Analysis of Public Health Expenditure and Health outcome in Nigeria

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Abstract
The study critically investigated the effect of public health expenditure in Nigeria considering its outcome by life expectancy at birth and infant mortality rates. The study made an attempt to provide empirical evidence of the impact of public health spending on health outcomes in Nigeria with secondary data spanning from 1980 and 2018. Therefore, the study made use of the Johansen Co-integration and the Vector Error Correction Model (VECM) econometric technique to determine the long-run relationship between public spending on health and health outcomes in Nigeria. The result indicated that public spending on health has a significant relationship with health outcomes in Nigeria. It was also discovered that environmental factors such as carbon dioxide emissions which was used in this study affects individuals' health. Furthermore, the results showed that an increase in public health expenditure in Nigeria improves life expectancy and reduces infant mortality rates for about 12%. In addition, urban population and HIV prevalence rate significantly affects health outcomes for about 50% while per capita income exhibits no effect on health outcomes in Nigeria. Therefore, based on the findings, the study recommends that government should introduce programmes, like health inspectors going round to create awareness and health seminars that will cause awareness concerning the effect of carbon dioxide emissions on individual's health and should enact stiff penalty measures on those people and industries who default in community sanitisation. Also, the government should increase and restructure the public expenditure allocation to the health sector in Nigeria in order to reduce to the barest minimum the crowding out effect.

Keywords: *Health expenditure, health outcome, infant mortality rate*

1. Introduction

Health is a prominent part of human capital along with education. Lichtenberg (2004) argued that more public health services could enhance the level of life expectancy. An increase in government spending not only leads towards longer life and hence faster economic growth as reinforced by that long life, but implies a larger work force, which can also drive faster growth (Aisa Pueyo, 2004). Studies like Dauda (2004) revealed that a healthy person not only works efficiently but is also able to devote more time to economic activities that increase productivity. It is estimated that health improvements accounts for one-third increase in GDP growth (Bloom & Sevilla, 2004).

In recent years, impact of human capital formation, especially health status is realized to be an important predictor of economic growth not only in individual countries but across countries and over time (Bhargava, 2012). Consequently, health services and its likely impact on individual's well-being and on economic development received immense importance at various levels (Frank & Mustard, 1994). The availability of healthcare services and the physical, biological, epidemiological and socio-economic environment in which a person lives, broadly determines the disease pattern, health status and generally the quality of life which reflects on the welfare of an individual. Long term impact of health on economic growth can be understood in the more general context of the relation between human development and economic growth. Human development is understood as an intergenerational process of human capital accumulation that is slowed down by market failures that can be strong enough to result in poverty traps.

Health is a very important aspect of an individual's wellbeing, and since individuals make a nation, therefore, healthcare could be regarded as one of the necessary conditions to achieving a sustainable long-term economic development. The significance of this study arises from the need to examine the relationship between public health expenditure and health outcomes in Nigeria and to

understand the distribution of household health expenditure in Nigeria across socioeconomic groups. Against this background, that the study examines the impact of the public health expenditure on health outcome in Nigeria. Following this introduction, the remaining part of the study is structured as follows: Section two, presents the literature review and the theoretical framework. The methodology of the study is discussed in section three. Data analysis and interpretation of result is the main thrust of section four while section five draws up policy implication and conclusion.

2. Theoretical Framework and Literature Review

2.1 Theoretical Framework

i. Health Belief Model

The health belief model (HBM) is a conceptual framework that attempts to explain and predict health-related behaviour, particularly in regard to the uptake of health services (Jenz & Becker, 1984). If a person does not perceive a health care behaviour as risky or threatening, then there is no stimulus to act. For example, if a smoker does not feel that he is at risk of developing lung cancer, he has no reason for behaviour change. The model postulates that health-seeking behaviour is influenced by a person's perception of a threat posed by a health problem, and the value associated with actions aimed at reducing the threat. Hayden (2009) explained that the underlying concept of HBM is that health behaviour is determined by personal beliefs or perceptions of a threat posed by a health challenge, and the strategies available to decrease its occurrence. The greater the perceived risk, the greater the likelihood of engaging in behaviour that will decrease the risk. For example, people using condoms to decrease susceptibility to HIV infection, or vaccination for influenza, measles, and polio among others (Hayden, 2009).

The HBM proposes that a person will change or adopt a health-related behaviour when the following four conditions for change exist;

a. The person's susceptibility to illness or health condition - the person believes that he or she is at risk of developing a specific condition;
b. The severity of a potential illness that is the person believes that the risk of developing an illness or condition is serious and the consequences are undesirable;
c. The benefits of taking a preventive action - the person believes that by undertaking a specific behaviour change the risk will be reduced; and
d. The barriers to taking that action - the person believes that barriers to the behaviour change can be overcome and managed. The model therefore consists of four main constructs; namely, perceived susceptibility, perceived severity, perceived benefits and perceived barriers. Perceived susceptibility examines the individual's opinions about how likely the behaviour they partake in is going to lead to a negative health outcome. It refers to one's subjective perception of the risk of contracting an illness, injury or death (Janz & Becker, 1984; Rutherford & Vasarhelyi, 2006). Perceived severity refers to subjective assessment of the seriousness of the health condition and its potential consequences (Glanz, Rimer & Viswanath, 2008; Janz & Becker, 1984). Though, perception of seriousness is often based on information or knowledge about the condition, it may also come from a person's beliefs on the disease itself (example, whether it is life-threatening or may cause disability or pain) as well as broader impacts of the disease on his/her life in general. For example, an individual may perceive flu as a relatively minor ailment, but if he/she is self-employed, having the flu might have serious financial consequences as a result of being absent from work for several days. This would influence his/her perception of the seriousness of this illness. Health-related behaviour is also influenced by the perceived benefits of taking an action (Glanz et. al, 2008). Perceived benefits refer to an individual's beliefs regarding the effectiveness of engaging in a health-promoting behaviour to reduce risk of disease (Janz & Becker, 1984). Thus, the individual must have the expectation that the new behaviour will be beneficial.

2.2 Healthcare Delivery System and Health Expenditure in Nigeria

Table 1**:** Indicators of health expenditure in Nigeria

	2000	**2005**	**2009**	**20013**	**2018**
Total expenditure on health as % of GDP	4.6	5.2	6.6	5.8	3.9
General expenditure on health (GGHE) as % of THE	23.5	31.4	29.2	36.3	15.6
Private expenditure on health (pvtHE) as % of THE	76.5	68.5	70.8	67.3	66.8
Out-of-pocket expenditure as % of pvtHE	94.6	91.4	95.8	95.6	95.8

Source: http://apps.who.int/nha/database

The responsibility of health services provision in the public sector rest on the government. Government financing of healthcare has for many years contributed less than 20% of total health financing in the country, while out-of-pocket financing has been constantly higher than 67% of total healthcare financing (Olaniyan, Oburota, & Obafemi, 2013). This account for unequal access to healthcare as the poor will be unable to meet healthcare needs, and where they meet these needs it will be done at great 'displacement effects' of other essential household needs (Ichoku, & Fonta, 2009). The dominance of out-of-pocket health financing in the Nigerian

The table above shows that government expenditure on healthcare has been generally low. Government expenditure as a percentage of GDP was 4.6% in 2000; it rose in 2009 to 6.6% and fell to 5.8% in 2013. It fell further in 2018 to 3.9%. Government expenditure as a percentage of total health expenditure has been fluctuating, it was 23.5% in 2000, it rose to 31.4% in 2005 and it fell again in 2009 to 29.2%. It rose again in 2013 to 36.3% and fell drastically in 2018 to 15.6%. This is an indication of inadequate commitment towards the financing of the Nigerian health system.

Table 2: Total Federal Allocation to Health (2010-2018): Recurrent vs. capital

Year	**Recurrent Expenditure (NGN billion)**	**Capital expenditure (NGN billion)**	**Total expenditure (NGN billion)**	**% recurrent**	**% capital**
2013	103.8	50.8	154.6	67	33
2014	111.9	53.0	164.9	68	32
2015	203.3	63.4	266.7	76	24
2016	217.8	65.0	282.8	77	23
2017	215.0	64.2	279.2	77	23
2018	216.4	46.3	262.7	82	18

Source: Budget Office of the Federation, Federal Ministry of Finance, 2018

From the above table, the proportion of recurrent expenditure allocation to health in Nigeria has increased from 67% in 2013 to 82% in 2018 and the capital expenditure to health decreased all through the years from 33% in 2013 to a far smaller 18% in 2018.

Table 3: Federal Allocation to health in relation to the total budget and GDP

Year	Total allocation (NGN billion)	Allocation to health (NGN billion)	As percentage of total budget	GDP (NGN billion)	As percentage of GDP
2014	3557.7	154.6	4.3	25,102.44	0.6
2015	4427.2	164.9	3.7	30,980.84	0.5
2016	4971.9	266.7	5.4	36,123.11	0.7
2017	4877.2	282.8	5.8	42,132.16	0.7
2018	4920.0	279.2	5.7	63,504.00	0.4

Source: Budget Office of the Federation, Federal Ministry of Finance, 2018

Federal government allocation to health increased drastically from NGN154.6 billion in 2014 to NGN279.2 billion in 2018. Health expenditure as a percentage of total budget is far less than the 15% commitment required by the Abuja and Gaborone declaration. The highest was in 2017 and it stood at 5.8%.

2.3 Literature Review

Most of the studies done in this area for instance in Nigeria, examined the impact of health expenditure or health status on economic growth. Dauda (2004) analyzed the impact of healthcare spending on health outcome in Nigeria, by adopting the neo-classical growth model. The study used the ordinary least square methods of estimation and found a positive relationship between health care expenditure and health outcome. Filmer and Pritchett (2009), in their own work found that public spending and health outcome are tenuously related. According to them doubling public spending from 3 to 6 percent of GDP would improve child mortality by 9 to 13 percent. Surveying the literature on the link between public expenditure and outcome, Pritchett (2016), notes that all of the negative or ambivalent findings on the effect of public spending on outcomes could potentially be a reflection of differences in the efficacy of spending which could arise due to a variety of reasons including corruption and patronage. Besides, it is also noted that the link between public spending and outcomes could be broken by the displacement of private sector effort in public spending. This argument is eloquently made in Filmer and Pritchett (2009) while commenting on the weak links that several studies have found between public spending on health and health status. Although in most of the studies where public spending is found to have low or negligible impact, it is argued that public provision could lead to a "crowdingout" of private sector provision, but have failed to question the efficacy of public spending.

For instance, Anyanwu and Erhijakpor (2007) carried out a study on health expenditures and health outcomes in Africa and provided econometric evidence linking African countries' per capita total as well as public health expenditures and per capita income to two health outcomes: infant mortality and under-five mortality. This was based on data from 47 African countries. Health expenditures were found to have significant effect on infant mortality and under-five mortality. The results imply that for African countries, total health expenditures (as well as the public component) are certainly important contributor to health outcomes. In addition, infant and under-five mortality were found to be positively related to health outcome for Sub-Saharan Africa. The reverse is true for North-Africa where ethno-linguistic fractionalization and HIV prevalence positively affect health outcome while higher numbers of physicians and female literacy reduce these health outcomes.

Novignon, Olakojo and Nonvignon (2012), carried out a study to determine the effects of public and private healthcare expenditure on health status in44 Sub-Saharan Africa countries for the period 1995-2010. Fixed and random effects panel data regression models were fitted to determine the effects of healthcare expenditure on population health status and to examine the effect by public and private expenditure sources. The obtained result showed that healthcare expenditure significantly influences health status through improving life expectancy, reducing death and infant mortality rates. Both public and private healthcare spending showed strong positive association with health status even though

public healthcare spending had relatively higher impact.

Boachie and Ramu (2015) examined the relationship between public health expenditure and health status in Ghana employing data for the period 1990-2014 using the standard OLS and Newey-White estimation technique. The study found evidence that the declining infant mortality rate in Ghana is explained by public health spending among other factors. Thus, they concluded that public healthcare expenditure is associated with improvement in health status through reduction in infant mortality. Also, using panel data set of Indian states between 1983-84 and 2011-12, Barenberg, Basu and Soylu (2015) studied the impact of public health expenditure on the infant mortality rate, after controlling for other relevant explanatory co-variables like per capita income, female literacy, and urbanization. The study found that public expenditure on healthcare dampens infant mortality rate. The baseline specification shows that an increase in public health expenditure by 1% of state-level GDP leads to a decrease in the infant mortality rate by about 8%. The study also finds that female literacy and urbanization also reduce the infant mortality rate.

Akinci, Samer, Farrukh and Akhmedjonov (2015), examined the impact of healthcare expenditures on selected health outcomes for 19 countries in the Middle East and North Africa region. Using panel data for 1990-2010, the study estimated the impact of both government and private healthcare expenditures on infant, under-five and maternal mortality rates. The results showed that, government and private spending on healthcare significantly improve infant under-five, and maternal mortality in the region, though it impact is not significant. In specific terms, a percentage increase in per capita government expenditure reduces the infant mortality rate by 8.6-9.5%, under-five mortality by 10.3-12 %, under-five deaths and maternal mortality by 26.0-26.3%. In the same vein, a percentage increase in the log per capita private expenditures reduces the infant mortality rate by 7.2-8.1%, under-five mortality rate by9.5-9.8% and the maternal mortality rate by 25.8-25.9%.

The past empirical studies on the relationship between healthcare expenditures and health sector outcomes provide conflicting views. For example, the studies of Anand and Ravallion (2013), Patricio, Edward, Rifat, and Sevil Salakhutdinova (2008) and Imoughele and Ismaila (2013) revealed a positive relationship between public healthcare expenditure and health sector performance for Sri Lanka, Russia and Nigeria, respectively. On the other hand, Filmer and Pritchett (2009), Musgrove (2006) and Kim and Moody (2012) found no relationship on these variables. Filmer and Pritchett (2004) identified that rather than the public health expenditure, the level of poverty, income inequality, female education, and other socio-economic factors are the main determining factors of child mortality. Further, a World Bank study on Indian states during 1980-99 used panel data, and found no effects of healthcare expenditure on infant mortality rates (World Bank 2014), which are similar to the findings of Burnside and Dollar (2008). Some other studies like Zakir and Wunnava (2009), Nolte and Mckec (2004) and Young (2001) also found no significant and consistent relationship between health spending and health outcomes.

This research study filled the gap in the literature as replete with works on the relationship between public expenditure and outcome. For instance, the several endogenous growth models link public health spending with the economy's long-term growth as evaluated in the study which portraits the real life situation. However, Barro (2010), Levine and Renelt (2012), Ricci and Zachariad (2006), Sparrow, Pradhan and Kruse (2009) among others have examined the relationship between public health spending and economic growth. In order to investigate the determinants of public health outcomes in a macroeconomic perspective, taking into cognizance households' choices concerning education, health related expenditure and saving. They found evidence for a dual role of education as a determinant of health outcomes and analyzed the impact of healthcare spending on health outcome in Nigeria, by adopting the neo-classical growth model. Most of these studies used the ordinary least square methods of estimation and found a positive relationship between health care expenditure and health outcome. This study filled the divergent in

other studies and found that public spending and health outcome are tenuously related. Therefore, all of the negative or ambivalent findings on the effect of public spending on outcomes could potentially be a reflection of differences in the efficacy of spending which could arise due to a variety of reasons including corruption and patronage. Besides, this study established the gab notably that the link between public spending and outcomes could be broken is the displacement of private sector effort by public spending.

3. Methodology

The specification of the model is consistent with literature and allows for the identification of the channels through which government expenditure and other policy interventions affect these health outcomes over time. Thus, the empirical model was stated as:

$HEOU = f(PHE, PCI, UPOP, HIVP)$ …….(1)

The linear form of the model is specified as;

$HEOU = \beta_0+\beta_1 PHE_t+\beta_2 PCI_t+\beta_3 UPOP_t+\beta_4 HIVP_t+\mu_t$ ……..... (2)

Considering life expectancy and infant mortality rates respectively as proxy for health status, equation (1.2) above can be re-specified as:

$LEXP_t = \varphi_0+\varphi_1 PHE_t+ \varphi_2 PCI_t+ \varphi_3 UPOP_t+ \varphi_4 HIVP_t+\mu_t$ …….... (3)

$IMR_t = \chi_0+\chi_1 PHE_t+\chi_2 PCI_t+\chi_3 UPOP_t+\chi_4 HIVP_t+\mu_t$ ……..... (4)

Where HEOU= Health outcomes,
LEXP= Life expectancy at birth (measured by LE at birth per 1000 live births),
IMR= Infant mortality rates (measured by IMR per 1000 live births),
PHE= Public health expenditure (measured by percentage of total health expenditure),
PCI= per capita income (measured by GDP per capita (constant USD),
UPOP= Urban population (measured by percentage of total urban population),
HIVP=HIV prevalence rate (measured by total prevalence of HIV).

This paper used annual data to examine the interactive impact of the public health expenditure on health outcome in Nigeria using secondary data that covers the period between 1980 and 2018. The annual time series for all the variables were obtained from Statistical bulletin, annual reports, World Development Indicators and Statement of Account of Central bank of Nigeria. All the variables are expressed in log forms before the analysis. The population of the studies covers all the health variables in Nigeria. However, the samples are life expectancy, infant mortality rate, public health expenditure, per capita income, urban population, HIV prevalence rate.

4. Discussion of Findings and Testing of Hypothesis

The result indicated that a unit increase in public health expenditure will lead to a 0.03% increase in life expectancy (see table 6 in the appendix page). The positive relationship between public health expenditure and life expectancy in Nigeria can be largely attributed to the persistent increase in demand for improvements in health care services by the population. The coefficient of per capita income implies that on the average, a unit increase in per capita income increases life expectancy by 0.00%. As per capita income keeps increasing, it would reflect in the disposable income of the individuals and improve their access to healthcare services. Increased access to healthcare will also increase health status and improve life expectancy. There is a positive relationship between urban population and life expectancy. Holding all the other explanatory variables constant, on the average, a one percent increase in urban population will lead to an increase in life expectancy by 0.45%. The positive relationship can be largely attributed to the fact that residents in the urban areas tend to adopt more health improvement techniques, largely due to their increased knowledge of the benefits of better health status, as compared to their counterparts in the rural areas and this accounts for the difference between concentration of health care services which are more in the urban areas than in the rural areas. The difference in healthcare concentration revealed the effect of urban population on improving life expectancy in Nigeria. The coefficient of HIV prevalence rate of -0.51 indicated that holding all other explanatory variables constant, on the average, a one percent increase in HIV prevalence rate will result to a decrease in life expectancy by 0.51 percentage point. The reason for the negative relationship is because HIV is a virus that

renders the human immune system weak and vulnerable due to the death and loss of anti-bodies in the cells, which leads to the entrance of various diseases and deterioration in health status. The deterioration in health status thereby reduces life expectancy in Nigeria.

A unit increase in public health expenditure decreases infant mortality rate, by 0.35% on the average (see table 7 in the appendix page). The negative relationship can be largely attributed to the persistent increase in demand for improvements in healthcare services by the population. Similarly, the coefficient of per capita income of -0.01 implies that on the average, a unit increase in per capita income decreases infant mortality rate by -0.01%. Also the negative relationship between urban population and infant mortality rate means that an increase in urban population decreases infant mortality rate by -2.92%. The negative relationship between urban population and infant mortality rate in Nigeria can be largely attributed to the fact that residents in the urban areas tend to adopt more health improvement techniques, largely due to their increased knowledge of the benefits of better health status, as compared to their counterparts in the rural areas and this accounts for the difference between concentration of health care services which are more in the urban areas than in the rural areas. This difference in health care concentration revealed the effect of urban population on a decreasing infant mortality rate in Nigeria. The coefficient of HIV prevalence rate means that holding all other explanatory variables constant, on the average, a one percent increase in HIV prevalence rate will result to an increase in infant mortality rate by 2.95%.

When variables are co-integrated, it means that there is a long run relationship among them. Despite this long run relationship, there can be disequilibrium in the short run. As shown in the result of the Johansen co-integration discussed earlier in which there is a long run relationship among the variables, the Vector Error Correction Mechanism (VECM) had to be carried out on the results. This aims at examining the reconciliation among the variables. The VECM measures the speed of adjustment from short run disequilibrium to long run equilibrium. The coefficient of the VECM measures the speed at which the level of the dependent variable adjusts to changes in the explanatory variables in an effort to achieve long run static equilibrium. The assumptions of the VECM are that the value lies between 0 and 1 and it has a negative sign (see table 8).

5. Summary of Findings and Conclusion

This study had examined public health expenditure and health outcomes in Nigeria. Based on the findings of this study, it was seen that public health expenditure has a positive relationship with health outcomes in Nigeria. The government expenditure on health is positively related to life expectancy. Therefore, the null hypothesis of hypothesis one is rejected. This implies that the current and past government expenditure in the health sector have significant impact on health outcomes but does not reflect in the efficiency of health outcomes which is proxied by life expectancy in this study. Several factors such as air pollution, hospitals, provision of adequate drugs amongst others were identified as being important in determining health outcomes in Nigeria. Therefore, policy makers must take note of this and implement policies which will give good and favourable results. Health and environmental factors also go hand in hand, and they should be given adequate attention as well. Based on the findings of this study, the following recommendations are made: The Federal Government of Nigeria (FGN) should increase and restructure the public expenditure allocation to the health sector in order to provide more health facilities, drugs, laboratories, equipment, amongst other things). However, government should concentrate on its redistributive role of income through her fiscal policy in order to bridge this income inequality gap and enhance the significance of per capita income on improving health outcomes. Similarly, government should formulate and engage in scale-Up gender sensitivity reduces HIV and AIDs prevention prevalence rate among in the society.

From the results in Table 8, it is observed that the VECM of LnLEXP is 9.7 percent. This showed that 9.7 percent errors made in a particular year are corrected in the subsequent year. Also, the VECM of the LnPSER showed that 39 percent errors made in a particular period are corrected in the subsequent year. This means that they both met the requirements for this test which is a negative coefficient and these variables showed convergence in the long

run. Based on the results, there is a statistically significant relationship between public health expenditure and health outcomes. The government expenditure on health is positively related to life expectancy. Therefore, the null hypothesis of hypothesis one is rejected. This implies that the current and past government expenditure in the health sector have significant impact on health outcomes but does not reflect in the efficiency of health outcomes which is proxied by life expectancy in this study. In Nigeria, this may be due to the wrong channeling of funds and corrupt practices of the leaders coupled with the problem of brain drain and frequent strikes by health officials. This is in line with the findings of Issa and Ouattara (2015) who found that there was a negative relationship between health expenditure and health outcomes.

From my emperical theoretical and practical discussions/evidences, this result support the opinion and work of Dauda (2004), who analyzed the impact of healthcare spending on health outcome in Nigeria, by adopting the neo-classical growth model. The study used the ordinary least square methods of estimation and found a positive relationship between health care expenditure and health outcome. However, the result is different from the opinion of Nolte and Mckec (2004) and Young (2001) who found no significant and consistent relationship between health spending and health outcomes.

Suggestion for Further Studies

From the foregoing, the study suggested some research problem for further studies.

1. Public health expenditure and health Outcome in Nigeria: The impact of governance.
2. Distributional Analysis of Household Health Expenditure in Nigeria.
3. Financial Protection and Universal Health coverage in Nigerian.
4. Socioeconomic and Policy context of the Nigerian Health Care Financing System

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APPENDICES

Table 4: Argumented Dickey Fuller (ADF) Test

Variables	ADF (Levels)	Remarks	ADF (First Difference)	Remarks
	Intercept		Intercept	
lnLEXP	-3.843761	I(1)	-3.397660	I(1)
lnPHEX	-0.880489	I(0)	-6.436215	I(1)
lnPSER	-2.802768	I(0)	-3.535378	I(1)
lnCADEM	-1.904100	I(0)	-5.5814664	I(1)
Critical values at 5% significance level				
Levels	-2.960411		-3.568379	

Source**:** *Estimated by the Researchers, 2019*.

Table 5: Test of Co integration

Hypothesized No. of CE(s)	Eigen Value	Trace	5% Critical value	Prob.**	Max- Eigen	5% Critical Value	Prob.**
None *	0.770051	72.31779	40.17493	0.0000	42.62706	24.15921	0.0001
At most 1 *	0.492156	29.69073	24.27596	0.0094	19.64984	17.79730	0.0260
At most 2	0.230062	10.04089	12.32090	0.1170	7.581901	11.22480	0.2030
At most 3	0.081297	2.458993	4.129906	0.1380	2.458993	4.129906	0.1380

Source: *Estimated by the Researchers, 2019*.

Table 6: Regression Result of the Effect of Public Health Expenditure on Life Expectancy

Variables	**Coefficient**	**Standard Error**	**t-Value**	**Probability**
Constant	31.0022	0.7971	38.8895	0.0000
PHE	0.0275	0.0046	5.9432	0.0000
PCI	0.0014	0.0007	1.9601	0.0600
UPOP	0.4534	0.0335	13.4954	0.0000
HIVP	-0.5140	0.0807	-6.3663	0.0000
R-squared			0.9933	
Adjusted R-squared			0.9924	
Durbin-Watson statistic			0.7749	
F-statistic			1050.927	

Source: *E-View Output, 2019.*

Table 7: Regression Result of the Effect of Public Health Expenditure on Infant Mortality Rates

Variables	**Coefficient**	**Standard Error**	**t-Value**	**Probability**
Constant	241.1024	6.5828	36.6257	0.0000
PHE	-0.3468	0.0382	-9.0738	0.0000
PCI	-0.0111	0.0059	-1.8706	0.0719
UPOP	-2.9162	0.2774	-10.5110	0.0000
HIVP	-2.9550	6.5828	-0.4490	0.0001
R-squared			0.9937	
Adjusted R-squared			0.9928	
Durbin-Watson statistic			1.1211	
F-statistic			1112.431	

Source: E-View Output, 2019.

Table 8: Vector Error Correction Mechanism Result

Variable	LnLEXP	LnPSER
ECM	-0.096949	-0.386866
T-STAT	[-2.10909]	[-2.16441]

Source: *Estimated by the Researchers, 2019*