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Abstract
The study examines Income Disparity and Health Outcome in Nigeria and the Implication for Economic Growth, with the Case study of the FCT. It further analyses the determinants of health outcomes between the high and the low income families in Nigeria society and the impact on Economic growth. With the use of panel data, the study engaged the one-way error component panel modelling technique as its methodology, with the outcome showing the existence of a correlation between income inequality and mortality rates across income quintiles while child mortality was found to impact negatively on growth through a decline in the level of individual income. Thus, infant and under-five mortality rates are about 2.5 times higher among the poorest 20 per cent of the population than among the richest 20 per cent. The implication is that poverty and income inequality have contributed to, as well as reinforced, the poor health conditions of most Nigerians and further curtailed their capacity to access health services.

Key words: Health outcomes, Mortality, Incomes differentials, Productivity, Growth

Introduction
Health and education are important aspects of development and have been considered as basic needs in the development strategies (Deolalikar, 2008). Improving the state of health and the level of health outcomes contribute immensely to the realization of other developmental objectives such as labour productivity growth, responsiveness to innovation, and future orientedness. From the perspective of economic development, investment in education and healthcare can be regarded as an investment in human capital while in turn, economic growth and development lead to improvements in health, education and other indicators of human development (Ranis, Stewart and Ramirez, 2000).

The 1960s witnessed the considerably low quality of family health with the index as high as one child in five dying before age five, and by the 1990s, the rate had fallen to one in ten. Such progress gave hope that child mortality could be cut by two-thirds by 2015 – the Millennium Development Goals (MDGs) projections. However, the observed progress slowed in the 1990s, particularly in the low income economies of the sub-Saharan Africa. Only Northern Africa, Latin America, the Caribbean and South-Eastern Asia maintained their rapid pace. In these regions, economic growth, better nutrition and access to healthcare helped to drive improvements in child and maternal survival. Regional averages, however, overshadowed differences among countries and inequalities among socio-economic groupings in terms of income and non-income realities (DanBen-David, 1999). For instance, it is no gain saying that the world economies are still marked by the very uneven distribution of wealth and income. This unevenness which results in inequalities in income earnings cut across virtually all the segments of any society. This is seen in inequality of incomes among nations across the continents, among allied industries, firms, and markets; among various groups, households and individual persons who make up the societies. Illness and disability reduce hourly wages substantially, with the effect being especially strong in developing countries, where a higher proportion of the work force is engaged in manual labour than in industrial countries (Aluko and Adeniji, 2013)

Literature Review
Since the British Government granted Nigeria political independence in 1960, successive governments have continued to face the daunting task of reforming her various sectors, particularly the health sector. The social and demographic indicators on health and education remain weak. Mortality due to

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HIV/AIDS has led to various health outcomes such as higher infant mortality, lower life expectancy, higher death rates, high population growth rates, and changes in the distribution of population by age and sex than would otherwise be expected (WHO, 2008). The 2011 UN Human Development Report ranked Nigeria 156th out of 187 countries, having an infant mortality rate (IMR) of 74.36 deaths/1,000 live births which comprised of 59.44 male deaths/1000 live births. In 2010, the global ranking of the poverty level and access to basic primary health delivery saw Nigeria ranked 142nd out of 169 countries. As a result, the Nigerian government has sought to improve her health care system. Health spending in the Federal budget, therefore, increased from 4% in 2010 to 6% in 2011 but unfortunately far less than the Sub-Sahara Africa (SSA) average of 12%.

**Health status and Productivity**
Health status measures the physical and emotional well-being of an individual or a defined population. Health status is said to be affected by a wide range of social and economic variables. According to McRake et. al. (2003), health status performance is not only influenced by the health system of a country but has a strong association with historical and cultural factors, political systems and geographical locations. Correspondingly, (Obansa, 2008) identified productivity as a measure of output of a person per unit of time. He further noted that quite a substantial body of literature exists on the impact of a person’s health or his/her time allocation on productivity (Baldwin and Weisbrod, 1974; Barlow, 1979; Strauss, 1986; World Bank, 1993; and Goodman et al., 2000). Calculating productivity loss or productive potential resulting from sickness involves the application of some consensual economic principles (Klarman, 1965). Earnings which include wages, salaries, and remuneration other than transfers, have been theoretically and generally accepted as an appropriate measure of workers’ productivity. Weisbrod et al. (1961) pioneered an empirical assessment of the impact of health status or productivity. This he did by relating health status to earnings and other income generating potentials.

**Nature of Income Distribution in Nigeria**
One way of assessing the trends in the income class in Nigeria is by looking at minimum wage fixing or wage bounds. As a means of closing the gaps between the two extremes of lower and upper class consumption groups, minimum wage legislation has been on the increase since the late 1970s beginning with the Udoji minimum wage award. Since then wage floors have always come as welcome and genuine economic policies; and immediate and quick measures to close income gap or as a palliative against changing prices. This is because the minimum wage generates the most help to those with the least income and the least help to those with high income. The federal minimum wages have been on the increase, while the national has been steadily low over the same period except for a brief, sharp rise in 1999.

**Theoretical Review: Perspectives on Income Inequality and Health**
There are a number of theories that explain how income inequality influences mortality i.e. health outcomes: Notable among them are; **The individual (absolute) income theory** asserts that the relationship between income inequality and mortality is a reflection of individual level data (Gravelle 1999; Deaton 2003). In this perspective, the relationship is found at the aggregate level since poorer people are more likely to live in high unequal areas. Studies that failed to establish significant associations between income inequality and health outcomes seem to support such claim, and as such question, if the relationship could be explained as simply a statistical artifact (Gravelle, 1999). However, this seems unlikely since researchers note that only a small amount of the difference in mortality rates could be attributed to such a compositional effect Franzini, Ribble, and Spears (2001), and other studies that have shown that the effects of income...
inequality remained significant after adjusting for individual income. This is further buttressed by Soobader and LeClere (1999); Kennedy et al. (1998).

i. **The relative income hypothesis (RIH)**, an alternative to the individual income theory, suggests that a threshold effect takes place beyond which per capita income is no longer a safeguard against ill health, and income inequality becomes a better predictor of health outcomes. The reasoning is that higher income and better standards of living enable mothers to have better hygiene, sanitation, and nutrition. When there is reasonable income to provide care for the mother, further increases in income contribute to a reduction of infant deaths. This theory is supported by the demographic trends that have shown that developed nations have declining infant mortality rates due to “a higher standard of living, urbanization, and better medical care that accompany economic development” (Pampel and Vijayan, 1996). This perspective includes a social psychological aspect made popular by Wilkinson, Kawachi, and Kennedy (1998); Wilkinson (1992).

ii. **The Neo-material theory** is a structural explanation for the effect of income inequality on mortality. Areas with higher income inequality are more likely than areas with less income inequality to have characteristics that influence unfavorable health outcomes, such as worse environmental conditions (i.e. more hazardous waste sites, less funding provided for public safety). Investments are concentrated in the high income areas. This theory suggests that it is not the perception of the inequality, but the inequality itself that produces differential mortality outcomes. For example, low economic status and low educational attainment decrease the likelihood of receiving good nutrition, adequate housing, receiving adequate health care and developing positive health related attitudes and lifestyles (Matteson, Burr, and Marshall, 1998).

iv. **The Modernization Theory**: The theory supports the belief that industrialization reduces infant mortality through increased economic output. Economic growth fosters improvements in education, housing, nutrition, health care, sanitation, and various public services that reduce infant mortality. When the economy is on the rise, morale and energy are positive. Positive energy translates into healthy mothers and healthy babies. A strong modernized economy creates jobs while boosting morale.

vi. **Gender Stratification Theory**: This theory is one of the most convincing theories. As the female gender is appreciated, so is her role as a mother. Female education is one of the most important ways of reducing infant and child mortality. Educated mothers are more likely to seek health care for their children; a literate mother is more likely to be able to communicate with health care providers, and female education has positive effects on the balance of family relationships regarding child care. Educated mothers tend to have a higher self-esteem than uneducated mothers that triggers healthy outcomes and healthy babies.

**Methodology**

The study area consists of three area councils of the Federal Capital Territory (FCT) Abuja. These are Gwagwalada, Bwari and the Municipal area councils. These were further stratified into the various communities, towns, and villages for effective coverage. The stratification of the study area is required to permit spatial comparison of the impact of income disparity and infant mortality levels in the area councils. Noteworthy is that a pilot test was carried out in Gwagwalada Area Council, which is one of the Area Councils, earmarked for the survey. The purpose of this is to ascertain the prospect of a successful survey and the prospect of a territory-wide survey.

It is instructive to mention that the pilot test enabled useful decisions on the requisite qualities of questionnaire administrators, such as gender-mix, the relevance of fair knowledge of language/culture of prospective respondents; cost involved and likely time period involved. Others are adjustments in
some variables in the final copy of the questionnaire, such as; occupation of respondents, range and alternative means of income. Consequent on the pilot test, the decision on the number of Area Councils and which of them will adequately serve the purpose of the study were taken, with respect to the limitations of the study.

The choice of FCT as a case study is precipitated by its cosmopolitan nature. This is such that it provides adequate representation of Nigeria’s diversity in terms of ethnic nationality, tribe, culture, religion, profession, etc. Furthermore, the FCT is the seat of the Central government and a fast growing business and commercial location (Public and private) with its original settlers. The Federal Capital Territory (FCT), Abuja, was created by the Late General Murtala Muhammed led Federal government in 1976 via decree No. 6 of 1976, in the then Federal government quest to relocate the Federal Capital from Lagos (Obansa, 2008). Several geographical, historical and strategic factors influenced the decision to establish a new Federal Capital Territory (Dawam, 2000 quoted in Obansa, 2008). Geographically, the FCT is located between latitude 8° 25’ and 9° 25’ North of the Equator, longitude 6°34’ and 7°45’ east of the Greenwich (Aluko and Areo, 2011). The Territory occupies a landmass of 8,000 square kilometres which looks like a trapezium with two longer opposite sides parallel to each other, more than two times the size of Lagos, the former capital (3,535 sq.km). It is situated within the region generally referred to as the “Middle Belt” or Central Nigeria and is bordered on all sides by four states – namely: Niger to the North-West; Nasarawa to the North East, Kogi to the South; and Kaduna to the North.

Sources of Data
Both primary and secondary data were collected and used for this study. The primary data were collected through a field survey using structured questionnaire along with short interviews with respondents, focusing on the sources and effect(s) of income disparity in health outcomes (infant mortality) in the FCT, implication on economic growth of Nigeria. Furthermore, secondary data at the macro level, on infant and childhood mortality were obtained from the health unit of Ministry of Federal Capital Territory (MFCT); health expenditure per capita, out-of-pocket health expenditure data were collected from the Federal Ministry of Health, gross per capita formation and output per capita data obtained from both the CBN statistical bulletin and world economic indicator data. Data used in arriving at wage differences and income quintiles were obtained from Federal Ministry of Labour and Productivity as well as the data from the Luxemburg income studies.

Questionnaire administration
The questionnaires for the study area were administered by trained enumerators and data collected were from respondents across income levels among across the communities in the area councils. Whereas 372 completed questionnaires were returned out of the 530 administered; a list-wise deletion was carried out in order to exclude incomplete responses from the study analysis. As such, a total of 350 valid and useable questionnaires with about 34 variables were used. Cronbach Alpha reliability test was further carried out on the valid questionnaires (Appendix 1), thereby reducing the eventually analysed to 270 which gave a response rate of 77%. The reliability test of the questions and the Likert scale used resulted in 0.689 (with P-Value of 0.000) meaning that cumulatively, the questions administered were reliable enough to explain the impact of differences in income (income group differentials); infant and childhood mortality among income groups.

Sample Size
In line with the studies of Walpole (1974) and Chou (1969), the choice of a sample size essentially depends on several factors which include: The allowable error, the level of confidence, the sample standard deviation, Size of the population and the amount of resources available to the researcher for the survey.

The theory noted that whenever a sample size is small, the degree of confidence producing an unreliable result enlarges. Walpole (1974) observed that sample size of size greater than 30 would often normally have sample standard deviation that approximates to 0.3. Chou (1969) went on to define the allowable error, \( E \), as half the length of a given confidence interval. The error must be less than \( Z \frac{\%}{2} \sigma_{\bar{x}} \) at a confidence interval of \( 1 - \alpha \), that is, if we construct, say, 95 per cent confidence interval for \( \mu \), it means that we are 95 per cent sure that \( 1.96 \sigma_{\bar{x}} > E \) or the probability is 0.95 that \( 1.96 \sigma_{\bar{x}} > E \). The left term of the inequality is called the risk of an interval estimate, which is defined as the probability that the error of estimation will be equal to or greater than \( Z \frac{\%}{2} \sigma_{\bar{x}} \) that is, \( P (E \geq Z \frac{\%}{2} \sigma_{\bar{x}}) \).

**Theoretical framework**

Here we proceed to explore the theoretical foundation of the study by examining the place of Human capital and Harrod-neutral (labour augmenting) in the growth process and the link between absolute income inequality and infant mortality. In doing this, we used income data by quintiles which captured the relationship between absolute income and infant mortality.

\[
C_i = \frac{1}{T} \left( A_0 + \sum_{t=1}^{T} E_i [Y_t] \right)
\]  
(1.0)

The above implies that the individual consumes the amount he/she would if his/her future incomes were certain to equal their means; put differently the uncertainty about future income has no impact on consumption. On the contrary, it negates the subsisting situation of high health outcomes expenditure prevalent in the LDCs occasioned by income inequality, where the current marginal utility of consumption is greater than the expected future marginal utility. This would make the individual become better off, raising current consumption (Hall, 1978).

\[
C_j = C_i + \frac{1}{T-1} \left[ \sum_{t=j}^{T} E_j [Y_t] - \sum_{t=j}^{T} E_i [Y_t] \right] - \frac{1}{T} \sum_{t=j}^{T} E_i [Y_t]
\]  
(1.1)

Where \( i \) and \( j \) are the estimable periods

Random-walk hypothesis pre-supposes that change in consumption between periods should be equal to the change in the individual’s estimate of his/her lifetime resources divided by the number of remaining life span (Romer, 2006). He further considered certainty-equivalence behavior is utilizing Euler equation relating consumption in those periods, in this case, period’s \( i \)th and \( j \)th thus:

\[
U'(C_i) = E_i [U'(C_j)]
\]  
(1.2)

The utility is quadratic. In other words, it is made linear, as such, the expected marginal utility of consumption becomes same as the marginal utility of expected consumption. It is, therefore, this certainty-equivalence behavior we took to augment Solow’s growth accounting model. We utilized an income decomposition approach to evaluating its impact on infant mortality with an increase in inequality of income distribution.

In a broad sense, neither the microeconomic nor the macroeconomic models can on its own appropriately capture the full effects of the income inequality and rise in infant mortality on the level of productivity. For instance, while the macroeconomic models tend to be highly aggregative and over reliant on too many sets of assumptions, the microeconomic models allow only for declines in GDP driven by losses in labour supply while ignoring the effect of a slowdown in saving and capital formation.

The study therefore utilized macroeconomic model premised on Cobb-Douglas function given its robust nature; capable of accommodating more relevant variables in any chosen model. More so,
studies in the past, such as (Mankiw et. al. 1992; Cornia, 1996) noted that production function is consistent with factor share of one third of each of physical capital, labour, therefore differences in growth of these factors collectively explained about 80% of GDP per capita variations. Similarly, (Barro, 1990; Aschauer, 1988) held that government expenditure is an essential input in the structure of production particularly in the LDCs. The above findings, therefore, suggest that more factors account for production output than those traditional factor input enumerated above. In spite of the flaws of macro models, therefore, they are found to provide a relatively more accurate description of the economy with its attendant reliable statistical conclusion. It, therefore, would be characterized by constant returns to scale. Ajay (2005) identified health alongside education as components of human capital investments that yield ‘returns’ in the form of high output and productivity both at the macro and micro level. The framework augments the standard Solow growth model by explicitly incorporating human capital as an individual factor of production, assuming that aggregate output in i\textsuperscript{th} country and period (t) is a function of physical inputs (K\textsubscript{it}) and (A\textsubscript{Lt}) labour-augmenting productivity. In line with this, (Ogunleye, 2008), was motivated into assessing the relationship between health expenditures, health outcomes, and economic growth. The standard neoclassical growth theory pioneered by (Solow, 1956) assumes an economy-wide production function of the form:

\[
Y(t) = A(t)L^\alpha(t)K^\beta(t)
\]

\[
> 0, \beta > 0, \alpha + \beta = 1
\]  

Where, \( Y \) is aggregate output, \( A \) is the efficiency parameter, \( K \) is total physical capital stock, and \( L \) represents the labour force.

However, one of the basic weaknesses of this model is its treatment of the variable it assumes to be the driver of differences in economic growth across countries. While it recognizes the effectiveness of labour as the driver of economic growth, the model treats this variable as a mystery. In addition, it has been shown that health, education, and human capital were exogenous factors influencing growth (Romer, 1990); (Barro, 1990). Thus, following Mankiw et. al. (1992) the production function was modified by augmenting it with human capital as:

\[
Y(t) = K(t)^\alpha H(t)^\beta [A(t)L(t)]^{1-\alpha-\beta}
\]

\[
> 0, \beta > 0, \alpha + \beta < 1
\]  

The dynamics of labour, capital, knowledge, and health are assumed to follow the following paths:

\[
\dot{K}(t) = s_k Y(t)
\]  

\[
\dot{L}(t) = nL(t)
\]  

\[
\dot{A}(t) = gA(t)
\]  

\[
\dot{H}(t) = s_h Y(t)
\]  

Where, \( s_k \) is the fraction of capital devoted to physical capital accumulation, \( s_h \) is the percentage of resources devoted to health expenditures, \( n \) is the population growth rate and \( g \) is the growth rate of knowledge.

Expressing equation (1.5) per unit of effective labour yields:

\[
y(t) = k(t)^\alpha h(t)^\beta
\]  

Given the focus of this study, we assume the process of physical capital accumulation is exogenous. Consequently, we concentrate on the dynamics of health outcomes. To obtain this, equation (1.8) is differentiated by applying both the quotient and product rules thus:
\begin{align}
\dot{h}(t) &= \frac{\dot{H}(t)}{A(t)L(t)} - \frac{H(t)\dot{A}(t)}{[A(t)L(t)]^2} - \frac{H(t)L(t)\dot{A}(t)}{[A(t)L(t)A(t)]^2} \\
\dot{y}(t) &= \frac{s_nY(t)}{A(t)L(t)} - \frac{H(t)}{A(t)L(t) L(t)} - \frac{H(t)}{A(t)L(t) A(t)} \\
\dot{h}(t) &= s_n y(t) - nh(t) - gh(t) = 0
\end{align}

Taking natural logarithm of equations (3.9) and (3.10) respectively yield:
\begin{align}
\ln y(t) &= \alpha \ln k(t) + \beta \ln h(t) \\
\dot{h}(t) &= s_n k(t)^\beta h(t)^\beta
\end{align}

Equations (1.13) and (1.14) show the dynamics of health outcomes and economic growth, respectively. Thus, $y(t)$ is the growth of output per capita, $S_H$ represents the certainty-equivalence utility derivable from the resources devoted to health, $k(t)$ is capital per capita and $\dot{h}(t)$ is the growth in health indicators or human capital. The underpinning of the above model is that in the long run, the steady growth rate is determined by the rate of growth of the labour supply and efficiency. With higher mortality, the results for life expectancy at birth suggest that the difference in average life expectancy between a relatively egalitarian and a relatively non egalitarian (repressive) country is likely to be as much as five to ten years. In other words, inequality in income distribution is likely to be associated with inequality in access to health and social services, etc. relevant to mortality (Jocelyn, 2006).

**Model Specification**

According to Tilman and Waldmann (2009), infant mortality is functional to the relative difference between the wages of lowest and uppermost quintiles (income disparity) ($Q_1; Q_4$); symbolically denoted as ($\Delta$ income $Q_1; Q_4$) = ($Q_1 - Q_4/Q_4$) for i=1; j=4. They, however, utilized log of per capita and the relationship was found to have been a two-way causation. The study further held that $Q_1$ which is the lowest 73 quintile is 20% of the income distribution while the difference between the average income of a person in the lowest quintile ($Q_1$) and an average person in the fourth quintile ($Q_4$) amounts to two-third of the income of the wealthier person. Consequently, the coefficient not only indicates the validity of the theory of relative income hypothesis but also the absolute income hypothesis of the upper quintiles. Given that the focus of this study is on income disparity and its impact on health outcomes (infant mortality) and economic growth, the above assumes cross-section dimension with individual specific effect and time-invariant. On this note, Robertson and Symons (1992) observed that false imposition of parameter homogeneity, and dynamic estimation of a static model when the regressors follow a random walk lead to perverse results.

We therefore, apply one-way error component panel model technique. Early applications of error components in economics include Kuh (1959) on investment, Mundlak (1961) and Hoch (1962) on production functions and Balestra and Nerlove (1966) on demand for natural gas etc.

**Pooled OLS models**

\begin{align}
y_{it} &= \alpha + \sum_{k=1}^{J} \beta_k X_{kit} + \mu_{it} ; k=1...J \\
\ln(\text{mort}Q_{1it}) &= \alpha_1 + \alpha_2 \text{lowerinc}Q_{1it} + \alpha_3 Y_{it} + \alpha_4 \ln C_{it} + \alpha_5 \ln O_{it} + \alpha_6 \ln H_{eit} + \mu_t \quad \cdots \cdots \cdots 1 \\
\ln(\text{mort}Q_{4it}) &= \alpha_2 + \beta_2 \text{upperinc}Q_{4it} + \beta_3 Y_{it} + \beta_4 \ln C_{it} + \beta_5 \ln O_{it} + \beta_6 \ln H_{eit} + \mu_t \quad \cdots \cdots \cdots 2
\end{align}
\[ \ln(y(t)) = \alpha_3 + \delta_2 \Delta \text{inc} Q_{1i} + \delta_3 y_{i-1} + \delta_4 \ln(\text{mort} Q_{1i}) + \delta_5 \ln(\text{mort} Q_{4i}) + \mu_t \ldots \]

where;

- \( \text{mort} Q_{1i} \) = Infant mortality of the lowest (income) quintile being 20\% of the income distribution;
- \( \text{lower inc} Q_{1i} \) = income of the lowest quintile;
- \( \Delta \text{inc} Q_{1i} \) = relative difference between the wages of lowest and uppermost quintiles (income disparity);
- \( \text{mort} Q_{4i} \) = Infant mortality of the upper (income) quintile;
- \( \text{upper inc} Q_{4i} \) = income of the upper quintile;
- \( y(t) \) = is the growth of output per capita a proxy of economic growth;
- \( y(t)_{i-1} \) = lagged value of output per capita;
- \( C_{fi} \) = gross per capita formation;
- \( Op_{it} \) = out-of-pocket health expenditure (private);
- \( H_{ei} \) = direct health expenditure per capita (ppp@2005 constant);
- \( i \) = indexes of cross-sectional dimension
- \( t \) = time series dimension

\( \alpha_1 - \alpha_3 \) = the intercepts;

The partial derivative of each variable with respect to the relative infant mortality of quintile groups as well as the output per capita is the coefficient in each case. Similar definitions apply to subsequent models except otherwise indicated.

All variables are in log transformation form except those expressed in rates and/or economic integration index. This is to standardize and satisfy the normality assumption.

To further justify the models used; Tilman and Waldmann (2009) used log of per capita GDP together with \( \Delta \text{inc} \) (relative income differential in wage quintiles) to examine the impact of income differential on infant mortality. Similarly, Mankiw et al. (1992), Barro (1996) and Grossman (1972) have at various times developed models that include health capital as a significant variable for economic growth.

**Data Analysis and Presentation of Results**

The analysis of data in this research was carried out using SPSS 16.0 and E-view 7.0 statistical packages which enabled us to determine some relevant descriptive, analytical and inferential statistics such as the means, reliability tests, percentages, frequency distribution, coefficients of correlation, forecasting, and panel regression analysis among others. The study made use of both survey and secondary data; through which the subject matter; Income Disparity and family Health Outcomes in the FCT: Implication for Economic Growth in Nigeria, was assessed.

**Socio-Economic and Demographic Characteristics of the Respondents**

A representative random sample of 525 respondents was originally planned for the survey. However, only 270 responses as earlier reported were utilized representing approximately 61 per cent success rate. The study engaged about thirteen (13) research assistants who worked in the area councils for two months both for the pilot test and the eventual administration of the final questionnaire. The selected research assistants were trained prior to the field work, to meet up with the needed standard for the survey. In all, about 87 villages or rural communities and towns were covered by the survey. Cronbach alpha reliability test on the questions and the Likert scale used resulted in 0.689 (with P-Value of 0.000) meaning that cumulatively, the questions administered were reliable enough to explain the...
impact of differences in incomes (income group differentials); infant and childhood mortality among income groups in the FCT and economic growth in Nigeria.

**Presentation of estimated results**

Presented below is the result of the stationarity test on the secondary data

<table>
<thead>
<tr>
<th>Variables</th>
<th>Levin &amp; Chin</th>
<th>P-value</th>
<th>Pesaran &amp; Shin</th>
<th>P-value</th>
<th>ADF Fisher</th>
<th>P-value</th>
<th>Philip Peron &amp; Fisher</th>
<th>P-value</th>
<th>Remark</th>
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<tbody>
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<td>logMortq1</td>
<td>Level -5.4466</td>
<td>0.0612</td>
<td>-0.95891</td>
<td>0.168</td>
<td>3.7103</td>
<td>0.1564</td>
<td>3.0461</td>
<td>0.2180</td>
<td>Probability Values for Fisher tests are based on the Asymptotic Chi-square Distribution, hence others assume asymptotic normality. *=significant 0.05 significance level, therefore; leading to rejection of the null hypothesis which assumes common unit root process.</td>
</tr>
<tr>
<td></td>
<td>1st diff. - 8.5269*</td>
<td>0.0000</td>
<td>-0.74691*</td>
<td>0.0000</td>
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<td>0.0000</td>
<td>31.177*</td>
<td>0.0000</td>
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<td>Cf</td>
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<td>4.1358</td>
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<td>0.02389</td>
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<td>15.892*</td>
<td>0.0003</td>
<td>15.892*</td>
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<td>Y(t-1)</td>
<td>Level 2.2799</td>
<td>0.9887</td>
<td>3.1759</td>
<td>0.9993</td>
<td>0.0677</td>
<td>0.9992</td>
<td>0.1357</td>
<td>0.9988</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1st diff. - 2.1356*</td>
<td>0.0016</td>
<td>-3.2608*</td>
<td>0.0006</td>
<td>17.226*</td>
<td>0.0001</td>
<td>16.970*</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>He</td>
<td>Level -7.0267*</td>
<td>0.0000</td>
<td>-5.6710</td>
<td>0.0000</td>
<td>31.8003*</td>
<td>0.0000</td>
<td>31.8003</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1st diff. -</td>
<td>0.0000</td>
<td>-</td>
<td>0.0000</td>
<td>31.8003*</td>
<td>0.0000</td>
<td>31.8003</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>logLower</td>
<td>Level -0.21715</td>
<td>0.4140</td>
<td>0.54111</td>
<td>0.7058</td>
<td>0.6431</td>
<td>0.7250</td>
<td>0.66534</td>
<td>0.7170</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1st diff. 1.42092</td>
<td>0.9223</td>
<td>-1.4069</td>
<td>0.0797</td>
<td>5.199</td>
<td>0.0743</td>
<td>5.1998</td>
<td>0.0743</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2nd diff. - 1.8224*</td>
<td>0.0003</td>
<td>3.53315*</td>
<td>0.0000</td>
<td>13.676*</td>
<td>0.0011</td>
<td>13.5796*</td>
<td>0.0001</td>
<td></td>
</tr>
<tr>
<td>logUpper</td>
<td>Level 0.92564</td>
<td>0.8227</td>
<td>1.95639</td>
<td>0.9748</td>
<td>0.06153</td>
<td>0.9697</td>
<td>0.07519</td>
<td>0.9631</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1st diff. - 2.3492*</td>
<td>0.0009</td>
<td>2.24058*</td>
<td>0.0012</td>
<td>8.36706*</td>
<td>0.0001</td>
<td>8.36076</td>
<td>0.0015</td>
<td></td>
</tr>
<tr>
<td>Y(t)</td>
<td>Level 0.9682</td>
<td>0.5076</td>
<td>-2.0945</td>
<td>0.8745</td>
<td>2.1345</td>
<td>0.0564</td>
<td>3.4122</td>
<td>0.2134</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1st diff. - 5.6748*</td>
<td>0.0001</td>
<td>-6.7842*</td>
<td>0.0000</td>
<td>10.3421*</td>
<td>0.0000</td>
<td>11.5672*</td>
<td>0.0000</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author’s computation; 2015

The above shows that virtually all the variables used in the analysis were stationary at a level in most of the test tools used. For instance, mortality in the lowest quintile (logmortq1) was stationary at first difference in all the test tools while Health capital (HE) was stationary at a level in all the test tools.

**Pooled regression results**
### Model 1

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient</th>
<th>Std. error</th>
<th>t-statistic</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>27.76277</td>
<td>4.71515</td>
<td>5.8879</td>
<td>0.0000</td>
</tr>
<tr>
<td>LogLower</td>
<td>0.608145</td>
<td>0.43433</td>
<td>1.4001</td>
<td>0.1794</td>
</tr>
<tr>
<td>LaggLower</td>
<td>-1.208746</td>
<td>0.40088</td>
<td>-3.0152</td>
<td>0.0078*</td>
</tr>
<tr>
<td>LogCf</td>
<td>-1.502142</td>
<td>0.65438</td>
<td>-2.2955</td>
<td>0.0347*</td>
</tr>
<tr>
<td>LogHe</td>
<td>-0.001765</td>
<td>0.02375</td>
<td>-0.0745</td>
<td>0.941</td>
</tr>
<tr>
<td>LaggOp</td>
<td>-5.228120</td>
<td>1.30590</td>
<td>-4.0032</td>
<td>0.0009*</td>
</tr>
<tr>
<td>logY_t_</td>
<td>-0.970003</td>
<td>0.30159</td>
<td>-32163</td>
<td>0.0051*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dependent Var.</th>
<th>* denotes that the value is significant at five percent level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logmortq1</td>
<td>0.809558</td>
</tr>
<tr>
<td>Adjusted ( R^2 )</td>
<td>0.742343</td>
</tr>
<tr>
<td>F-test</td>
<td>12.04431</td>
</tr>
<tr>
<td>Fprob.</td>
<td>0.000026</td>
</tr>
<tr>
<td>DW</td>
<td>2.084044</td>
</tr>
<tr>
<td>Akaike criterion</td>
<td>-2.195233</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>33.34279</td>
</tr>
</tbody>
</table>

The result above shows, given the probability values, that lagged value of income of the lowest quintile (laggLower), gross per capita formation (logCf), lagged value of out-of-pocket health expenditure (laggOp), and growth of output per capita, a proxy for economic growth (logYt) were all statistically significant while the current value of income of the lowest quintile (loglower), direct health expenditure per capita (He) were not. The regressors in the model are in log form including the regressand whereas only (He) was stationary at level; others became stationary at first difference. Therefore, 1% increase in gross per capita formation (logCf), lagged value of income of the lowest quintile (laggLower), lagged value of out-of-pocket health expenditure (laggOp), and growth of output per capita (logYt) would lead to a significant reduction in infant/child mortality at lowest quintile by 1.50%, 1.21%, 5.23% and 0.97% respectively on the average, holding other variables constant. Although, the effects of direct health expenditure per capita (He), and income of the lowest quintile (loglower) are not statistically significant, their increase by 1% has the potential effect of reducing mortality rate by 0.002% in terms of direct health expenditure and increasing mortality by 0.61% in terms of lower income. The implication of the result was first that the distributive growth in output per capita before now has been largely skewed. Secondly, the expected a priori signs were in order amongst the estimated regressors in relation with the regressand. Finally, the estimated model explained about 74% variation in the mortality rate in the lowest income group (the regressand).
The result above shows that the model explained about 78% variation in the dependent variable (mortality rate in the fourth quintile). Income of the upper quintile alongside its lag was significant at 5% level of significance. Both the lagged values of gross per capita formation (laggCf), and of out-of-pocket health expenditure (laggOp), together with output per capita, a proxy for economic growth (logYt) were as well statistically significant about the same level whereas direct health expenditure per capita (He) was not. Therefore, 1% increase in gross per capita formation (logCf), lagged value of out-of-pocket health expenditure (laggOp), and growth of output per capita (logYt) would lead to a significant reduction in infant and child mortality at the upper quintile by 3.74%, 4.87%, and 1.42% respectively on the average, holding other variables constant. Although the effects of direct health expenditure per capita (He), and income of the upper quintile (logupper) are not statistically significant, their increase by 1% has the potential effect of reducing infant mortality rate by 0.02% and increasing same by 1.81% respectively. It is however not surprising that rise in income of the upper class in Nigeria is neither significant nor able to exhibit expected sign. The implication of the result is that cases of mortality amongst the upper income class in Nigeria were not in any way connected to income level but by other factors rather. It further shows that the current direct health expenditure in Nigeria cannot sustain the possible reduction or eradication common health outcome such as childhood mortality rate, particularly at the hinterland.
Model 3

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient</th>
<th>Std. error</th>
<th>t-statistic</th>
<th>Pvalue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>11.53265</td>
<td>0.152314</td>
<td>75.71630</td>
<td>0.0000</td>
</tr>
<tr>
<td>LOGMORTQ1(1)</td>
<td>-0.272962</td>
<td>0.076021</td>
<td>-3.590592</td>
<td>0.0008*</td>
</tr>
<tr>
<td>LOGMORTQ4(1)</td>
<td>-0.282666</td>
<td>0.069467</td>
<td>-4.069082</td>
<td>0.0002*</td>
</tr>
<tr>
<td>_INCQ1Q4</td>
<td>0.291567</td>
<td>0.056451</td>
<td>5.164957</td>
<td>0.0000*</td>
</tr>
</tbody>
</table>

* denotes that the value is significant at five percent level of significance

Dependent Var. Logmortq1

| R2        | 0.490839 |
| Adjusted R2 | 0.469172 |
| F-test    | 22.65432 |
| Fprob.    | 0.000000 |
| Dw        | 1.089453 |
| Akaike criterion | -0.933566 |
| Log likelihood | 26.33914 |

Having established from the previous models that there exist a significant relationship between the income of the groups, gross output per capita and mortality rate; model 3 was meant to examine the possible impact of mortality rate (i.e. at both lower and upper quintiles); and income differential on the growth of the economy. The result found that all the variables estimated were statistically significant, in other words, mortality rate at both lower and upper income quintiles together with income differential between the two income groups are capable of affecting growth. For instance, one percent increase in mortality rate at the lower income quintile (group); holding other variables constant, would lead to 0.27 significant reductions in the output on the average. However, it is important to note that even though mortality at the upper quintile may affect growth but certainly not connected to income. It further confirmed the position of Tilman and Waldmann (2009); where it was noted that the differential income coefficient (in this case; $\delta_2=0.291567$) is not only an indicator of the validity of the relative income hypothesis but also measures absolute income hypothesis in upper quintile. It states that for a significant and negative coefficient, the absolute income hypothesis holds even amongst the rich: higher income leads to better health even at high level of individual income. An insignificant coefficient indicates either opposing effects of absolute income hypothesis (towards lower infant mortality in upper quintiles) and relative income hypothesis (towards higher infant mortality in lower quintiles) Neither a significant effect of absolute income on infant mortality in upper quintiles nor a negative effect of income inequality on infant mortality in lower quintiles. Consequently, to isolate and prove the relative income hypothesis the coefficient needs to be positive and significant: The higher the distance between the average income levels of the two quintiles, the higher the infant mortality. Drawing from the result above, the coefficient ($\delta_2=0.291567$) is though significant but still low; meaning that infant mortality amongst lower income quintile (group) exists moderately and is potentially liable to grow if not well managed through verifiable but consistent economic policies.

Conclusion

The fourth agenda of MDGs requires countries to reduce their rates of under-five mortality by two thirds between 1990 and 2015. However, most developing countries have been constrained in doing this as a result of three structural factors, namely incomes, income disparity/inequality and women’s power commonly referred to as determinants of childhood mortality and disparity across income.
groups, countries and time. Significant with the study findings was that income inequality and mortality rate correlate, as such, result shows that mortality rate in both income quintiles does affect the growth of the Nigerian economy. It further found that disproportionate share in income across the socio-economic divide in Nigeria places an undue burden on the already impoverished rural dwellers in Nigeria. These findings were seen to be consistent with Waldmann (1992); income inequality causes a rise in infant mortality. In other words, holding the absolute income of the poor constant, infant mortality increases when the share of national income controlled by the richest five percent of society increases. Pritchett (1996) and Easterly (1999) further provided strong evidence to support the position above.

**Recommendations**

Based on the results of the study, the following recommendations are made:

1. That the outright revision of the existing National health reform has become imperative if the MDGs target is to be achieved. This to be done through potent legislations via a National Health Bill with explicit details of the roles of each tier of government in providing functional healthcare to the people, with the FCT commanding special attention owning to its cosmopolitan nature.

2. Following from above, the center point of Nigeria health policy should be Preventive Healthcare Model (PHM), and Disease Control activities (Public oriented), which approach is aimed at preventing the occurrence of diseases which would have required curative care (Private oriented).

3. Growth in per capita output and out-of-pocket health subsidy has become imperative to compliment current effort of the FCT in which it is supplementing expectant mothers (during ante-natal) to help improve the peoples’ welfare via equitable income distribution; as a result scaling down the prevalence of infant/childhood mortality; particularly amongst the lower income quintile.

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