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Lingnan 嶺南大學
University

**Master of Social Sciences in
Comparative Social Policy (International)**

Academic Year 2020-21

SOC 605 Comparative Social Policy Research Project

**Public Health Expenditure and Health Outcomes in
Sub-Saharan Africa: The Role Of Public Policy**

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CHAPTER ONE

1.1 Introduction

Development theories all over the world has considered human capital as a major component for economic growth and development both at micro and macro levels (Novignon & Lawanson, 2017; Wilson & Briscoe, 2013). According to Grossman's human capital model, investments in education and health are significantly affects long run per capita income. Specifically, capital development in health contributes to economic growth through the increase in healthy times for both commercial and non-commercial activities (Novignon & Lawanson, 2017). Also, when individuals are healthy, they have the capacity to make contributions towards the growth of a nation, and four ways in which they can stimulate growth are: (i). at the place of work, healthier individuals tend to be more productive and thus earn a higher income, (ii). they spend longer time in the labour force and do not generally take sick leave or retire early, (iii). they have a higher probability of investing in their own education and self-development, which in turn enhances productivity and (iv). they are most likely to save and invest with the expectation of longer life after retirement, this in turn increases the money available for investment within the economy (Bloom & Canning, 1999, p. 1207). Therefore, improving the investment on healthcare remains paramount in the development agenda of every nation, which is in line with the sustainable development goal (SDG 3) of the United Nations (United Nations, 2020). Ensuring that everyone lives healthy is critical to sustainable development, the recent global pandemic caused by the COVID-19 is an example of how health crises can destabilize the economy and upend the lives of people. Before, the emergence many low-and-middle income countries suffer from burden cases like malaria and HIV/AIDS which has continually interrupted their daily lives and further reduced their productivity. By the governments of these countries focusing on more efficient funding towards the health systems, increasing the people's access to physicians and improving the sanitation and hygiene, there can be significant progress made in reducing events like infant and maternal mortality (United Nations, 2020).

In the year 2000, 147 of 189 countries in the world, including the rich and poor countries, came together at the Millennium Summit to make an unprecedented commitment in line with United Nations millennium declaration to attain sustainable development and poverty eradication in a

target fifteen years (15 years). This commitment was summarized into the Millennium Development Goals (MDGs) targeted at improving human capital in the areas of poverty alleviation, health development, education attainment, environmental sustainability, gender equality and globalization. These MDGs were summarized into 8 goals which are: eradicate poverty and extreme hunger, achieve universal primary education, promote gender equality and empower women, reduce child mortality, improve maternal health, combat HIV/AIDS, malaria and other diseases, ensure environment sustainability and to develop a global partnership for development (WHO, 2005). To achieve this goal especially in health such as child mortality, maternal health, combating HIV/AIDS and malaria adequate resources are needed. However, the resources required for this development was limited in the Sub-Saharan African (SSA) region.

To this end, the African leaders gathered in the year 2001 in what is today known as the Abuja Declaration, to offer an unprecedented commitment towards the improvement of health outcomes in the continent by improving public health expenditure. The goal was to improve public health expenditure to 15% of national budget by 2015. Till this day, only few countries in the continent have been able to achieve this target. According to World Bank reports in 2012, only six (6) countries had been able to achieve this target, these countries include: Rwanda (23%), Liberia (18.9%), Malawi (18.5%), Madagascar (15.5%), Togo (15.4%) and Zambia (16%) (Novignon & Lawanson, 2017). The economic giants within the continent like Nigeria, Ghana and South Africa till this time are nowhere near this target. For instance, in the year 2013, public health expenditure was only 3.39% of the total budget, while in Ghana it was 6.1% of the total budget (World Bank, 2019). Twelve (12) years after the MDG and eleven (11) years after the Abuja Declaration, the WHO reported that only eight (8) countries were on track to meet the health related MDGs, most of the countries within the region including Nigeria and Ghana were yet to achieve 50% of the target (World Bank, 2019). The state of health in SSA is very poor, for instance Nigerian overall health system performance was ranked 187th of 190 countries (WHO, 2017). In 2013 Nigeria's infant mortality rate was (80.5 per 1000 births) maternal mortality (951 per 100,000 deaths), and Ghana (42 Per 1000 births) and (321 per 100,000 deaths) respectively are currently one of the highest in the world when compared to other first world countries with single digits (World Bank, 2019). This study seeks to investigate how the effectiveness of public expenditure is affected by public policy.

Some studies have examined the relationship between public health expenditure and health outcomes. For example, (Nixon & Ulmann, 2006) found that increasing public healthcare expenditure is significantly associated with large improvements in infant mortality in fifteen European Union (EU) countries between the years 1980 to 1995; evidence from (Crémieux et al. 1999) showed that lower healthcare spending is statistically significant to increase in infant mortality in Canada; and more recently, findings from Ojapinwa et al. (2012) revealed that public health expenditure had a negative effect on infant mortality in Nigeria; and (Novignon & Lawanson, 2017) found that public healthcare expenditure is positively and significantly related to infant mortality, under-five mortality and neonatal mortality. Most of the above-mentioned studies focused more on developed countries, except for (Novignon & Lawanson, 2017; Ojapinwa & Yussuff, 1857) that paid attention to developing countries in their studies. In examining the relationship between public health expenditure and health outcomes, all the studies examined by this research restricted their health outcomes to mostly infant and maternal mortality. Deaths caused by malaria and HIV are health outcomes of high prevalence in Sub Saharan Africa and must not be overlooked hence, the reason for this study.

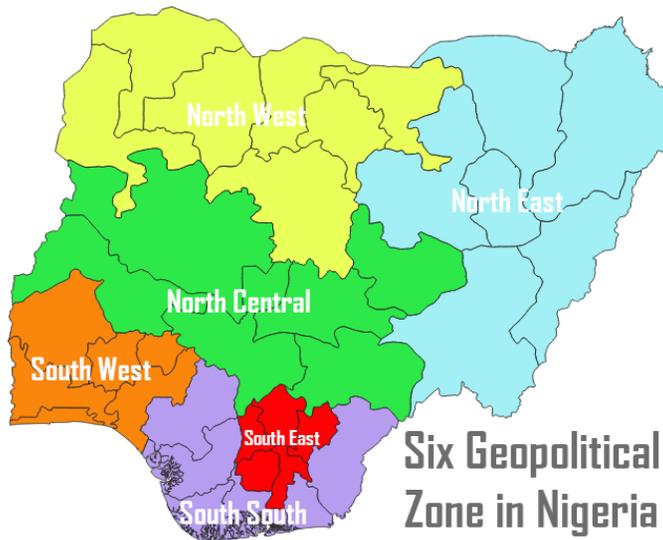
Based on this background, this study therefore examines the relationship between public health expenditure and public health outcomes in Nigeria and Ghana, factoring the role of public policy. Following the introduction of this research, the remaining aspects of this study is structured as follow: literature review, theoretical and conceptual framework, methodology, findings, discussion, implication and conclusion in section two, three, four, five, six and seven respectively.

1.2 Study Context

The context of this study is limited to two study areas located in Sub-Saharan African. The Sub-Saharan Africa region was considered because of the peculiar prevalence of health outcomes such as infant mortality, maternal mortality, HIV/AIDS and malaria. According to reports from the World Health Organization report (WHO, 2019), Africa accounts for 93% of the global malaria cases, the region also accounts for the highest cases of HIV/AIDS, while infant and maternal mortality still remain very high when compared to other regions of the world. Based on these

reasons, two countries with high burdens of these outcomes were randomly selected for this study. These countries are Nigeria and Ghana.

NIGERIA



Source: Umar Yusuf, 2018

Nigeria is a Sub-Saharan African country located in the West African region of the African continent. Nigeria accounts for almost half of West Africa's population with a population size estimated around 202 million making largest African country in terms of population and one of the highest population of youths in the world (World Bank, 2020). Nigeria is a multi-ethnic society divided into six geopolitical zones as seen in the image above, namely: North-West, North-East, North Central, South-East, South-South and South-West. Nigeria consists of 36 autonomous states and the Federal Capital Territory (FCT), with seven hundred and seventy-four (774) local government areas (LGAs). The country occupies a total land mass of 923, 763km².

Nigeria has an abundance of natural resources such as tin, coal, limestone, iron ore and arable land amongst many others. It is the largest exporter of crude oil in Africa and also has the largest natural gas reserve on the continent (World Bank, 2020). The oil and gas sector accounts for almost ten percent (10%) of the gross domestic product (GDP), the revenue from oil accounts for eighty-six

percent (86%) of export revenue in Nigeria (OPEC, 2020). Despite the abundance of these resources and huge revenue from crude oil, the impact of this has not reflected on the living condition of the populace especially in the aspect of health.

According to recent reports from the World Bank, cases of Malaria and HIV/AIDS continues to be public health burden in Nigeria. For instance, of the six countries that accounts for half of the world's malaria cases, Nigeria accounts for 25% of the total malaria burden (WHO, 2019). The case of HIV/AIDS is also a prevalent public health problem within the country, according to reports by the United Nations Aids (UNAIDS), HIV/AIDS affects 1.9million Nigerians (UNAIDS, 2020). It is for these reasons this study randomly selected Nigeria as one of its study areas.

GHANA



Source: William K Bosu

Ghana like Nigeria is a Sub-Saharan African country located in the Western region of Africa, the country sits on the Atlantic Ocean bordering Togo, Ivory Coast and Burkina Faso. The country is divided into nine (9) administrative regions namely: Northern, Volta, Central, Western, Eastern, Ashanti, Brong-Ahafo, Upper West and Upper East regions. It has a population size of 29.6 million people and a land mass of 238, 535 km² (World Bank, 2020). Ghana is considered as one of the stable economies in the West African region since its transition to a multi-party system.

Ghana formerly known as the Gold Coast is rich in natural resources such as Gold, Cocoa and most recently discovered oil which has recently formed the cornerstone of the booming economy. In recent times, Ghana has experienced significant growth in its economy, for instance in 2019 the gross domestic product experienced a growth of 6.7% and it's projected to reach 7.6%. Oil, Gold and Cocoa account for a significant share of the country's export revenue, revenue from these three exports resulted to a trade surplus of 2.8% of the country's GDP (World Bank, 2020). Like Nigeria, this economic success has not translated into a better health system. After twenty (20) years since the Abuja Declaration and United Nations Millennium Development Goals commitment, the country is yet to achieve 50% of the agreed targets.

Cases of Malaria, HIV/AIDS, infant and maternal mortality continues to threaten the lives of the citizens. According to recent reports from the World Health Organization, 100% of Ghana's population are at risk of malaria infection, cases of infant and maternal mortality stand at 38.9 Per 1000 births in 2015 and 319 Per 100,000 deaths respectively in 2015 (WHO, 2019 and World Bank, 2020). Despite these burdens public health expenditure when considered as a percentage of the GDP has not experienced any significant shift from the early 2000s till this time. According to the World Bank, public health expenditure grew by only 0.48% from 2000 till 2015 (World Bank, 2020). Based on these troubling issues Ghana was randomly selected as one of the two countries to examined in this study.

1.3 Research Questions

This study aims to answer the following questions:

1. What is the relationship between public health expenditure and health outcomes (infant mortality, maternal mortality, malaria mortality and HIV/AIDS mortality) in Nigeria and Ghana?
2. How would the fulfilment of the United Nations general assembly commitment for the MDGs (now known as the SDGs) and the Abuja Declaration affect health outcomes between 2000 and 2018?

1.4 Research Hypothesis

The hypothesis of this study includes:

Hypothesis 1

- Increase in public healthcare expenditure would improve health outcomes (infant mortality, maternal mortality, malaria mortality and HIV/AIDS mortality).

Hypothesis 2

- Public policy (Millennium Development Goals and Abuja Declaration) is significant to the improvement of health outcomes in the region.

CHAPTER TWO

LITERATURE REVIEW

Over the years, studies have examined the relationship between health expenditure and health outcomes. On the micro level, an individual who is healthy will not only be more effective and efficient at work, but he would devote more to other productive activities (Clements-Croome, 2015). Evidence from Straus and Thomas (1998), indicates that health status like other variables such as education reflects the variations in wages. On the macro level studies of public health expenditure and health outcomes globally have concentrated on three main themes: impact of per capita income and health expenditure, total population outcome and health outcome, and health aids and health outcome. Some studies have focused on the impact of per capita income on health expenditure, for instance (Bloom & Canning, 1999; Marwa Farag, Nandakumar, & Stanley Wallack, 2012; Jaunky & Khadaroo, 2008; Moscone, 2010; Murthy & Okunade, 2009). Some other group of studies concentrated on estimating the relationship between health expenditure and the total population health outcome (Babazono & Hillman, 1994; Bokhari, Gai, & Gottret, 2007; Cevik, 2016; Novignon & Lawanson, 2017). The third group of more recent studies paid attention to the relationship between health aid and health outcome (Claudia, 2008; Doucouliagos, 2019; Yogo & Mallaye, 2015). Generally, this study has been considered from two separate angles of developed and developing countries or high income and low- and middle-income countries. However, the literature has reported conflicting views in the relationship between the public health expenditure and health outcomes.

Based on the focus of this study, emphasis was placed on reviewing related literature focused on developing countries especially the Sub-Sahara African region. The review suggests that there exists to be an excessive number of studies that have focused on the relationship between health expenditure and health outcomes in high income countries, with little focus on the low- and middle-income countries (LMICs) or developing countries. Studies that have given attention to developing countries with specific attention to the Sub-Sahara African region includes (Anyanwu & Erhijakpor, 2009; Boachie, Ramu, & Tatjana, 2018; Gupta, Verhoeven, & Tiongson, 2002; Gyimah-brempong & Wilson, 2004; Ojapinwa & Yussuff, 1857).

Generally, research in this study area has revealed an inconsistent result in the relationship between public health expenditure and health outcomes. Some studies for instance, (Filmer & Pritchett, 1997; Kim & Moody, 1992; Musgrove, 1996; Ojapinwa & Yussuff, 1857) revealed that there is no relationship between health expenditure and health outcomes. (Musgrove, 1996) specifically indicated that health expenditure has no impact on child mortality. More recently, results from (Kamiya, 2010) showed that public expenditure did not have any impact of mortality in developing countries.

In contrary to the above, results from other studies revealed a positive relationship between public health expenditure and health outcomes, results from (Novignon & Lawanson, 2017) showed a positive relationship between public health expenditure and health outcomes across forty-five Sub-Saharan African countries. The study of (Novignon & Lawanson, 2017) examined this relationship using variables such as infant mortality, under five mortality, crude death and life expectancy to represent health outcomes. Results from (Anyanwu & Erhijakpor, 2009; Rahman & Khanam, 2014) indicate a positive relationship between public health expenditure and health outcomes. Although in examining this relationship, (Anyanwu & Erhijakpor, 2009) only used to two variables for health outcomes represented by infant mortality and under five mortality. Studies such as (Bokhari et al., 2007; Crémieux et al., 1999; Gupta et al., 2002) found strong positive relationship between public expenditure and infant mortality. Another interesting finding from the study of (Bokhari et al., 2007) is that economic growth had a stronger relationship with health outcomes and a more important contributor to the improvement of health outcomes in developing countries. While result from (Filmer & Pritchett, 1997) show that although there is a positive link between public health spending and health outcomes, the impact is statistically insignificant in both developed and developing countries.

A more recent empirical studies by (M Farag et al., 2013) across 133 low and middle income countries for a selected period of years 1995, 2000, 2005 and 2006 showed a significant impact of public health spending on health outcomes. The study further explained that the magnitude of the impact in this relationship was dependent on the levels of good governance. In other words, countries with higher levels of good governance showed a higher significant impact of public health spending on health outcomes. Although most of the results from high income countries

reviewed by this study showed that there exist a stronger relationship between public health spending and health outcomes, however, (Rana, Alam, & Gow, 2018) reported that the link between public health expenditure is stronger for low income countries compared to higher income countries. The result further explains that public health spending has an insignificant impact on maternal mortality.

In a single country analysis (Nixon & Ulmann, 2006) was carried out by (Rhee, 2012) in South Korea to examine the relationship between public health expenditure and infant mortality and life expectancy at birth. The result shows that there was a positive relationship between public health expenditure and health outcomes represented by the two selected variables of infant mortality and life expectancy at birth. The study further concluded that in the long run public health expenditure would be more impactful but in the short run, the number of physicians and hospital beds available would impact more infant mortality and life expectancy at birth.

In a similar cross-country study of fifteen (15) European countries by (Nixon & Ulmann, 2006) analyzed the relationship between public health expenditure and health outcomes similarly represented by infant mortality and life expectancy. The result from this study revealed that there is a positive relationship between public health expenditure and health outcomes however, public health expenditure had no significant impact on life expectancy. In contrary to the findings by (Nixon & Ulmann, 2006), result from (Cevik, 2016) show a strong negative relative relationship between public health expenditure and health outcomes. The study by (Cevik, 2016) is a cross-country analysis carried out across twenty countries, the variables used to represent health outcome in this study were child and infant mortality. While the result was generally negative, there was higher negativity between public expenditure and under-five mortality.

An important gap identified from previous literature is the fact most studies in both developed and developing countries have only analyzed the relationship between health expenditure and health outcomes using variables such as infant mortality, maternal mortality, life expectancy and life expectancy at birth. However, other health outcomes such as Malaria and HIV/AIDS have not been examined in this relationship. These two outcomes are high burden epidemics in developing countries especially in Sub-Sahara African countries. Beyond individual illnesses and deaths

caused by Malaria and HIV/AIDS, these outcomes have undermined the social structure in Sub-Saharan African countries, evidence from other studies (Breman, Egan, & Keusch, 2001; Dixon, McDonald, & Roberts, 2002; Arrow, Panosian, & Gelband, 2004 and Murphy et al., 2005) have shown the social, financial and economic cost of malaria and HIV/AIDS related illnesses and deaths. Secondly, only (Ojapinwa & Yussuff, 1857) has examined the role of governance in this relationship. Based on review so far, no study has examined the relationship between public health expenditure in Nigeria and Ghana combining these four variables (infant mortality, maternal mortality, and malaria and HIV/AIDS mortality) together. This study will take it a step further by examining the role of public policy in the relationship between public health expenditure and health outcome, adding two other variables in Malaria and HIV/AIDS to infant and maternal mortality.

CHAPTER THREE

THEORETICAL AND CONCEPTUAL FRAMEWORK

3.1 Theoretical Framework

To explain the relationship between public health expenditure and health outcomes, this study would utilize a demand side theory represented by Grossman's demand for health model and a supply side theory represented by Wagner's Law. The Grossman's demand for health model was founded by Michael Grossman in 1972 in his monograph titled 'The Demand for Health' (Jones, Rice, & Contoyannis, 2006). In this model, Grossman categorized health as a durable capital good which has the potential to improve health outcomes. This model is considered the founding model for the demand for health by (Jones et al., 2006). Wagner's Law on the other hand postulates that there is a positive relationship between economic growth and public expenditure. The theory was propounded by a German economist known as Adolf Wagner, and first observed in Germany before further observations in other parts of the world.

3.1.1 Demand Side Theory (Grossman's Demand for Health Model)

Following the study of (Rana et al., 2018), this study would adopt the Grossman's demand for health model. Grossman's demand for health model says that the gross investment on healthcare comprises of four variables represented by medical care, time input and the stock of human capital.

$$I = (M, T, E)$$

From the above equation, gross investment is represented by I, medical care is represented by M and the stock of human capital is represented by E.

Based on this model, a change in any of the given components would have an impact on the outcome of healthcare in any society (Rana et al., 2018). In this model Grossman considered medical as the most important component of gross investment on healthcare because, it is the most marketable component of the three variables. Since medical care is the only marketable component that is associated with price and cost, all other components in this model (time input and the stock of human capital) were held constant. Based on that, a higher investment of medical care would

translate to an improved health status. Since this study argues that the increase in public health expenditure would improve health outcome, this model would be relevant.

3.1.2 Supply Side Theory (Wagner's Law)

Wagner's law is generally known as the law of the of increasing government (state) spending, this principle was named after Adolf Wagner, the German economist who propounded the law (Wagner, 1890). This principle was first observed in Germany, following which Wagner tested in other countries. The theory suggests that as the economy grows the share of public expenditure is expected to also grow across the broad spectrum of the economy.

In 1994, (Ramakrishna, 2016) tested the validity of Wagner's law in India, the study examined the behaviour of government's expenditure in relation to economic growth in India between 1960 and 1991. The study observed that the Wagnerian doctrine of rising public expenditure in relation to economic growth was valid in the Indian context. Peacock and Wiseman also examined the relationship between public expenditure and gross domestic product in the UK between 1891 and 1955, and Wagner's theory was also found to be applicable (Henry & Olekalns, 2010). The study observed that there was considerable increase in public expenditure in relation to economic development, and the government cannot ignore the demands of the people for social services due to an increasing revenue at constant tax rate.

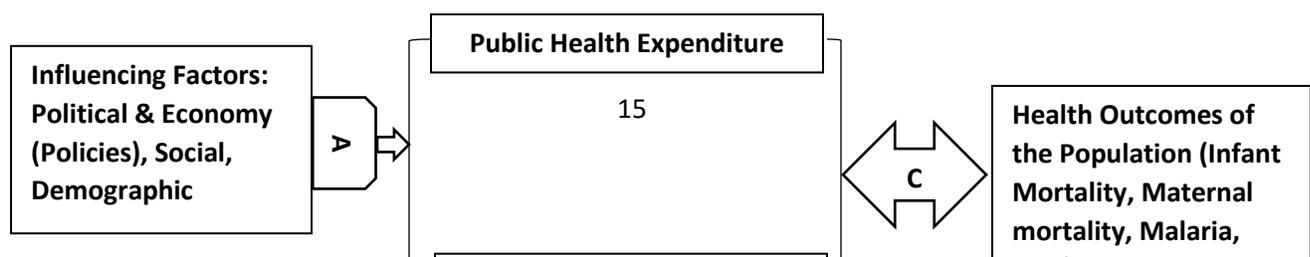
Therefore, considering the peculiarity of this study areas, the study would also adopt the supply side theory for this study. This is based on the assumption that there is an already existing demand for health services because of the high prevalence of burden health cases such as infant mortality and malaria mortality. However, state of medical centers, availability of drugs and equipment, and the quality of service has prevented people from patronizing the healthcare centers while they rely on self-medication. Hence, to improve the demand, the government must improve expenditure in fixing the state of the healthcare centers. This study assumes that as the GDP grows, public health expenditure (which will be represented as a percentage of gross domestic product) would also increase, thus improving the health outcomes. As well, if there is a fall in the public health expenditure, the level of health outcomes would also deepen.

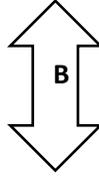
3.2 Conceptual Framework

Globally, the concept of human capital development is an essential aspect of economic growth (Abbas, 2010). According to the World Health Organization's human development index (HDI), health is considered a key component for human development, hence, investment in this sector is critical (UNDP, 2019). Health is widely recognized as an input and also an outcome of development processes (relationship between health and economic development), it is also believed that upliftment in socioeconomic status would occur within the society as a result of an improvement in health status (Abbas, 2010). Some studies (Fuentes, 2012; Karhan, 2019) have identified human capital development as a factor that differentiates developed countries from developing countries. This can be justified evidence that advanced education and health systems translates to a better economy, and can be seen in countries like Germany, Sweden, Denmark and other developed countries. Poor investment in important economic pillars like healthcare will lead to poor health status in the population which will further lead to poor health outcomes. This should be a reason for nations to reflect towards the development of social welfare policies that would make the health sector a better place, and further translates into reductions in health outcomes.

Many African countries in comparison to developed countries in the west have lower investments on health care, and also have higher health burden cases like high infant and maternal mortality, more prevalent malaria cases and higher number of deaths from HIV/AIDS (World Health Organization, 2011a). It is expected that increasing public health expenditure would be able to improve these outcomes however, since the United Nations general assembly commitment towards the achievement of the MDGs, currently known as the Sustainable Development Goals (SGDs), and Abuja Declaration commitment in the years 1999 and 2000 respectively, policies have not been put in place to stimulate the growth of public health expenditure. This study is adopting the framework developed by (Abbas, 2010) to explain the role of public policy in the relationship between public health expenditure and health outcomes.

Figure 3.0 Diagrammatic Relationship Between Public Health Expenditure and Health Outcomes





Source: Abbas, 2010

The above explanation in figure 3.0 reflects a supply and demand side scenario. (Abbas, 2010) argues that the supply side is only hypothetical hence, hence the study examined this relationship by analyzing only the demand side of this model (figure 3.0). The model assumes that from point A, policies would be designed by the government to improve health status and outputs like fertility rate, hospital services, nutrition and life expectancy thus the demand for healthcare would increase. Since we operate most countries operate a market economy, an increase in demand for health services would further increase supply which will be represented by public health expenditure. Several studies for example, (Anyanwu & Erhijakpor, 2009; Rana et al., 2018) also used similar analysis. Considering the selected study areas for this research, the demand for health care is very high as a result of burden cases like malaria, infant and maternal mortality. Despite that, the public health expenditure in the past decade has not had any significant increase (World Bank, 2020). Hence, balancing both the demand and supply side analysis may yield a more positive outcome.

CHAPTER FOUR

METHODOLOGY

4.1 Inclusion Criteria

Following standard evidence synthesis approach adopted by (Thomson et al., 2018) the inclusion criteria for this study is considered as PICOS which stands for Population, Intervention, Comparison, Outcome and Settings. In addition to the original adopted criteria, this study would add a Study Period, which makes the inclusion criteria for this study PICOSS (Population, Intervention Policies, Comparison, Outcome, Setting and Study Period).

1. **Population:** The target group for this study would be children and mothers. These group of the population were selected because, of the total affected cases of the burden cases in developing country countries, they have been the most affected group. It is for this reason this study has chosen to select health outcome variables in terms of infants and maternal deaths.
2. **Intervention Policies:** This study will include global and national public policies that affect the health sector of the two study areas. Two of which include the Abuja Declaration and the UN's general assemble commitment towards the MDGs now known as the SDGs. These interventions would be used to examine the role of public policies in the relationship between public health expenditure and health outcomes.
3. **Comparison:** This study will carry out a comparative analysis between two developing countries in the Sub-Sahara African region. The two countries to be used in this study include Nigeria and Ghana.
4. **Outcomes:** The outcome for consideration in this study are health outcomes. Health outcomes would be represented by the following dependent variables: infant mortality, maternal mortality, malaria mortality, HIV/AIDS mortality. These variables are being considered because of their high prevalence in the study areas. The afore mentioned dependent variables would be examined against the public health expenditure, which will be derived as a share of gross domestic product (GDP). The public healthcare expenditure will serve as the independent variable for this study. Other variables such as the GDP, female

school enrolment and urban population would be included as control variables for both countries.

5. **Settings:** The study will focus on the Sub-Sahara Africa region. Sub-Sahara African was identified by this study because this region constitutes a large share of the global population and coupled with this it suffers from a high prevalence of many burden health cases like malaria and HIV/AIDS. From this region, Nigeria and Ghana are the two specific study areas considered for this study. These two countries were purposively selected for the following reasons: the size of their economy, population risk, for instance 100% of the population in Nigeria and Ghana are at risk of being infected by Malaria (WHO, 2014, 2017a, 2017b). Based on those reasons, a comparative analysis of public health expenditure and health outcomes in the context of developing countries, represented by Nigeria and Ghana.
6. **Study Period:** The period under examination will be from 1999 to 2016. This study has chosen this period because they represent significant events in the world that was channeled to improve the global health. For example, in the year 2000 world leaders gathered at the United Nations summit to commit towards the achieving global development. These commitments were summarized what was known as the Millennium Development Goals currently known as the Sustainable Development Goals (SDGs), one of the key areas of these goals was health with targets such as reducing infant and maternal mortality, deaths caused by malaria and HIV/AIDS (WHO, 2015; World Bank Group, 2020; World Health Organization, 2014). Also, in 2001, the African leaders assembled in what is today known as the Abuja declaration. In this meeting the African leaders committed to increasing public health expenditure to 15% of their annual GDP by 2015. Hence, the decision of this study period (World Health Organization, 2011b).

4.2 Data Collection, Participants and Procedure

The type of data to be used by this study are annual time series data from 2000 to 2018. This study will collect quantitative data from key data sources like the World Bank data bank (<https://data.worldbank.org/>), World Health Organization (<https://www.who.int/gho/database/en/>), the International Health Metrics Evaluation (IHME) (<http://www.healthdata.org/>). The data collected will focus on health expenditure (public health

expenditure), the economy (gross domestic product, public expenditure) and health outcomes (infant mortality, maternal mortality, malaria mortality and HIV/AIDS mortality). These variables are in line with the goals of the MDGs and most recently the Sustainable Development Goal 3.0. These sets of variables would be used to examine the relationship between public health expenditure and health outcomes.

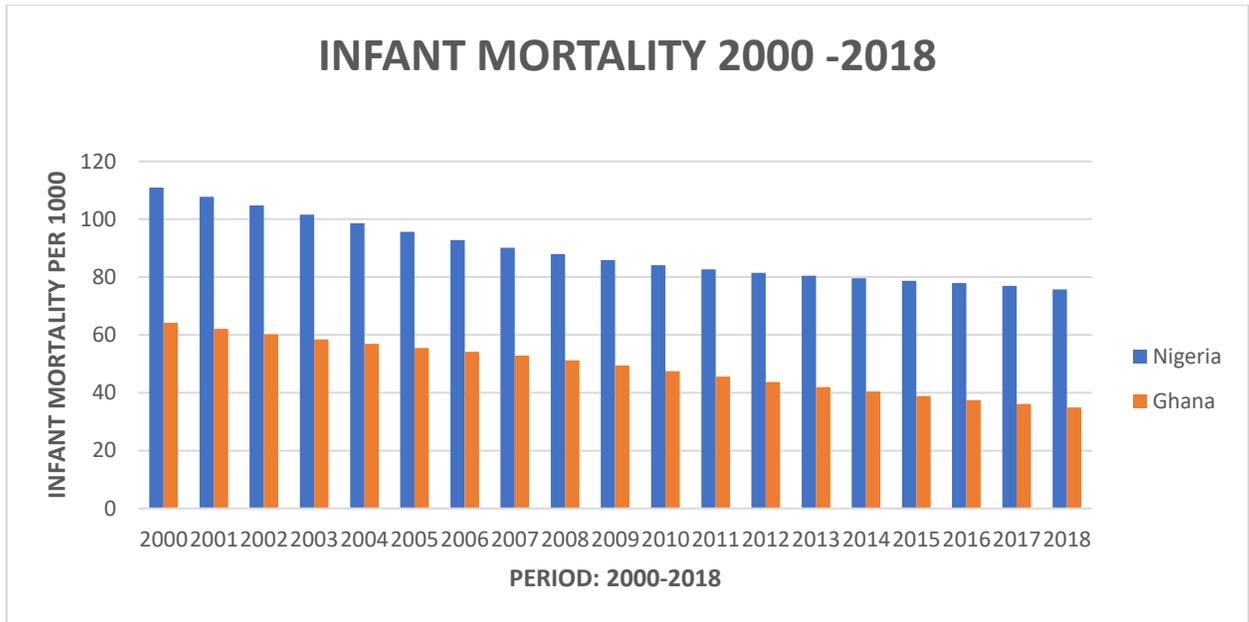
4.3 Data Analysis and Method

After the data collection, the study will employ the use of various techniques to analyze the quantitative data. Descriptive statistics such as mean and standard deviations will be used as a univariate technique to describe the data. Microsoft excel will be used to analyze the trends of the independent and dependent variables. The independent variable would be represented by public health expenditure which will be captured as a share of the GDP and the dependent variables would be represented by the selected health outcomes for this study (infant and maternal mortality, mortalities caused by malaria and HIV/AIDS).

Finally, SPSS will be used to carry out a linear regression analysis to examine the relationship and effect of public health expenditure on health outcomes in both Nigeria and Ghana. The correlation test would be carried out by examining the relationship between public health expenditure and each dependent variable. The results from this would be compared between Nigeria and Ghana to determine if there are any similarities between the two countries.

In this study, health outcomes were proxied by infant mortality, maternal mortality, and malaria and HIV/AIDS morbidities. Health expenditure data is expressed as a share of the total government's expenditure for both countries. Following (Bokhari et al., 2007), it was observed that since public health expenditure is potentially endogenous, there is a need to control for this variable. Thus, the variables were controlled with GDP, female school enrolment and urban population. This is because these variables are likely to be correlated with public health expenditure.

Figure 1: Trend of infant mortality rates in Nigeria and Ghana, 2000-2018



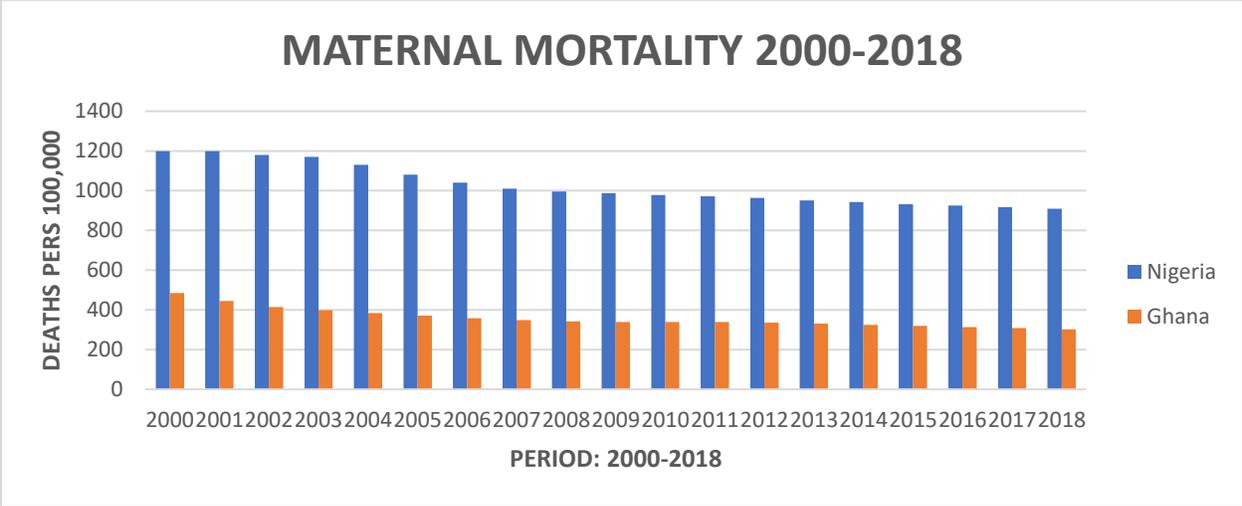
Source: World Bank Group, 2020

The infant mortality rate (IMR), maternal mortality rate (MMR), malaria mortality (MM) and HIV/AIDS mortality are represented in figure 1, 2, 3 and 4, respectively. Figure 1 shows that both Nigeria and Ghana experienced a reducing trend in IMR from year 2000 to 2018. Ghana recorded an average of 49.0 deaths per 1,000 live births (infant mortality), with Nigeria almost doubling this figure with an average of 89.14 deaths per 1,000 live births over the same period. With respect to maternal mortality rate, as seen in Figure 2, both countries experienced a downward trend over the study period, but maternal mortality rates in these two countries remain relatively high. Although when compared to Nigeria, Ghana reported a relatively low rate at an average of 357.9 per 100,000 deaths. Nigeria has an extremely high mortality rate with an average of 1025.37 per 100,000 deaths.

Figure 3 which shows the trend in malaria mortality in both Nigeria and Ghana shows an interesting trend, with Ghana reporting a higher malaria death than Nigeria. The result shows that Malaria caused an average of 133.9 and 113.5 deaths per 100,000 deaths in Ghana and Nigeria, respectively. For HIV/AIDS mortality, which is shown in figure 4, displayed downward slopes from 2008 with peak years for both countries in 2007 at 13% and 11.4% of total deaths for Nigeria

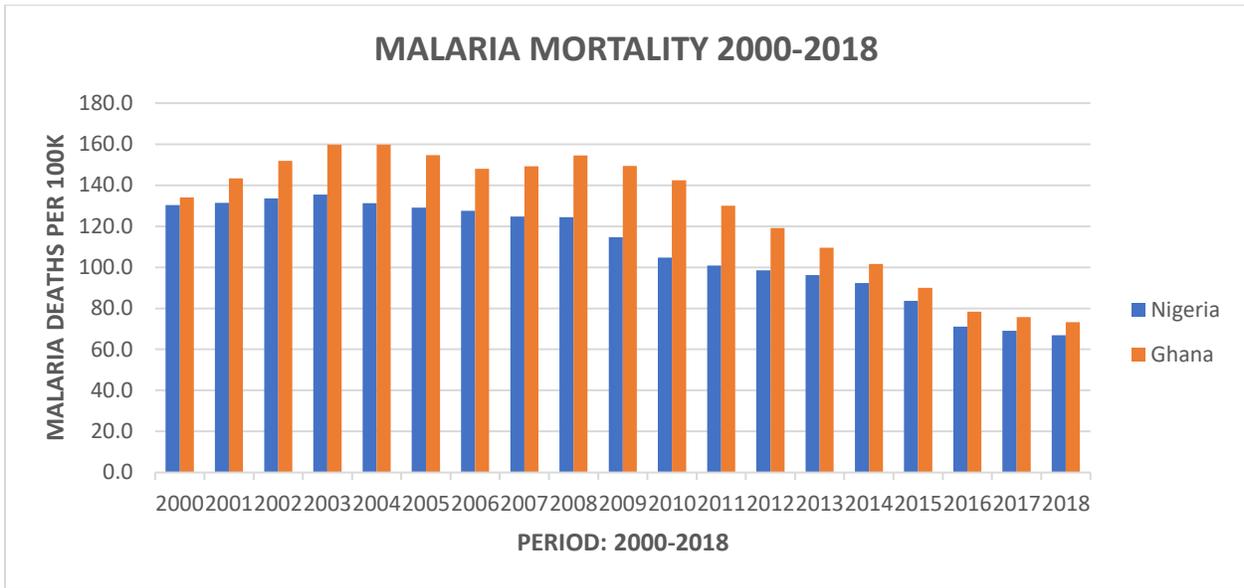
and Ghana, respectively. However, Nigeria shows a slow downward trend from 12.8% in 2008 to 10.4 in 2018, while Ghana moved from 11.1% of total deaths share in 2008 to 6.5% in 2018. Finally, figure 5 shows the trend analysis for public health expenditure per capita (PPP) for Nigeria and Ghana. Although the graph showed an increasing trend, public health expenditure for countries remains low at an average of 3.7% and 3.8% as a share of GDP respectively for both Nigeria and Ghana. This indicates that the governments of both countries need to scale up health expenditure.

Figure 2: Trend of maternal mortality rates in Nigeria and Ghana 2000-2018



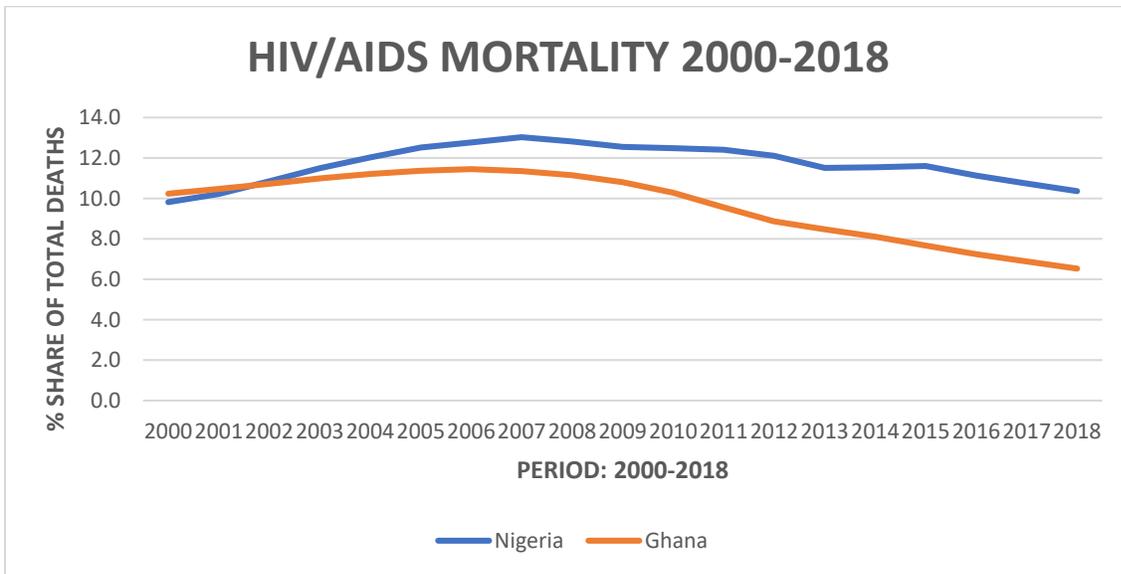
Source: World Bank Group, 2020

Figure 3: Trend of Malaria mortality for Nigeria and Ghana 2000-2018



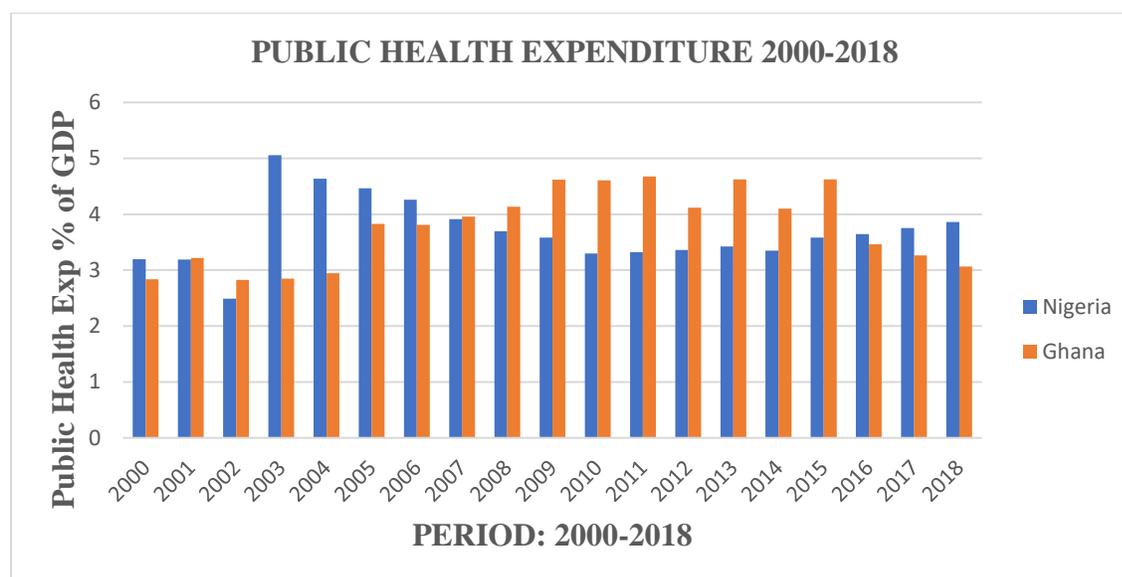
Source: World Bank Group, 2020

Figure 4: Trend of HIV/AIDS in Nigeria and Ghana 2000-2018



Source: World Bank Group, 2020

Figure 5: Trend of public health expenditure for Nigeria and Ghana, 2000-2018



Source: World Bank Group, 2020

Table 1: Variable Names and Descriptive Statistics for Nigeria

Descriptive Statistics			
Variables	Mean	Std. Deviation	N
HIV	11.6811	.95856	19
Malaria Mortality	108.7120	23.69364	19
Infant Mortality	89.1421	11.14711	19
Maternal Mortality	1025.368	102.22536	19
	4		
Public Health Expenditure as a Percentage of GDP	3.6879	.59178	19
GDP	4648.360	851.18954	19
	6		
Female School Enrolment	86.4663	5.61767	19
Urban Population	42.5941	4.88960	19

Table 2: Variable names and descriptive statistics for Ghana

Descriptive Statistics			
Variables	Mean	Std. Deviation	N
HIV/AIDS Mortality	9.6507	1.68288	19
Malaria Mortality	127.6273	30.31067	19
Infant Mortality	49.0263	9.23796	19
Maternal Mortality	357.8947	48.23426	19
Public Health Expenditure as a Percentage of GDP	3.7657	.68932	19
GDP	3075.1593	685.90540	19
Female School Enrolment	94.5877	12.39512	19
Urban Population	50.0201	3.80615	19

Summary descriptive statistics of the variables used in the empirical analysis for Nigeria and Ghana are available in table 1 and 2, respectively. The tables show that, on the average (mean), infant mortality stood at 89.14 per 1,000 births for Nigeria and 49.03 for Ghana. Maternal Mortality mean was 1025 and 357.9 per 100,000 deaths for Nigeria and Ghana, respectively. The mean for malaria mortality was 108.7 per 100,000 deaths for Nigeria and 127.6 per 100,000 deaths for Ghana. The mean for HIV/AIDS for Nigeria and Ghana were 11.68% and 9.65% respectively. The other variables found in the table are the control variables represented by GDP, urban population, and female school enrolment.

4.4 Findings and Discussion

Table 3: Public Health Expenditure and HIV/AIDS for Ghana and Nigeria

Variables	Ghana					Nigeria				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
HIV/AIDS		-.059	-.917	-.854	-.854		.323	.201	.201	.015
Mortality										
Public				.423	.423			.201	.201	-.090
Health			.364							
Expenditure										
GDP				.981	.981				-.329	.950
Female					.924					-.493
School										
Enrolment										
Urban										
Population										

Table 4: Simulation for Public Health Expenditure and HIV/AIDS Mortality for Ghana and Nigeria

Variables	Ghana					Nigeria				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
HIV/AIDS										
Mortality		-.866	-.917	-.710	-.854		-.006	.242	.201	.015
Public										
Health			.983	.918	1.000			.942	-.501	1.000
Expenditure										
GDP				.899	.981				-.329	.950
Female										
School					.924					-.493
Enrolment										
Urban										
Population										

Table 5: Public Health Expenditure and Malaria Mortality for Ghana and Nigeria

Variables	Ghana					Nigeria				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Malaria Mortality		-0.063	-0.905	-0.722	-0.855		.185	-0.848	.540	-0.958
Public Health Expenditure			.364	.643	.423			-0.103	.201	-0.090
GDP				.899	.981				-0.329	.950
Female School Enrolment Urban Population					.924					-0.493

Table 6: Simulation of Public Health Expenditure and Malaria Mortality for Ghana and Nigeria

Variables	Ghana					Nigeria				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Malaria Mortality		-0.867	-0.905	-0.722	-0.855		-0.963	-0.848	.540	-0.958
Public Health Expenditure			.983	.918	1.000			.942	-0.501	1.000
GDP				.899	.981				-0.329	.950
Female School Enrolment Urban Population					.924					-0.493

Table 7: Public Health Expenditure and Infant Mortality for Ghana and Nigeria

Variables	Ghana					Nigeria				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Infant Mortality		-.422	-.983	-.920	-.999		.048	-.982	.437	-.972
Public Health Expenditure			.364	.643	.423			-.103	.201	-.090
GDP				.899	.981				-.329	.950
Female School Enrolment Urban Population					.924					-.493

Table 8: Simulated Public Health Expenditure and Infant Mortality for Ghana and Nigeria

Variables	Ghana					Nigeria				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Infant Mortality		-.999	-.983	-.920	-.999		-.967	-.982	.437	-.972
Public Health Expenditure			.983	.918	1.000			.942	-.501	1.000
GDP				.899	.981				-.329	.950
Female School Enrolment Urban Population					.924					-.493

Table 9: Public Health Expenditure and Maternal Mortality for Ghana and Nigeria

Variables	Ghana					Nigeria				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Maternal Mortality		-0.550	-0.834	-0.866	-0.912		0.076	-0.966	0.450	-0.954
Public Health Expenditure			0.364	0.643	0.423			-0.103	0.201	-0.090
GDP				0.899	0.981				-0.329	0.950
Female School Enrolment Urban Population					0.924					-0.493

Table 10: Simulated Public Health Expenditure and Maternal Mortality for Ghana and Nigeria

Variables	Ghana					Nigeria				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Maternal Mortality		-0.904	-0.834	-0.866	-0.912		-0.948	-0.966	0.450	-0.954
Public Health Expenditure			0.983	0.918	1.000			0.942	-0.501	1.000
GDP				0.899	0.981				-0.329	0.950
Female School Enrolment Urban Population					0.924					-0.493

The result of the health expenditure and health outcome relationship are presented in tables 3, 4, 5, 6, 7, 8, 9, and 10 above for HIV/AIDS mortality, malaria mortality, infant mortality and maternal mortality. The results from the alternative specifications which was used to test the robustness of the model are also reported in the tables. Tables 4, 5, 8, and 10, represents the simulated analysis of the public health expenditure and health outcome relationship. The simulation is an assumption that both countries implemented 15% public health expenditure budget as agreed in the United Nations Assembly and the Abuja Declaration in the year 1999 and 2000 respectively (Edeme, Richardson, Emecheta, & Omeje, 2017).

Table 3 above, is a bivariate relationship between public health expenditure as a share of GDP and HIV/AIDS mortality as a share of total deaths for Ghana and Nigeria. The relationship shows to be negative for Ghana, although the effect of public health expenditure is not statistically significant. The result implies that on the average, a percentage increase in public health expenditure in Ghana, would reduce HIV/AIDS mortality by 0.1%. However, in the case of Nigeria as seen in Table 3, contradicts the result in Ghana. The relationship between public health expenditure and HIV/AIDS mortality in Nigeria appears to be positive. It implies that when public health expenditure increases by 1%, HIV/AIDS mortality also increases by 0.3%. When controlled by GDP, female school enrolment and urban population respectively, the result suggests that increasing public health expenditure reduces HIV/AIDS deaths by approximately 0.9% in Ghana. For Nigeria, the case remains the same (positive correlation). When public health expenditure was assumed to maintain a 16.4% average between year 2000 and 2018 in both countries, the relationship was negative in both countries, although the effect was more significant in Ghana than Nigeria as seen in table 4. This simulation implies that the public health expenditure for both countries are very low. Therefore, it lacks the strength to reduce HIV/AIDS mortality in significantly. Secondly, out-of-pocket expenditure is very high in both countries and this may be the likely be the reason for the improvement that we see in the trend analysis for both countries. Thirdly, the findings suggest that attaining the 15% public health expenditure target pledged at UN Assembly and Abuja Declaration in the years 1999 and 2000 respectively is critical to reducing the burden of HIV/AIDS in both countries.

In table 5, Public health expenditure showed a negative relationship with malaria deaths in Ghana but not Nigeria. This suggests that increasing public health expenditure budget as a proportion of GDP by 1% would reduce malaria deaths in Ghana by 0.063% which is very insignificant. However, after controlling for other variables such as GDP, school enrolment, and urban population, the result suggests that increasing public health expenditure by 1% significantly reduces malaria deaths in Ghana by approximately 0.91%, 0.72%, and 0.9% respectively. This case is also similar in Nigeria, however, only GDP and urban population were able to reduce malaria mortality after increasing public health expenditure by 1%. After simulating that public health expenditure was averaged 16.4% between 2000 and 2018 as seen in table 6, the relationship between public health expenditure and malaria mortality negatively correlated, this is an implication that public health is very low in both countries especially Nigeria. Hence, for any significant impact to be observed both countries would have to increase public health expenditure to at least 15% of the total government's expenditure.

The infant mortality case for both countries is seen in table 7, the direct relation between public health expenditure and infant mortality works with the existing theory for Ghana, although, when controlled for GDP the relationship. Although, when controlled for GDP and urban population, the relationship becomes negative in Nigeria. Increasing public expenditure based on the simulations as seen in table 8 for Ghana and Nigeria reduces infant mortality rate in both countries, without the use of control variables. However, controlling for these variables significantly reduces the estimate. For example, in Nigeria, the infant mortality rate improves from -0.42% to 0.98% when controlled before simulation, and after simulation, it improves from 0.97% to 0.98% after controlling for GDP.

Table 9 represents the public health expenditure–maternal mortality relationship for Ghana and Nigeria respectively. Yet again, the effect of public expenditure on maternal mortality showed a negative relationship for Ghana, and positively related in Nigeria. However, controlling for other variables (GDP and Urban population) indicated there was a significant effect of public health expenditure on maternal mortality in Nigeria. For Ghana, the relationship between public health expenditure and maternal mortality remains negative and statistically significant. While

controlling for female school enrolment could not improve the relationship between public expenditure and maternal mortality in Nigeria.

In summary, at first glance, the tables suggest different effect of public health expenditure on the different health outcomes. One interesting reason might be because of the fact that in these countries public health expenditure is very low and may not be well targeted at interventions or infrastructure that address these concerns such as HIV/AIDS, malaria, infant and maternal mortality. Secondly, another interesting reason might be the effect of out-of-pocket (OOP) expenditure which seems to be very high in these countries. For instance, in Nigeria out-of-pocket health expenditure accounts for 77.2% of total health expenditure in 2017 (World Bank Group, 2020). Thirdly, these two countries rely heavily on foreign aids, these may be another factor that would affect these relationships. To check if these two factors (OOP and foreign aid) are actually driving the inconsistencies in the relationship between public health expenditure and these health outcomes, it will be important to see whether including out-of-pocket expenditure and foreign aid provides a more robust regression estimate. Also, the large population of Nigeria estimated at 202 million people in 2019 (World Bank, 2020) may be a reason for the consistent variations observed between Ghana and Nigeria in the results when compared to Ghana's population of 29.6 million people (World Bank, 2020).

4.5 Limitation

The only limitation experienced by this study was the availability of consistent data for out-of-pocket expenditure and foreign aids to examine if these two variables were responsible for the improvement of the health outcomes over the period. Future studies can examine this relationship incorporating OOP and foreign aids into the dataset depending on the data availability.

5.0 Conclusion

From the results of this study, it can be deduced that public health expenditure has the potential to reduce health burdens like infant and maternal mortality, and malaria and HIV/AIDS mortality in both Nigeria and Ghana. Although, the proportion of total government's expenditure spent on

healthcare in both countries is very low to combat infant, maternal, malaria and HIV/AIDS mortalities. The simulation conducted by this study has revealed that increasing public health expenditure significantly (at least 15%) can reduce health outcomes significantly. This study has shown that fulfilling the UN Assembly (MDG/SDG) and the Abuja Declaration commitment is critical to resolving this over dragging issues. Also, other factors like GDP and residing in urban areas also determines prevalence of health outcomes. Many rural communities in low-and-middle income countries like Nigeria and Ghana do not have access to health care facilities which is critical for good health.

Several lessons can be could be deduced from the findings of this study. One of the lessons is the statistical insignificance of public health expenditure as a percentage of GDP in improving health outcomes in Ghana, and the positive relationship found in Nigeria. This suggests that, coupled with the fact that public health expenditure is very low, and OOP is very high, government should also concentrate on the redistributive role of income to bridge the income inequality gap that exists between the rural and urban residents, in order to improve these burden health outcomes. Secondly, taking a look at most high income and developed countries, technological advancement may also be determining factor to significantly reducing the high mortalities caused by these outcomes. For instance, after many years many Sub-Sahara African countries are still battling with the malaria endemic.

Based on the results from this study, since budgetary allocations for healthcare has the power to boost and enhance health outcomes, policy makers and the government of Nigeria and Ghana have to pay massive attention to increasing and efficiently maximizing public health expenditures. Following the requirements of the SDGs target to reduce infant and maternal mortality and the eradication of malaria, improved domestic and foreign mobilization of resources would also be critical for its achievement in Nigeria and Ghana, as well as other low-income countries struggling with similar challenges.

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