

AN ANALYSIS OF DISEASE PROGRAM FINANCING IN NIGERIA USING THE NATIONAL HEALTH ACCOUNT DATA: DO GENERAL GOVERNMENT AND DONOR DISEASE EXPENDITURE CORRELATE?

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Abstract: This study provides an in-depth analysis of domestic and external health financing situation in Nigeria by disease-specific conditions between 2010 to 2018. Key health financing agents in the country include households, firms, government, donors, and non-profit organizations. . The study adopted the descriptive analytic approach and the Pearson correlation analysis. It considers the correlation between donor expenditure per disease area and general government health expenditure. The study revealed that between 2010-2018, total expenditure by diseases was \$72.92 billion. Further analysis by the core priority interventions shows that total expenditure on malaria was \$29.0 billion, followed by non-communicable diseases (NCDs) \$6.9 billion, while human immunodeficiency virus (HIV) treatment consumed \$6.5 billion. Tuberculosis (TB) expenditure was \$2.7 billion and Neglected Tropical Disease (NTDs) was \$0.2 billion. The study found a strong correlation between aggregate donor expenditure and aggregate Federal Government (FG) expenditure ($r=0.6$), a medium correlation between the donor and State Governments (SG) expenditure ($r=0.3$), and a small correlation between donor and Local Government (LG) expenditure ($r=0.2$). However, disaggregating by disease intervention, the study showed that there is a small correlation between FG HIV and FG Reproductive Health (RH) expenditure and no correlation between FG malaria expenditure and donor malaria expenditure. On the contrary, the study finds a strong correlation between donor expenditure and (SG) HIV and SG RH expenditure and a small negative correlation between donor malaria expenditure and SG malaria expenditure. These findings indicate that while overall FG expenditure increases as donor increases financing, this increase may not be related to HIV, Malaria, and RH programming. However, donors are willing to work with state governments who are ready to put in more money for health especially for HIV and RH, and not necessarily for malaria. Thus, the study recommends that government should increase intervention/program targeting especially on Malaria as well as TB, and HIV.

Keywords: Nigeria, National Health Account, Disease Expenditure, Health Financing, Malaria, Federal Government, State Government, Local government.

1.0 Introductory background

Specific diseases and/or health conditions have been identified as priority health interventions within the Nigeria Health Account (NHA). Identifying health expenditure by disease area or condition is important to determine expenditure variabilities among health financing agents as well as the future of disease programming in the country. Disease program expenditure poses a significant burden to the country. We find from the current 2017 NHA data that households are increasingly bearing the burden for disease expenditure in Nigeria leading to further impoverishment.

Estimates for 2017 indicates that households spent \$9,006.3 million on disease treatment; decreasing to only 4.3% to \$8,613.0 million in 2018. Whereas donors expenditure decreased from 2017 and 2018 from \$885.2 million to \$796.1 million, General Government expenditure on disease interventions increased from \$1,656.4 million in 2017 to \$2,026.6 million in 2018.

Since 1964 when the first National Health Account (NHA) was estimated, determining health expenditure through the NHA perspective has gained momentum as the best gauge for measuring the health economy of any country. The ‘‘NHA remain the

preferred approach for estimating overall health care expenditures because of their consistent methodology and the focus by the NHA staff on accuracy'' (Mehrotra et al., 2003 p.389). Apart from other measures such as the Insurance premiums and medical price indices (*ibid*), the NHA provides robust information on current health expenditure levels, employing data from disparate sources including hospital data, household surveys, public finance statistics and health insurance data.

The NHA tracks disease data effectively; providing such data across spending institutional units. Information on disease expenditure is an aid to further understanding growing public and private health expenditure; which provides grounds for furthering health policy discussions and development. Results from Country NHA studies forms larger input into the WHO General Health Expenditure Database for tracking disease spending data. The NHA scope of disease assessment is enhance by the ''high-profile disease specific accounts such as the HIV and tuberculosis accounts''(OECD).

Following the development of the System of Health Account (SHA) framework in 2000, the NHA Disease Accounts have follow the Cost-of Illness (COI) analytical approach. The COI adds patient related information such as disease, age and gender into health expenditure analysis (OECD, 2008 page 21 line 66) and ''provides an accounting system for disease costs'' (OECD, 2008 p.25 line 87). While integrating the COI approach into the SHA framework, all NHA studies follow almost the same recommendation. These recommendations include: 1) conducting a general COI study instead of a specific study so as to capture country wide disease costs instead of patient specific disease expenditure; 2) including only direct medical cost¹ as defined by the ''boundaries of health expenditure under the SHA'' ; 3) using a prevalence-based method, that is collecting and reporting data annually; 4) using a mixed methodology, that is both top-down and bottom up approaches to cost allocation to capture issues of co-morbidities² and 5) ensuring that NHA results represents broad definition of health expenditure from societal perspective not personal health expenditure(OECD, 2008 p23 line 77.).

To ensure international comparability of NHA findings along these lines of recommendation, Country NHA disease accounts framework, directly draws from the Global Burden of Disease (GBD) classification and the International Classification of Diseases (ICD) developed by the World Health Organization (WHO). While the GBD is found to be most appropriate for international comparisons of expenditure by disease, it is a higher aggregation of the ICD with major chapters of the ICD 9 and 10 captured in the GBD (OECD, Eurostat, WHO). However, given the problems associated with their use especially the bulky nature of disease classification the documents contain, countries were allowed to developed a national list albeit closely related to the recommended classification. The shortlist, are then mapped locally

to the recommended standard classification. This is the approach adopted by the Nigeria NHA team, led by the Country's Federal Ministry of Health (FMoH).

Research employing NHA country data are increasing, however while this study identifies some research focusing on disease expenditure and results from such research, it emphasises on studies examining these issues from the NHA perspective. Several studies have examined health expenditure using Medical Expenditure Survey (MEPS), such as the work of Yelin et al., (2002). For instance, Ling, et al., (n.d.) employing the SHA framework examined the current curative expenditure of respiratory disease and factors influencing such expenditure in China. Their study identified the weaknesses in other studies. They found that while most studies have examined the pathogenesis or medical costs of specific respiratory diseases, these studies failed to examine the current curative expenditure of respiratory diseases especially from the dimensions of institutional flows, health care function of these disease as well as their population distribution. Ling, et al., (n.d.) aimed to then capture these differences drawing data from the State Health Accounts prepared for the Hunan State. Furthermore, they added that most of the studies used data from medical records and Medicare database, therefore ''expenditure including fixed assets that were not used on patients, were not excluded from the real expenditures on health while total consumption of goods and services purchased by individuals could not be calculated precisely'' (p.4). Hence, they recommended that an expenditure accounting system was needed that can accurately capture the current curative expenditure of respiratory diseases. Following Ling, et al (n.d) approach, the Country NHA team capture all health expenditure from a macro perspective including capturing fixed asset for primarily delivering health services which is added up to make up current health expenditure.

Official Development Assistance to health

Official Development Assistance (ODA) to health or donor expenditure (supported by government health spending) on disease programming is an expedient health spending source driven by need to close gaps in health outcomes and curb increasing poverty. According to Gyimah-Brempong (2015) 'health aid is most effective at improving health outcomes for countries that *increase domestic government health expenditures* and those with better governance'. Although ODAs have not been found to reduce Out of Pocket Spending on health, however studies by Muhammed and Maryam (2021) found that foreign aid for health improve health outcomes in Nigeria in both short and long run. In the short run, their study found that a percentage increase in health aid will decrease under five mortality a proxy for health outcomes by 0.04% while decreasing by 0.0005% in the long run.

Earlier studies discuss the rationale behind donor spending in developing countries such as Nigeria with increasing spending on health. A study published by Global Trade Analysis Project (GTAP) identified high economic volatility, extreme poverty, political instability and social unrest as challenges plaguing developing countries in sub-Saharan Africa. Extreme poverty has especially motivated international development institutions such as the World Bank to push for more funding in the region especially for the health sector. Similarly, another study by Fatukasi & Kudaisi (2015), ''investigated the factor influencing the foreign aid from U.S to Nigeria during the period 1980-2013 using the variables unemployment rate, poverty rate, population growth rate,

¹ Indirect medical cost and intangible costs are excluded in disease SHA estimations due to the complications in cost calculations resulting from non-observable data. Indirect medical cost results from ''productivity losses either of the patient or caregivers which causes loss in earnings as a result of illness'' and tangible cost '' comprises for instance, the costs due to loss of life or quality of life caused by illness or disability'' (OECD)

² While the earlier approach ensures that the issues of double counting are avoided, the later approach do not. Thus, all cases of morbidity are capture together in the bottom-up approach while resources spent on health care are distributed proportionally among diseases in the top-down approach

demographic factors proxy by the number of people living with HIV as well as the growth rate of GDP per capita. The findings revealed that aid flow to the country are influenced by poverty rate in the country, number of people living with HIV/AIDS and population growth rate. The result however showed what foster increase in U.S aid to Nigeria over the past decades. Although, a great deal of approximately 50% of the U.S aid to Nigeria is designated to address the problem of HIV/AIDS''.

This present study is important as it fills a gap in the literature using data for developing country such as Nigeria. No study from the best of our knowledge has consider this using disease expenditure data from the health accounts. While our analysis finds some sort of correlation between General Government Health Expenditure and total donor health expenditure, it provided the strength of such correlation. The aim is to test the assumption that government commitment whether financially or in-kind is related to donor expenditure on health.

Following this introductory background, the study was structured as follows: section two presents the brief methodology. Section three introduces the result, followed by section four which dives into the discussion of findings, and recommendations.

2.0 Methodology

Analytical Approach

The study adopts a descriptive and inferential statistical approach. It attempted to understand why expenditure by disease area varies across economic agents, it considers several qualitative information that explains behaviour in expenditure data in Nigeria. The study adopted the simple Pearson correlation approach. The approach was adopted to determine the correlation between Federal Government expenditure by disease intervention area and disease financing by Donors in Nigeria. To provide a quantitative interpretation of the correlation result, this principle was adopted: ''If the coefficient value lies between ± 0.50 and ± 1 , then it is said to be a strong correlation. The correlation is a moderate degree, if the value lies between ± 0.30 and ± 0.49 , then it is said to be a medium correlation. Low degree: When the value lies below ± 0.29 , then it is said to be a small correlation''. (Statistics Solutions).

We adopted the Simple Pearson correlation formula provided with the excel function: CORREL (Array 1, Array 2). The correlation coefficient is written in mathematical form as:

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{\{n \sum x^2 - (\sum x)^2\}\{n \sum y^2 - (\sum y)^2\}}}$$

To test for the significance of the strength of correlation the model employed the formula of t-Test: Paired Two Sample for Means, which ran alongside the correlation analysis:

$$T = \frac{\bar{d}}{\frac{s_d}{\sqrt{n}}}$$

Where $T = T$ statistics, $\bar{d}$ mean difference and s_d = standard deviation and $\sqrt{n}$ = square root of the total sample size (Rosie, S.)

Data

Data was drawn from the National Health Account (NHA) for several years for Nigeria. The NHA studies have been conducted for the periods 1998-2002, 2003-2005, 2006-2009, 2010-2016, 2017, 2018 and currently 2019. The development of NHA is undertaken by the Federal Ministry of Health (FMOH) with support from Centre for Health Economics and Development (CHECOD), the National Bureau of Statistics (NBS), with support from the World Health Organisation. The NHA tracks expenditure flow in the health sector in aggregate terms. It is a true reflection of expenditure on the health economy in Nigeria. Results from the NHA estimation strongly influence the result of this study.

Approach to determining the disease data via the Nigeria NHA

Disease expenditure data within the NHA is derived from all agent sources disaggregated into capital and current health (disease) expenditure. The country disease burden is distributed across all agents and share disproportionately depending on expenditure per agent. This is particularly supported by Health Facility Surveys conducted in the six geopolitical zones of Nigeria to determine the average cost of disease treatment as well as several other producers' input to service delivery.

Justification of the time period and Limitation of the Study

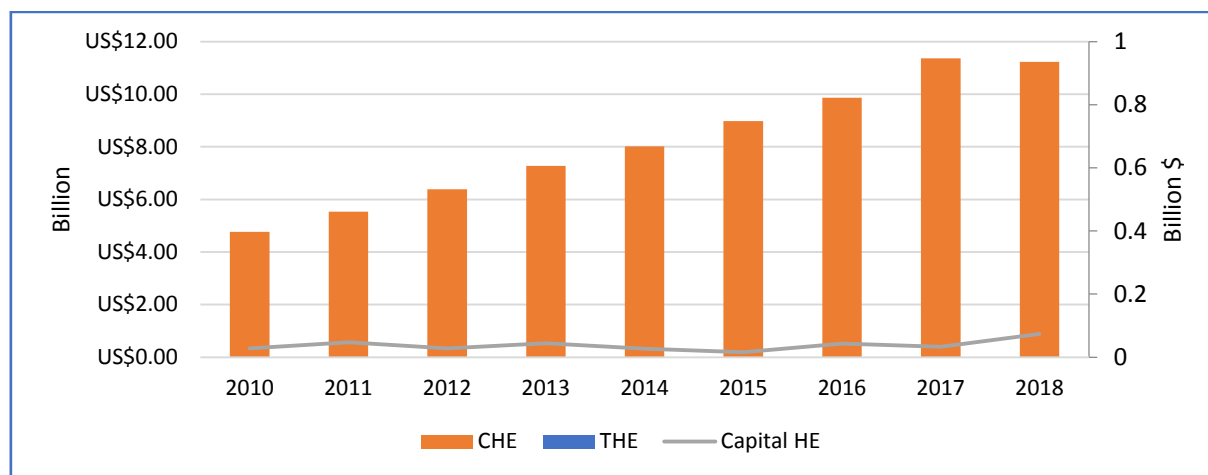
This study adopted a 9- year study period. The rationale for doing this is the availability of data for the selected variable covering the year 2010-2018 given the extensive disease breakdown within these periods. While the first limitation of the study was the short period used for the study, the second is an inability to get further breakdown of Donor disease expenditure disaggregated by Federal, State, and LGA levels, *thus the study correlated donor expenditure per disease area with disease spending per level of government*. Therefore, we have to interpret the result with caution.

3.0 Result

Health Expenditure in Nigeria

Aggregate estimated health expenditure for a 9 years under review, 2010 to 2018 was \$77.5 billion averaging \$8.61 billion driven majorly by Current Health Expenditure (CHE). As presented in figure 1, although current health expenditure has continued to increase year on year, capital expenditure has remained low. At an average increase of 5.5%, Capital Health Expenditure increased from \$0.33 billion in 2010 to \$0.89 billion in 2018, compared to current expenditure which increased from \$4.7 billion to \$11.2 billion. In proportion, while 94.7% of health expenditure within these periods was recurrent, only 5.6% was spent on capital projects. In 2015, the Capital Health Expenditure declined to \$ 0.19 billion which dipped below its \$0.45 average as a result of poor capital releases.

Figure 1: Current and Capital Health Expenditure for Nigeria



Source: Author's computation from the National Health Account, 2010-2018

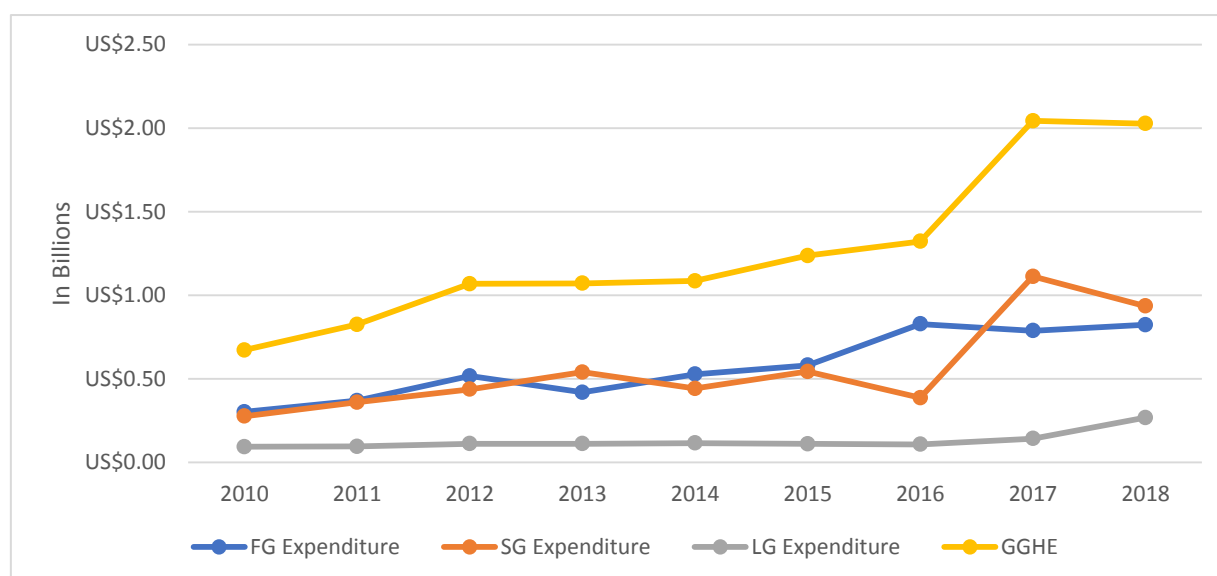
Without donor support, between 2010 to 2017, capital health expenditure to GDP average 0.2%. this expenditure has been sliding lower from a peak of 0.3% in 2011 (which rose by one percentage point in 2010) to a value of 0.1% in 2017. The overall implication of this finding is that actual health expenditure in Nigeria has been focused on *feeding the belly* expenditures than on developing future critical capital investment for the sector. This also implies that Capital health expenditure do not increase as the country's economic size increases. At the moment relief in this pattern of expenditure is not in sight as the current budgeted health expenditure is still tilted towards recurrent expenditure. The proportion of capital health expenditure to total health decrease from 5% in 2013 to 2% in 2015 and only averaged 5.4% between 2010-18.

While the bulk of the components of Current Health Expenditure covered the personnel and overheads of the entire health system, further analysis of the components of capital expenditure shows remarkable expenditure differentials on health development goods. Other unspecified Gross Fixed Capital Formation (GFCF)³, buildings and Structure and medical equipment were the major expenditure areas for capital expenditure in Nigeria. Intellectual property products⁴ as well as land and non-produced assets were least expended on.

Government expenditure

General Government Health Expenditure (GGHE) in Nigeria between 2010-2018 was \$11.35 billion with both Federal and State governments expenditure representing 90% of total GGHE (45% Federal and 44% State) with Local government representing 10%.

Figure 4: Public Expenditure on health in Nigeria



Source: National Health Account, 2010-2018.

As depicted in figure 4, GGHE in Nigeria is driven by Federal and State government expenditure with Local government Areas (LGAs) expenditure remaining practically constant over the years. While LGA expenditure averaged \$0.13 billion between 2010 and 2018, it increased

³Unspecified GFCF remains an issue hard to define by the health accounting team for Nigeria. This may have resulted from lack of clarity from the expenditure document presented to the estimation team. The team is working to resolve this in future NHA estimations.

⁴ Intellectual Property Products are restricted knowledge (as a result legal protection) meant to protect research products, or innovation leading to knowledge that the developers can market or use to their own benefit in production. Research on vaccines such as the COVID-19 vaccine, computer softwares and databases are some examples of intellectual property.(OECD, Eurostat, WHO)

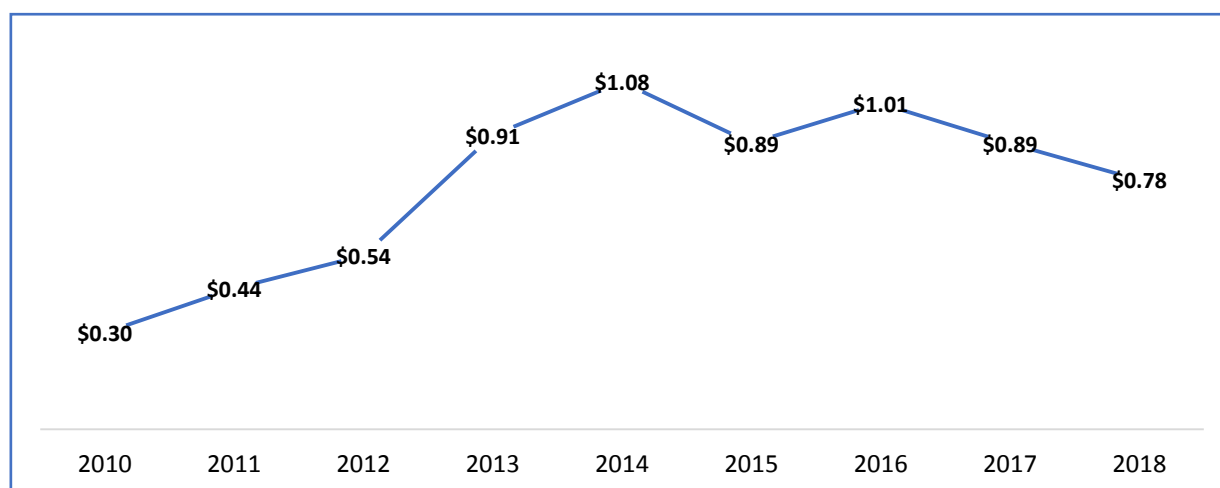
from \$0.09 billion in 2010 to \$0.27 billion in 2018 representing 13.9% and 13.2% of GGHE respectively. Although, both the FG and States government fund the larger chunk of health expenditure, LGAs through their health departments are by law expected to provide direct financial support to primary health care centres; funding health workers remuneration and other reimbursable at the PHC level aside from support from the Federal Government through the National Primary Health Care Development Agency (NPHCDA). Between 2010 and 2011, GGHE rose steadily from \$0.67 billion to \$0.83 billion driven by almost the same level of federal and state expenditure within those two years.

Apart from Federal government expenditure on health systems within states⁵, states spend disproportionately on health care within their states as a result of their different revenue mobilization capacity, fiscal space, including Statutory allocation from the federation account. The share of capital and recurrent expenditure to total state recurrent and capital expenditure varies. The table below illustrates this with 2018 data of States with completed actual expenditure. States with higher recurrent expenditure perform optimally on capital expenditure on average, however, this also depends on state expenditure priorities. Three states-Kano, Ondo, and Sokoto State, with actual capital expenditure above 10% spent above 5% on recurrent expenditure compared to the 2018 average of 2.7%. However, Kwara State with the highest capital expenditure amongst states maintains a low recurrent below 2.7% average. Thus, the implication is that states can still make room for improving capital expenditure by reducing recurrent expenditure. This is an interesting revelation as these states' capital expenditure rose above the average population growth rate of 3.2%; performing above the Abuja Declaration of 15%.

Donors expenditure

The Nigeria health sector also receives financial and non-financial support from bilateral and multilateral donors as well as domestic Donors. According to the NHA classification, these bilateral Donors represent countries with mutual agreement with Nigeria; and multilateral Donors represent international development institutions.

Figure 5: Donor health expenditure in Nigeria (in Billion \$)



Source: Authors calculation from NHA, 2010-2016, 2017 and 2018. (Exch. Rate: ₦380 = \$)

Figure 5 shows that between 2010 to 2018, Donor contributions in the Nigerian health system amount to approximately \$6.84 billion, about \$4.51 billion lower than General Government Expenditure, and \$1.68 billion higher than federal government expenditure on health. From a total contribution of \$0.30 billion in 2010, it rose to \$0.78 billion, averaging \$0.76 billion within the 9 years. Donor funding spiked from \$0.54 billion in 2012 to \$1.08 billion in 2014. The rise was a result of increased expenditure by multilateral Donors within these periods. Bilateral Donor funding was driven majorly by Canada, Japan, the UK, and United States while multilateral contributions came from the Global Funds, Bill and Melinda Gates Foundations amongst others.

Household expenditure

Households are the largest spenders in the Nigerian health system. Table 6 shows that between 2010-2018, households spent \$54.43 billion, which is almost five times higher than general government health expenditure within the same period. The average year-on-year change in household health expenditure was positive representing 11% between 2010 to 2018. Household expenditure rose by 137% (\$5.17 billion) from \$3.70 to \$8.77 billion in 2017 and by 2018 it decreases slightly by 4.4%. This fall was a result of possible demographic changes.

Expenditure on Disease programs in Nigeria

Nigeria is experiencing an annual increase in aggregate disease expenditure. Between 2010 to 2018, total aggregate expenditure on disease intervention by all financing sources was estimated at \$72.9 billion representing 94.4% of Current Health Expenditure. This aggregate grew year on year at an average of 11.2% and almost tripled from \$4.7 billion in 2010 to \$11.1 billion in 2018. Out of the total disease expenditure, 40.2% was spent on treating malaria representing almost half of the total disease expenditure of the country followed by other and other/non-specific

⁵ Federal plus State government expenditure on health is captured by the SNL in the NHA report.

diseases⁶ (12.4%), non-communicable diseases (9.4%), reproductive health (9.3%) as well as HIV/AIDs (8.9%). Major disease cost drivers apart from malaria for 2017 included HIV/AIDS (\$0.57 billion), reproductive health (\$0.43 billion), and non-communicable diseases (\$0.43 billion). While expenditure on injuries contributed significantly to total disease expenditure in 2018, expenditure on injuries increased constantly per year is increasing per annum 0.44.

Table 1: Selected Disease expenditure for Nigeria, 2010-2018 in \$(Billion)

Diseases	2010	2011	2012	2013	2014	2015	2016	2017	2018	Grand Total
Malaria	2.00	2.21	2.48	2.84	3.15	3.56	3.98	5.04	4.18	29.46
HIV/AIDS & Opportunistic Infections	0.57	0.50	0.34	0.66	0.76	0.82	0.98	0.87	1.06	6.54
Respiratory infections	0.33	0.37	0.44	0.45	0.50	0.56	0.64	0.74	0.27	4.30
Tuberculosis	0.02	0.20	0.26	0.26	0.29	0.31	0.35	0.48	0.59	2.74
Diarrheal diseases	0.06	0.07	0.12	0.09	0.10	0.10	0.13	0.13	0.07	0.87
Vaccine preventable diseases	0.06	0.12	0.14	0.17	0.21	0.27	0.34	0.31	0.26	1.88
Reproductive health	0.43	0.51	0.58	0.69	0.79	0.80	0.93	0.89	1.21	6.83
Non-communicable diseases	0.43	0.57	0.65	0.70	0.78	0.74	0.82	0.89	1.31	6.89
Injuries	0.25	0.28	0.26	0.36	0.39	0.44	0.48	0.49	1.06	4.00
Nutritional deficiencies	0.01	0.01	0.04	0.12	0.02	0.05	0.04	0.03	0.04	0.36
Neglected tropical diseases	0.02	0.02	0.05	0.02	0.02	0.03	0.03	0.03	0.06	0.28
Others/Non-specific	0.57	0.66	1.03	0.88	0.99	1.00	1.12	1.16	1.65	9.06
Grand Total	4.76	5.52	6.37	7.25	8.00	8.67	9.84	11.33	11.19	72.92

Source: Authors calculation from NHA, 2010-2016, 2017, and 2018.

⁶ Other/non-specific diseases are used to represented expenditure figures for diseases that were not captured during Health Accounting Mapping exercise or cross-cutting expenditure figure not placed on any particular disease.

Current and Capital Health Expenditure on disease

To understand current disease expenditure in the country, the study further elucidates by presenting the shares by capital and current expenditure for 2017 and 2018. In 2017, capital health expenditure was accrued for the following diseases: malaria, vaccine-preventable diseases, diarrheal disease, TB, and HIV. Malaria maintained the lead in all infectious and parasitic disease expenditure in Nigeria. More than half of all current infectious disease expenditure, representing 60% was on malaria compared to 49% of capital expenditure on the disease. This was a reverse for HIV/AIDS expenditure as twice more capital was expended than current expenditure. Similarly, capital expenditure was four times higher than current expenditure, for Vaccine-preventable diseases as 12.3% of all total capital expenditure on infectious and parasitic diseases was expended on vaccines compared to 3.7% current expenditure.

Expenditure on Reproductive health conditions in Nigeria cuts across maternal and perinatal conditions, contraceptive management, and other unspecified reproductive conditions. maternal conditions, covering all Maternal, Neonatal and Child Health (MNCH) programs received the largest expenditure as it represented 87.9% of all current reproductive health expenditure and capital expenditure of 82.5%. Expenditure on family planning was far below perinatal conditions as only 4.6% of all reproductive health expenditures were made in 2017.

Apart from Neglected Tropical Diseases (NTDs), expenditure on nutritional deficiency has consistently remained the least expended disease expenditure in Nigeria as found from the recent NHA data. Current expenditure on nutrition increased only minimally by 2% in 2018 from 93.4% while capital expenditure on nutrition decrease by a percentage point from 6% to 5%.

The three highest NCD spending areas in Nigeria include cardiovascular diseases, endocrine, and metabolic diseases, as well as neurological disorders while the three lowest include respiratory diseases, oral diseases, and sense organ disorder. Cardiovascular diseases consumed more expenditure as compared to other NCDs. More than half (63.6%) of all current NCD expenditures in 2017 was spent on cardiovascular diseases which are 9.1% greater than capital NCD expenditure and twice the expenditure on Endocrine and metabolic disorders. Endocrine and metabolic disorders represented 30.1% of all current NCD expenditures and 26.4% of all capital NCD expenditures. Mental and neurological conditions consume more capital NCD expenditure (13.6%) than current NCD expenditure (3.9%).

Disease expenditure by Financing agents

Economic agents spending on disease programs in the country include: Government (Federal, state and local government); Corporations, Households, Non-Profit institutions serving households, the rest of the world including bilateral and multi-lateral donors and other unspecified financing agents. Four diseases or conditions including respiratory infections, injuries from road accidents, tuberculosis, and vaccine-preventable disease are emerging expenditure areas in the country with Nigerians now paying more for these conditions. Recent disease expenditures, that is in 2017 and 2018, show that aggregate disease expenditure by all financing agents was constant, totalling \$23,135.2 million, though decreasing minimally from \$11,637.8 million in 2017 to \$11,497.4 in 2018. In both years, and out of the total expenditure

by agents, households spent 76% on the average paying for treatment of these diseases. Thus, while households bore \$9,006.26 million in 2017, in 2018 it decreased minimally by 4.4% to \$8,613.01 million with \$43 expenditure on disease treatment per capita. This indicates that households have continued to bear the catastrophic payment for disease treatment in Nigeria. General government expenditure on all disease programs in the country is four times lesser than household expenditure. General Government expenditure on all diseases for 2017 and 2018 was 3,683.0 which is at least four times lower than total household expenditure within the same period.

Malaria remains the principal disease burden for Nigerians in 2017, with households bearing 79.1% of total burden of malaria treatment. Other diseases/conditions was \$1017 million, five times lower than total malaria cost for 2017 was next to malaria. This is followed by reproductive health conditions (\$911.8 million) and NCDs (\$910 million), HIV/AIDS and other STDs (\$895.5 million), respiratory infection (\$765 million), and injuries (\$502 million). NTDs (\$30.8 million) and nutritional deficiencies (\$33.7 million) remained the least spending areas by all economic agents with donors spending representing almost half of all nutritional spending.

Although current expenditure on malaria treatment decreased by 20.5% between 2017 and 2018, malaria remained the principal disease burden for Nigerians in 2018, with households bearing 88.8% malaria treatment cost. NCDs was the second highest disease spending area, with expenditure rising to \$1017 million, almost two times the value of the previous year. This is followed by reproductive health conditions (\$1237.5 million), injuries (\$1,093.4 million), and HIV/AIDS and other STIs (\$1,086 million). \$49.9 million was spent treating Other infectious and parasitic diseases, \$40.6 million spent treating nutritional deficiencies, \$61.1 million spent treating NTDs and \$76.9 million spent treating diarrheal diseases. These diseases remained the least spending areas by all economic agents with donors spending next to federal government compare to state government and households.

Priority Interventions Areas

This section discusses disease expenditure for four priority diseases for the past four nine years (2010-2018). Within this period, total expenditure on malaria consumes \$29.0 billion, followed by non-communicable diseases (NCDs) which consumed \$6.9 billion, while HIV treatment consumes \$6.5. TB expenditure was \$2.7 billion and Neglected Tropical Diseases was \$0.2 billion.

Expenditure on Malaria remains the largest disease expenditure area in Nigeria followed by other non-specific diseases, non-communicable diseases, reproductive health, and HIV/AIDS. Aggregate malaria expenditure for nine years (between 2010-2018) was \$29.03 billion, with the household expenditure of \$24.6 billion representing 85% of total malaria expenditure. General Government Expenditure on malaria was 8% (\$2.36 billion) of the total share while Donor spent lesser, about 1% (\$0.40 billion). Within this period under review, Malaria expenditure doubled, increasing from \$2 billion to \$4.5 billion in 2017 with households mostly responsible for paying for malaria case management. In many cases, households pay out of pocket at service points to obtain malaria services, especially in the private sector. "Eighty-five percentage of mosquito nets classified as other nets (any net that is not ITNs) are obtained from a shop/market. By the states,

the percentage of households obtaining nets in a shop/market was highest in Yobe (60%) and lowest in Ekiti and Osun (less than 1% each)’’ (NDHS, 2018 p. 300).

With an estimated total expenditure of \$6.59 billion for HIV within 9 years, averaging \$0.73 billion per annum, expenditure for HIV-AIDS was almost five times lower than expenditure for malaria. While the lowest expenditure within the review period was \$0.38 billion incurred in 2012, the highest was \$1.06 billion incurred in 2018 indicating an increasing expenditure on HIV AIDS by all economic agents. Total cost for HIV was still driven by households and Donors with Donor expenditure a little lower than a household with a difference of \$0.40 billion which implies that donors still largely finance the HIV financing space. General Government expenditure on HIV within the nine years totaled \$1.81 billion and average \$0.60 billion driven by the Federal Government releases for HIV treatment representing 14% of all Total HIV expenditure within the period. However, this finding shows that households still bear the highest burden of HIV treatment financing in the country.

Total TB expenditure between 2010-2018 of \$2.74 Billion. 82.8% of total TB expenditure representing \$2.27 billion was spent by household. Donors were the next spenders on TB (8%), FGN (3.2%), Local government (2.9%), and State Government (2.1%).

Non-communicable Diseases (NCDs) are non-transmittable diseases that include heart disease, stroke, cancer, diabetes, and chronic lung disease, amongst others which are collectively responsible for almost 70% of all deaths worldwide (WHO). Within the last 9 years, expenditure on NCDs averages \$0.77 billion and total \$6.95 billion. Household expenditure represented more than half (77%) of total NCD expenditure within the period which is followed by expenditure by the federal government.

Donor expenditure on NCDs is less significant albeit greater than what the Local government expended.

“Neglected tropical diseases (NTDs), are a group of diseases that occur under tropical and sub-tropical climate conditions and are intimately linked to poverty. NTDs flourish in poor communities without access to adequate sanitation, clean water, and healthcare, and people living in proximity with animals and infective disease vectors, such as in remote and rural areas, informal settlements, or conflict zones. (WHO, 2010). According to Nuphi (2019), in Nigeria, about ‘100 million persons are at risk for at least one NTD with several million cases of co-endemicity where people are infected with more than one of the NTDs’. Within the period under review, a total of \$0.29 billion was spent by all economic agents on NTDs which is 22 times lower than expenditure on NCDs. Although household expenditure drove expenditure on total NTDs, this expenditure is still 35 times lower than NCDs expenditure. Within the review period, General Government expenditure on NTDs was still very low compared to their expenditure on NCDs with a difference of \$1.3 billion.

Correlation between GGHE and Donor expenditure

Donor funding and government resource commitments are very important health financing sources in Nigeria. Donors have funded numerous disease programs in the country for several years. This subsection determines whether there is a correlation between Donor resource commitments and General Government expenditure by employing expenditure data for four priority intervention areas: Malaria, TB, HIV, and Reproductive Health (RH). It begins with General Government expenditure per disease intervention; correlating it with Donor financing and then considers the correlation between expenditure by different level of government and Donor contributions by the level of government, albeit proxied by total Donor financing.

Table 2: GGHE vs Donor

Dependent variable ↓	GGHE	GGHE TB	GGHE HIV	GGHE Malaria	GGHE RH	Sample size
Donor Exp.	#0.5 (0.006) *	0.1 (0.00004) *	#0.6 (0.00007) *	#0.5 (0.0001) *	#0.7 (0.00006) *	9
TB(Donor)	0.1 (0.004) *	0.1 (0.17)	-0.08 (0.003)	-0.3 (0.003) *	-0.1 (0.003) *	9
HIV Exp(D)	#0.8 (0.00005) *	0.2 (0.0003)	#0.5 (0.24)	#0.8 (0.38)	#0.6 (0.007) *	9
Malaria Exp(D)	-0.2 (0.0002) *	-0.2 (0.0009)	0.1 (0.68)	-0.2 (0.25)	0.3 (0.05) *	9
Reproductive Health Exp(D)	0.2 (0.00006) *	0.2 (0.01) *	#0.7 (0.0001) *	0.3 (0.005) *	0.4 (0.005) *	9
Sample Size	9	9	9	9	9	

Note # refers to strongly correlated relationship; +Some data are missing; T-test p-value in parenthesis * Significant at 5% alpha level ** Significant at 5% alpha level

There is a strong significant relationship between general government expenditure (FG, State, and LGAs) and Donor financing for the four diseases as depicted in the GGHE vs Donor table. Overall, the table shows that there is a strong positive correlation ($\rho = 0.5$) between Donor expenditure and general government health expenditure, meaning that as government at all levels realized financial commitments on health,

Donors are likely to respond accordingly. However, the result on parallel program expenditure indicates lesser Donor contribution if the government does not display leadership either in kind or financially. Apart from general GGHE on HIV treatment which has a strong correlation to Donor HIV expenditure, though not significant, GGHE on malaria, TB and RH have a small or weak relation with their Donor counterpart, implying slow response by Donors if government responses are poor.

Direct cross-programmatic responses to government-Donor expenditure nexus were only significant between HIV and RH. Table 9 show that GGHE HIV expenditure and GGHE RH correlates strongly with Donor RH expenditure and Donor HIV respectively. Further cross-program examination of GGHE variables show a strong and significant link between HIV, Malaria, and RH expenditure and total Donor health expenditure, given a correlation coefficient greater than 0.5. These principal diseases or conditions are core health financing areas to Donors in the country, despite the poor performance of their GGHEs to Donor expenditure.

Table 3-5, now further examines correlation by the three disease expenditure levels of government to justify the data presented in table 9.

Table 3: FG vs Donor

Dependent variable ↓	Total FG Health Exp	FG TB ⁺	FG HIV	FG Malaria	FG RH	Sample Size
Donor Exp.	#0.6 (0.02) *	-0.03 (0.13)	-0.3 (0.00) *	0.4 (0.00) *	0.3 (0.00) *	9
TB(Donor)	0.02 (0.00) *	-0.3 (0.16)	-0.3 (0.00) *	-0.5 (0.00) *	-0.3 (0.00) *	9
HIV Exp (Donor)	#0.9 (0.00) *	0.2 (0.11)	0.2 (0.00) *	#0.5 (0.00) *	0.1 (0.00) *	9
Malaria Exp (Donor)	-0.3 (0.001) *	-0.4 (0.11)	0.06 (0.04) **	-0.007 (0.04) **	0.3 (0.00) *	9
Reproductive Health Exp (Donor)	0.4 (0.00) *	-0.03 (0.10)	#0.6 (0.54)	0.1 (0.73)	0.08 (0.05) **	9
Sample size	9	7	9	9	9	

Note # refers to strongly correlated relationship; +Some data are missing; T-test p-value in parenthesis * Significant at 1% alpha level ** Significant at 5% alpha level

The principal diagonals of Table 10 show the correlation between total FG health expenditure, as well as FG expenditure on TB, HIV, Malaria, Reproductive Health (RH), and their Donor expenditure sides. A correlation coefficient of 0.60, shows a strong association between total FG Health expenditure and Donor Health Expenditure. This is similarly explained in Figure 1 in the appendix below which closely examines the Donor-FG expenditure relationships. Panel 4 of the figure shows a close relationship between Donor and federal government health expenditure where both federal government and Donor spent both \$0.30 billion and \$0.79 billion in 2010 and 2018 respectively. By 2012 Donor expenditure on health was slightly higher than government expenditure by \$0.04 billion. However, from that same year onward there were divergent between Donor expenditure and Federal government health expenditure as Donor Expenditure rose faster than FG expenditure on health, albeit FG expenditure rose on the average. The reason for this was perhaps the increased expenditure of Donors on some key disease areas such as HIV supported by PEPFAR.

This is not the same for FG TB, HIV, Malaria, and RH Expenditure and their respective Donor components. The result shows a low negative and possibly zero correlation between FG malaria and Donor malaria expenditure; implying that as FG malaria expenditure decreases, Donors will respond by decreasing their malaria expenditure. FG HIV and RH and Donor HIV and RH expenditure show a positive but small correlation. Furthermore, the result also shows that an increase in FG RH expenditure does not also mean Donors will increase expenditure on RH given the zero correlation ($\rho = 0.08$) between the two variables.

The result in table 10 further provided a relationship between the disease(s) expenditure and aggregate Donor disease expenditure (FG HIV, FG Malaria and FG RH vs total Donor) and against other priority diseases (that is FG HIV vs Donor Malaria and RH; FG Malaria vs Donor HIV and RH; and FG RH versus Donor HIV and Donor Malaria). While there is a strong positive relationship ($\rho = 0.60$) between FG Malaria expenditure and HIV expenditure by Donors, there is a moderate relationship between FG Malaria and total Donor expenditure and a weak relationship between FG Malaria and RH expenditure by Donors.

Table 4: SG vs Donor

Dependent variable ↓	Total SG Health Exp	SG TB ⁺	SG HIV	SG Malaria	SG RH	Sample Size
Donor Exp.	0.3 (0.07) *	-0.04 (0.31)	#0.6 (0.00003)	0.5 (0.00005)	#0.6 (0.00004)	9
TB Exp. (Donor)	0.3 (0.004) *	-0.04 (0.31)	0.3 (0.003)	0.3 (0.004)	#0.6 (0.0004)	9
HIV Exp. (Donor)	#0.5 (0.003) *	0.2 (0.27)	#0.5 (0.0009)	#0.7 (0.002)	#0.6 (0.0004)	9
Malaria Exp. (Donor)	-0.2 (0.007) *	-0.5 (0.27)	0.2 (0.003)	-0.2 (0.10)	-0.1 (0.001)	9
Reproductive Health Exp. (Donor)	0.2 (0.0009) *	-0.01 (0.26)	0.4 (0.79)	0.3 (0.08)	#0.5 0.05	9
Sample Size	9	6	9	9	9	9

Note # refers to strongly correlated relationship; +Some data are missing; T-test p-value in parenthesis * Significant at 1% alpha level ** Significant at 5% alpha level

The result table above now further explains donor response, and state government commitments to the four priority interventions. A correlation coefficient of 0.34 shows that there is a medium, though positive correlation between state government (SG) health expenditure and donor health expenditure. However, while there is a strong positive relationship between SG HIV and Donor HIV expenditure ($\rho = 0.5$), SG malaria expenditure versus donor malaria expenditure as well as SG RH versus donor RH were negative ($\rho = -0.2$) and strongly positively correlated ($\rho = 0.5$) respectively. This implies that while SG malaria expenditure was decreasing, donor expenditure also decreased, though the coefficient was insignificant. In contrary, SG RH increased with donor TB, and HIV expenditures.

Table 5: LG vs Donor

Dependent variable ↓	Total LG Health Exp.	LG TB ⁺	LG HIV	LG Malaria	LG RH	Sample Size
Donor Exp.	0.1 (0.00009) *	-0.04 (0.006) *	0.20 (0.00003) *	0.31 (0.00003) *	-0.05 (0.00003) *	9
TB Exp. (Donor)	0.3 (0.004) *	#0.53 (0.02) *	0.08 (0.003) *	-0.34 (0.003) *	#0.58 (0.003) *	9
HIV Exp. (Donor)	0.4 (0.006) *	0.07 (0.004)	0.48 (0.0001) *	#0.74 (0.00005) *	-0.22 (0.0002) *	9
Malaria Exp. (Donor)	-0.5 (0.13)	-0.20 (0.004) *	-0.19 (0.0001) *	-0.64 (0.003)	0.09 (0.0001) *	9
Reproductive Health Exp. (Donor)	0.1 (0.10)	0.06 (0.004) *	-0.03 (0.0003) *	0.21 (0.02) **	0.17 (0.0007) *	9
Sample Size	9	7	9	9	9	

Note # refers to strongly correlated relationship; +Some data are missing; T-test p-value in parenthesis * Significant at 1% alpha level ** Significant at 5% alpha level

Interpreting the variable Donor-LGA health expenditure relationship requires some caution as donor entry into an LGA may

not necessarily be determined by the LGA expenditure on health. This may be determined by disease burden, poverty level, and a

host of other factors. Besides political factors may even determine this, as decisions may even be taken at the state level on which LGA donors can implement health projects. However, as table 12 shows, there is a strong positive significant relationship between LG TB and RH expenditure with Donor TB expenditure as well as a significant relationship between LG Malaria and HIV donor.

5.0 Discussion of Findings

This study has attempted to explore the correlation between donor expenditure and government spending in the health sector as well as cross programmatic correlation analysis of donor-government spending on disease programs. Prior expenditure analysis shows an increase in OOP by household in the country, which is higher than both government and donor expenditure. Malaria remains the most critical disease spender in Nigeria, with donor support obvious in both malaria and other disease programs. From the correlation analysis, we find a positive correlation between expenditure by all levels of government and donor expenditure, which indicate that although development aid to health is likely to diminish as a country transit to a middle-income bracket (Robert & Sara, 2016), our presumption is that official development assistance is likely to follow a domestic government willingness to spend more in their health system, with the ultimate aim of improving health outcome. We suspect that official development assistance (ODA) is associated to national government actual expenditure on health and the seriousness of government to finance the sector.

The weaknesses in the relationships between government and donor disease programs (e.g GGHE HIV and Donor HIV) depicts what happens in reality where donors singlehandedly finance program areas without government support. This happens when the government do not prioritize certain programs, believing that it will be financed by donors in the next budgetary cycle. Therefore, wanting to cover unmet needs, donors swing into action inspite lack of government counter path funding.

It is important to note that cross programmatic analysis has some implications for donor coordination activities at the federal, state and local government levels. Our findings show strong correlation for only *federal government to donor expenditure* than other levels of government. This is not surprising as donors usually align more with federal government in many instances than the states. The positive relationship between spending by: (1) federal government on reproductive health and donor spending on malaria, (2) state government reproductive health and donor HIV expenditure and (3) local government reproductive health and donor TB expenditure somewhat implies efficiency in donor coordination effort.

Cross programmatic analysis is an information enabler for donor entry into a new program. According to Ifeoma (2016), information sharing and coordination in the official development community “helps donors to be aware of what other donors are doing at the federal, state and local government levels, as well as community and ward levels. The recipient government has the responsibility to capture all the donor organizations funding projects in the country, their area of focus, and period of projects. The donor organizations have the responsibility to share their focus, areas of interest, and goals, with the recipient country, and with other donor organization.” Furthermore, although findings from the FG and donor disease expenditure program nexus show that overall FG health expenditure increases are related to donor

expenditure increases, this increase may not be related to government commitments on HIV, Malaria, and RH programming as donor consider other factors before funding a particular program.

The findings also show a positive relationship between state governments health expenditure and direct aid to health at the state level. Programmatically, this applies to state government and donor expenditure on reproductive health. Hence, it appears that donors are likely to support state governments who are ready to put in more money for health especially for HIV and RH, and not necessarily for malaria. States with prudential Public Financial Management (PFM) systems also fall into this bracket.

Our cross programmatic analysis also further stresses the importance of disease program integration. Positive disease program spending on one end, will reduce funding for other disease programs) on the other end. However, this may this require that program designers find a way of carrying along other inefficient or unprioritized disease programs aside from the four program discussed.

Result from table three indicates that donor and LG expenditure on disease interventions are weak indicate negative relationships. LGs have the prerogative to spend in the primary health care which include health advocacy. Although the spending by a local government may not necessarily influence donor response, increase spending on health provisions better community health.

5.1 Recommendation

5.1.1 Action for Government

Based on the study findings above and its implications, the following recommendations are made to improve the disease programming in the country which serves as action points for the Government.

1. Improve Social Health Insurance: to cushion the negative impact of the health care cost on households in the country, the government must as a matter of urgency improve access to social health insurance. While this is now done through the current State Social Health Insurance Schemes, the Federal Government must ensure that States can cover the informal sector- a sector with the largest strata of the working population. The MHIRP Framework⁷ should be employed as the first step.
2. Proper Donor coordination and efficient utilization of Donor funds: Donor funds are scarce resources available to government at all levels. Government must ensure the judicious utilization of these resources. This is because “spending more on health services does not necessarily buy better health. It needs efficient management and use of resources”(Rout).
3. Improve stronghold on Principal Donor funding disease area: Generally, the study found a strong significant correlation between FG health expenditure and Donor expenditure and a small correlation between FG HIV and Donor expenditure as well as no and negative relationship between FG malaria and Donor malaria expenditure though significant. These disease conditions are still strongholds for Donor expenditure in the country. FG must show leadership

⁷ A paper on this Framework is still been developed

in these expenditure areas, to prevent catastrophic situations when Donors leave the country.

4. Health Infrastructure Development and Maintenance Fund (HIDMF): Apart from donor basket fund provided for a few capital items such as medical equipment, State and Federal government will need to create a HIDMF to provide sustainable financing for capital investment. This will increase the share of capital expenditure from the current 6% capital expenditure of THE.

5.2.1 Action for Development Partners

Based on the study findings above, the following recommendations are made to improve the disease programming in the country as well as serve as action points for the Development Partners.

1. Improve Technical Assistance via available evidence: Understandably, Donors work where they are assigned to work by the government. However, Donors must consider the evidence before deploying effort and resources. This evidence should be placed before the authorities during project discussion periods and used for canvassing to ensure proper resource targeting.
2. Provide more support for capital expenditure: The Country's health expenditure is tilted recurrent health expenditure. While Donors have provide minimal support to government especially with the provision of some fixed asset such as vehicles and medical equipment Donors can invests in other fixed capital investments for the benefit of the health sector.
3. Supporting the development of Intellectual Property Products: Medical Research and Development is an area requiring much interest in the country, the result of this study shows that only 0.2% of all capital health expenditure is invested in this critical area. This was laid bear with the outbreak of COVID-19. Therefore, the country requires support in vaccine development. Supporting foundational research employing traditional knowledge for local pharmaceutical development is indeed necessary to achieve this.

5.3.1 Lessons for other Africa Countries

1. Look for innovative and sustainable means of financing the health sector: Africa countries must look for new health financing sources given the unstableness of Donor funding now and in the future. This study, using the Nigeria data, shows how Donors will likely respond if the government increases health expenditure. If health systems must improve other sources of financing should be explored.
2. Explore the MHIPRP Framework to improve informal sector health insurance: African population is largely informal. Therefore, the MHIPRP framework will likely serve as the future of informal sector financing in sub-Saharan Africa. The Digital Economy and Development Solutions Limited (DeDSL) developed the MHIPRP framework- a new framework meant to integrate health insurance and pensions system for the poor in the continent. MHIPRP employs an age-old traditional savings approach common amongst the poor in the continent. Given the partially increasing budgetary allocation to health as well as donor support, an overall coverage of the informal sector in not in sight.

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