PUBLIC HEALTH EXPENDITURE SHOCKS AND UNDER-FIVE MALARIA MORTALITY IN NIGERIA BETWEEN 1990 – 2017

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Abstract

This paper investigated whether if under-five malaria mortality responds significantly to public health expenditures shocks in Nigeria. Using times series data from 1990- 2017, the paper employed modified Vector autoregressive model (VAR). To determine how under-five mortality responds to changes in public health expenditure. To properly capture the impact of health expenditure shocks on under-five mortality, the public health expenditure was decomposed in to capital and recurrent expenditure. Findings from the study reveals that public health expenditure does not have significant impact on under-five mortality, however, when the public health expenditure was disaggregated in to capital and recurrent expenditure, capital expenditure was found to have more significant influence on under-five mortality than recurrent expenditure. Other findings revealed that positive household's behavior is capable of reducing under-five malaria mortality. The study therefore recommends more allocation of resources to capital health expenditure such as purchase of drugs, diagnostic equipments and ITNs should be prioritized to reduce under-five malaria mortality in Nigeria.

Keywords: public health expenditure, under-five mortality, VAR.

JEL: H51, H11, I18

BACKGROUND OF THE STUDY

Health is one of the significant factors that determine the quality of human capital which is a necessary factor for economic growth. Based on this paradigm developing countries have attempted to enhance the human capital through public health expenditure as

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well as government spending on education and other social services. Al- Yesufy (2000) and Lawson (2009) noted that education, health care, training and investment in social services enhances and improves the human capacity which has a spillover effect on economic growth.

Therefore, the public health expenditure is expected to have a positive impact on child health outcomes through a significant reduction in both infant and under-five mortality. However, statistics shows that globally under-five mortality is rated the highest among all death (adult and childern) and the major cause of this death is attributed to malaria. WHO (2012) reports that in Nigeria malaria accounts for 60% of out-patient visits and 30% of hospitalizations among children under five years of age. With a population of about 200 million people, at least 50% of the population in Nigeria suffers from at least one episode of malaria each year and more reported cases of deaths due to malaria than any other country in the world, (WHO, 2012). This malaria scourge has caused serious economic damage to the country as evidenced in a study by Bello (2005) who found that between 1975 and 2001, average of 5.86% of the GDP was lost to malaria death annually.

This malaria death in children under the age of five calls for the need to investigate why despite government health expenditure and malaria interventions the statistics for under-five mortality is still high in the country. Even though, the amount of budget allocated to health have not been encouraging.For example in 1990 only 1.01% of the total budget was allocated to health and by 1994 the percentage increased marginally to 1.8 however, by 1995 the allocation to health witnessed a sharp increase to 5.2% of the total budget allocation and by 1998 it nose-dived to 0.66%. The year 1999 witnessed and unprecedented increase allocation to health sector getting 7.32% of the total budget. The increase was not sustained in 2000 as the percentage allocation to health dwindled again to 5.15% and 3.85% in 2000 and 2001 respectively. The downward trend continue up to 2010 were only 3.58% was

allocated to health from the total budget. However, the percentage allocation increased to 5.58% in 2011. By 2012 it increased marginally to 5.95% and decreased to 5.66%, 5.63%, 5.78%, and 4.13% in 2013. 2014, 2015 and 2016 respectively. In 2017 it appreciated to 5.17% again and declined to 4.00% in 2018 (FMoH, 2018).

In spite of the resources invested and programmes introduced to fight malaria and reduce malaria death especially in children of less than five years of age have not yielded desired results. Available data (WDI, 2017) shows that reduction in under-five mortality in Nigeria fall short of WHO recommendation of reducing under-five mortality to as low as 25 per 1000 live birth. For example, in 1990 under-five mortality per 1000 live birth was 212.5 it declined to 207.8, 186.8, 158.1 in 1995, 2000 and 2005 respectively. By 2010 and 2015 it further declined to 130.3 and 108 accordingly (WDI, 2016). The figure 108 is far from the recommended 25 per 1000 live by SDGs. Already, about 117 countries have met the SDGs target and 26 countries are expected to meet the target by 2030. Tanzania and Rwanda are predicted to meet up with the target of 25 deaths (under-five mortality) per 1000 live birth (WHO, 2016). WHO (2014) reports that Nigeria and Pakistan have the worst record globally in infant and under-five mortality traceable to malaria. World malaria report (2015) also shows that Nigeria share of estimated malaria case in 2015 was 55% in West Africa above Ghana, Niger and Burkina Faso with only 6%, 5% and 6% share respectively. Hence, the objective of this study therefore is examine trend in public health expenditure by disaggregation the total public health expenditure in to recurrent an and capital health expenditure for the period 1990 to 2017. This will enable us to understand which component of the total health expenditure is more potent in reducing under-five malaria mortality in Nigeria. Besides, the study will also explore other factors likely responsible for increase in under-five malaria mortality with a view to make policy recommendations that will reduce under-five malaria mortality in Nigeria.

Though, similar studies have carried out on under-five mortality, but the problem of the previous studies have been their inability to situate their study within the context of specific diseases hence, this study tried to fill the gap by considering age and diseases specific (under-five malaria mortality) in Nigeria.

LITERATURE REVIEW

Numerous empirical literatures exist on the relationship between public health expenditure and under-five mortality. One of the earliest works by Filmer and Pritchett (1999) using OLS and 2SLS examined the impact of public health spending on child and infant mortality using cross-section of 98 countries. The OLS estimates showed that an increase in public health expenditure by 1% led to a fall in under-five mortality by 0.14% at 10% significance level indicating a weak link. However, once the potential endogeneity of health expenditure was addressed through 2SLS, the effect of health spending on child mortality was insignificant.

Similarly, Gupta, et al. (1999) also employ OLS and 2SLS to investigate the effects of total health spending and public spending on primary health care (public expenditure on clinics and practitioners or on preventive health) on under-five mortality rates in 50 developing countries and transition economies. They found that an increase in primary health care expenditure by 1% reduced under-five mortality rates by 0.97% and 0.95% respectively. The estimation results also indicated that total health expenditure as percent of GDP did not significantly affect under-five mortality rates.

Houweling, et al. (2005) examined the effects of public health expenditure on under-five mortality rates in a sample of 43 countries in Africa, Asia and Latin America with emphasis on differential impact among the rich and poor. OLS estimates indicated that a 10% increase in public health expenditure per capita would decrease under-five mortality rates by about 1.1% (rich) to 2.4% (poor).

Issa and Quattara (2005) investigated the effect of public and private health expenditure on IMRs: Does the level of development matters? The study considers some selected developing and developed countries over the period 1980-2000. Variables of interests in the study include RPCGDP, per capita income, female secondary school enrollment rate, CO_2emmissions. Employing OLS and panel data estimation techniques, the results suggest a strong negative relationship between health expenditures and IMRs. However, public expenditure exert more influence on IMRs in developing countries, while, private health expenditure at developed countries. The relationship between IMRs and per capita income was negative and statistically significant. However, the study that effect of environment variable was statistically weak in explaining infant mortality rate.

Similarly, Novignon, et al. (2012) studied the effects of public and private health care spending on infant mortality rates in a panel of 44 Sub-Saharan Africa countries for the period 1995-2010 using fixed effect model. The results obtained indicated that a 1% increase in total health expenditure reduced infant mortality by about 3 per 1000 live births. The results further show that increasing public and private health expenditure by 1% reduced mortality rates by 4.2 and 2.5 per 1000 live births respectively. A drawback of these results is that potential endogeneity of the health expenditure variables in both infant and an under-five mortality equation was not taken into account.

Odhiambo (2014) estimated health care spending and health outcomes in SSA: evidence from dynamic panel using GMM-IV. The study was conducted over the spanning from 2000-2011. The results indicate that health expenditure significantly reduces under-five mortality and adult mortality as well in SSA countries. Hence, public health expenditure has significant negative effect on under-five mortality and positive effect on adult mortality.

Craig and Hristos (2016) conducted a study in OECDA countries to examine the impact of health care spending on health outcomes. The model consists of only the following explanatory

variable public health spending which was regressed against infant mortality rate and under-five mortality rate. The estimation was carried out using Meta Regression Analysis (MRA). The empirical result revealed that spending elasticity for the mortality rate is particularly sensitive to data aggregation, to the specification of the health production function and the nature of the health care spending The finding from this study confirms negative relationship between public health spending and U5M.
Bello (2005) in a study reducing the impact of malaria in Nigeria: A public expenditure conundrum. He focused on malaria specific mortality in Nigeria. Variables included in the model are public health spending, per capita income, non-public health expenditure and political instability. An OLS estimation technique was employed to test the model. The result from the study revealed negative relationship between death from malaria and public health expenditure. The study concludes that to reduce death from malaria, government should increase its health expenditure. The study did not focused on a particular group of population like under-five children or adult thereby making it difficult for policy recommendation.

Abbas and Heimenz (2011) empirically examine the determinants of public health expenditure in Pakistan for the period which span between 1972 and 2006. Using co-integration and error correction methodology, the study reveals that health care in Pakistani is a necessity commodity. Urbanization and unemployment have negative effect on health care expenditure which implies that it is costly to provide health care to resident of remote rural area of Pakistan. However, they found government expenditure having significant impact on child mortality. The study failed to connect that the positive effect of immunization together with the household played their role by agreeing the uptake of immunization which reduced the infant mortality.

Again, Bassey et al (2011) examine health care expenditure in Nigeria; does the level of government spending really matter for the period which spanned between 1980 to 2003, employing cobb-

douglas production and ordinary least squares method of analysis. They found that life expectancy and literacy rate were negatively correlated with health care expenditure both in the short and long run, income elasticity of health care expenditure was below unity both in the short and long run. Which show that health care spending is income inelastic and concluded that health is a necessary good in Nigeria. The result concurred with findings of Abbas and Heimenz (2011) and George et al (2013) however, both studies failed to recognized the relevance of other factors that contributes to health outcome such as the service delivery indicators (household's behavior, hospital equipment and facilities)

In a similar study, Kristine et.al (2012) investigated prioritizing child health intervention in Ethiopia: modeling impact on child mortality, life expectancy and inequality in age at death. The study was carried out looking at the period spanning between 2011- 2015. Infant mortality and life expectancy were regressed against health intervention (public health expenditure). Using life save tool the result indicates that health intervention reduces child mortality and increases life expectancy in Ethiopia.

Olarinde and Bello (2014) examined public health Expenditure and health sector performance in Nigeria: Implication for sustainable economic development. The considered the period between 1990-2012. Variables of interest in the study are government health expenditure, private health care expenditure, literacy rate, Gross domestic product per capita (a proxy for poverty level) and urban population. Dependent variable which is the health outcome comprise of IMR and U5MR. the study employed Autoregressive distributed lag (ARDL) and Vector error correction mechanism (VECM). The empirical result from the ARDL bound testing approach provide strong evidence of the existence of a long run and short run stable relationship among the variables included in both model. The findings shows a significant negative relationship between per capita health expenditure in Nigeria and health outcomes (U5MR and IMR).

In a study conducted by Riayati and Junaid (2016) between 1984-2009, examined public health expenditure, governance and health outcome in Malaysia. The study employed autoregressive distributed lag (ARDL) cointergration to test for the relationship between under-five mortality and infant mortality and public health expenditure, income level, corruption and government stability. The results based on the bounds testing procedure shows that a stable long run relationship exist between health outcome and there determinants namely, income level, public health expenditure, corruption and government stability. The result also shows that public health expenditure and corruption affect long and short run health outcomes in Malaysia.

Sede (2017) in a similar study in Nigeria looked at Government Health Expenditure and Malaria in Nigeria for the period spanning from 1990 to 2013. Variables of interest in the study include government recurrent expenditures on health sector, per capita income and malaria cases reported while the dependent variable is Malaria death. Using cointegration and error correction mechanism result indicated that Government health expenditure is significant in reducing malaria deaths in Nigeria. The coefficient of malaria case (prevalence) is found to be highly significant in explaining malaria deaths in Nigeria, while that of per capita income is not significant.

METHODOLOGY

Grossman (1972) developed a framework for anlysing demand for health. The theory was further developed by Cropper, 1974; Maurine, 1982; Fayissa and Gutema, 2005; Thorton, 2002 and Muthaka, 2013 all of which emphasized on investment in human capital (health and education) for better health outcomes and economic growth.

Grossman (1972) health production function can be symbolically presented as follows;

H= f (A) …….. (1)

Where H = health outcomes (Life expectancy, infant mortality/ under-five mortality.

A = vector of other economic variables (income per capita), social (education), environmental (urbanization), demographic (population below or above certain age group) and health service variables (like population doctor ratio, population hospital ratio etc) variables affecting health status. Although, Grossman (1972) presented a model at micro level however, a number of studies have tried to employ his specification at macroeconomic level (for example; Fayissa and Gutema, 2005 and Thorton, 2002). Representing the variables in their per capita form we can rewrite equation 3.1 in per capita extended form as follows;
h= f (e, d, p, s, n)……. (2)

e = is economic factors in per capita terms affecting health status h (reduce mortality).
d = is demographic factors.
P = political factors.
S = social factors.
N = environmental factors.

The Grossman theoretical model presented above can be modified to Health production functions for estimating the relationship between public health expenditure and under-five malaria mortality. The relationship can be expressed as follows.
$U5M = f(HEXPTOTAL, RGDPC)$.....(.3)

Where *U5M* is under-five malaria specific mortality rate.*RGDPC* is real income per capita). *HEXPTOTAL* is public health spending (public health care spending).

Based on the above framework, we developed a model which analyses the volatility of government health expenditures and to determine the sources of the shocks, we estimated a modified vector autoregressive (VAR) technique. The estimation is designed to ascertain if under-five malaria mortality responds to public health expenditure. We used a modified VAR technique to

determine the influence of public health expenditure on under-five malaria mortality and also to determine the sources of shocks and their impacts. Here the public health expenditure is disaggregated into the recurrent and capital health expenditures. The equation is as follows.

$$\Delta u5m_t = \Delta u5m_{t-1} + \alpha_1 \Delta rec\exp_{t-i} + \alpha_2 \Delta cap\exp_{t-i} + \alpha_3 \Delta immrate_{t-i} + \alpha_4 \Delta mcase_{t-i} + \alpha_5 \Delta popden_{t-i} + \lambda\mu_{t-1} + \varepsilon \quad \ldots\ldots 4$$

Where i represents the optimal lag which will be determined based on the information criterion (AIC, SIC, HIC). From the unit root test, the maximum order of differencing is denoted by d_{max} which is constant with the order of intergration of the series. Hence, the modified VAR in the spirit of Toda and Yamamoto (TY) is determine by $i+d_{max} = k$.

Therefore from equation 4 the modified VAR model is given as,

$$\Delta u5m_t = \Delta\sum_{i-1}^{N} u5m_{t-i} + \alpha_1 \sum_{p=1}^{N} \Delta rec\exp_{t-k} + \alpha_2 \sum_{p=1}^{N} \Delta cap\exp_{t-k} + \alpha_3 \sum_{p=1}^{N} immrate_{t-k} + \alpha_4 \sum_{p=1}^{N} \Delta mcasek_{t-k} + \alpha_5 \sum_{p=1}^{N} \Delta popden_{t-k} + \lambda\mu_{t-1} + \varepsilon \quad \ldots\ldots 5$$

Where k≥ i

Where; ***U5m*** is under-five mortality (a proxy for under-five malaria mortality), ***recexp***is recurrent health expenditure, ***capexp***is capital health expenditure, ***immrate*** is immunization rate, ***mcase*** is malaria cases reported is ***popden*** is population rate.

Hence, the technique adopted for the determinants of public expenditure in Nigeria is modified VAR where all series are not intergrated of the same order.

ESTIMATION OF RESULTS & DISCUSSION

Time Series Characteristics.

To fully capture the responds of under-five mortality to shocks from public health expenditure we decompose the health expenditure in to capital health expenditure and recurrent health expenditure. The variables (under-five malaria mortality,

recurrent health expenditure, capital health expenditure, household's behavior, malaria cases and population density) in the model were subjected to ADF stationarity test (appendix 2, table 4.2). The series were stationary at different levels hence, we employed Modified VAR in line with Toda and Yamamota (1995) and Bello and Sanusi (2018) to estimate the variables. The VAR lag order selection criteria was used in selecting the lag length

Figure 1: Impulse Response Function: response of under-five mortality to shocks in public health expenditure

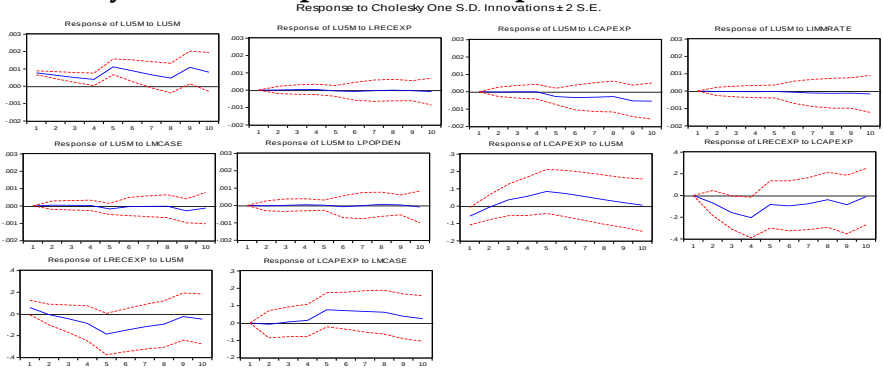

Table 1 Variance Decomposition

Variance Decomposition of LU5M:

Perio...	S.E.	LU5M	LRECEXP	LCAPEXP	LIMMRATE	LMCASE	LPOPDEN
1	0.000772	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.001002	99.65708	0.010085	0.009003	0.037074	0.233066	0.053690
3	0.001122	99.43350	0.085341	0.007761	0.096015	0.320827	0.056551
4	0.001192	99.09961	0.206448	0.007124	0.157313	0.373333	0.156172
5	0.001667	95.61444	0.183419	2.728542	0.100975	1.279932	0.092691
6	0.001925	93.25011	0.270994	5.067151	0.205469	0.990054	0.216222
7	0.002062	91.49113	0.258363	6.738213	0.451682	0.870463	0.190150
8	0.002137	89.93677	0.240626	7.977151	0.760483	0.814272	0.270702
9	0.002473	86.41700	0.195680	10.49225	0.784329	1.892986	0.217752
10	0.002669	83.41474	0.266308	13.15604	1.043426	1.822980	0.296508

Variance Decomposition of LRECEXP:

Perio...	S.E.	LU5M	LRECEXP	LCAPEXP	LIMMRATE	LMCASE	LPOPDEN
1	0.331904	3.133970	96.86603	0.000000	0.000000	0.000000	0.000000
2	0.424323	1.939278	94.24701	2.668524	0.498723	0.236763	0.409700
3	0.494138	2.214866	83.56914	12.16463	0.900276	0.820269	0.330826
4	0.563048	4.057363	70.18202	22.46441	1.092931	1.536380	0.666891
5	0.608638	12.76917	61.19586	21.10396	1.994734	1.930089	1.006186
6	0.641157	17.00245	56.42302	21.21843	2.063629	2.378314	0.914149
7	0.665030	18.98966	54.27798	21.01221	2.171274	2.680543	0.868340
8	0.681471	19.98820	53.75922	20.33465	2.205953	2.854232	0.857749
9	0.687375	19.76627	52.84998	21.48355	2.172725	2.861537	0.865943
10	0.692915	19.92548	52.40314	21.16507	2.220241	3.058824	1.227246

Variance Decomposition of LCAPEXP:

Perio...	S.E.	LU5M	LRECEXP	LCAPEXP	LIMMRATE	LMCASE	LPOPDEN
1	0.250158	5.341540	3.125589	91.53287	0.000000	0.000000	0.000000
2	0.317133	3.381428	2.500685	93.28446	0.116110	0.049503	0.667814
3	0.348525	3.831984	2.187728	92.99728	0.303530	0.074264	0.605210
4	0.368667	5.794332	1.981378	90.95195	0.476644	0.241790	0.553910
5	0.390150	9.864525	1.816945	81.90649	1.897441	4.017419	0.497178
6	0.405077	12.34752	1.731990	76.03789	2.595746	6.792130	0.494722
7	0.416917	13.39406	1.635056	71.81172	3.371359	8.980593	0.807212
8	0.426738	13.53824	1.581696	68.84301	3.969400	10.69108	1.376578
9	0.429666	13.58648	1.580486	67.93508	3.953880	11.34814	1.595931
10	0.430753	13.53470	1.585623	67.64381	3.957411	11.62615	1.652317

Interpretation and Discussion of the Results

Itis observed in figure 1 that recurrent expenditure (salaries, allowances, workshops and conferences) does not transmit shocks to under-five mortality this implies that shocks in recurrent expenditure does not have influence on under-five mortality rate. This does not conform to the a priori expectation of the study. We expect increase in health workers salaries and allowances will not only motivate but make them more efficient in their duties, hence reduction in under-five malaria mortality. Though, corruption and ghost workers in the payroll could be responsible for recurrent expenditure without corresponding positive impact on child health (Riati and Junaid, 2016). Secondly, incessant strikes in the health sector are probably responsible for neutral effect of recurrent expenditure on under-five malaria mortality.

Capital expenditure produced negative shocks to under-five mortality after a period of four years which remain negative through without dying off. This in consistent with the a priori expectation of negative relationship between capital health expenditure and under-five malaria mortality. This infers that capital expenditure (training of doctors and other health worker, construction of health centers, purchase of drugs and hospital equipments, ITNs and LLINs) has a significant influence in reducing under-five malaria mortality in the long run. This implies that when more clinics or hospital are built with more facilities/equipments and drugs there will be more access to health care services and this will reduce under –five mortality. This finding is in line with finding of Adeleke and Sijuola (2016) who found statistical significant influence of capital expenditure on under-five mortality. This is also in line with government

health capital expenditure policy of building basic health care facilities in all the wards across the country. However, the result does not conform to the existing reality in Nigeria. In reality increase in government capital expenditure in Nigeria does not decrease under-five malaria mortality because of corruption. In spite the effort to increase budgetary allocation to health (capital expenditure) it is not matched with the expected decrease in under-five malaria mortality. Money meant for projects are diverted for personal use and are also used for workshops, seminar and conferences which do not have direct impact on the beneficiaries (Yaqub et.al 2013).

Household's behavior produce negative and weak shock to under-five mortality after a lag of about five years. The result conforms to the a priori expectation of negative relationship between positive households behavior and under-five mortality. Increase in positive household's behavior in form of sleeping in ITNs and LLINs, keeping clean and safe environment from mosquitos and regular immunization of children will reduce under-five malaria mortality. The malaria control programe in Nigeria has unit of advocacy, communication and social mobilization were sensitization, advocacy visits and media are used in sensitizing households on how to prevent malaria and importance of immunization (RBM, 2010). This activities change influence household's health behavior positively thereby reducing under-five malaria mortality. However, studies (Malar J (2014), Malar J (2013), Koenker andKilian (2014) have shown that despite the advocacy, communication and social mobilization some household's do not use the ITNs given to them (RBM, 2010).

Population density affects under-five malaria mortality positively. This implies that high population without corresponding health facilities will restrict some individual from having access to health care facilities especially in the rural areas and this may increase under-five malaria mortality. This is in consistent with the a priori expectation of the study of positive relationship between population density and under-five mortality. the result is in line with the findings of John and Andrew (2007), Erick (2013) and

Quinhas (2014) that uncontrolled population could lead high demand of health facilities which may not be available. This may result to increase in child mortality rate. According to 2017 estimate Nigeria population stood at 190.632,261(NBS, 2018) of children between the ages of 0-14 constitute 42% of the total population. The increase in children population has not met with corresponding increase in health care facilities thereby causing long que, over stretched health facilities and high doctor-patient ratio. The resultant which has always been increase in under-five malaria mortality.

On the other hand, the variance decomposition in table 1 the first quarter (1-4 year), recurrent expenditure does not have influence on under-five malaria mortality. The forecast error variance of recurrent expenditure on under-five mortality is 0.26% in the long run. This implies that changes in recurrent health expenditure (salaries, allowances, conferences, workshop and meetings) does not have significant influence on under-five malaria mortality even in the long run. Capital expenditure (provision of health care centers, purchase of hospital equipments, drugs) does not influence under-five mortality in the first quarter, however, in the long run capital expenditure influence decrease in under-five malaria mortality by 13.15%. This infers that capital health expenditure influences reduction in under-five malaria mortality when compared to recurrent health expenditure. Even though, the result shows that an increase in capital health expenditure will results in decline of under-five malaria mortality, the existing reality in Nigeria does not support our claims. Increase capital health expenditure over the years has not actually led to the expected decline in U5MM because of Nigeria's disease (corruption, wastages and mismanagement of public resources). Resources budgeted for health are often misappropriated and mismanaged living little impact on child's health (Yakub et.al 2013)

The household's behavior influences the decrease in under-five malaria mortality by 1.04% in the long run. This implies that when

households change their behavior positively by complying with immunization routine for children, keeping clean environment, sleeping inside ITNs will significantly reduce under-five malaria mortality.

Change in Malaria case accounts for 1.82% change in under-five malaria mortality in the long run. This infers that as more cases of malaria are reported. It may likely result in the increase of malaria death of children less than five years.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

The study set out to investigate how under-five malaria mortality responds to shocks from Public health expenditure in Nigeria. When the public health expenditure was decomposed in to recurrent (salaries and allowances) and capital health (drugs, hospital equipments and purchase of ITNs) expenditure, under-five malaria mortality was found to responds to shocks from capital health expenditure compared to shocks from recurrent health expenditure. The results also prove that positive household's health behavior will reduce under-five malaria mortality. Increase in malaria cases without adequate response from government may result in increase of death of children under the age of five. On population, the study observed that unchecked population may increase the risk of high under-five malaria mortality in the country.

In conclusion, it is evident when the public health expenditure is disaggregated in to recurrent and capital health expenditure; under-five malaria mortality was found to respond to changes in capital health expenditure like availability of drugs, diagnostic equipments and insecticides treated mosquito (ITNs). Household's behavior, malaria cases and high population density contributes to under-five malaria mortality.

The study recommends that since government is a major player in the health sector, more funds should be allocated to health especially the capital expenditure (purchase of drugs, hospital equipments and ITNs) with strict compliance to fiscal rule to

avoid mismanagement and diversion of the funds, advocacy on positive household's behavior to reduce malaria incidence and adequate family planning to check population explosion.

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