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Private Health Care Finance and Infant Mortality Rate in Nigeria

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Abstract

The study examines private health care finance and infant mortality rate in Nigeria from 1980-2020. To facilitate this study, data were sourced from World Bank database and analyzed using the ordinary least square (OLS) regression method. The result revealed that private health expenditure, per capita income and percentage of children immunize against diseases and infections are significant factors that affect infant mortality rate in Nigeria. It was therefore recommended among others that there is need for teamwork amongst public and private sectors in providing quality and quantitative health facility to meet the demand of Nigerians and this will in turn, decrease the problem on the government. Also, government should intensify immunization programs and activities to help protect infant from being infected with diseases

Keywords **:** Infant mortality, private healthcare finance, out-of-pocket expenditure, per capita income and immunization.

INTRODUCTION

Health care is a basic requirement for achieving a sustainable long-term economic development which necessitates for calls to expand private health financing to advance the efficiency of health systems (Reynolds and McKee, 2012). In low and middle-income countries seeking to increase access to health care, it is sometimes suggested that private financing is more effective than public financing because of the bureaucratic shortcomings (Pauly et al., 2006).

Infant mortality is regarded as one of the most important factor that determines the availability, utilization and effectiveness of healthcare. It reveals the socio, economic and environmental inequalities in numerous emerging countries (Eboh, Abba and Fatoye, 2018). The possibility of an infant dying before attaining the age of one was foremost in the World Health Organization (WHO) African Region (51 per 1000 live births), which is over six times higher than that in the WHO European Region (8 per 1000 live births). Several factors are considered to be accountable for the high rate of infant mortality in developing countries; the most frequently sighted factors in previous studies have been the level of female education, per capita income, expenditure on health, etc. (Hug et al 2017, Issa and Ouattara, 2005, Kiross, 2018)

In Nigeria, infant mortality has remained seemingly high. About 9% deaths of new-born babies in the world in 2015 occurred in Nigeria, consequently placing Nigeria as the third

country with highest infant mortality after India and Pakistan. It recorded 69.4% death rate per 1,000 infants, though this rates are higher in rural areas compared to their urban counterparts. (Owoseye, 2017)

It is observed that previous studies have not really address the issue of private healthcare finance on health output in Nigeria. This study therefore seeks to examine private healthcare finance and Infant mortality in Nigeria.

REVIEW OF RELEVANT LITERATURES

Private Health Care Finance

Private health care finance simply means the payment for direct health care services, such as medicines, consultation fees, and laboratory diagnostic tests by individuals, communities, non-governmental agencies, etc. It encompasses a sizeable portion of household expenditure and has been on the increase, etc.

Private health finance constitutes the greatest proportion of total health spending in Nigeria. For instance, household out-of-pocket spending averaged 64.5% between 1998 and 2002. In 2000, out-of-pocket health spending of households, health insurance and non-governmental agencies (NGOs) put together accounted for a total of N116.0 billion which was 73.9% of total health spending. This means that just a little over a quarter of total health spending was channelled through public spending on health. Such out-of-pocket payment for health care in most developing countries, including Nigeria, signifies the level of insufficient investment in the health sector by government and this is accountable for the medical poverty trap (Adetunji, Mafe, Onajole and Lambo, 2008).

With growing levels of disposable income amongst some divisions of the society, inadequate supply of public hospitals which are not adequately funded, there is a larger demand for private sector involvement in the provision of health care facilities. The extent to which private health-care spending affects the health system, seems to depend on the effectiveness of policies and institutions.

Private Health Care Financing Options

Out-of-Pocket Finances

Out-of-pocket finances are personal payments made by a patient to a health service provider without recompense. It occurs when patient are made to pay directly for the service rendered to them. This is called user fees and it ranges from drug costs, medical material costs, entrance fees, and consultation fees. (Lagarde & Palmer, 2006). Evidence from previous research reveals that private health spending accounts for about 64% of total health spending and could be more than US$ 23 per capita. The results further provide confirmation on the impoverishing effect of healthcare payments on households. Households are estimated to spend more than 4% of their total earnings on health care while about 12% spend more than a quarter (FRN, 2006). In Nigeria, out-of-pocket payments for health care account for the highest percentage of health spending. According to Soyibo et al, (2009), out-of-pocket spending averaged about 64.59% from 1998 to 2002. In 2003, it rose to 74% and reduced to 66% in 2004 and later increased to 68% in 2005. This suggests that households carry the utmost problem of health spending in Nigeria.

Donor Financing

This is financing of health care by external agencies and non-governmental organizations such as the "World Health Organization, World Bank and United Nations Children Fund. The annual average external financing inflow from 1999 to 2007 was estimated at US$ 2.335 and US$4.674 per capita, respectively (United Nations Development Program UNDP, 2011). These figures are way below the Sub-Saharan African average of US$28 per capita (7.57). The contribution of developmental assistance to health care financing in Nigeria was valued as N27.87 billion (4% of total health care spending) in 2003. This increased by 29% to

N36.04 billion (4.6% of total health care spending) in 2004 and by just 1% to N36.30 billion (4% of total health care spending) in 2005 (Soyibo et al, 2005)". Although the international assistance to the Nigerian health subdivision is growing, it still accounts for a small percentage of public health expenditures. The united states agency for international development USAID during the World Economic Forum on Africa which was held in Abuja Nigeria between 7th to 9th may 2014, announced a US$20 million scheme to provide affordable financing options and increase capacity in Nigeria Primary Health care system to assist in preventing infant, child and maternal mortality (FMoH, 2014).

Community Based Health Insurance

Community based health financing is a system where households in a community finance or co-finance the costs linked with a given set of health services, thereby taking part in the management of the community financing scheme and organization of health services. A scheme can involve the direct payment of health services or health services inputs such as drugs, payment of user fees via the scheme, or community based health insurance. Community health insurance is usually a voluntary health insurance schemes that are labelled otherwise as mutual health insurance schemes or mutual health organization, (HMO) and medical aid societies or medical aid schemes. Their common features however is that they are operated are as a non-profit making body and they apply the basic principle of social health insurance. (Obansa and Orimisan, 2013).

Infant Mortality

Mathews and MacDorman (2013) defines Infant mortality as the death of young children under the age of one. This is the probability of deaths of children under age of one year per 1000 live birth or number of infant deaths for every 1,000 live births. The infant mortality rate for Nigeria has been on the decrease as recorded in 2018 which is 62.142 deaths per 1000 live births, a 3.97% decline from 2017. In 2019 it reduced to 60.662 deaths per 1000 live births, a 2.38% decline from 2018. In 2020 it further reduced to 59.181 deaths per 1000 live births, a 2.44% decline from 2019. Currently, infant mortality rate for 2021 stands at 57.701 deaths per 1000 live births, a 2.5% decline from 2020.

Empirical Review

Novignon, Olakojo and Nonvignon (2012), examined "public and private health care spending on health status in sub-Saharan Africa" using panel data on 44 Sub-Saharan African countries from 1995 to 2010. They employed fixed and random effect panel regression analysis. Their result shows that both public and private expenditure on health significantly decrease the rate of infant mortality in the 44 Sub-Saharan African countries. Kim and Lane (2013) examined the impact of public health spending on infant mortality and life expectancy. Their result shows that while public health expenditure negatively and significantly influences infant mortality but positively influence life expectancy at birth.

Shetty and Shetty (2014) studied the correlation amid health expenditure and the rate of infant mortality using the data from 34 Asian countries. Their study found a significant inverse association amid health expenditure and the rate of infant mortality. Rana and Srinivas, (2017) studied the Effects of Public and Private Health Care Spending on Child Mortality in Developing Countries. The findings from Random Effects models suggest that the total health care spending has significant negative effect on child mortality. The public spending is negatively associated with child mortality but the private spending is not associated, rather it becomes supplementary of the public care spending.

Abdelhafidh (2018) examined the impact of private spending on infant mortality, the study revealed a negative and significant association amid private spending and infant mortality in upper-middle- and high-income countries, but no evidence of such a relationship in the low- and lower-middle-income groups. David (2018), empirically examined the relationship between Infant Mortality and Public Health Spending In Nigeria from 1980 – 2016. They employed Autoregressive Distributed Lag (ARDL) bounds testing approach to co-integration and Granger causality technique. In addition, the study considers the roles of immunization, private health

spending and external health resources on infant mortality in Nigeria. Their results show that, government health spending, private health spending, immunization, and external health resources significantly influence infant mortality negatively both in the long and short term.

Rahman, Khanam and Rahman (2018) conducted study on the association amid health expenditure and infant mortality amongst 15 south Asian countries. Their result showed that total health expenditure, public health expenditure and private health expenditure has a significant effect in reducing infant mortality rate and the extent of the effect is greater with private health expenditure than public health expenditure. Kiross, *et al* (2020), investigated the consequences of health spending on infant mortality in sub-Saharan Africa. The result of their study reveals that both public and external health care spending showed a substantial inverse association with infant and neonatal mortality. However, private health spending was not significantly associated with either infant or neonatal mortality.

METHODS

The study adopted the analytical/causal research design and to ascertain the association amongst the variables, the Ordinary Least Squares (OLS) regression analysis was employed to analyse data which were sources from the world bank database from 1980-2020. The statistical analysis package used for this study is the E-Views 8.0.

Model specification

We adopted the model of David, (2018) and Kiross, (2020) on the study of infant mortality and health spending. The model is specified as follows;

IMR = f(PEX, OPE, PCI, IMMUN)

Putting the foregoing functional relationship in a linear econometrics form, we have;

$IMR_t = \alpha_0 + \alpha_1 PEX_t + \alpha_2 OPE_t + \alpha_3 PCI_t + \alpha_4 IMMUN_t + \varepsilon_t$ ----------(1)

Where;

IMR_t= Infant Mortality Rate

PEX_t= Private Health Expenditure

OPE_t = Out-of-Pocket Expenditure

PCI_t= Per Capita Income

$IMMUN_t$= % of Children less than one immunize against diseases and infections.

ε_t = Error Term

Apriori Expectation

Infant mortality rate (IMR) is expected to have an inverse relationship with private health expenditure, out of pocket expenditure, per capital income, percentage of children less than one year immune against diseases and infection. i.e. $\alpha_1, \alpha_2, \alpha_3, \alpha_4 < 0$

PRESENTATION AND INTERPRETATION OF RESULTS

Table 1: Descriptive Statistics Result

	IMR	PrHEX	OPE	PCI	IMMUN
Mean	96.6	48.39	71.72	1371.92	21.38
Skewness	-0.18	-0.63	-0.78	0.43	0.34
Jarq-Bera	2.50	4.88	3.16	2.92	3.79
Prob	0.29	0.09	0.21	0.23	0.15
Obs	29	29	29	29	29

Sources: Researcher's Computation 2021

The table above shows the descriptive statistics result of the variables used in the analysis. The result shows that from 1990-2018 the average IMR, PrHEX, OPE, PCI and IMMUN variables were 96.6, 48.39, 71.72, 1371.92 and 21.38 respectively. These indicate that the variables exhibit considerable variation in terms of size, suggesting that estimation at levels may introduce some bias in the result. It is observed that per capita income and percentage of children immunise variables are positively skewed, meaning they have been rising overtime. While the variables of infant mortality, private health expenditure and out of pocket expenditure are negatively skewed (suggesting that they have been falling overtime). The descriptive analysis also revealed that private health expenditure was normally distributed, while the other variables were not as observed from the Jarque-Bera probability.

Table 2: Unit Root Test

	Values @ 1^{st}/ 2^{nd} Diff		
Variables	ADF Test Statistic	Critical Value @ 5%	Remark
IMR	-5.710074	-2.981038	/(2)
PrHEX	-8.130069	-2.976263	/(1)
OPE	-4.960809	-2.991878	/(1)
PCI	-3.518204	-2.976263	/(1)
IMMUN	-5.387410	-2.976263	/(1)

Sources: Researcher's Computation 2021

The Augmented Dickey Fuller (ADF) test was employed to test for the presence of unit root in the variables used in the model. The result presented in table 2 above shows that variables were integrated at different levels. In other words, the variables of PrHEX, OPE, PCI and IMMUN were stationary at first difference [/(1)], while the variable of IMR was found to be stationary after second difference i.e. integrated at order one [/(2)].

Table 3: Johanson Co-integration Result

	TRACE STATISTIC		**MAX-EIGEN STATISTIC**	
Hypothesized No. of CE(s)	Trace Statistic	Critical Value @ 5%	Max-Eigen Statistic	Critical Value @ 5%
r = 0*	72.80	69.82	29.94	33.88
r = 1	40.84	47.86	17.01	27.58
r = 2	23.83	29.80	11.37	21.13
r = 3	12.46	15.49	7.94	14.26
r = 4*	4.52	3.84	4.52	3.84

Sources: Researcher's Computation 2021

The co-integration result is in two partitions; the Trace Statistic and the Max-Eigen Statistic. From the trace statistic it can be seen that there are two co-integrating equations, whereas in the Max-Eigen Statistic there is one co-integrating equation. This confirms therefore that there is co-integration between the dependent and the independent variables of each of the model.

Table 4: Vector Error Correction Model (VECM) Result

Explanatory Variables	D(IMR)	D(PrHEX)	D(OPE)	D(PCI)	D(IMMUN)
ECM	-0.013 (-0.356)	-1.017 (-1.209)	0.428 (1.527)	-26.846 (-2.434)	0.494. (1.128)
D(IMR(-1))	0.062 (0.111)	-3.569 (-0.267)	-3.657 (-0.827)	135.397 (-1.752	-2.237 (-0.322)
D(IMR(-2))	0.439 (0.734)	-4.809 (-0.337)	4.997 (1.057)	-321.390 (-1.752)	4.337 (0.584)
D(PrHEX(-1))	-0.005 (-0.286)	0.174 (0.448)	-0.146 (-1.136)	6.430 (1.290)	-0.114 (0.566)
D(PrHEX(-2))	-0.010 (-0.622)	0.175 (0.479)	-0.026 (-0.215)	5.610 (1.198)	-0.152 (-0.803)
D(OPE(-1))	-0.001 (-0.036)	-0.191 (-0.198)	0.300 (-0.936)	-11.724 (-0.943)	-0.2030 (-0.403)
D(OPE(-2))	0.037 (0.931)	-0.446 (-0.471)	-0.086 (-0.273)	3.453 (0.283)	0.244 (0.495)
D(PCI(-1))	-0.0004 (-0.492)	0.008 (0.444)	-0.007 (-1.147)	0.844 (3.496)	-0.002 (-0.191)
D(PCI(-2))	-0.0008 (-0.636)	0.017 (0.558)	-0.011 (-1.133)	0.370 (0.967)	-0.009 (-0.586)
D(IMMUN(1))	0.017 (0.624)	-0.385 (-0.593)	-0.047 (-0.218)	15.958 (1.914)	0.027 (0.081)
D(IMMUN(2))	0.008 (0.283)	-0.178 (-0.259)	0.116 (0.511)	-17.807 (-2.029)	0.451 (1.265)
C	-1.177 (-1.813)	-17.534 (-1.132)	4.464 (0.870)	-454.835 (-2.286)	7.198 (1.265)
R^2	0.693	0.143	0.261	0.620	0.286
Adjusted R^2	0.453	-0.530	-0.319	0.321	-0.275
F-Stat	2.880	0.212	0.450	2.075	0.510

Sources: Researcher's Computation 2021

It is observed from the result that the ECM is rightly signed but statistically insignificant; hence it is not totally in conformity with economic theory of negativity and statistical significance of the ECM. The coefficient of ECM of -0.013 shows that approximately 1.3% of the discrepancies between the long run and the short run dynamics is corrected annually. This reveals that the ECM has a correcting property as the short run and the long run equilibrium will converge in the long run.

From the result one period lag infant mortality rate (IMR) with the coefficient of 0.062 and a t-value of 0.11 reveals that a unit increase in one period lag IMR will cause current IMR to increase by 0.062unit and it's statistically insignificant. Also, two periods past IMR with the coefficient of 0.439 and a t-value of 0.734 shows that a unit increase in two periods past IMR will bring about 0.439 unit increase in current IMR.

The result shows that one period lag private health expenditure (PrHEX) with the coefficient of -0.005 and a t-value of -0.286 signifies that a unit increase in one period past PrHEX will bring about 0.005 units decrease in IMR but it is not statistically significant. Also, two periods past PrHEX with the coefficient of -0.010 and a t-value of -0.622 reveals that a unit increase in two periods past PrHEX will lead to 0.010 unit decrease in IMR and it's found to be statistically insignificant.

The result shows that one period lag out-of-pocket (OPE) with the coefficient of -0.001 and a t-value of -0.036 signifies that a unit increase in one period past OPE will bring about

0.001 units decrease in IMR and is statistically insignificant. Also, two periods past OPE with the coefficient of 0.037 and a t-value of 0.931 reveals that a unit increase in two periods past OPE will lead to 0.037 unit increase in IMR and its statistically insignificant.

From the result, one period lag per capita income (PCI) with the coefficient of -0.0004 and a t-value of -0.482 reveals that a unit increase in one period past PCI will cause IMR to decrease by 0.0004 units and it's statistically insignificant. Also, two periods past PCI with the coefficient of -0.0008 and a t-value of -0.636 shows that a unit increase in two periods past PCI will bring about 0.0008 units decrease in IMR but not statistically significant.

From the result, one period lag percentage of children immunize against diseases and infection (IMMUN) with the coefficient of 0.017 and a t-value of 0.624 signifies that a unit increase in one period past IMMUN will bring about 0.017 units increase in IMR and it is statistically insignificant. Also, two periods past IMMUN with the coefficient of 0.008 and a t-value of 0.283 reveals that a unit increase in two periods past IMMUN will lead to 0.008 units increase in IMR and it's found to be statistically insignificant.

The coefficient of determination (R^2) of 0.693 shows that 69% of the systematic variation in public health expenditure is a consequence of the variations in the repressors, while the other 31% is captured by the error term. When the coefficient of determination was adjusted by its degree of freedom, the explained variation became 45%. Judging by the R^2 and its adjusted R^2, the estimated model has both high explanatory power and good predictive ability.

The calculated F-statistics value of 2.880 is higher than the critical value at 5% level. This shows that the explanatory variables are correlated to public health expenditure (the dependent variable).

Table 5: Long Run Regression Result.

Regressors	PrHEX	OPE	PCI	IMMUN
Coefficients	-0.205	0.073	-0.007	-0.372
T. Stat	-2.672	0.238	-2.200	-3.307
Probability	0.013	0.814	0.038	0.000
R^2= 0.928 Adjusted R^2= 0.916 F-Stat= 77.790 (0.000) DW= 0.326				

Sources: Researcher's Computation 2021

The long run regression result above shows that all the variables except out-of-pocket expenditure were rightly signed. From the result above, the coefficients of PrHEX, PCI and IMMUN of -0.205, -0.007 and -0.372 shows that a unit increase in PrHEX, PCI and IMMUN will bring about 0.205, 0.007 and 0.372 units decrease in infant mortality rate respectively. Also the coefficients of OPE of 0.073 shows that a unit increase in OPE will bring about 0.073 units increase in infant mortality rate.

Looking at the individual statistical significance of the model as shown by the t-values, the result revealed that in the long run, PrHEX, PCI and IMMUN have significant impact in reducing the rate of infant mortality since their t-values of -2.672, -2.200 and -3.307 are greater than their critical t-values at 5% level of significance.

From the result the coefficient of determination of 0.928 shows that approximately 93% systematic variations in infant mortality rate is due to the variations in the explanatory variables in the model, while the remaining 7% is attributed to the error term. When adjusted to its degree of freedom, the explained variation became 92%. Thus judging from the coefficient of determination and their adjusted counterparts, the estimated models have both high explanatory power and good predictive ability.

The F-statistics of 77.790 is statistically significant at 5% level, which means there is a significant simultaneous link amid the dependent variable and the independent variables in the model and it

confirm that the model is of good fit. Lastly, the Durbin-Watson statistics of 0.326 confirm the presence of autocorrelation in the model.

DISCUSSION OF FINDINGS/POLICY IMPLICATION

Our analysis revealed that private health expenditure has a negative and significant influence on infant mortality rate. This signifies that it has significantly reduced the rate of infant mortality during the period under investigation. The extent to which private health-care spending affects the health output seems to depend on the effectiveness of policies and institutions. This is at variance with the findings of Burnside and Dollar (2004), Kiross, *et al* (2020) and David (2018) who in their studies found an insignificant relationship between private healthcare expenditure and changes in child mortality rate.

Out-of pocket expenditure was found to have a positive and insignificant impact on infant mortality during the period under investigation. Households have high financial burden due to out-of-pocket health payments. This indicates little or no access to quality healthcare facilities which makes it difficult to seek healthcare. The study also revealed that percentages of children immunize against diseases and infection significantly influence infant mortality negatively both in the long. This finding is in agreement with the findings of David (2018) who found a negative significant relationship between immunization and infant mortality rate.

Lastly, per capita income was found to have a negative and significant influence on infant mortality rate. This further substantiates the finding of Abdelhafidh (2018). This implies that as welfare of the people improves, more resources will be channelled into improving the health status of their children with having to wait or solely depend on government.

CONCLUSION AND RECOMMENDATIONS

The study examined the private health finance and health output in Nigeria from 1980-2020. Using time series data on infant mortality rate, private health expenditure, out-of-pocket health expenditure, per capita expenditure and percentage of children immunize against diseases and infection, the result show that private health expenditure, per capita expenditure and percentage of children immunize against diseases and infection significantly reduces the rate of infant mortality in Nigeria during the period under investigation. Base on the results, we recommend that;

1. There is need for alliance amongst all the stakeholders' in providing quality and quantitative health facility to meet the demand of Nigerians as this will reduce the burden on government.
2. Government should put in place regulatory framework to check the activities of private health providers so that universal and equitable healthcare utilisation which will result in the better health outcome in general and reduced infant mortality in particular in developing countries.
3. Government should intensify immunization programs and activities to help protect infant from being infected with diseases.
4. Government should improve the welfare of its citizens across board.

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