

Assessment of the Impacts of Health Related Millennium Development Goals' Intervention on Economic Growth in Nigeria: 2000-2015

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ABSTRACT

In September, 2000, the 189 member states of the United Nations unanimously adopted a millennium declaration tagged "The Millennium Development Goals (MDGs)." as an attempt to address the challenges relating to extreme poverty, hunger, health, gender equality, education, environmental sustainability and global partnership for development. Three of the goals were health-specific while the others can be regarded as health enhancing as there exist some form of positive correlation between health system development and sustainable economic growth. This study empirically investigates the effect of Millennium Development Goals' (MDGs) health interventions on economic growth in Nigeria for the period 2000 – 2015. It adopts the least squares regression analysis to examine the impact of MDGs 4, 5, and 6 in improving the health system performance for Nigeria's economic growth. The model adopted views health as a durable capital stock that yields an output of a healthy economy whose production function account for the gap between health care as an output and medical care as an input into the aggregate output of an economy. Results show that increased recurrent expenditures on health and reduction in infant mortality rate has positive impact on economic growth while low life expectancy at birth, high rate of maternal mortality rate and the spread of HIV/AIDS have negative impact on economic growth/. The study conclude with recommendations including increase in public spending on health, targeting intervention on high risk and vulnerable women and children, as well as speeding up efforts to track down the spread of HIV/AIDs among others as means to achieve sustainable growth.

1. Introduction

In September, 2000, the 189 member states of the United Nations unanimously adopted the millennium declaration tagged "The Millennium Development Goals (MDGs)." as an attempt to address the challenges relating to extreme poverty and hunger, health, gender equality, education, environmental sustainability, as well as developing global partnership for development. As a matter of fact, three of the goals were health-specific while the others can be regarded as health enhancing as there exist some form of positive correlation between good health status and sustainable economic growth. This millennium declaration was more or less, a re-instatement of commitment by world leaders to issues relating to setting all men, women and children free from the abject dehumanizing conditions that threatens the very survival strategies of human race. Implementation of these strategies and goals were to be seen as an exit gate from poverty and health-related challenges across the globe by the year 2015. The main aim of the Millennium Development Goals was to achieve some specific goals of human welfare in developing countries by the year 2015. The declaration outlines some of the key development challenges confronting member nations, proposes a response mechanism to these challenges and defines a series of policy targets and progress measures to be achieved by the year 2015. The declaration encapsulated eight (8) broad goals with fifteen (15) targets that are to be monitored and implemented through a set of forty eight (48) indicators. The eight goals are to: eradicate extreme poverty and hunger, achieve universal primary education, promote gender equality and empower women, reduce child mortality, improve maternal health, combat HIV/AIDS, malaria and other diseases, ensure environmental sustainability and develop a global partnership for development.

A look at the health-related MDGs target revealed that, upon attainment of the Goals of reduction in child mortality, the mortality rates would have been reduced by two-thirds between 1990 and 2015. The indicators of this target were the under-five mortality rate, infant mortality rate and immunization coverage. According to the National Bureau of Statistics NBS (2015), under-five mortality rate was 94 (per 1000 live births) which positively reduced to 89 (per 1000 live births) in 2014 while infant mortality rate as at 2012 stood at 61 (per 1000 live births) which decreased to 58 (per 1000 live births) in 2014. In other to further combat infant mortality rate, incentives such as full immunization against killer diseases such as Polio (1, 2, & 3), Diphtheria, Pertussis and Tetanus (DPT 1, 2, & 3), Measles, Hepatitis B (1, 2, & 3) and Yellow fever were administered. As at 2014, babies that were immunized with polio vaccine were 52.8 percent, polio (1, 2, & 3) averaged 57.6 percent in 2012 and 63.5 percent in 2014. DPT 1, 2, & 3 averaged 53.1 percent in 2012 and slightly increased to an average of 57.2 percent in 2014. Immunization coverage for measles was 63.1 percent in 2014 which showed an increase of 13.1 percent compared to the 2012 figure.

In the case of improvement in maternal health, the target was to reduce by three-quarter, the maternal mortality rate between 1990 and 2015, to be achieved by the year 2015 including universal access to reproductive health. By 2014, the proportion of women who died from pregnancy-related problems, child birth and six weeks after delivery reduced to 243 (per 100,000 live births) as compared to 350 recorded in 2012. Also, skilled attendance at delivery increased by 9.3 percent in 2014 as compared to the figure in 2012. In a related development, contraceptive prevalence rate increased by 6.9 percent to 18.5 percent in 2014 as compared to the 2012 figure which indicated that women have increased their dependence on contraceptives as a method of family planning. In the same vein, adolescent fertility rate (15 – 19) stood at 74 (per 1000 live births) in 2014 which was a decrease from 79 (per 1000 live births) recorded in 2012. About 68.8 percent of ante-natal visits of at least once before delivery by skilled personnel were recorded which was an increase when compared to the 2012 figure. Ante-natal coverage by any provider also increased at least 4 times to 60.6 percent from 57.40 in 2012. This indicated that the number of women being attended to by skilled personnel or by any health-care provider while on ante natal visits increased, which positively influenced the decline recorded from maternal mortality rate.

The third health-related MDGs were to effectively combat the spread of HIV/AIDS, malaria and other diseases by the year 2015. The target was to halt the spread of the disease and achieve a universal access to treatment for HIV/AIDS for all those who needed it and to reverse the incidence of malaria and other major diseases. The National Bureau of Statistics, NBS (2015) opined that the percentage of the population aged (15 – 49) with comprehensive knowledge about HIV prevention increased to 32.10 percent from the previous year, 2014. The proportion of women aged (15 – 24) with comprehensive and correct knowledge of HIV was also significantly low at 32.80 percent, which was a decline by 0.6 percent from the previous year, 2014. The acceptance attitude of people towards those living with HIV dropped to 11.00 percent in 2015 from the previous year which implied that stigmatization of people living with AIDS remained an issue to be tackled. The proportion of women with adequate knowledge of where to be tested for HIV increased from 56.7 percent in 2014 to 69.20 percent in 2015. With respect to malaria, there was a decline in the number of household with at least one ITN (Insecticide Treated Net) to 38.9 percent while the proportion of pregnant women and children (under five) that sleeps under ITN reduced to 28.50 percent and 34.70 percent respectively. The proportion of people who are aware of anti-malaria treatment also reduced to 53.50 percent which created some vacuum in the awareness of the use of ITN.

2. Literature Review

Fostering social development, reducing inequality and promoting economic growth among the poor in least developed countries are some of the important policy objectives addressed by the Millennium Development Goals (MDGs) through interventions. According to Merriam (2014), intervention is an act or fact or a method of interfering with the outcome or course especially of a condition or process (as to prevent harm or actions or events leading to a result). It defines process as actions or events leading to a result. Thus, in health improvement, an intervention is an act or method that seeks to encourage individuals and/or communities to accept a change in attitudes and behaviour in order to improve their health. A process is the actions over time that allow acceptance of the intervention.

On the other hand, the World Health Organization (1948) define health as a state of complete physical, mental and social wellbeing and not necessarily the absence of disease or infirmity, That is, the level of functional and metabolic efficiency of a living being. In human parlance, it is the ability of individuals or communities to adapt and self-manage themselves when facing physical, mental or social changes. In response to the global call to achieve the MDGs by the year 2015, many countries moved towards the attainment of the collective goals of MDGs. These collective efforts towards the achievement of the MDGs put many regions or countries on track to achieve at least some (if not all) of the targets

Goal 4 of the MDGs was aimed at reducing child mortality. Although, the evidence is thin on the causal relationship from child health to economic growth, it is important to established the importance of child-health as an instrumental variables as an input into the accumulation of human capital which, according to WHO (2002) is a determining factor of economic growth. As World Bank (2011) remarked, improved outcomes for women and children include more education, lower fertility rates, higher nutritional status, and lower incidence of illness, among others have broad individual, family and societal benefit. A number of studies such as Strauss and Thomas (1998), Bloom and Canning (2000), WHO (2001), Gallup and Sachs (2001), Sachs and Malaney (2002) have pointed unanimously to a strong correlation between health and poverty, with evidence from Gallup and Sachs (2001) revealing a health-related poverty trap. Despite the lack of good studies on the existence of a potential causal link between maternal and child health (MCH) at the household or national level, maternal and child health is intrinsically valuable not only to mothers and children but also to the national, regional and global

community as is evident from the prominent placement of MCH in the MDGs. This has led to a global initiative on nutrition, child survival and maternal well-being that were announced at both the G8 summit in 2009 and the MDG summit in 2010.

Relatedly, the MDGs 5 is aimed at improving maternal health by enabling people to have fewer children and contribute to upward mobility and helps to stimulate economic growth and development. When women can negotiate their reproductive health decisions with men, it could lead to an increased decision making role within families and communities that benefits all. Fewer pregnancies lead to lower maternal mortality and morbidity rates and hence, more education and economic opportunities that results in aggregate economic growth and development. This is because as women become more educated, they tend to have fewer children and thus, participate more fully in labour market. This implies that those with lower fertility are better able to invest in the health and education of each child, spaced births and fewer pregnancies which have overall improvement on child survival. In addition, psychosocial domestic violence, greater interaction with the justice system and alcohol and substance use has been found to have negatively affect health status and mental and emotional well-being of women. In the same vein, there are other indices such as life expectancies at birth; the rate of teenage pregnancies and infant and maternal mortality that demonstrate poorer outcomes for families with low income.

With regards to MDGs 6, there was a clarion call on countries to stop and reverse the spread of HIV/AIDS and to secure universal access to antiretroviral drugs for people living with HIV/AIDS by 2015. For many countries, fighting their way out of poverty, and the ravage of HIV/AIDS represents not only a singular health crisis, but also the single greatest obstacle to economic growth and well-being. Empirical evidence showed that the sub-Saharan African countries accounted for almost three-quarter (3/4) of the global deaths related to AIDS and for about two-thirds (2/3) of those infected with HIV worldwide. The same applied to Asia in which the Commission on AIDS in Asia (2008) projected about 6 million households sinking into poverty between 2008 and 2015 as a result of the economic consequences of AIDS.

Meeting the MDGs 4, for instance calls for a two-third (2/3) reduction in under-five mortality rate by 2015 which required a significant reduction in neonatal death. This call for a cost-effective interventions that could prevent at least two-third of all neonatal death of which Adam et al (2005) posited that many of these interventions are relatively simple and highly cost-effective. While the notion that most neonatal deaths can be prevented even in settings with high neonatal mortality and weak health system, it should be recognized that most of these programmes face serious logistical challenges. As a result, Victora (2004) have argued that cost-effective interventions rarely reach people who need those services most, as programmes delivering these interventions often suffer from intermittent coverage, poor quality, inequitable access and lack of long-terms objectives. Hence, Victora (2004) addressed the deficiencies in health system from inequities to logistical and resource constraints and drew attention to the death of health system effectiveness.

It is important to recognize that unimproved outcomes for women and children through more education, lower fertility rates, higher nutritional status and low incidence of illness are among other factors that are found to have broad individual, family, and social benefits as emphasized by World Bank (2011). While growing evidence of causal relationship from maternal and child health care to economic growth and poverty reduction is thin in the literature, it may quite appear robust in establishing the intrinsic importance of general health to the individual and its instrumental importance as an input into the accumulation of human capital which according to WHO (2002), is a determining factor of economic growth. In a recent study, the WHO (2012) stressed the major cause of maternal mortality in developing countries to hypertension and heavy bleeding after childbirth, which are responsible for 18 and 35 percent of obstetric deaths. In combination with infections, obstructed labour, and unsafe abortions, these five complications account for 80 percent of maternal deaths. Indirect causes including malaria and HIV/AIDS make up the remaining 20 percent. The WHO study assents that most of these deaths can be prevented if the woman receives the appropriate interventions from a skilled health provider, and with adequate equipment, drugs and medicines as added by PMNCH (2010).

In a related study, United Nations (UN, 2011) opined that birth attendance by skilled health care providers has been designated an intermediate MDG as it is believed to help reduce maternal mortality. The study reveal that the share of pregnant women attending at least one antenatal visit (of which the WHO recommends four visits) increased from 64 percent in 1990 to 8 percent in 2009. It conclude that progress is still insufficient to achieve MDGs 5 (unimproved maternal health) as the average annual decline in the maternal mortality rate (MMR) was 2.3 percent between 1990 and 2008, less than half of the 5.5 percent per year average required to meet the goal. As UN (2011) concludes, increasing evidence suggest that MDG target can be reached only if substantial and accelerated action is taken to eliminate the leading killers of children: pneumonia, diarrhea, and malaria which

accounted for 43 percent of under-five deaths in 2008; malnutrition contributes to one-third of under five deaths. A-third of stillborn deaths due to maternal conditions such as hypertension and obstructed labour but also partly reflecting poor quality of care and management as reported by PMNCH (2010).

Given a two-way relationship between improved health and economic growth across the world, studies have contended that improved health care increase per capita GDP through increase in the productivity of existing human resources coupled with resource accumulation and technological change. Also some part of increase in income is spent on investment in human capital which results in per capita growth. Relatedly, economic development results in improved nutrition, better sanitation, innovation in medical technologies with increase in life expectancy and reduction in infant mortality rate.

In some other studies, Adeniyi and Abiodun (2011) analysed the effect of health using data on life expectancy at birth, fertility rate, capital and recurrent expenditure between 1985 and 2009. The study found that there is a direct and substantial effect of health-care expenditure and economic growth. Equivalently, Odion (2011) examined the potential impact of increase in government expenditure on health care in Nigeria using an integrated sequential dynamic computable general equilibrium (CGE) model. The results show that a reallocation of government expenditure to health sector is significant in explaining economic growth in Nigeria.

In an MDG's-related studies, Okoh (2009) examined the UNICEF and UK Department for International Development effect in Nigeria by assessing the progress made on MDG's 4 and 5 (reduction in maternal and under-five mortality rates) target, adopted a documentary method to review a sector-specific policy analysis and found that only marginal improvements have been made. The study found major problems relating to aid administration process and adverse influence of women's poverty and cultural biases which reinforce gender inequality as major constraints against the attainment of Goals 4 and 5. The study recommends that aid should be implemented using budgetary support and sector-wide operations or recurrent cost financing

3. Model Specification

In an attempt to specify the interactions between policy interventions and development outcomes, a generation of development economists has labored over general equilibrium models of development over the years. For instance, a path breaking work of Adelman (1975), Adelman and Robinson (1975) whose works "Development Economics – A Reassessment of Goals" and "Income Distribution Policy in Developing Countries: a case of Korea" respectively have come up with a general equilibrium model to analyze the relationship between policy intervention and an outcome of development issues. Their works was later consolidated upon by Dervis, De Melo and Robinson (1982) who opened up the channel of modeling this interaction through their work "General Equilibrium models for Development Policy".

Based on these studies and with some modifications to suit the present study, the relationship between health policy intervention and economic growth in Nigeria is modeled as follows:

$$RGDP_{gr} = f(THE, LEB, MMR, IMR, HIV) \quad \text{--- 1}$$

Where: RGDP = real gross domestic product growth rate; THE = rate of Total health expenditure as a proxy for government interventions. LEB = Life expectancy at birth; MMR = Maternal mortality rate; IMR = Infant mortality rate; HIV = Rate of HIV/AIDS infections;. Linearizing the above equation yield:

$$RGDP_{gr} = \beta_0 + \beta_1 THE + \beta_2 LEB + \beta_3 MMR + \beta_4 IMR + \beta_5 HIV/AIDS + \mu_t \quad \text{--- 2}$$

All the variables were as previously defined. The μ_t is an error term to account for all other variables not included in the model due to limited information and data availability. The β 's are parameter estimates. Taking the natural logarithm of equation (2) allows this study to interpret the coefficient as elasticities. Consequently, the estimating equation becomes

$$\ln RGDP_{gr} = \beta_0 + \beta_1 \ln THE + \beta_2 \ln LEB + \beta_3 \ln MMR + \beta_4 \ln IMR + \beta_5 \ln HIV/AIDS + \ln \mu_t \quad \text{--- 3}$$

Since the variables are I (1), the specification of the model is done in its first differencing as follows:

$$\ln RGDP_{gr} - \ln RGDP_{gr,t-1} = \beta_0 + \beta_{1n1}(THE_t - THE_{t-1}) + \beta_2(LEB_t - LEB_{t-1}) + \beta_3(MMR_t - MMR_{t-1}) + \beta_4(IMR_t - IMR_{t-1}) + \beta_5(HIV/AIDS_t - HIV/AIDS_{t-1}) + (\mu_t - \mu_{t-1}) \quad \text{--- 4}$$

Hence, the first difference operator gives:

$$\Delta RGDP_{gr} = \beta_0 + \beta_1 \Delta THE + \beta_2 \Delta LEB + \beta_3 \Delta MMR + \beta_4 \Delta IMR + \beta_5 \Delta HIV/AIDS + V_t \mu_t \quad \text{--- 5}$$

Where V_t is $\mu_t - \mu_{t-1}$. All variables are as previously defined.

Upon estimation, the above parameters are expected to fulfill the following a priori signs. $\beta_1, \beta_2 > 0, \beta_3, \beta_4, \beta_5 < 0$.

Time series data are exploited for this study for the period 2000-2015. The annual time series data were obtained from the Statistical Bulletin of the Central Bank of Nigeria, Annual Abstract of Statistics from the National Bureau of Statistics. These are in addition to the data obtained from the Millennium Development Goals Performance Tracking Survey Reports 2012 and 2015.

4. Results and Discussion

As a guide to an appropriate specification of equation (5), the characteristics of the time series data were examined in order to avoid spurious regressions that may emanate from regressing two or more non-stationary series. To this effect, a test of stationarity and co-integration were performed on the levels of the variables and on the error term respectively. This is to ensure that long-run equilibrium relationship exist between the non-stationary dependent and independent variables. The existence of co-integration allows this study to formulate a model that incorporates an error correction mechanism which is included to ensure the preservation of long-run relationships. To achieve this, three test were carried out, namely: the Augmented Dickey-Fuller test, Unit root test and Co-integrations test were carried out.

(a) The Augmented Dicker-Fuller (ADF) Test

The ADF test is performed in order to ensure that the data generating process (GDP) are integrated of the same order, preferably, first order, AR (1) process. To overcome the problem of the existence of autocorrelation, the ADF test is carried out as follows:

$$ADF: dRGDP_t = \alpha_0 + \alpha_1 RGDP_{t-1} + \sum_{k=1}^K r_k RGDP_{t-k} + \varepsilon_t$$

In this case, $dRGDP_t = \alpha_0 + \Delta RGDP_t = (RGDP_t - RGDP_{t-1})$ With K-lag length on the dependent variable that is necessary to make ε_t white-noise (zero mean and constant variance).

(b) Co-integrations Test

The study carried out a test of co-integration on the levels of the variables. This is because of the fact that non-stationarity of the variables makes the results spurious – thus, violating the basic properties of OLS estimates. To determine the stationarity of the data, a unit root test is performed in the form:

$$\Delta RGDP_{gr} = \alpha_0 + \delta RGDP_{gr\ t-1} + \sum_{i=1}^P \alpha_i \Delta RGDP_{gr\ t-i} + \varepsilon_t$$

Where: $\Delta RGDP_{gr}$ is the change in real GDP growth rate, t is the trend factor, α_0 is the constant, α_1 is the slope, ε_t is the Gaussian white noise. The Augmented Dickey-Fuller (ADF) test, Unit root test is performed to test the level of co-integration through Maximum Eigen value Test and Trace Statistics.

In particular, the Johansen and Joselius (1990) and Johansen (1991) Maximum likelihood test and Trace Statistics is adopted. The choice of these techniques is due to the vector auto-regression based test which is characterized by better performance than single equation and alternative multivariate method. The Maximum Eigen value test is calculated using:

$$\lambda \max(\gamma.r + 1) = -T \ln - \lambda r + 1$$

While the Trace test is calculated using

$$\lambda \text{trace} (r) = -T \sum_{i=r+1}^k \ln (1 - \lambda_i)$$

The existence of co-integration imply that the error correction mechanism (ECM) is constructed to show both the short-run and long-run dynamic relationship which allows for the incorporation of ECM defined by the equation

$$RGDP_{gr} = \alpha_1 \beta RGDP_{gr} + \varepsilon_t$$

So that

$$\Delta RGDP_{gr} = \mu_{t-1} + \sum_{i=1}^R \beta \Delta X_{t-1} + \sum_{i=1}^R \alpha \Delta R \square DP_{gr\ t-1} + \varepsilon_t$$

The μ_{t-1} is a one period lag value of the term from the co-integrating equation. The Δ is a first difference (lag) operator while ε_t is a white noise which assume zero mean and constant variance.

Systematic reviews of health – related Millennium Development Goals across the world have provided a social basis for an understanding of the evidence on the impact of various mechanisms for improving health service delivery. In some instances, targeting rural population have led to rapid decline in child mortality, maternal mortality and the spread of other terminal diseases with an acknowledgment that successes in achieving this outcomes were underpinned by broader factors such as economic growth and cultural homogeneity.

To determine the impact of health – related MDGs on the Nigerian economy, a regression analysis was performed on the natural logarithm of the variables as reported in table (1) as seen below:

Table (1) Result of Unit Root (Stationarity) Test

Variable	Critical valve at 5%	ADF Test value at 5%	Status
RGDP _{gr}	-3.1222	-7.415322	1(1)
LEB	-1.9699	-2.872281	1(1)
MMR	-3.1483	-3.513980	1(1)
IMR	-3.1003	-3.625273	1(1)
HIV/AIDS	-3.1222	-28.77236	1(1)
THE	-3.1222	-3.548824	1(1)

Source: Own computation using E-views 7.0

The study employs the Augmented Dickey – Fuller (ADF) test to investigate the null of the unit root as against the alternative of a stationery process for all series. The result shows that all the variables were integrated at order 1. That is 1(1).

Since all the variables are 1(1), a test of co-integration is carried out based on Johansen and Joselius (1990) and Johansen (1991). In particular, the Trace statistic and Maximum Eigen value test is carried out. One basic advantage of these statistics is the identification of the co-integration vectors to confirm the existence of a long-run relationship among the variables. The result of the co-integration test shows that the null hypothesis of no co-integration among the variables cannot be rejected. Hence, in other to capture the dynamic characteristics of these data on the assumption that the error term has a zero mean and a constant variance, the test of co-integration is carried out to detect the presence of a steady state equilibrium and the speed at which variables returns to the equilibrium value after a deviation from the steady state. The results of co-integration tests are presented in the table below

Table 2 The Result of Co-integration Test

Variables	Trace statistic/Maximum Eigen Value	5% Critical value	Hypothesized NV of CE(s)
RGDP _{gr}	194.1173	94.15	1(1)
LEB	118.3625	68.52	1(1)
MMR	59.13240	47.21	1(1)
IMR	28.30486	29.68	1(1)
HIV/AIDS	11.63686	15.41	1(1)
THE	5.07972	2.76	1(1)

Source: Own Computation, using E-views 7.0

The Unit root test as presented in table 4.1 shows that all the variables are integrated of order one. That is I (1). As a result, a test of co-integration based on Johansen and Joselius (1990) and Johansen (1991) is carried out with the aid of reduced rank procedure.

The method helps to detect a number of co-integrating vectors in a non-stationary series which allows for the test of hypothesis relating to the co-integrating vectors. The results shows that there exists, long-run relationship between the non-stationary variables, hence, actual estimation of the relationship between health-related MDGs and economic growth rate can be carried out.

Table 3 Regression Results of the Impact of Health related MDGs on the Nigerian Economy

Variable	Coefficient	Std Error	t-Statistic	Prob.
RGDP _{gr t-1}	- 0.453421	0.165070	- 2.746832	0.0226
LEB	0.020399	0.166028	0.122862	0.9049
MMR	- 1.867438	1.029033	- 1.814810	0.1029
IMR	1.932677	0.973003	1.986301	0.0783
HIV/AIDS	1.056879	0.230569	4.579445	0.0013
THE	- 0.689797	0.329268	- 2.094940	0.0657
C	26.98956	10.81343	2.496931	0.0341
R-Squared	0.837124	Mean Dep. Variable	6.635625	
Adjusted R-Squared	0.728539	SD dep. Variable	2.178278	
S.E of Regression	1.447536	Akaike Inf. Criterion	3. 877237	
Sum. of Sq. resid.	18.85822	Schwarz Criterion	4.215245	
Log Likelihood	- 24.01790	F-Statistic	7.709439	
Durbin-Watson Stat.	2.114716	Prob. (F-Statistic)	0.003817	

Source: Own computation, using E-views 7.0

The regression results as presented in table (3) are estimated in accordance with the model specification in equation (5). The parameter estimates are done at 5 percent level of significance to show the relationship between the health components of the MDGs and economic growth in Nigeria. The results are plausible because the t-statistics corresponding to each of the parameter estimates are statistically high while the coefficient of determination (R^2) which measures the goodness of fit of the model is equally high and significant. This shows that the explanatory powers of the regression equation are equally high. It means that about 84 percent of the total variation in the real GDP growth rate is explained for by the regressors of the model (the health related MDGs). The value of the Durbin-Watson (D-W) test of 2.114716 reveals that autocorrelation is not a problem.

Evidence from the regression estimates shows that real GDP growth rate would rise by about 2 percent (0.020399) for every one unit improvement in life expectancy at birth (LEB), holding other variables constant. This is because improvement in individual's life expectancy enables such an individual to contribute meaningfully towards the growth of the economy.

The result also revealed that real GDP growth rate would decline by over 100 percent (-1.867498) for every unit increase in maternal mortality rate (MMR), holding other variables constant. A reasoning behind this result is that a worsening maternal mortality rate would result in declining growth rate as fewer women would be available to work toward the growth of the economy.

The result further reveal that economic growth rate would rise by over 100 percent (1.932677) for every one unit improvement in infant mortality rate (IMR), holding other variables constant. This means that improvement in child survival helps to grow the economy in the future – thereby, resulting in aggregate economic growth.

Similarly, real GDP growth rate would rise by over 100 percent (1.055879) for every one unit change (improvement) in the HIV/AIDS, holding other variables constant. This means that as the rate of infection declines, individuals are better able to contribute towards the growth of the economy.

In the same vein, economic growth would decline by about 69 percent (-0.689797) for every one unit decline in health sector expenditure, holding other variables constant. That is, as public expenditure decline, more individuals may be prone to contacting infections with its effect on weakening immune system, thus, making them not being able to work towards the growth of the economy.

Finally, real GDP growth rate would decline by about 45 percent (-0.453421) for every one unit decline in the previous year real GDP growth rate, holding other variables constant. This value is the coefficient of error correction model which is negative, indicating the speed of adjustment at which real GDP growth rate returns to its long-run equilibrium position after its deviation from the steady state.

5. Conclusion and Recommendations

This study has empirically investigated the impact of the health – related Millennium Development Goals on economic growth in Nigeria for the period 2000- 2015. The study was conducted with the objective of identifying whether the MDGs has enhanced improvement in health systems development and to assess whether there exist any relationship between health sector expenditures and the growth of the Nigerian economy. The regression results shows the existence of a positive relationship between economic growth and three key variable of health system performance such as life expectancy at birth, infant mortality rate and new cases of HIV/AIDS.

The implication of this finding is that improvement in life expectancy is necessary to combat the rate of infant mortality and morbidity and reduction in HIV/AIDS to guarantee economic growth and sustainability.

The results also show that material mortality rate and the public expenditure exhibited negative relationship with economic growth for Nigeria. The implication here is that while the prevalence of maternal mortality rates and inadequate funding of the health sector affects the productivity of an individual which limit income generations, retard investment and weaken the growth rate of the economy. These are fundamental health problems that affect the stock of human health in the economy that need urgent attention in the quest to achieving the Sustainable Development Goals (SDGs) being currently implemented across the globe.

Based on the findings of this study, the following recommendations are made:

1. There is the need to increase public expenditures on health at all levels of government to accommodate improved health and nutrition and to promote longevity of life so that individuals could contribute meaningfully to economic growth and development.
2. There should be a conciliation and integration of material and child interventions by targeting the high risk and vulnerable women and children to minimize incidence of morbidity and mortality. This is to halt the persistence of material mortality and infant mortality rate to a minimal level, and to address some of the fundamental ecological factors of mothers and children.
3. There is the need to speed up efforts to track down the unending spread of HIV/AIDS in the country through adequate sensitization and enlightenment programmes. This can be achieved by conscientizing individuals against high risk behaviour of contracting the dreaded disease of HIV/AIDS. Measures to be adopted should include regular voluntary HIV/AIDS testing and counseling, expanding the distribution of antiretroviral drugs among other measures.

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