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## Socio-economic Determinants of Life Expectancy in Nigeria

**Agbatogun, Kehinde Kabir**

Lecturer, Department of Economics, Tai Solarin University of Education, Nigeria

**Osinusi, Bankole Kunle**

Lecturer, Department of Economics, Tai Solarin University of Education, Nigeria

**Opeloyeru, Olaide Sekinat**

Lecturer, Department of Economics, Tai Solarin University of Education, Nigeria

### **Abstract:**

*Life expectancy describe quality of life lived right from birth till the time of death. Health economics literature indicated that life expectancy is affected by genetics, lifestyles, environment and socio-economic factors and that, socio-economic circumstances are strong predictors of life expectancy, as they are more evident in their health status. Empirical literature on the socio-economic determinants of life expectancy have focused on micro perspectives, involving partial equilibrium analysis, to the neglect of macroeconomic considerations, such as household income and lifestyle. This study, therefore, examined the macroeconomic determinants of life expectancy in Nigeria between 1980 and 2017.*

*The paper was predicated on the Grossman analytical framework rooted in the human capital development theory. A macroeconomic model incorporating major macroeconomic variables in explaining health outcomes was explored. The model examined the influence of literacy rate, government health expenditure, total number of health workers and per capita income on life expectancy. Ordinary least square estimation technique that took into consideration error correction mechanism was used. Tests of the model's reliability were carried out using descriptive statistics, unit root and co-integration tests. All estimates were validated at  $p \leq 0.05$ .*

*Government health expenditure, per capita income and literacy rate had positive significant effects on life expectancy. A 0.4% increase in literacy rate increased life expectancy by one year, while 0.3% and 2.6% increase in government health expenditure and per capita income, respectively, increased life expectancy by one year. The total number of health workers had a positive but insignificant relationship with life expectancy.*

*Socio-economic factors were critical to improving life expectancy as a health outcome in Nigeria. Therefore, government should strive towards increasing literacy rate and per capita income, as well as target its health expenditures towards improved life.*

**Keywords:** *Life expectancy, per capita income, socio-economic determinants, literacy rate, government expenditure*

### **1. Introduction**

Fifty years after independence, Nigeria health indicators have stagnated or worsened during the past decades, despite investment from private and public sectors to enhance the quality of health of the Nigerian people. Everyday, more than 160 Nigerians die of malaria, malnutrition or complications of pregnancy and childbirth (Adetokunbo, 2006), which means more than 58,400 lives are lost to avoidable health problems yearly. Despite the promise of health for all by 2000 in 1990s, and later emphasized in Vision 20, 2020, this lofty goal is yet to be realised in Nigeria. The national strategic health development plan 2009 to 2013 (NDHS, 2008) contends that "the health status indicators for Nigerians are among the worst in the world and that on the average, health status of the population has declined, compared with the indicators of a decade earlier." Life expectancy at birth, which is a strong measure of health outcomes, measures the quality of life lived right from birth till the time of death (Francesco and Marios, (2006); Fayissa and Gutema, (2005) ), has continued to drop, reported to be 47.55 years in 2008 (Nigerian Demographic Health Survey (NDHS, 2008)). There was a marginal increase in the value in 2011 as it was recorded to be 48.4 years, five years lower than the 53 years average for the less developed countries (LDCs). The funding of the sector is grossly inadequate. Even where there is enough fund, there is mismatch of funding, because the tertiary health institutions get more than the local health institutions. Ironically, the disease burden is more in local communities.

Life expectancy at birth has continued to drop, reported to be 47.55 years in 2008 (Nigerian Demographic Health Survey (NDHS, 2008)). There was a marginal increase in the value in 2011 as it was recorded to be 48.4 years, five years lower than the 53 years average for the less developed countries (LDCs). However, from 2015, there has been an average of 0.84% marginal increase in life expectancy in Nigeria. For instance, it increased by 0.84% to 53.29 years in 2016 and equally increased by the same magnitude in 2017 to 53.73 years in 2017, though this is still less to what is obtainable most less developed countries which ranges between 50 and 60 years (OECD, 2019)

The continued downward spiral movement of life expectancy in Nigeria seems to put a question mark on the effective implementation of the health policies so far instituted. These have resulted in lack of access to basic health care packages by large proportion of the population, and have generated such questions as: Why has life expectancy of Nigerians not improved appreciably?, What factors are responsible for the poor life expectancy of Nigerians? How would the factors to be identified as impediment to improved health status be curbed? This paper therefore focuses on identifying and analysing the relative contributions of macroeconomic factors that determine the life expectancy in Nigeria, using a secondary data covering 31 years (1980 to 2011).

## 2. Factors Determining Life Expectancy

The link between socio-economic factors and health is long-established. The term “socio-economic status” has been used variously to refer to social class, social status, position in a social hierarchy, or specific socio-economic factors such as income, education, locality or occupation. All of these are strongly related to health (Kaplan, et al., 1996). The relationship between each of these factors and health (and with each other) is complex. To analyse the impact of socio-economic determinants of life expectancy in Nigerians, three factors are examined; income, education and government health expenditure.

### 2.1. Gross Domestic Product Per Capita

GDP per capita has been found to be a major determinant of health status (Jourmand et al., 2008; Afonso, 2009; St Aubyn, 2006). Higher GDP per capita (income) can improve life expectancy because it facilitates access to health care, education, food, and housing, all of which contribute to better health outcomes (Jourmand et al., 2008; AIHW, 2008). As income decreases, rates of poor health increase (Kawachi and Kennedy, 1997b, Kasachi et al., 1999 cited in O’dea and Howden – Chapman, 2000). The conceived relationship in question exists for all the usual measure of health outcomes including morbidity perceived health status and mortality (Kennedy et al., 1996; Kaplan et al., 1996; Wilson and Dly, 1997; cited in O’Dea and Howden – Chapman, 2000; Blakely, 2001; Blakely et al., 2002c; Sorlie et al., 1995; Backlund et al., 1996; Davey et al., 1998; Kaufman et al., 1998 cited in Blakely, 2001a).

Conversely, poor health can also lead to low GDP per capita income. For example, Smith (1999, cited in Judge and Paterson 2001), using US data from the Health and Retirement Survey, finds that reductions in GDP per capita often follow the onset of ill health because of its impacts on population, participation and productivity.

### 2.2. Educational Level (Literacy Rate)

Educational level has been shown to play an important role in affecting health behaviours and health outcomes. Poorly educated people die at a higher rate than highly educated people (Feldman et al., 1989; Kunst and Mackenbach, 1994a; Shkolnikov et al., 1998; Fox and Goldblatt 1982; all cited in Blakely, 2001a; Blakely et al., 2002c) and, generally, people with the worst health status have low education levels (Bemsal, 1999, cited in RACP 1999).

Many studies have found that people with low literacy skills are not able to function well in a health care environment. For instance, Schhillinger et al., (2002) pointed out that patients with poor literacy usually had trouble understanding instructions on prescription drug bottles, appointment slips, medical educational brochures, and consent forms. Williams et al. (1998) report that low level of literacy is strongly correlated with poorer knowledge and self-management of asthma. Additionally, Mayeaux et al. (1996) notes that patients with poor literacy may have problems processing verbal communication and conceptualizing risk in the health care environment.

There are inverse relationship between education and a range of health outcomes such as disability, infant mortality, asthma and cardiovascular disease, (Stats NZ and Ministry of Health 1999; Pamuk et al., 1998; Lin et al., 1999; Kaplan and Keil 1993; Gonzalez et al., 1998; and Davey et al., 1998; cited in Wilson 2000a). In the linked census-child mortality study conducted by Blakely et al., (2003) there was an approximately two-fold higher mortality rate among the lowest socio-economic respondents compared with the highest socio-economic categories of education, with a tendency for strong socio-economic differences in Sudden Death Syndrome (SDS) mortality, particularly by education. Low literacy level (an indicator of low educational attainment) coincides with poverty, malnutrition, ill health as well as high infant and child mortality (Mathers and Douglas, 1998; Perrin, 1998).

### 2.3. Public Health Expenditures

Conceptually, a healthy person can work more effectively and also devote more time to productive activities. Based on micro economic evidences, Strauss and Thomas (1998) argue that health status explains the variations in wages at least as much as education. Research at the macro level can better capture the potential externalities of health sector interventions, and the existing studies are supportive of the positive contribution of health capital to growth.

Using a panel data from some Sub-Sahara African (SSA) Countries, Lawanson (2012), shows that the effects of the three public health expenditure measures (per capita public spending on health care, share of public spending on total health expenditure, and share of government budget allocation on health care) are significantly negatively related to the three mortality variables (infant mortality rate, under-five mortality rate, and crude death rate), and significantly positively-associated with life expectancy.

## 3. Theoretical Framework

The underlying theory of this paper is Grossman model. At conceptual level, increase in a person’s stock of knowledge or human capital are assumed to raise productivity in the market sector of the economy, where he/she produces money earnings, and in the non-market or household sector where he produces commodities that enter his

utility function. To realise potential gains in productivity, individuals have an incentive to invest in formal schooling or in on the job training. The costs of these include direct outlay or market goods and the opportunity cost of time that must be withdrawn from competing uses. This framework develops models that determine the optional quality of investment in human capital at any age.

In the construction of the model, let the inter-temporal utility function of a typical health consumer be

$$\mu = \mu(\theta_0 H_0, \dots, \theta_n H_n, Z_0, \dots, Z_n) \dots\dots\dots 1$$

Where:

$n = t =$  The time period

$H_0 =$  This is the inherited stock of health

$H_t =$  The stock of Health in period  $t$ .

$\theta_t =$  The health service flow per unit stock

$h_t = \theta_t H_t$  is the total consumption of 'health service'

$Z_t =$  the total consumption of other commodity in the  $t$ th period.

By definition, net investment in the stock of health equals gross investment minus depreciation.

$$H_{t+1} - H_t = I_t - \delta_t H_t \dots\dots\dots 2$$

$I_t$  is gross investment.

$\delta_t$  is the rate of depreciation during  $t$ th period.

$$I_t = I_t(M_t, TH; E) \dots\dots\dots 3$$

$$Z_t = Z_t(X_t, T_t; E) \dots\dots\dots 4$$

$$\sum_{t=0}^n \frac{P_t M_t + Q_t X_t}{(1+r)^t} = \sum_{t=0}^n \frac{W_t T W_t}{(1+r)^t} + A_0 \dots\dots\dots 5$$

Where:  $P_t$  and  $Q_t$  are the prices of  $M$  and  $X_t$ ,  $W_t$  is the hourly wage rate,  $T W_t$  is the hours of work,  $A_0$  is the initial assets, and  $r$  is the market rate of interest. The time constraint requires  $\Omega$ , the total amount of time available in any period, must be exhausted by all possible uses:

$$T W_t + T H_t + T_t + T L_t = \Omega \dots\dots\dots 6$$

Where  $T L_t$  is the time lost from market and non-market activities due to illness and injury.  $T L_t = \Omega - h_t$   $\dots\dots\dots 7$

Substituting for hours of work ( $T W_t$ ) from equation 6 into equation 5, the single full wealth constraint is obtained as:

$$\sum_{t=0}^n \frac{P_t M_t + Q_t X_t + W_t (T L_t + T H_t + T_t)}{(1+r)^t} = \sum_{t=0}^n \frac{W_t \Omega}{(1+r)^t} + A_0 \dots\dots\dots 8$$

In equation 8, full wealth is given by the right hand side, which equals initial assets plus the discounted value of the earnings an individual would obtain if he spent all of his time at work.

The first-order optimality conditions for gross investment in period  $t - 1$  are:

$$\frac{\pi_{t-1}}{(1+r)^{t-1}} = \frac{W_t G_t}{(1+r)^t} + \frac{(1-\delta_t) W_{t+1} G_{t+1}}{(1+r)^{t+1}} + \dots + \frac{(1-\delta_t) \dots (1-\delta_{n-1}) W_n G_n}{(1+r)^n} + \frac{U h_t}{\lambda} G_t + \dots (1-\delta_t) \dots (1-\delta_{n-1}) \frac{U h_n}{\lambda} G_n \dots\dots\dots 9$$

$$\pi_{t-1} = \frac{P_{t-1}}{\partial I_{t-1} / \partial M_{t-1}} = \frac{W_{t-1}}{\partial I_{t-1} / \partial T H_{t-1}} \dots\dots\dots 10$$

Where  $U h_t = dU / dh_t$  is the marginal utility of healthy time;  $\lambda$  is the marginal utility of wealth;  $G_t = \partial h_t / \partial H_t = -(\partial T h_t / \partial H_t)$  is the marginal product of the stock of health in the production of healthy time; and  $\pi_{t-1}$  is the marginal cost of gross investment in health in period  $t - 1$ . Equation (9) states that the present value of the marginal cost of gross investment in health in period  $t - 1$  must be equal to the present value of marginal benefits.

To examine the forces that affect the demand for health and gross investment, Grossman (2000) converted equation (9) into an equation that determines the optimal stock of health in period  $t$ . if gross investment in period  $t$  is positive, a condition similar to equation (9) holds for its optimal value.

From these two first order conditions:

$$G_t \left[ W_t + \left( \frac{U h_t}{\lambda} \right) (1+r)^t \right] = \pi_{t-1} (r - \pi + \delta_t) \dots\dots\dots 11$$

Where:  $\pi_{t-1}$  is the percentage rate of changes in marginal cost between  $t - 1$  and period  $t$ . Equation (11) implies that the discounted value of the marginal product of the optimal stock of health capital at any age must be equal to the supply price of capital  $\pi_{t-1} (r - \pi + \delta_t)$ .

In the investment sub-model of the Grossman model, the wage rate and the marginal cost of gross investment do not depend on the stock of health. In the consumption sub-model of the Grossman model, the first prediction of the model is that if the rate of depreciation increased with age, then the quantity of health capital demanded would decline over the life cycle. The second prediction is that a consumer's demand for health and medical care should be positively correlated with his/her wage rate. The third prediction is that if education increases the efficiency when gross investments in health are made, more educated would demand a larger optimal stock of health.

#### 4. Model Specification

Within the context of the theoretical consideration, determinants of Life expectancy in Nigeria and the literature review, we specify a model expressing the functional relationship between life expectancy and other explanatory variables of concern: literacy rate, GDP per capita income and government expenditure in the health sector in Nigeria. The specification of the model is suitable for quantifying the impact of the determinants on life expectancy in Nigeria which follows the related empirical work of Fayissa and Gutema (2005) "The determinants of health status in Sub-Saharan Africa (SSA)."

Thus, the model for the estimation in this study is as follows:

$$\ln LE_t = \alpha_0 + \alpha_1 \ln LR_t + \alpha_2 \ln GHE_t + \alpha_3 \ln GPC_t + \alpha_4 \ln HW_t + \mu_t \quad \dots\dots\dots 1a$$

Where:

$LE_t$  = Life expectancy (Proxy for health status).

$LR_t$  = Literacy rate.

$GHE_t$  = Total government health expenditure.

$HW_t$  = Total health workers(proxy for Health Providers; Doctors, Nurses etc.)

$GPC_t$  = GDP per capita income.(Proxy for income of average Nigerians)

$\alpha_1 - \alpha_4$  = Coefficients of the parameter.

$\mu_t$  = Error term.

Theoretically, all the independent variables are expected to be positively related to the dependent variable. To incorporate short-run and long-run effects of the models, we specify models in form of Error Correction Model. i.e.

$$\Delta Y_t = \alpha + \beta \Delta X_{t-1} - \beta \theta_{t-1} + \varepsilon_t$$

Where:  $\theta$  is the error correction component of the model and measures the speed at which prior deviations from equilibrium are corrected. It shows how the dependent variable changes in response to disequilibrium.

From equation 1a,

$$\ln LE_t = \alpha_0 + \alpha_1 \ln LR_t + \alpha_2 \ln GHE_t + \alpha_3 \ln GPC_t + \alpha_4 \ln HW_t + \mu_t \quad \dots\dots 1a$$

$$\mu_t = \ln LE_t - \alpha_0 - \alpha_1 \ln LR_t - \alpha_2 \ln GHE_t - \alpha_3 \ln GPC_t - \alpha_4 \ln HW_t \quad \dots\dots\dots 2a$$

The fact that there may be disequilibrium in the short run necessitates the use of ECM. The error term in equation 1a is then treated as the "equilibrium error" which can then be used to tie the short run behaviour of the dependent variable to its long run value. This follows from the Granger representation theorem which states that if two variables Y and X are cointegrated, then the relationship between the two can be expressed as ECM.

Thus, ECM formulation of equation 3a then becomes:

$$\Delta \ln LE_t = \alpha_0 + \alpha_1 \Delta \ln LR_t + \alpha_2 \Delta \ln LR_{t-1} + \alpha_3 \Delta \ln LR_{t-2} + \alpha_4 \Delta \ln GHE_t + \alpha_5 \Delta \ln GHE_{t-1} + \alpha_6 \Delta \ln GHE_{t-2} + \alpha_7 \Delta \ln GPC_t + \alpha_8 \Delta \ln GPC_{t-1} + \alpha_9 \Delta \ln GPC_{t-2} + \alpha_{10} \Delta \ln HW_t + \alpha_{11} \Delta \ln HW_{t-1} + \alpha_{12} \Delta \ln HW_{t-2} - \theta \mu_{t-1} + \varepsilon_t \quad \dots\dots\dots 3a$$

Equation 3a incorporates short run and long run effects of equation 1a, used in our estimation.

#### 5. Estimation Technique

The paper adopts the use of error correction model (ECM) otherwise called error correction mechanism estimation techniques in the attempt to determine the macroeconomic determinants of health outcomes in Nigeria. The error correction mechanism assumes most economic time series data are non-stationary. In regressing a time series variable on another time series variable, one out of ten obtains a very high  $R^2$  (coefficient of multiple correlation), although there is no meaningful relationship between the two. This situation exemplifies the problem of spurious regression.

It is therefore very important to find out if the relationship between economic variables is true or spurious. An attempt to achieve stationarity led to differencing data, which is, taking the first differences of all variables that appear to be highly auto-correlated until a satisfactory model could be arrived at. At the formal level, stationarity can be checked by finding out if the time series contains a unit root. The Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) tests was used for this purpose. These issues have culminated into cointegration technique of econometric analysis which was used in estimating our model.

##### 5.1. Unit Root Test

The results of the unit root test as shown in the Table 1 shows that the variables are stationary at first difference. This is deduced from the fact that the absolute values of ADF test are greater than the value of the ADF critical value at the 5% level of significance.

With Intercept Only			
Variables	ADF	Critical value 5%	Remarks
InGHE	-2.5109069	-2.971853	Non stationary
InGPC	-8.027684	-2.967767	I(1)
InLE	-3.150841	-2.986225	I(1)
InHW	-8.252614	-2.971853	I(1)
InLR	-5.953398	-2.991878	I(1)

Table 1: Unit Root Test at First Difference  
Source: Author's Computation

## 5.2. Cointegration Test

Having established the order of integration and stationarity of the variables used in the estimation of the model, we proceed to test for cointegration between the dependent variable and the independent variables (see Table 2).

Model	Null Hypothesis	Alternative Statistics	Trace Statistics	Max-Eigen Statistics	5% Critical Value	No Of Co-Integrating Equation
1a	R= 0*	R=1	70.05203	34.83110	30.04	1
	R≤ 1	R=2	35.22093	20.58055	23.80	
	R≤ 2	R=3	14.64038	8.500016	17.89	
	R≤ 3	R=4	6.140366	3.697662	11.44	
	R≤ 4	R=5	2.442704	2.442704	3.84	

Table 2: Result of Johansen's Cointegration Test  
\*(\*\*) Denotes Rejection of The Hypothesis at the 5%(1%) Level  
Trace Test Indicates Two Cointegrating Equations at Both 5% and 1% Levels  
Source: Author's Computation

The stationarity of the residuals implies that the dependent and independent variables used in estimating the models are cointegrated. Hence, we can proceed with estimation of the ECM.

### 5.2.1. Error Correction Model

The error correction modelling involves three steps. The first is to estimate a long run model, followed by including the error term from the long run model in a dynamic over-parameterised model and thereafter work on this model until one obtains the parsimonious model which is then interpreted. In these results, the over-parameterised model is not presented.

### 5.2.2. Long Run Model

The Life expectancy model analysed the sensitivity of life expectancy (LE), a proxy for health status, to literacy rate (LR), government health expenditure (GHE), GDP per capita (GPC), and total number of health workers(HW).

Variables	Coefficient	T- Statistics	Probability	
Constant	3.504134	24.56758	0.0000	R <sup>2</sup> =0.831629
Log(GPC)	0.013743	0.285001	0.7778	AdjR <sup>2</sup> =0.806685
Log(GHE)	0.010133	4.360430	0.0002	S.E=0.012039
Log(HW)	0.003728	0.429406	0.6710	F.Stat=33.34002
Log(LR)	0.046006	2.679558	0.0124	D.WStat=0.602366

Table 3: Regression Results of Long Run Life Expectancy Model  
Dependent Variable is LE  
Source: Author's Computation

From Table 3, all the variables conform to the priori expectation. While for health workers, and GDP per capita are insignificantly positive, all other independent variables in LE model are significantly positive to life expectancy from birth. The error correction representation for the selected ARDL model, selected on the basis of the Schwarz information criterion is represented below

### 5.2.3. Parsimonious Error Correction Model

Using the exact AR(1) inverse interpolation method, converged after 5 iterations (i.e. dumping insignificant variables) we have the following results as contained in Table 4.

Variables	Coefficient	Standard Error	t-Statistics
Constant	0.001229	0.012574	0.103287
D(LE(-1))	0.798917	0.174829	4.569702
D(LE(-2))	0.224155	0.175446	1.277631
D(LR(-1))	0.004127	0.001613	2.558179*
D(LR(-2))	0.00219	0.001228	1.783026
D(GHE(-1))	0.003421	0.001925	1.776692***
D(HW)	0.696222	0.303844	2.291382
D(HW(-1))	-0.8379	0.321006	-2.610241*
D(GPC)	-0.01717	0.012503	-1.3733
D(GPC(-1))	0.02191	0.011027	1.986902
D(GPC(-2))	0.026125	0.008192	3.188985**
ECT(-1)	-0.08912	0.032834	-2.71431
R-Squared = 0.915833		Adjusted R-Squared = 0.869074	
D-W Statistics = 1.499991		F-ratio = 19.58614	

Table 4: Regressed Results of Life Expectancy Model.

Dependent Variable is LE

Note: \* = Significant at 1 % \*\* = Significant at 5 % \*\*\* = Significant at 10 %

Source: Author's Computation

The result obtained above shows that the adjustment response of life expectancy is confirmed by the coefficient of the residual ECM (-1). It shows that about 0.089 of the discrepancy between the actual and the long run or the equilibrium value of life expectancy (LE) is eliminated or corrected in each period.

About 91% of the systematic variation in life expectancy (LE) in Nigeria over the period of estimation is explained in the ECM model. This percentage is indicative of the high goodness-of-fit of the model. The F- statistic of 19.58614 is statistically significant at 5% significance level. Hence, there exist a strong linear relationship between dependent variable and all the explanatory variables of the model. The value of the Durbin Watson Statistics of 1.4999 in the model indicates the absence of autocorrelation in the model, an indication of the efficiency of the obtained parameters estimates.

The result shows that the level of government health expenditure (GHE), GDP per capita (GPC) and literacy rate (LR) had progressive effect on life expectancy (LE) in Nigeria. Literacy rate (0.41%); government health expenditure (0.34%) and GDP per capita (2.61%) significantly explained life expectancy in Nigeria. This implies that a 1% improvement in life expectancy was brought about by less than 1% influence of these factors. Thus, health expenditure has the ability to improve health status of a population. This signifies that the levels of budgetary expenditure on health and educational sectors are sufficient to provoke a positive effect on health status in Nigeria. The positive and significant relationship between government health expenditure (GHE), literacy rate (LR), GDP per capita (GPC) and life expectancy (LE) means that there is conformity with the theory. Thus, good education, income and government expenditure on health are necessity in stimulating improved health status. However, health workers (HW) failed to conform to the conclusions in the theories. This unexpected result of health workers (HW) could be attributed to the emergency of brain drain in the sector.

## 6. Policy Implication

The health status of the labour forces, along with other factors, in any emerging and developed economy, strongly determines the speedy growth and development of such economies. Nigeria as a developing economy, no doubt, needs such healthy labour force if its drive towards growth and development is to be realised. Against this background, it is important to note the policy implications of the results analysed above.

There is need for Nigeria government and health authorities to pursue stable and consistent macroeconomic policy that will improve life expectancy such as increments of the allocation to health sector, improvement in the utilisation of health sector allocation, promoting the quality and quantity of health workers, and engagement in health enlightenment campaign.

Lack of high-tech equipment in Nigerian health sector discourages improved life expectancy. Hence, policy measures need to be put in place to encourage acquisition of knowledge (i.e. education) on the part of the health care providers and the patients, to enjoy the associated benefits. Besides, government should encourage the importation of high-tech equipment to improve the services in the sector.

## 7. References

- i. Ademiluyi, I.A. and Aluko-Arowolo, S. O. (2009). Infrastructural distribution of health care services in Nigeria: An overview. *Journal of Geography and Regional Planning* 2(5):104-110.
- ii. Adetokunbo O. Lucas. (2006). National health conference--- Chairman's opening remarks.

- iii. Fayissa, B. and Gutema, P. (2005). Determinants of health status in Sub-Sahara Africa (SSA). *The American Economist*, Vol 49, No.2, pp 60 – 66 ([www.jstor.org/stable/25604326](http://www.jstor.org/stable/25604326)).
- iv. Filmer, D. and Pritchett, L. (1997). Child mortality and public spending on health: How much does money matter? *World Bank Policy Research Working Paper No.1864* Washington: World Bank.
- v. -----.(1999). The impact of public spending on health: Does money matter. *Social Science and Medicine* 49(10): 1309-23.
- vi. Filmer D. (2003). The incidence of public expenditure on health and education. *The World Bank, Washington DC*.
- vii. -----.(1999). The impact of public spending on health: Does money matter. *Social Science and Medicine* 49(10): 1309-23.
- viii. Filmer, D., Jeffrey, H., and Lant, P. (1998). Health policy in poor countries: Weak links in the Chain. *World Bank Policy Research Working Paper No. 1874* (Washington: World Bank).
- ix. Filmer, D., Hammer, J. and Pritchett, L. (2000). Weak links in the chain: A diagnosis of health policy in developing countries. *World Bank Research Observer*, 15(2), 199-224.
- x. Fogel, R. (1993). New sources and new techniques for the study of secular trends in nutritional status, health, mortality, and the process of aging. *Historical Methods*. 26(1): 5-43
- xi. Forbes, J. and McGregor, A.(1984). Unemployment and mortality in post-war Scotland. *Journal of Health Economics*, 3, 239-257.
- xii. Francesco, R. and Marios, Z. (2006). Determinants of public health outcomes: A macroeconomic perspective. *Université de Cergy-Pontoise*. Retrieved on December 26, 2011 from [http://www.degit.ifw-kiel.de/papers/degit\\_11/C011\\_045.pdf](http://www.degit.ifw-kiel.de/papers/degit_11/C011_045.pdf)
- xiii. -----.(2008). Longevity and education externalities: A macroeconomic perspective. *University of Cyprus*, Retrieved on December 24, 2011 from <http://sceco.univ-poitiers.fr/recherpubli/doctravail/T2008-10.pdf>
- xiv. Grossman, M. (1972). On the concept of health of health capital and the demand for health. *Journal of Political Economy*. 80, 223-55.
- xv. -----.(1972a). *The demand for health: A Theoretical and Empirical Investigation*. New York. NBER Book.
- xvi. -----.(2000). The Human Capital Model. *Handbook of Health Economics*, Vol. 1. Elsevier Science.
- xvii. Hadley, J. (1982). *More medical care, better health?* *The Urban Institute Press*, Washington, DC.
- xviii. Health Indicators. (2001). Building blocks for health situation analysis. *Epidemiological Bulletin; Pan American Health Organisation*, Vol. 22(4). Retrieved on December 26, 2011 from [http://www.paho.org/english/dd/ais/eb\\_v22n4.pdf](http://www.paho.org/english/dd/ais/eb_v22n4.pdf)
- xix. Kaplan, G., Pamuk, E., Lynch, J., Cohen, R., and Balfour. (1996). Inequality in income and mortality in the United States: Analysis of mortality and potential pathways. *British Medical Journal*, 312, No. pp. 999-1003.
- xx. Kaplan, G.A. & Lynch, J.W. (1997). Whither studies on the socioeconomic foundations of population health? *American Journal of Public Health*, 87(9), 1409-1413.
- xxi. Kawachi, I. and B. Kennedy. (1997). The relationship of income inequality to mortality: Does the choice of indicator matter? *Social Science and Medicine*. 45(7); pp. 1121-27.
- xxii. Kennedy, B.B., Kawachi, I. and Prothrow-Smith, D. (1996). Income distribution and mortality: Cross sectional study of the Robin Hood index in the United States. *British Medical Journal*, 312, pp. 1004-7.
- xxiii. Lawanson, Akanni O. (2012). *Public health care financing and health outcomes in Sub-Sahara African countries*. Economics of Health System Governance and Financing in Nigeria. Ibadan University Press
- xxiv. Mathers, C.D. (1996). *Health differentials among young Australian adults*. Canberra: AIHW.
- xxv. Musgrove, P. (1996). Public and private roles in health. *Technical Report 339*. World Bank Washington, D.C.
- xxvi. NACA (2013). President's comprehensive response plan for HIV/AIDS in Nigeria
- xxvii. National Bureau of Statistics, Demographic Statistics Bulletin (2012).
- xxviii. Nigerian Demographic Health Survey (2008)
- xxix. OECD (2019). Life Expectancy at Birth. (<https://ourworldindata.org>)
- xxx. Strauss, J. and Duncan, T. (1993). .The impact of improved nutrition on labor productivity and human resource development: an economic perspective. in *The political economy of food and nutrition policies*. Pinstrup-Andersen, P. (Ed.), Baltimore: Johns Hopkins Press.
- xxxi. United Nations (2008), World Historical and Predicted Crude Birth / Death Rates (1950 – 2050)
- xxxii. WDI. (2017). *World Development Indicator*. World Bank, 2017 Edition.