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HEALTH POLICY AND MORTALITY RATE EXPECTANCY IN NIGERIA

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ABSTRACT

The relationship between health policy on malaria and mortality rate expectancy especially among under-five (U5) in Nigeria has not been succinctly detailed in literature. This study examined the relationship between government expenditure (GE) on malaria (proxy for health policy), per capita income (GDPP, control variable) and U5 mortality rate expectancy using data from 2000 to 2015 obtained from the World Bank and WHO data base. The unit root test conducted showed that all the variables were not stationary at level. The Ordinary Least Square regression model was used and all analysis done at $p<0.05$. Results showed that there was consistent decline in mortality rate over the years under review despite the sharp increase in GE between 2006 and 2008. The coefficients of GE and GDPP have negative signs and statistically significant at 5% and 1% level, respectively. The result indicated that a percentage increase in government expenditure on malaria will lead to only 0.2% decrease in life U5 mortality. Based on the finding it was recommended that effort at enhancing awareness of the Roll Back malaria program is germane and improvement in government funding of malaria control strategies in the country should be prioritized.

Keyword: Nigeria, malaria, health policy, mortality rate, under-five.

INTRODUCTION

It has been previously established that good health in a nation generally reduces mortality rate (Cutler *et al*., 2006). Therefore, factors that diminish good health will increase mortality rate. Good health is the absence of diseases.

Over the years, studies have focused on infant mortality in the developing countries. This special focus derives from the fact that consistent statistics have shown that one in three deaths in the world is the death of an under five year old, and most of these deaths occur in the developing world (Grant, 1988; Ahonsi, 1992). Despite the decline in overall developing world mortality levels since 1950, the under-five mortality rate is still on the increase in Sub-Saharan Africa (World Bank, 2016). Nigeria, since the 1980s have been rate to have the 30th highest early mortality rate in the world. Up till present, nearly 50 percent of all deaths still occur among children below five years of age (Adeokun, 1985; Ransome-Kuti, 1986; Babalola *et al*., 2013).

Among the major diseases that are common in Africa, malaria is one of the greatest threats to life expectancy, infant mortality and economic development (Novignan *et al*., 2012; Mosunmola, 2016). Malaria transmission continues to affect 97 countries and territories around the world, inflicting a tremendous burden especially on countries in sub-Saharan Africa (MIM, 2001; Alaba, 2005). Thus, combating malaria has become a health and economic priority, as such special focus has been given to it in the millennium development goals (MDGs) and the sustainable development goals (SDGs) (Babalola *et al*., 2013). This has also led to the initiation of programs such as the Roll Back Malaria Program (RBMP). Broadly speaking, as concluded at the Abuja summit in 2000, the goal of the RBM program is to half the malaria burden by 2010 through appropriate interventions. This initiative is meant to motivate increase in government expenditure to facilitate malaria control activities in all affected regions (FMOH, 2000; WHO, 2008; Salaudeen and Jimoh, 2009). Despite this laudable global effort, rural Africa still suffers gravely from mortality due to malaria.

Nigeria is one of the highly affected regions of the world, together with Congo, accounting for over 40% of the estimated global total of malaria deaths (Sede and Ohemeng, 2015). Every year, the nation loses over ₦132 billion from cost of treatment and absenteeism from work, schools and farms (Alaba and Alaba, 2003; Bawah and Binka, 2005; Babalola *et al*., 2013). This statistics have serious implications for economic growth and the welfare of the people.

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Reduction in infant mortality rate thus increasing life expectancy to at least 70 years by 2020 is one of Nigeria's health policy targets (Sede and Ohemeng, 2015; Julien, 2009; Jie *et al*., 2001; Courtney *et al*., 2002). Mortality has important implications for economic growth, human capital investment and public finance (Granstein and Kanganovich, 2004). Investing in the social sectors like health, education, sanitation, environmental management and social safety nets is expected to impact on life mortality rate (Kabir, 2008). In Nigeria, as in other developing countries, variations in morbidity and mortality have been associated with a wide variety of measures among which is health care expenditure (Sede and Ohemeng, 2015).

Abu *et al*. (2015) reported that Nigeria has one of the highest child mortality rates in the world, data from the United Nations sources shows a low rate of decline especially The low rate of decline is a major cause for concern. With the current low rate of reduction in the under-five (U5) mortality rate in Nigeria, the country may experience similar failures in meeting the Sustainable Development goal as experienced with the MDG expected rate of 4.5% annual decline, which would have translated to a target of 64 per 1,000 live births in 2015.

According WHO (2015), in 2015, an estimated 438 000 deaths (range between 236 000 and 635 000) worldwide were due to malaria infection. Most of these deaths occurred in the African Region (90%), followed by the South-East Asia Region (7%) and the Eastern Mediterranean Region (2%). However, the WHO report showed that between 2000 and 2016, malaria incidence rates (new malaria cases) fell by 37% globally, and by 42% in Africa. During this same period, malaria mortality rates fell by 60% globally and by 66% in the African Region. This improvement, even though not satisfactory, has been adduced to the progress made by the Roll Back Malaria policy.

Despite the fact that many of the countries in Sub-Saharan Africa and Nigeria in particular, has recorded increase in health expenditure, particularly since 2000 (after the Abuja summit on RBM), mortality rate has been unsteady (World Bank, 2016). It is against this backdrop that this study examined the nexus between government expenditure on malaria (proxy for health policy) and life infant mortality due to malaria in Nigeria between 2000 and 2015. Beyond significant contribution to the body of knowledge, this study aimed to serve as an instrument to assess the contribution of the effort of RBM policy to life public health in Nigeria.

REVIEW OF RELATED LITERATURE

Although there is a dearth in literature on the relationship between government expenditure on malaria control and mortality rate especially highlighting Nigeria, there are however previous studies (scanty) assessing other different measures of socioeconomic indicators and their influence on life mortality. This further justifies the importance of a study of this nature. Most of the previous studies concentrated more on the biological, health behavioural and cultural factors. Some of these studies are reviewed in this paper.

Economic Burden of Malaria, health expenditure and the Rollback Malaria Policy

Arrese (2001), agreeing with the World Bank (2000) report, observed causality between malaria and economic growth. He posited that severe malaria attack leads to poor health outcomes which in turn lead to a low gross national income and poor economic growth. While assessing the case in Africa countries, Soyibo *et al*. (2005) concluded that human capital is important in fostering economic development. This conclusion was also supported by Alaba and Alaba (2003, 2005). Their study reported that the quality and quantity of human capital in African countries, including Nigeria, have been continually affected by low health status and that malaria is the most prevalent of all major tropical diseases in the country. Denison (1974) indicated that economic growth is promoted more by investment in human capital than in physical capital. Sequel to this, Harold and Delworth (2012) added that returns from human capital investment are realized as a flow of labour services through time.

Yaqub *et al*. (2010) observed that a key element of public policy is the promotion of good health in order to attain broad based economic growth. Base on this paradigm, many countries devote huge budgetary allocation to health, but in most developing countries especially, this huge health expenditure failed to translate into better health status.

Ernest (2011) analyzed the dynamic direct and indirect effects of government policy on health and its relation to the cyclical economic growth in the long run. Using an integrated sequential dynamic computable general equilibrium (CGE) model to examine the potential impact of increase in government expenditure on health in Nigeria, the result showed that the re-allocation of government expenditure to health sector is significant in explaining economic growth in Nigeria. He thus recommended that in order to achieve a steady economic growth, investment in health services should also receive great attention in the public investment portfolio. In determining the relationship between deaths from malaria and public health and non-health expenditure in Nigeria, Bello (2005) adopted Filmer and Pritcher model and the gross output transfer models on data from 1975-2001. The study revealed that there is a negative relationship between deaths from malaria, public health expenditure,

per capita income, and non-public health expenditure, but a positive relationship between deaths from malaria and political instability. The study further showed that between 1975 and 2001, an average of 5.86% of the GDP was lost to malaria deaths annually. The author recommended increase in government expenditure on malaria control. The works of Babalola *et al*. (2013) revealed that increase in expenditure on malaria control has been motivated by the RBM policy.

Determinants of Life Mortality

Bichaka and Gutema (2005) examined the determinants of health status (as measured by reduction in mortality rate) in SSA based on the Grossman (1972) theoretical model which considers the economic (the ratio of health expenditure to GDP and the per capita food availability index), social (illiteracy rate and alcohol consumption) and environmental factors (urbanization rate and carbon monoxide emission per capita index). The study showed that health policy, focusing on the provision of health services, can improve the health status and reduce mortality rate. The work of Wilkinson (1992) established that absolute level of income measured by per capita GDP seems to impact significantly on mortality reduction. Ernest (2011) also found significant positive relationship between per capita GNP and mortality reduction, which is transmitted through public expenditure on health. This paper assessed the nexus between Health policy, using the RBM policy (proxied by government expenditure on malaria), and mortality rate (using U5 mortality) in Nigeria.

MATERIALS AND METHODS

Theoretical Framework

As established by Grossman (1972) and Sede and Ohemeng (2015), the theoretical foundation of the study hinges on *a priori* expectation that investment in health policy impacts mortality rate. In order to achieve this, a framework regression model to capture the relationship between government expenditure (GE) on malaria and life expectancy (LE) was established.

Following Rajkumar and Swaroop (2008) who modelled outcome of a public program, for example public health expenditure as:

$$\text{Outcome} = GDPP^{\alpha} * (\text{Public or Govt Expenditure on Health} \div GDP)^{\beta} \text{ where } \alpha > 0, \text{ and } \beta \geq 0 \quad \ldots\ldots(1)$$

Where GDPP is per capita income, GDP is gross domestic product, and outcome could be indicators of health status such as under-5 mortality rates as the case in this study.

Equation (1) implies that outcome (U5 mortality) does the followings: (a) reduces with an increase in per capita income; (b) decreases (or does not worsen) if an increased proportion of the country's resources are spent on health care. Taking the logs of equation (1), we have the linear form of (1) as equation (2).

$$\ln \text{Outcome} = \alpha \ln GDPP + \beta \ln\left(\frac{Pubexp}{GDP}\right) \quad \ldots\ldots(2)$$

Adopting this theoretical model to this study, the empirical model becomes

$$\ln(U5M) = \alpha_0 + \alpha_1 \ln(GDPP) + \alpha_2 \ln(GE) + e_i \quad \ldots\ldots (3)$$

Data Sources and Measurement

This study used data from 2000 to 2015 obtained from the World Bank and WHO data base (WHO, 2015; World Bank, 2016). Government expenditure was measured in US dollars, U5 mortality is measured as death per 1000 live birth.

RESULTS AND DISCUSSION

Preliminary Analysis – Descriptive statistics

Results in Table 1 shows that there was relative consistent decline in mortality rate over the years under review. However, it is expected that there will be a sharper decline in the years with sharp increase in government expenditure (2006 to 2008) as compared to the years with less fluctuation in government expenditure on malaria (2000 and 2005). The non-response of the mortality rate to the surge in government expenditure may be due to influence of governance in implementation and corruption. The impact of corruption in government on health policy implementation has been noted by Yaqub *et al.* (2010). The sharp fall in funding received between 2009 and 2010 is suspected to be responsible for the non-apparent decline in mortality in this period. This result is consistent with the findings of Mosunmola *et al*. (2016). There is also an inverse relationship between gain in per capita income and mortality rate. Increase in per capita income will increase spending on prevention and treatment of malaria thus reduces mortality. This result is consistent with Yaqub *et al*. (2010).

Unit Root Tests Analysis

The standard Augmented Dickey-Fuller (ADF) unit root test was employed to check the order of integration of all the variables in the model. Based on the ADF test statistic in Table 2, it was observed that all the variables were not stationary at level. Thus there is no serial auto-correlation among the variables.

Estimation Results

The diagnostic result for the regression model shows that the adjusted R-square is 0.93 which indicates that 93

percent of the variation in the dependent variable is caused by the variations in the independent variable which shows that the model has high goodness of fit.

Table 1. Distribution of malaria funding, U5 mortality and per capita income in Nigeria (2000-2015).

Year	U5 Mortality *(deaths per 1,000 live births)*	% change in mortality	GDPP (USD)	Government Expenditure on malaria (USD Bill)
2000	I86.8	-	1200	2
2001	181.3	-2.94	1300	2.02
2002	175.6	-3.14	1350	4
2003	169.9	-3.25	1600	3.5
2004	164.1	-3.41	1820	3.09
2005	158.1	-3.66	1830	3.38
2006	152.2	-3.73	1900	11
2007	146.4	-3.81	2046.6	11
2008	140.9	-3.76	2117.8	14.3
2009	135.5	-3.83	2205	10.2
2010	130.3	-3.84	2315	6.5
2011	125.5	-3.68	2363.7	5
2012	120.9	-3.67	2399.3	4
2013	116.6	-3.56	2461.8	4.3
2014	112.5	-3.52	2548.4	2.7
2015	108.8	-3.29	2548.2	2.6
Mean	145.33		2000.4	5.60

Source: Computed from result output (2017)

Table 2. Result of unit root (ADF) test.

Variables	**Level I(0) Constant and trend**
U5M	-1.012130
GDPP	-2.042120
GE	-1.002526

Source: Computed from result output (2017)

The F-statistics is significant at 1%, thus the model is statistically significant at 1% indicating that the explanatory variable significantly explains the dependent variable. The value of the Durbin Watson d statistics shows that there is no serial autocorrelation since the value is greater than 1.

Results in Table 3 show that the coefficients of government expenditure and per capita income have negative signs and statistically significant at 5% and 1% level respectively. The result indicated that a percentage increase in government expenditure on malaria will lead to only 0.2% decrease in life U5 mortality. The implication of this result is that increasing government spending on malaria decreases U5 mortality rate in Nigeria although the change is small. This result confirms the descriptive result earlier present and upholds the submissions of previous studies (Sede and Ohemeng, 2015). Similarly, a percentage increase in per capita income will decrease the mortality rate by 1.02%.

Table 3. Empirical analysis of relationship between government expenditure on malaria and life expectancy.

Variable	Standardized Beta-Coefficients	t-value
(Constant)		27.159*
Government Expenditure (GE)	-0.195	2.677**
Per capita Income (GDPP)	-1.022	14.04*
$R^2 = 0.94$		
Adjusted $R^2 = 0.93$		
F-Stat = 101.82*		
Durbin Watson = 1.97		

Note: i) Log U5M is the dependent variable ii) *(**) implies 1%(5%) significance level.
Source: Author, 2017.

CONCLUSION AND RECOMMENDATION

The relationship between government expenditure (proxy for health policy) on malaria and U5 mortality has not been succinctly detailed in literature especially drawing data from Nigeria. This study examined the relationship

between government expenditure on malaria, per capita income (control variable) and U5 mortality rate expectancy using data from 2000 to 2015. Based on the finding the following have been recommended for policy action:

1. Effort at enhancing awareness of the Roll Back malaria program is germane.

2. Improvement in government funding of malaria control strategies in the country should be prioritized.

Further studies can capture the effect of governance on health policy *vis a vis* health outcomes.

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