



**AN EMPIRICAL ANALYSIS OF THE CAUSALITY BETWEEN POVERTY
AND ILL-HEALTH IN NIGERIA: MACRO APPROACH.**

AILEMEN, MOSES I.

DEPARTMENT OF ECONOMICS, AMBROSE ALLI UNIVERSITY, EKPOMA

ABSTRACT

Health is one of the most important conditions of human life. People may borrow to cover health expenses if out of pocket payments do not correspond to the resources available to them, this will further worsen their poor welfare condition. Ill-health burden has been estimated to have pushed millions of people into poverty. Poverty in Nigeria is associated with the absence of health facilities and lack of sufficient nutrition which directly lead to ill-health. The impoverishment effect of health care cost is obvious in the literature.

This paper provided an explicit empirical evidence of the causality between poverty and ill-health in Nigeria. Johansen Co-integration Technique and Granger Causality Test econometric methods were used to analyse the times series data for this study. Evidence of causality between poverty and health was established in the study. However, it confirmed the uni-directional causality from poverty to health. The economic implication of the results obtained is that poverty leads to ill-health. Therefore, access to health care services is imperative to ensure poverty reduction. Government should sustain its commitment to the health sector by ensuring that 5 percent of its annual budget is allotted to health sector as recommended by World Health Organisation.

Key Words: poverty, ill-health, health care, life expectancy, granger causality

INTRODUCTION

Health is an important economic asset upon which human livelihoods depend. The consequences of ill-health are that substantial time is diverted from income generating activities to cater for the sick and they are forced to sell assets required for livelihoods. Many households may be so poor that they are unable to spare any resources for health care. To that extent, ill-health reduces the income generating ability of the poor; in fact, could perpetuates poverty. OECD (2003) observed that the poor suffer more health wise and die younger, since they have higher than average child and maternal mortality, higher levels of disease and more limited access to health care and social protection. When poor people become ill or injured, the entire household can become trapped in a downward spiral of lost income and high health care costs. If the access of the poor to infrastructural services such as health care services is not addressed, poverty reduction will continue to be a mirage.

Beyond the direct impact of ill-health on households' living standards through out-of-pocket expenditure, it indirectly affects labour income through productivity and the number of hours that people can work. The effects of illness on income which may take time to appear are often long-lasting. Van Doorslear and O'Donnell, 2008 argues that health care cost further impoverishes the very poor. Those persons who can not afford health care cost resolve to borrowing to be able to obtain health care services. According to Okojie, Anyanwu, Ogwumike and Alayande (2000), poverty in Nigeria is associated with the absence of facilities; lack of access to health facilities and lack of sufficient nutrition which directly affect productivity and quality of life. As such, new mechanism to finance the health system will be needed because the main barrier to access health care is its affordability.

Health care service is a burden to most families especially the poor ones. In the general health economics literature, the connection between health and poverty is only implied. The study analyses causal relationship between poverty and ill-health in Nigeria. To the best of my knowledge, research focusing on health and its relationship with poverty has not been given due attention. Most work done in Nigeria on health related issues did not examine the impact of health status on poverty at the macro levels. For instance, Akin, Guilkey and Hazel (1993) analysed health care demand in Nigeria using data from field survey in Ogun State without examining the effect of poverty and ability to pay the user charges while Mbanefoh, Soyibo and Anyanwu (1996) did a micro study on demand for health care services in Nigeria, but did not empirically examine the impact of poverty on demand for health care services in Nigeria. They identified that there is need to increase user charges though the option might be regressive. Amaghionyeodiwe's study utilized mainly primary data obtained from household survey and focused on user charges, healthcare choice and willingness to pay for health care services in Nigeria, leaving- out the analysis of poverty health nexus (Amaghionyeodiwe, 2005), which this study highlights.

LITERATURE REVIEW

Health is important to us as individual and as a society. It is a form of human capital and a durable capital stock that yields an output of healthy time. People inherit an initial amount of this stock that depreciates with age and can be increased by investment. Health can be regarded as a 'fundamental commodity', one of the true objects of people's wants and for which other more tangible goods and services- such as health care are the simple means to create it (Grossman (1972). Health care is an economic good. The resources that are used to produce health care services, such as human resources, capital and raw materials are finite; more of these resources can be devoted to production and consumption of health care only by diverting them from some other uses. The poor patronises traditional health services providers because of cost of accessing modern medicine. The health care seeking behaviour of the poor does not mean that alternative medicine is necessarily preferred to orthodox medicine (Okafor, Abumere, Egunjobi and Ekpenyong, 1998). Where the household is poor and has limited resources, it is likely to face painful trade-off of its limited resources for the development of human resources which pays off in the future at the expense of reduced current consumption. The impact of poor health on human development has its origin in the effects of health on growth in labour force and on the productivity of labour and capital. The huge amount of labour loss to ill-health is capable of reducing the growth rate of the economy. This effect will come through two ways - diverting savings to less productive uses such as health and its related expenditures by households and governments so that fewer resources are available for investment in growth-inducing sector. Slow growth is as a result of low productive investment, this is evident due to the effects of losses of human resources and losses of social capital. Also, economic growth can be reduced through widespread poverty. Ill- health is a major cause of poverty through loss of labour time and inability to work resulting from poor health leading to reduction in human resource capacity (Ogunleye, 2008) According to Okojie (1997), poverty can also affect health inputs which affect productivity and earning. The impact of poverty on payment for health service is the difference between poverty estimates derived from household expenditures and out-of-pocket payments for health care (Gustaffson and Li, 2004).

Health care cost may push households into or further into poverty. Such impoverishment is not captured by the standard measures of poverty that compare total household resources, including those exhausted by health care, with a poverty line that reflects needs for food and possibly those for other basic necessities but do not take full account of health care needs. The variability and unpredictability of health care costs means that they cannot be reflected in a given poverty line. If expenditures on health care were completely non-discretionary, constituting resources that are not available to meet other basic needs, then it would be appropriate to assess poverty on the basic of household resources or net of payments for health care. Of course, not all expenditures on health care are made without discretion.

There are evidence that individual's health expenditures are responsive to incomes and price and there is a non-linear relationship between income and health irrespective of how they are measured (Wagstaff, Van Doorslear, Calonge and Christiansen,1992; Feinstein, 1993). Nonetheless, it is likely that households make great sacrifices in order to meet needs for vital health care. It seems inaccurate to categorise a household as non- poor simply because high medical expenses raise its total spending above the poverty line, while spending on food, clothing and shelter is below subsistence levels. Increasing user-charges, other things remaining the same, lowers the share of the poor in total visits to health facilities. . But Van de Walle (1990) emphasized that healthy, well nourished and educated individual obviously have a higher standard of living than sick, hungry and ignorant ones. This is because healthy persons are more productive and better able to respond to new opportunities. She, therefore, suggested investment in human capital and involvement of the poor in the growth process.

Alderman and Lavy (1996) observed that the demand for health care is a function of the quality of the services provided in the health institutions. But, the poor household demand for health services is relatively quality of services inelastic. A study done in China observed that health care quality in China has improved overtime, but these improvements seem to be confined primarily to urban areas (Zhuang and Wan, 2005). Also, studies have shown that there may well be differences in care provided at different health facilities to the disadvantage of poorer households (Lavy and Germain, 1994). For patients, especially poor ones, unnecessary expenses associated with low quality can make the difference between health care being affordable and being unaffordable. In some situations, unnecessary care may also have adverse health consequences.

Van Doorslear, O'Donnell and Ranna Eliya, (2006) estimated the change in the poverty headcount ratios for 11 low to middle income countries in Asia by comparing household consumption /expenditure both gross and net of out-pocket payment relative to two poverty lines. The findings are quite consistent with studies of World Bank (Chen and Ravallion, 2004), which show that at \$1.08 poverty line, subtracting out-of-pocket payment from total resources results in 3.8 percentage point increase in the poverty headcount in Bangladesh, equivalent to almost 5 million people, a 3.7 percentage point increased in India (37million) and a 2.6 percentage point increase in China (32.4million). The total estimated increase in the poverty headcount is 78.25 million people or 2.7 percent of the population of these eleven low/ middle income Asia countries. This does not, of course, provide an estimate of how health care demand would change if some form of prepayment replaces out of pocket financing of health care. But, the figure is informative of the magnitude of the impoverishing effect of payments for health care that is not currently reflected in poverty estimates. It goes to show how many individuals are not counted as poor despite the fact that the value of their consumption of all goods and services other than health care is less than estimated poverty line of \$1.08 per day. Preston (1975) observed that health improves with income; this is the related concept of the poverty hypothesis which emphasizes that ill health is a consequence of low income or extreme poverty.

Studies have shown, using aggregate data, the correlation between income, inequality and health (Wilkinson, 1996). Also studies find an association between income distribution across US States with health consumption behaviour (Marmot, 1997). But, some indicate no association between income inequality and individual health. Meara (1999) shows that no significant relationship exists between income inequality and birth outcome such as infant mortality and birth weight. The income inequality hypothesis presumes that income inequality per se is a threat to the health of individuals within a society, even holding their income constant. It focuses on the direct tie between health and income inequality, regardless of a person's particular income level. But few studies that used data outside United States showed evidence against the income inequality hypothesis (Gerdtham and Johannesson, 2004). Using data of national household survey on living conditions, Lindelow (2002) observed that eradication of poverty will have only a negligible effect on health care choices. A lot of the literature played down on poverty as a factor determining demand for health care services. Though, there is a high consensus on the impact of income, distance to health centres on the demand for health care services, the effect of poverty on health care demand is not clear. . However, the gaps in the literature as highlighted above are what the present study attempts to fill. It is expected that the findings will reveal factors influencing health care demand in Nigeria and establishes the direction of causality between health and poverty in Nigeria.

THE HEALTH AND POVERTY NEXUS IN NIGERIA

According to Alfred Marshal, health and strength – physical mental and moral are the basis of industrial wealth, while conversely, the main importance of material wealth lies in the fact that when wisely used, it increases the health and strength, physical, mental and moral of the human race (World Bank, 1993). The well being of people depends on the available health facilities from which they can obtain health care services. Good health is a crucial part of well-being. It is not only desirable as an end in itself, it also brings substantial economic benefits. A healthy person can live a socially and economically active life. United Nations Department of Public Information (2002) observes that striking evidences abound that improved health is not only a reward in terms of personal income over a lifetime, but also helps to support economic growth

Although poverty is a worldwide phenomenon, Nigeria has persistence high poverty rate. Table 1 shows the poverty situation in Nigeria. The situation has been at alarming rate, where poverty incidence in Nigeria jumped from 54.4 percent in 2004 to 60.9 percent in 2010. Drawing from the available data, Nigerians have increasingly suffered impoverishment basically due to lack of choice and opportunities to live a long life (Oladumni, 1999).

Table 1: Nigeria: Trend in Poverty Level 1980 – 2010 (%)

Year	Poverty	Estimated total population in million	Poverty population in million
2000	1%		7
2005	3%		7
2002	7%	15	2
2006	6%	12.3	1
2004	4%	15.3	7
2010	9	18.8	3

Source: NBS,2005; NBS, 2012

Poverty usually results in poor diet, which causes malnutrition and malnutrition brings about chronic diseases. This was the view of (Okojie, Anyanwu, Oguwmike, Alayande, 2000; Alabi and Chime, 2007) who asserted that incidence of poverty in Nigeria is found to be highest among women and children with poor health as a result of inadequate food intake.

Furthermore, Table 2 reveals some social and health indicators, such as life expectancy at birth, crude death rate per 1000 persons etc. Nigeria has experienced different measles, meningitis and polio epidemics in the past that have killed and maimed thousands of children. The main victims of these disease epidemics are usually the poor. Access to safe water has remained significantly unchanged since 1999. Population access to safe water was 53 percent in 1996, but slightly increased to 57 percent in 2002. Furthermore, it rose to 60 percent in 2004 and 61 percent in 2005 while it dropped to 51.4 percent in 2007. However, it increased with about 16.6 percent in 2009, but dropped slightly to 65 percent in 2010.

Table 2: Selected Macroeconomic and Social Indicators in Nigeria.

Indicators	2000	2005	2002	2006	2004	2005	2007	2010
Incidence of Poverty	1	3	7	6	6	0	0	9
GDP growth rate					8			
Employment					3	7	9	1
Life expectancy at birth (years)	5							0
Crude birth rate (per 1000 persons).	8				0		55	2
Crude death rate (per	7				1		8	

0 persons)								
ant mortality (per 100 births)				1				
ulation (million)						.0	.5	.8
ulation access to safe er							4	

Sources : NBS (2005); World Bank (2011)

But life expectancy remained at 54 years while crude death rate per 1000 persons remains at 14 from 1992 to 2001 before it dropped to 12 in 2005 and further declined to 11 in 2006. It gradually rose to 17.8 percent in 2007 but dropped to 14 percent in 2010. Infant mortality rate on the other hand recorded 91 per 1000 births in 1990, it has experienced a marginal improvement in the year 2000 as it stood at 75 per 1000 births. In the year 2001, it was 80 per 1000 births after which it steadily improved slightly to 76 in 2004 and reached 75 in 2006. The infant mortality rate remains unchanged in the country. It remained 76 percent in 2010. Most countries have succeeded in achieving reducing infant mortality rate, for instance in Indonesia, infant mortality dropped from 70 in 1980 to 36 in 1996, also in Ghana, it was 100 and 71 in 1980 and 1996 respectively (Olaniyi and Adams, 2002) . These poor indicators presented in Table 2 are evidence of absence of health infrastructural facilities, poor hygiene and sanitation. Resources for health development are essential and indispensable component of efficient health care delivery. Without the relevant ‘resources mix’ that is material, non material, quality and quantity, achieving the goals and objectives of national health policy will continue to be a dream.

RESEARCH METHODS

Sources of Data

The research work relies on secondary sources of data. Annual data covering 1980 – 2010 were obtained from CBN Annual Reports and Statement of Account, World Bank Economic Indicator, 2011 and IMF 2011, Economic Outlook. This period is considered long enough for the purpose of this study. Also, this is to ensure enough data points for the econometric analysis in order to cater for loss of degree of freedom. As such, annual data series are relatively more stable than quarterly series. These variables used are poverty rate, life expectancy at Birth, infant mortality rate, maternal mortality rate and crude death rate which are generally associated with health status (Bloom and Canning, 2003; Ogunleye, 2008). The reason for using these variables as measures of health status is because these indicators have been more widely used in the literature (Oluyele and Afeikhena, 2006; Ajakaiye and Mwabu, 2007). Also, this study takes a macro perspective on the linkage between poverty and health, much of the evidence on health poverty discourse is from households panel data. More recent

studies are deviating to macro view of the issues of health and these variables are amenable to time series analysis.

Estimation Techniques

Econometric tools are adopted in this study to examine the causality between poverty and health status in Nigeria. A cointegration test be carried out to detect the influence of health status on poverty. Specifically, the vector error correction methodology employed incorporates time-series analysis within a dynamics framework that enables one to discern both long-run and short-run relationship between the variables. However, one major limitation of the ECM models is the selection of an appropriate lag length, without a formal method, the selection of lag order in a Vector Autoregressive (VAR) model is arbitrary and could lead to specification error (Johanson,1991).

To examine the direction of causality or whether one variable in the system explains time path of the other variables, the traditional Granger causality test was applied in the study as an alternative way to detecting a causal link between poverty and health status. However, co-integration and Granger causality tests become very relevant in this study because the choice of lag length is based on the sample size and underlying economic process. Due to periods for which time series data are available and the fact that period too far away do not inform policy, the Granger method is applied in the choice of optimum lag length for each variable in the model for this study. However, all discussions are carried out within the general framework of economics theory and policy. The estimation was conducted using econometric computer software package, EViews 7.0.

Stationarity and order of integration

Ensuring stationarity is imperative, because time series data, basically those collected in developing countries are not satisfactory, most especially as they exhibited the presence of unit roots. The concept of stationarity denotes the non-existence of unit roots. Various methods exist for testing the stationarity condition of time series data. The most widely used are the Dickey-Fuller[DF], Argumented Dickey Fuller [ADF] and the Phillips-Pearson[PP] tests. The stationarity test involves running the regressions of the following model.

$$Y_t = \beta_1 + \beta_2 t + \delta y_{t-1} + \sum \Delta y_{t-1} + \epsilon_t \text{-----(1)}$$

(for first level)

Where;

Y_t = variable of interest, Y_{t-1} = lagged variable.

The lag length, n is selected large enough to render the residual $\sum \epsilon_t$ not autocorrected (White noise).

Cointegration test

A cointegration test be carried out to detect the long-run relationship between poverty and health status. The Johansen's method of cointegration was used

$$\Delta \mu_t = \beta_0 \mu_{t-1} + \beta_1 \Delta \mu_{t-1} + C \dots \dots \dots (2)$$

Where the t-value of the β_0 (parameter of μ_{t-1}) is compared to the ADF statistic at the various levels. Cointegration implies that the long-run movements in the variables are related to one another in a long-run equilibrium relationship. For instance the error-correction for two variables (LE and POV), where the value of β_2 (coefficient of μ_{t-1}) shows the degree of adjustment.

$$\Delta \text{POV}_t = \beta_0 + \beta_1 \Delta \text{LE}_t + \beta_2 \mu_{t-1} + \xi_t \dots \dots \dots (3)$$

Once co-integration is established, alongside its extent and form, the development of a parsimonious error correction model that incorporates long-run equilibrium relationships and short-run dynamics becomes preoccupation. This must however be proceeded by the estimation of an unrestricted or over-parameterised auto regressive distributed (ADL) model. Adam (1992) emphasized that the relevant of over parameterized ADL model is to allow for the identification of the main dynamic patterns of the model and ensure that the dynamics of the model have not been constrained by a too short lag length. The model is systematically simplified to ensure parsimony, then the outcome of the model is easy to explain.

For the purpose of this paper and from theoretical, intuitive, and review of empirical studies, we specify the cointegration relationship between health and poverty in Nigeria following Ajakaiye and Mwabu (2007), a model can be formulated for estimation as follows :

$$\text{POV}_t = \beta_0 + \beta_1 \text{LE}_t + \beta_2 \text{IMR}_t + \beta_3 \text{MAMR}_t + \beta_4 \text{CDR}_t + U_t \dots \dots \dots (4)$$

The apriori expectation of the coefficient of equation (4) is as follows:

$$\beta_1 < 0; \beta_2 > 0; \beta_3 > 0; \beta_4 > 0.$$

Where: LE = Life Expectancy at birth, IMR = Infant Mortality Rate, CDR = Crude Death Rate, MAMR = Maternal Mortality Rate, POV = Poverty rate. The equation above ignores any reference to the long-run aspects of decision making, that is, the procedure of differencing results in loss of valuable long-run information in the data. Co-integration fills this gap by including an error correction term lagged, one period i.e ECM_{t-1} integrates short-run dynamics in this long-run models. As mentioned earlier, error-correction technique is generally appealing because of its ability to induce flexibility, by combining the short-run dynamics and the long-run equilibrium model in a unified system while retaining its quality of consistency.

The adopted Error-Correction Model (ECM) for this study takes the following form:

$$\Delta \text{POV}_t = \alpha_0 + \sum_{i=1}^n \beta_1 \Delta \text{LE}_{t-i} + \sum_{i=1}^n \beta_2 \Delta \text{CDR}_{t-i} + \sum_{i=1}^n \beta_3 \Delta \text{IMR}_{t-i} +$$

$$\sum_{i=1}^n \beta_4 \Delta MAMR_{t-1} + \beta_8 ECM_{t-1} + U_t \dots \dots \dots (5)$$

where ECM_{t-1} is one period lag of the residual term from the long-run relationship. U_t is the white noise error term, $\beta_1 \dots \dots \beta_{11}$ are parameters and n is lag length.

Granger causality test

To ascertain the direction of causality the traditional Granger Causality test is applied in this study as an alternative way of detecting a causal link between poverty and health status. Recent development of Granger causality analysis is associated with the concept of co-integration, the existence of a long run equilibrium relation between two non-stationary series (Engle and Granger, 1991). As such time series data are co-integrated, standard granger causality test are misspecified, and Error-Correction Models (ECM) should be used instead. Consequently, Granger –causality between health and poverty is tested based on models as shown in equations below. If these variables are cointegrated, an ECM representation could have the following form;

$$\Delta \text{Ln Pov}_t = \Omega_1 + \sum_{t=1}^n \alpha \Delta \text{Ln Pov}_{t-1} + \sum_{i=1}^n \delta \Delta \text{Ln LE}_{t-1} + z_1 U_{t-1} + \xi_{1t} \dots (6)$$

H₀: $\delta_{1,t} = 0$ where $t = 1, \dots, n$ and $z_1 = 0$

$$\text{Ln POV}_t = \Omega_2 + \sum_{i=1}^n \beta_1 \Delta \text{Ln CDR}_{t-1} + \sum_{i=1}^n \lambda \Delta \text{Ln Pov}_{t-1} + z_2 U_{t-1} + \xi_{2t} \dots (7)$$

H₀: $\lambda_{1,t} = 0$ where $t = 1, \dots, n$ and $z_1 = 0$

Where these LE_t , CDR_t , and POV_t are defined above, all variables are stationary time series, Δ is the difference operator and the coefficients are time invariants. n is the optimal lag of the series of variables while ξ_{it} 's are serially uncorrelated random error terms, and the U_{t-1} are the lagged values of the error-correction terms derived from the long-run cointegrated equation. For instance, equation (5) tests the hypothesis that life expectancy does not Granger cause poverty shown as $\delta_{1,t} = 0$ where $t = 1, \dots, n$ and $z_1 = 0$ while equation (7) tests the hypothesis that poverty does not instantaneously Granger cause low crude death rate indicated by $\lambda_{1,t} = 0$ where $t = 1 \dots n$ and $z_1 = 0$.

Adopting a time-series data to determine the influence health condition on poverty using unit root test, co-integration test and Error Correction Mechanism is a novel approach which will yield unique interesting empirical results.

EMPIRICAL ANALYSIS AND RESULTS

Results of Unit Root Test

The test of the stationarity of the variables was carried out using the Augmented Dickey Fuller (ADF). The result as presented in Table 4.1 below showed the presence of unit root in all our variables at levels, the null hypothesis of non-stationarity was accepted for all the variables. Thus the variables were differenced to make them stationary. The result showed that all the variables except crude death rate that was stationary at second difference, were found to be stationary after first differencing, making them integrated of order one, I(1)..

Table 4.2: Unit-Root Tests using ADF technique

VARIABLE	AUGMENTED DICKEY-FULLER			
	Level	Diff	Diff	Order of stationarity
CV	-0.001178	-5.495166		I(1)*
	-2.174332	-5.285082		I(1)*
DR	1.188516	-8.27783	-3.366164	I(2)*
ER	0.709690	-3.518871		I(1)*
AMR	0.264001	-7.421723		I(1)*
Statistical @ 5% & 1% values	0.957110			
	-3.653730			

*indicates significant at 5% level of significance

Co-Integration Test. Since all the series were found to be non-stationary at levels, the analysis of investigating for the possibility of co-integration between the individual variables in relation to POV can be carried out. This was done using lag 2 which was found to be the optimal lag length. The study employed the Johansen's method of cointegration test because it is based on vector autoregression and have been proved to be better for a single and multivariate equation. The result is presented in Table 4.2 below. The co integration test result provides evidence for the existence of two co-integrating equations among the variables. This points to the fact that there existence of long-run relationship among our variables. It also follows that there is the existence of either a bi-directional or unidirectional causality among our variables.

Table 4.2 Co-integration Result

Null hypothesis	Trace Statistics	% Critical value	Null hypothesis	Maximum Eigen statistics	% Critical value
$\leq 0^*$	125.2510	76.97277	$\leq 0^*$	61.27418	34.80587
$\leq 1^*$	63.97678	54.07904	$\leq 1^*$	31.38220	28.58808
≤ 2	32.59458	35.19275	≤ 2	18.48749	22.29962
≤ 3	14.10708	20.26184	≤ 3	11.22638	15.89210
≤ 4	2.880699	9.164546	≤ 4	2.880699	9.164546

Note: * indicated rejection of the null hypothesis at 5% significance level.

Trace and Maximum Eigen indicates 2 co-integrating equations at 5% level of significance

Granger causality test

To test for the causal relationship between poverty and health in Nigeria, this was carried out using the Granger test. This shows the variable that drives each other. The result as presented in Table 4.3 below showed that there exist no presence of causality between poverty and crude death rate on the one hand and between poverty and maternal mortality rate in Nigeria on the other hand even at 10% level of significance while there is a uni-directional causality between poverty (POV) and infant mortality rate (IMR) at 1% level of significance, with POV causing IMR. The result also showed a unidirectional causality between POV and life expectancy (LE) at 10% level of significance with POV causing LE and there.

Table 4.3 Granger Causality Tests; lag 1

Test Hypotheses	F-Statistics/ Decision
MR does not Granger Cause POV	0.01570 Accept
POV does not Granger Cause IMR	10.5183 Reject*
LE does not Granger Cause POV	1.98905 Accept
POV does not Granger Cause LE	2.37927 reject***
CDR does not Granger Cause POV	0.16901 Accept
POV does not Granger Cause CDR	0.68204

	Accept
MAMR does not Granger Cause POV	0.56835 Accept
POV does not Granger Cause MAMR	1.05150 Accept

Notes:*indicates significant at 1% **indicates significant at 5%. and *** indicates significant at 10%.,

Parsimonious Error Correction Estimation

From the above results of the co-integration in table 4.2, we suspects long-run and short-run dynamics, hence we proceeded to carry out an error correction model. Table 4.4 below shows the result of the error-correction estimate with the coefficient of the error term negative and statistically significant at 5 per cent level of significance. The result showed that 37 per cent of the error in the previous times disequilibrium is corrected. It thus suggests a strong speed of convergence to equilibrium and confirms the long-run relationship between poverty and health.

Variable	Model (DPOV)
	358174 (.700132)
(IMR)	446124 (.833491)
(LE)	.438932 (.773380)
(MAMR)	.081705 (.805297)**
(CDR)	948097 (.045847)
CT(-1)	.374034 (.130416)**

	409910
dj-R ²	300634
W	777018
Test	751145
Test(pro)	010438

Source: Author's computation using Eviews 7 on the data; **Indicates significant at 5% level of significance;

Standard error in parenthesis

The result in Table 4.4 also shows that IMR, LE and CDR came out with expected relationship with poverty. IMR and CDR showed a positive relationship with poverty indicating that increase in IMR and CDR leads to increase in poverty while LE showed a negative relationship with poverty indicating that an increase in LE leads to a fall in poverty rate in Nigeria. Furthermore, this result confirms link between welfare status and infant mortality as observed by Adeoti and Oni (2010). As welfare status of the household improves, mortality rate reduce. A unit change in IMR and CDR leads to 0.446124 and 4.948097 increases in poverty respectively while a unit change in LE and MAMR leads to -0.438932 and -2.081705 falls in poverty respectively in the short-run. MAMR came out with the wrong sign showing that there is a negative relationship between MAMR and poverty. It showed that fall in MAMR leads to increase in poverty and statistically significant in explain the change in poverty. The overall significance nevertheless showed that the explanatory variables are jointly significant in explaining the change in poverty. The fitness of the model was relatively low, showing that only 40 percent and 30 percent of the variation in poverty is explained by the explanatory variables.

6. CONCLUSION

There is need for government to increase its commitment to health sector because the results have shown that health is imperative to poverty reduction. To ensure the achievement of poverty alleviation, government must sustain its commitment to health sector by ensuring that 5 percent its annual budget is allocated to health sector as recommended by World Health Organization (WHO) in the year 2000 for developing countries. Furthermore, as a matter of policy, special subsidy or waiving of fees for low income earners may be considered to reduce the mortality rate. For it to be effective there is need for government to put in place free health care services to the aging and children in the country. This is generally true given the high poverty level, which retards out of pocket expenses. Improved health care provision is capable of addressing the poverty problems in Nigeria. Only a healthy person has ability to generate income. The income streams of Nigerian are generally low, which explains the reason for poor health care utilization in the country and consequently persistent poverty.

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