Seychelles, which recorded the highest rate of immunization for measles, at 99 percent coverage, showed the lowest under-five mortality. Somalia with an immunization for measles rate well below the regional average recorded the highest under-five mortality rate in SSA. (See Figures 11 and 12)
Annual health expenditure in the region between the years 1996 and 2015 was US$73.60 per capita, while the average GDP per capita from 1996 to 2015 for the region as a whole was US$1,668.00. Maternal mortality was calculated to be to 563 for every 100,000 population, under-five mortality was 108 for every 100,000 population and life expectancy was 55 years for the same period. Per capita GDP is low, health spending is low and the leading metrics on health are not at all encouraging. There still remains a lot to be done by the SSA governments to ensure better health outcomes compared with the rest of the world.

Health expenditures play a role in determining some selected health outcomes. The level of health expenditure has a clear and significant impact on under-five mortality, life expectancy and maternal mortality. A 1 percent increase in health expenditure can bring about a 0.6 percent decrease in under-five mortality, 0.05 percent increase in life expectancy as well as 0.35 percent decrease in maternal mortality. These findings are corroborated by Ashiabi et al. (2016), Arthur and Oaikhenan (2017), Novignon et al. (2012) and Anyanwu and Erhijakpor (2007) who report that health expenditures significantly improve life expectancy, under-five mortality and selected maternal health outcomes. If the SSA countries were to authentically commit to the 1989 Abuja Declaration (setting clear...
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**Source:** Author’s computation

***, **, * represents significance levels 1%, 5%, and 10% respectively

Where **GDPC** is Growth in GDP per capita; **PHYS** is Physicians per 1000 population; **POP65** is population aged 65 years and above; **CO2** is Carbon Emission per Capita; **HIV** is HIV/AIDS prevalence rate; **GE** is Governance Effectiveness index; **RQ** is Regulatory quality index; **HEXGE** is the interaction between Health Expenditure and Governance Effectiveness; **HEXRQ** is the interaction between Health Expenditure and Regulatory Quality.

(Please note: The table is not vertically centered in the image, but this is how it should appear in the text.)
goals for health improvement, a commitment periodically reaffirmed by signatory states), acting to increase health expenditures to equal at least 15 percent of total government outlays, this would certainly go a long way toward bringing about much more favorable health outcomes. Other variables such as GDP per capita, physician population, government effectiveness and regulatory quality have also been found to have significant impacts on the selected health outcomes in SSA (see Table 1).

Social indicators in SSA have improved steadily in recent years in the region, albeit slowly. Yet most of the indicators lag behind the global averages. What this article has sought to highlight, however, is that higher health expenditures do not necessarily imply better health outcomes. Other factors, especially HIV prevalence, must be considered when accessing the variable levels of progress. Increases in health expenditures over time do have the tendency to improve health outcomes in SSA, but money alone cannot solve each issue. Each nation has its own array of health challenges, and how wisely health expenditures are targeted is the crux of the issue. Progress can and should be made, but each nation will need to find its own path.

**DECLARATION OF CONFLICTING INTERESTS**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**FUNDING**

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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