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An Empirical Analysis of the Distributional Impact of Public Expenditure Pattern on Human Development in Nigeria States

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Abstract
This study is to empirically analyze the distributional impact of public expenditure pattern on human development using data for 20 states in Nigeria for the period, 1996-2012. Based on the results of fixed-effects model, the analysis reveals that the effect of sectoral changes in public expenditure on human development differs. While a change in education, health, agriculture, rural development and water resources expenditure has an increasing effect, a change in energy and housing expenditure has a decreasing effect on human development. In all, the estimated coefficient reveals that public expenditure has not robustly impacted on human development across states and period covered by the study. It is therefore recommended that it is imperative for the states to improve and sustain human development expenditure focusing more on education, health, agriculture, rural development and portable water resources since they have positive marginal impact on human development. Moreover, states in Nigeria should develop an expenditure framework for equitable human development expenditure that would benefit all in the near future. More importantly, there is urgent need for reform in expenditure pattern among states in Nigeria. This is to ensure that more money is allocated to those sectors that have higher capabilities of fostering human development.
Keywords*:* Public expenditure; Human development; Panel data; fixed effect

1.Introduction

In the quest to improving quality of life and sustainable economic development, reduction in inequality, poverty and unemployment, human development has assumed as increasing importance. This is why Fakayesi (2001), Edeme, Ijieh and Eshenake (2008) asserts that it is in recognition of the importance of human development in the growth process of an economy that the international community decided on a target year of 2015, when all countries should achieve specific targets in health, poverty and inequality reduction, education, water and sustainable environment, housing as well as food security which has exacerbated government carrying out expenditure on some sectors. In line with this**,** government at the federal and state levels have carried out expenditure towards improving human development to such an extent that one should expect a positive correlation between progress in expenditure in these sectors and human development expenditure by the government. This optimism may, however, be suspected because despite growth in public expenditure, the pace of human development has been slow and so far its growth has been rather slow and erratic. For instance, human development index (HDI) grew positively by 0.3 percent in 1987 but declined to 0.1 percent in 1988. In 1992 and 1996 it grew negatively by -0.2 percent and -2.7 percent respectively. For these years, government expenditure grew by 4.7, 8.4 and 5.8 percent respectively.

Human development which is broadly viewed as a process of expanding people's choice and opportunities open to people is to improve living standard as well as the welfare of the citizens. The concept of human development puts people at the centre stage of all aspects of the development planning process and demands high level of government commitment (Sen 1999, Temple 1999, Seetha 2001). Similarly, UNDP (2008) affirms that human development is a *sine qua non* for any society that desires to achieve growth with equity and survive under the complex challenges of a dynamic world. It is therefore imperative that the citizens' well-being must be improved continuously so as to meet new challenges of the environment and expand their choices. These choices can be infinite and changes over time and space. However, the three most important critical and socially valuable from among these choices are the choice to lead a long and healthy life, the choice to acquire knowledge and be educated and access to resources needed for a decent level of living.

Accordingly, Seers (1989) asserts that development can only occur in an economy if there is displacement in poverty, unemployment and inequality even though there is increase in per capita GDP. It is for this reason that development should be assessed appropriately using a multi-dimensional process geared towards eradication of poverty, unemployment and improve living standard in the society. Thus, development should increase the

availability and widen the distribution of basic life sustaining needs such as decent living, longer life, personal protection; improved living standard and environmental sustainability which ultimately improve well-being through the provision of more jobs, better education and other humanistic values (Goulet 1991, UNSRID 1992).

It is immediately clear from the above that once the concept of development is broadened, growth in per capita income becomes inadequate for measuring human development. It could be argued from the above therefore that increase in per capita income is necessary but not a sufficient measure of human development, but enhanced quality life as manifested in higher educational attainment, easier access to employment and healthier life, food security, and access to portable water, affordable housing, sustainable environment and greater life expectancy. In all these, public expenditure has a role to play. But if human development efforts of a country are to be encompassing and useful for the purpose of internal policies aimed at achieving sustainable development, it is imperative that the impact of public expenditure pattern on human development at the sub-national levels should be assessed. Yet there have not been such study at the state level. The knowledge gap in these areas will be bridged by this study.

Beside, empirical literature however reveals that considerable changes have occurred on different sectoral expenditure on human development overtime. In line with this, the study examines the distribution of public expenditure, especially on education, health, agriculture, rural development, energy, housing, environmental protection and water resources and its impact on human development over the years. Specifically, the study intends to assess the relative impact of sectoral changes in public expenditure on human development across selected states in Nigeria.

This study would contribute to existing literature in several ways. First we use a new data set that significantly extends the coverage of sectors, expenditure components and economies. This is because we employ both recurrent and capital expenditure on education, health, agriculture, rural development, energy, housing, environmental protection and water resources as predictors of human development. Beside, previous specific, cross–sectional and panel studies used different countries and they have been limited in depth or in breadth. This study uses dataset that spans across 20 states in Nigeria for the period, 1996 – 2012.

Second, this study used panel data. The use of panel avails us the opportunity of exploring both cross–sectional and time–series variation in public expenditure and its impact on human development indices over the period. We therefore control for the effects of the variables in our regression with both the fixed effects and random effects model. Beside, our estimates are based on panel (pooled) least squares (PLS) regression models applied to and calibrated for 20 states in Nigeria. Third, by taking into consideration many sectors and expenditure components in our analysis, we offer additional depth and robustness to the analysis. This approach is extremely useful in showing that pattern and changes in sectoral expenditure have impact on human development. Fourthly, we adopt a multi-measure of human development, the human development index because of their reflection of the inadequacy of other measures. Finally, a study on the distributional impact on human development at the state level is crucial not only because it is necessary to substantiate the contributions or efforts of the state governments in human development but also because such a study is apt to provide policy guides relating to prioritization and review of public sector spending in human development efforts in Nigeria. The outcome of this study therefore, may help design strategies and draw inferences that could form policies, strategies and interventions for improving human development throughout the country.

2. The Theoretical and Empirical Literature

The essence of public expenditure stems from the fact that the functioning of the market by itself activates the signaling response and mobility of economic agents to achieve efficiency in both static and dynamic terms so as to meet the needs and aspirations of the citizens. This theory found in welfare economics is further supported by the government-led growth or so-called demand-led growth theory. The government-led growth theory argues that government spending is seen, both as a stimulant for capital investments and a source of needed social expenditure. Hence, the theory supports government spending in public goods where such expenditure further supports investment in public goods, which in turn enhances productivity growth along with the supply side improvement. The theory, however, argues that demand for goods and services must be sustained at high levels, and this requires public expenditure.

In essence therefore, public expenditure is to correct market failure and improve economic growth and well-being in the society. When a market economy fails to allocate resources effectively, market failure occurs. One such example is the case of externalities. Government can curb negative externalities (for instance, pollution) and promote positive externalities (for instance, education and health) by means of regulations, subsidy and

public expenditure. The justification of government provision of public goods is clear. Increasing the literacy rate, life expectancy, poverty reduction and environmental protection may also lead the government to provide private goods through transferring resources to a targeted group of people who are not able to make provisions themselves due to market failure. Structural policies are a response to the needy to ensure that, while stabilization measures may be harmful to the development of the economy in the short-run, the long-term effect is not jeopardized. While this requires sound stabilization policies, it is also predicated upon policies towards stimulating the supply side of the economy. As regards public expenditure, the challenge is to secure a level of spending in line with macroeconomic stability, and then restructure expenditure as part of a systematic reform package aimed at improving human development by promoting productive investments, reducing poverty, opening up opportunities inherent in economic growth and efficiency in resource allocation (Ranjit, Dhritidyuti, Indrannil and Jai 2006).

For the market to operate smoothly to create growth and improve well-being these services and infrastructure are required and yet in most cases, it is beyond the capacity of the private sector to provide. Hence, it is usually the government who provides for these so as to guarantee well-being in the society. This is the crucial link between public expenditure and human development. International experience in social and economic sectors expenditure have provided further pointer to a public expenditure and human development assessment. One example that has been cited is that of the Asian economies such as Japan, Korea and South-east Asian nations.

2.2. The Empirical Literature

There are prior studies that analyzed the impact of public expenditure on human development. One such study by Schultz (1980) asserts that investment in education has a significant effect in human development. Reinikka and Collier (2001) used data from a series of household surveys in Uganda from 1992-1999 and found that education, rural development and agriculture have a major positive impact on human productivity and improving rural poverty, which is connected to human development. In the same vein, Fan, Zhang and Rao (2003), adopting different methods and different country data for 1992, 1995 and 1999, analyzed the effects of different public expenditures on human development in Uganda. They found that public expenditure on agriculture and rural development has positive impact on human development. These studies along with some others suggest that public expenditure must play even greater role in fostering human development. However, different expenditure sectors and components have different impacts on human development in different countries. At the International Food Policy Research Institute some studies have been conducted along this theme for different countries. These studies are Fan, Hazelland and Thorat (2000) on India; Fan, Zhang and Zhang (2002) on China and Jitsachon and Methakunavut (2003) on Thailand. In a World Bank (2005) study of 83 developing countries, it was observed that for countries that had the highest growth rates of real per capital GNP between 1980 and 1997, education played a significant impact.

In developed economies, human development has in most cases been at the forefront of national development efforts and innovations. For instance, Klenew (2001) acknowledge that human development played (and still plays) a significant role in the quick and rapid industrialization and general development of such countries as Singapore, Hong Kong, the Republic of Korea, Taiwan and earlier, Japan. In further confirmation of this, a study of the East Asian development efforts identified human development as one important variable accounting for their rapid growth. These countries have been able to achieve high levels of literacy, longer life expectancy, healthier life and high per capita income in the post-war period and have also attained comparatively greater social development than countries in South Asia or Africa (IMF 2000). The studies express serious doubt about the existence of countries that have been able to grow at high and sustained rates without determined efforts at human development.

Health has also portrayed positive effects on economic growth beyond its inherent desirability as an end. To this end, Strauss and Thomas (1998) review a large literature documenting how improvements in health and nutrition improve productivity and income. A rage of labour productivity gains has been observed to be associated with calorie intake increase in developing countries. Studies of farmers in Sierra Leone (Strauss 1986), sugarcane workers in Guantemala (Immink and Viteri 1981) and road construction workers in Kenya (Wagstaff 1989). In these studies, productivity enhancement appears to follow fairly immediately as current intakes of calories or micro-nutrients are improved. Education may also affect per capita income growth through its impact on the population growth. This was demonstrated with a study of 14 African countries in the mid-1980s which found a negative correlation between female schooling and fertility in almost all countries, with primary education having a negative impact in about half the countries and no significant effects in other half, while secondary education invariably reduced fertility.

Changes in public expenditure have been found to have effect on human development. An analysis of Cameroon

economy by Emini and Fofack (2004) depicts that the dramatic fall in public expenditure during crises period persisted in the post devaluation growth period in the late 1990s have negative effect in improving the welfare of the poor and reduction in high unemployment rates in Cameroon. Under fixed–price multiplier analysis, a simulation of policy experiments highlight the potential growth and welfare benefits of increased public spending on human development and poverty reduction. Under the assumption of a reduction in external debt servicing with the relief reallocated to public investment on economic and social services, a significantly higher economic growth is estimated, with the benefits of growth reflected in the rapid increase in human development.

Bigsten and Levin (2000) posit that the compositions of government expenditure are critical determinants of human development. They are also of the view that if government is undertaking fiscal reforms, three types of impact should be expected. First, income distribution and poverty will change. Second, the composition of government expenditures affects sectoral productivity and hence labour demand. Third, change in public expenditure on services such as education and health have an impact on household's well-being

Kuburri (2003) did a study on the differential impact of government expenditures by various departments on total employment, total income, the distribution of income between wages and non-wage and import requirement for Ontario economy applying input-output analysis. He found that there exist wide variations in the income multiplier generated by a dollar increase in different departments. Similar outcomes hold for employment multiplier. However, the employment multipliers are obviously lower in magnitude and more clustered than the income multipliers. Surprisingly, expenditures by the departments of education and health generate lower than average income and employment multipliers. A high-income effect is associated with a department expenditure that entails purchase of goods from industries as well as lower import components and high direct income coefficient. The direct and indirect impact of government expenditures by the various departments seems to favour wage income as compare to non-wage income.

The United Nations Development Programme (2006) asserts that one of the most powerful weapons linked to human development is energy. Yet global strategies for how to meet this basic need for the world's rapidly growing population are sorely lacking. In line with this, Douglas and Willem (1996) and Saghis (2005) notes that lack of energy services is directly correlated with key elements of poverty, including low education levels, restriction to opportunity to decent life, subsistence activity and conflict in the developing countries. For a selection of 60 countries, he found an 84 percent correlation between human development and annual electricity use in per capita in kilowatt-hour (kwh). In essence, Vaclav (2003) have stated unequivocally that a direct correlation exist between energy use and human development. In a study of 10 developing countries, it is concluded that access to modern energy services is imperative in fulfilling basic social needs and fueling human development. Although, the efficient use of energy and supplies that are reliable, affordable and less-polluting are widely acknowledged as important and even indispensible components in improving human development. Yet, energy concerns are not adequately addressed in many human development strategies of most developing countries.
In the studies of the nexus between poverty, environment and human development in the Asian Pacific Region edited by Adrian and Nadkarni (2001), it was concluded that environmental degradation has tremendous human costs and affects the poor mostly and directly too. The studies opine that direct target oriented programmes alone are inadequate to deal with this problem and stepping up human development, particularly agricultural development through environmental protection. Hence, countries cannot any longer have environmental prevention through continuation of poverty and depriving them of human development opportunities.

There are however studies that show lack of impact between government expenditure and human development. Most of them argue that it is so because most government lacks the institutional capacity to effectively allocate these expenditures. Along this line, World Bank Development Report of the World Bank (2004) remarks that despite the fact that government devote about a third of their budget to poor, even if funds are dedicated to the poor people, the weak systems of incentives and delivery largely explain the lack of a consistent relationship between changes in the structure of government spending and human development.

3. Methodology

3.1 Nature, Sources, Description and Measurement of Data

The data used in this study were obtained from the selected states and various other official sources. The data extends from 1996 to 2012. Actual recurrent and capital expenditures on education, health, agriculture, rural development, energy, housing, environmental protection and water resources were obtained from the ***Accountant Generals' Report of the selected States, Various Years.*** To be consistent with other studies in this area, such as Deaton (1980) and Deaton and Paxson (1998), the distributional impact analysis was conducted on

difference log values. This is necessary to enable us express the relationship between human development and a lagged independent variables. Our analysis is done on a *first-order* equation. Thus, the equation is expressed a time lag of one period.

Human development will be proxied by different indices such as human development index (HDI), human poverty index (HPI), gender. The choice of HDI is borne out of the fact that it represents the average condition of living of all people in a country, zone or state irrespective of sex. The human development index was compiled from the ***United Nations Development Programme (UNDP) Human Development Reports (Nigeria), Various Years*.**

3.2. Specification of Model

Our model specification follows the works of Deanton (1998) with some variations. The model is useful in exploring how units change in public expenditure in a sector impact on welfare. Analogously, the approach could be employed in analyzing the impact of changes in expenditure in any sector of the economy on human development indices. Crucial to this approach is the recognition of the fact that expenditure on a particular sector varies greatly along with time, most especially in developing economies

The functional relationship between the depedent and independent variables can be stated as:

$HD_{it} = f(ED, HT, AG, RD, EN, HS, EP, WR)$ ---------- (3.24)

It is possible to reformulate equation (3.24) in terms of budget share of different sectors in relation to the differenced value of proportionate changes in human development in relation to change in expenditure with the following expression:

$$\Delta l\_HD^h = \sum_{i=1}^{n} B_{it} i \Delta l\_\Sigma Ep_{it} i \quad \text{---------- (3.25)}$$

where i = selected sectors of the economy,

Δ = first difference.

The budget share B, is simply a sector's share *(i)* deflated by total expenditure. Equation (3.25) has explicitly shown that any distributional impact of the expenditure on human development must derive from changes in expenditure across different sectors. Thus equation (3.25) provides a minimum bound on the impact of variations in expenditure but it does not take into consideration the distributional impact. Equation (3.25) may therefore not be an entirely accurate approximation. Returning to the expenditure function above, differencing the log values of the variables would allow for the analysis of the impact of sectoral changes in public expenditure.

Arising from above, the first-order difference equation expressing a time lag of one period of our independent variables can be expressed as:

$$\Delta l\_HD_{it} = l\_\Delta ED_t - \Delta ED_{t-1}/\Delta ED_t + l\_\Delta HT_t - \Delta HT_{t-1}/\Delta HT_t + l\_\ \Delta AG_t - \Delta AG_{t-1}/\Delta AG_t + l\_\Delta RD_t - \Delta RD_{t-1}/\Delta RD_t + l\_\Delta EN_t - \Delta EN_{t-1}/\Delta EN_t + l\_\Delta HS_t - \Delta HS_{t-1}/\Delta HS_t + \Delta\ l\_EP_t - \Delta EP_{t-1}/\Delta EP_t + \Delta l\_WR_t - \Delta WR_{t-1}/\Delta WR_t \quad \text{---------- (3.26)}$$

As we did in equation (3.24), we can reformulate equation (3.23) in terms of sectoral share and changes in expenditures as:

$$\Delta l\_HD^h = \sum_{i=1}^{n} B_i^{hln} \Delta Ep_{it} + \tfrac{1}{2} \sum_{l=1}^{n} \sum_{t=1}^{n} HD_{it}\, l\_\Delta Ep_{it}^{\ h} \Delta l\_Ep_{it} \quad \text{……} \quad (3.27)$$

From equation, (3.25) it can be further shown that HD_{it} term to be equivalent to $B_i\varepsilon_{it}$,

$$l\_\Delta HD_{it} = l\_\Delta ED_{it} - \frac{\Delta ED_{t-1}}{\Delta ED_t} \quad \text{……} \quad (3.28)$$

where ε_{it} is defined as the differential intercept coefficient of human capital development with respect to expenditure changes. Thus equation (3.28) can be rewritten as:

$$l\_HD^h = \sum_{i=1}^{n} B \Delta l\_ED_{it} + \tfrac{1}{2} \sum_{l=1}^{n} \sum_{t=1}^{n} E_{it}\, l\_\Delta ED_{it} \Delta l\_ED_t \quad \text{……} \quad (3.29)$$

The two formulations above are given in expression to explore the differential impacts on human development of sectoral changes in public expenditure. Thus, estimation on distributional impact requires estimation of expenditure elasticity in relation to changes in expenditure. Exactly how these elasticities are estimated depends on the nature of data employed in the analysis. Deaton and Paxson (1998) however present an approach to the estimation of marginal impact of changes in expenditure on the economy using cross-section of expenditure variables.

Specifically, the study suggests adopting the following econometric specifications for log human development

index (log HDI) and log expenditure on the selected sectors of the economy (lnED, lnHT, logAG, lnRD, lnEN, lnHS, lnEP, lnWR) which can specified separately as:

$lnHDI_{it} = \alpha^{o} + \beta^{o} lnE_{it} + Y^{o} Z_{it} + \mathcal{E}p lnR_{it} + fit + U^{o}_{it}$ ..... (3.30)
$lnEDit = \alpha^{1} + \beta^{1} lnEit + Y^{1} Z_{it} + \phi lnR_{it} + U^{1}_{it}$ ..... (3.31)
$lnHTit = \alpha^{2} + \beta^{2} lnEit + Y^{2} Z_{it} + \chi lnR_{it} + U^{2}_{it}$ ..... (3.32)
$lnAGit = \alpha^{3} + \beta^{3} lnEit + Y^{3} Z_{it} + \Theta lnR_{it} + U^{3}_{it}$ ..... (3.33)
$lnRDit = \alpha^{4} + \beta^{4} lnEit + Y^{4} Z_{it} + Þ lnR_{it} + U^{4}_{it}$ ..... (3.34)
$lnENit = \alpha^{5} + \beta^{5} lnEit + Y^{5} Z_{it} + \acute{M} lnR_{it} + U^{5}_{it}$ ..... (3.35)
$lnHSit = \alpha^{6} + \beta^{6} lnEit + Y^{6} Z_{it} + \ddot{W} lnR_{it} + U^{6}_{it}$ ..... (3.36)
$lnEPit = \alpha^{7} + \beta^{7} lnEit + Y^{7} Z_{it} + \acute{A} lnR_{it} + U^{7}_{it}$ ..... (3.37)
$lnWRit = \alpha^{8} + \beta^{8} lnEit + Y^{8} Z_{it} + \acute{P} lnR_{it} + U^{8}_{it}$ ..... (3.38)

where E represent total expenditure, Z state specific expenditure. Note that equation (3.30) above contains fixed effect f_{it} and the co-efficient of interest $\mathcal{E}p$

Given these insights as well as the nature of our data, we exploit the approach to estimate the marginal elasticity of sectoral changes in public expenditure on human development across states and time. This is the technique employed to estimate the εij terms.

Following from above, the corresponding panel specification for the distributional impact of sectoral changes in public expenditure on human development could be stated as:

$\Delta l\_HD_{it} = \emptyset_{o} + \Omega \Delta l\_ED_{it-1} + \psi \Delta l\_HT_{it-1} + \ell \Delta l\_AG_{it-1} + \chi \Delta l\_RD_{it-1} + \nu \Delta l\_EN_{it-1} + \zeta \Delta l\_HS_{it-1} + \eta \Delta l\_EP_{it-1} + \epsilon \Delta l\_WR_{it-1} + U_{it}$ (3.30)

where; $\emptyset_{o}$ = specific state effect; Δ = an operator that is use to measure continuous change in differential operations; l_HD = log of human development index; l_ED = log of education expenditure; l_HT = log of health expenditure; l_AG = log of agricultural expenditure; l_RD = log of rural development expenditure; l_EN = log of energy expenditure; l_HS = log of housing expenditure; l_EP = log of environmental protection expenditure; l_WR = log of water resources expenditure.

The process analyzed here concerns only the estimation of Ω, ψ, ℓ, χ, ν, ζ, η, and Є which is the respective marginal elasticity coefficient for education, health, agriculture, rural development, energy, housing, environmental protection and water resources expenditure. The summation of the marginal coefficients (Ω, Ψ, ℓ, χ, ν, ζ, η, and Є) gives information on the impact of sectoral changes in public expenditure on human development, whether it is having an increasing or decreasing marginal impact during the period covered by the study. The empirical results of this study have been obtained with the use of ***E- view (6.0 versions)*** computer packages of econometric data analysis and estimation. These software packages are user-friendly and make the implementation of panel analysis quite easy.

3.3 Data Estimation Procedure

Both the descriptive statistics and panel data techniques are employed in the data analysis. Panel data techniques are used to test the fixed effects model and the random effects model. Since our analysis is based on two competing models, fixed effects and random effects, the appropriateness of the fixed-or random-effects model is ascertained by conducting the Hausman test.

4.2 Presentation and Interpretation of Empirical Results

4.2.1 Descriptive Statistics

The descriptive statistics is presented in Table 4.2 and the result reveals that there is a large variation in recurrent expenditures, capital expenditure and human development and many of the explanatory variables are correlated with one another. This underscores the importance of performing panel regression analysis to control for the each state and period specific effect that might drive the explanatory variables.

4.2.2 Panel Estimation

The empirical results panel estimation are presented in table 2. The estimated coefficient shows that the marginal elasticity for education is 0.0036 and health 0.0009 respectively. The estimated coefficients for education 0.0036 and health 0.0009 portrays that, holding other expenditure constant, a unit increase in education expenditure would increase human development by 0.004 percentage point. Similarly, a unit increase in health expenditure improves human development by 0.001 percentage point, which is lower than that of education. The human improvement elasticity calculated for agriculture, rural development, energy, housing, environmental protection and water resources is 0.005, 0.008, -0.09, -0.08, -0.11 and 0.0003 respectively. This implies that holding other

expenditure constant, a unit increase in agriculture, rural development, energy, housing, environmental protection and water resources accounts for 0.005 percentage increase, 0.008 percentage increase, 0.09 percentage decrease, 0.08 percentage decrease, 0.11 percentage decrease and 0.003 percentage increase in human development respectively. The summation of the coefficients (-0.26) implies that for the period covered by the study, human development witnessed a decreasing growth for the period covered by the study. The outcome indicates that there is significant difference in the impact of sectoral changes in public expenditure on human development. The cross and period effect however differs from state to state and period to period. This finding may be somewhat surprising but it is largely consistent with the results reported in Deaton (1997). The outcome for education and health is the same, although not as pronounced. Equally, Keuning and Thorbecke (1999), Deaton and Paxson (1998) have shown that the impact of sectoral changes in public expenditure differs considerably.

5. Conclusion, Policy implication and Recommendations

The principal objective of this study is to empirically analyze the distributional impact of public expenditure pattern on human development across states in Nigeria. The analysis of the data shows that the relative impact of sectoral changes in education, health, agriculture, rural development, energy, housing, environmental protection and water resources expenditure on human development differs significantly. Among the sectors, education, health, agriculture, rural development and water resources expenditure has positive marginal impact while energy, housing and environmental protection have decreasing marginal impact on human development.

An important policy implication of our analysis is that if human development is to appreciate considerably across states in Nigeria, then it is portentous to stress that expenditure on education, health, agriculture, rural development, energy, housing, environmental protection and water resources must be further improved. The results, however do not suggest that expenditure on energy, housing and environmental protection should be curtailed. Rather, the results do suggest that any further increase in public expenditure on human development in the future should concentrate on education, health, agriculture, rural development and water resources. However, any increase in human development expenditure must emphasize the relative importance of capital expenditure compared to the current pattern of allocating higher proportion to the recurrent component.

The intuition behind these results is that states in Nigeria have spent on energy, housing and environmental protection towards improving human development. Further spending in these sectors seems to have negligible marginal impact on human development. However, more capital expenditure on education, health, agriculture, rural development and water resources opens more opportunities that help accelerate human development.

For improvement in human development across states in Nigeria, it is therefore imperative that (i).human development expenditure by the states should be further improved and sustained, (ii) such increases should however focus more on education, health, agriculture, rural development and water resources since they have positive marginal impact on human development, (iii), there should be a switching in expenditure from recurrent to capital since capital expenditure generates more productive resources in the future, (iv), states in Nigeria should develop an expenditure framework for equitable human development expenditure that would benefit all in the near future. Finally, there is urgent need to embark public expenditure reform by various states in Nigeria. This is to ensure that priority will be focused on those sectors that have grater capabilities of fostering human development.

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Table 1: Descriptive Statistics

Variable	Mean	Median	SD	Maximum	Minimum	Observations
HD	0.355	0.34	170.6	6.00	0.01	260
ED	12.82	3.12	4.23	100.00	0.04	260
HT	6.60	1.60	2.31	180.66	0.01	260
AG	4.83	0.10	1.8	150.99	0.01	260
RD	1.82	0.02	1.01	160.73	0.01	260
EN	11.76	3.03	3.13	61.88	0.02	260
HS	12.93	3.26	4.92	57.29	0.01	258
EP	11.65	3.00	3.05	169.73	0.01	260
WR	13.92	3.02	28.79	232.75	0.02	260
RED	7.77	2.10	3.26	48.33	0.04	260
RHT	3.79	0.16	1.55	51.43	0.00	258
RAG	2.49	0.01	1.05	107.06	0.03	260
RRD	0.49	1.00	0.01	152.02	0.01	250
REN	2.73	4.26	0.53	3686.89	0.01	164
RHS	0.92	0.03	0.01	3904.87	0.01	260
REP	1.09	0.01	0.00	221.58	0.00	258
RWR	4.93	0.21	1.24	365.92	0.01	258
CED	4.99	0.23	1.27	154.77	0.05	260
CHT	2.86	0.01	0.12	85.11	0.01	260
CAG	2.29	0.01	0.11	72.59	0.01	260
CRD	1.62	0.01	0.33	68.53	0.02	260
CEN	8.91	0.08	2.69	155.88	0.01	260
CHS	12.06	0.19	4.72	187.72	0.01	260
CEP	10.30	0.24	3.34	72.50	0.02	260
CWR	9.68	0.11	2.56	222.42	0.02	260

***Source*:** Authors' Calculations

Table 2: The impact of sectoral changes in Public expenditure on Human Development

Variable	Fixed Effects	Random Effects
Constant	0.1106 (1.0062)	0.0552 (1.0068)
Δl_ED	0.0036 (1.3759)	0.0038 (0.1031)
Δl_HT	0.0009 (2.1182)	0.0007 (-0.6143)
Δl_AG	0.0051 (0.1229)	0.0042 (1.2751)
Δl_RD	0.0079 (2.5360)	0.0076 (2.2620)
Δl_EN	-0.0883 (-0.0594)	-0.0886 (-0.0571)
Δl_HS	-0.0791 (0.0952)	0.0796 (0.0571)
Δl_EP	-0.1096 (-1.1336)	-0.1092 (-1.1402)
Δl_WR	0.0003 (0.0605)	0.0003 (0.0405)
Fixed Effects (Cross)		Random Effects (Cross)
_KAD-C	-	
_KEB-C	-.01281	
_JIG-C	0.0156	
_ADM-C	-0.0035	
_BCH-C	-0.0052	
_BRN-C	0.0253	
_NGR-C	-0.0240	
_KOG-C	0.0229	
_PLT-C	-0.0370	
_ANB-C	0.0435	
_IMO-C	-0.0256	
_ENG-C	0.0546	
_DTA-C	-0.0205	
_AKW-C	0.0019	
_CRS-C	0.0633	
_ED0-C	-0.0112	
_OYO-C	0.0528	
_LGS-C	0.0120	
_ODN-C	0.0009	
_EKT-C	-0.0042	
Fixed Effects (Period)		Random Effects(Period)
1996-C	-	-
1997-C	-0.3827	-0.3847
1998-C	-2.7019	-2.6619
1999-C	0.1354	0.1332
2000-C	-1.5803	-1.4986
2001-C	2.0246	2.0213
2002-C	-2.0012	-2.0006
2003-C	-2.4100	-2.2380
2004-C	1.7066	1.7042
2005-C	2.2490	2.2466
2006-C	-0.2153	-1.2130
2007-C	-1.4375	0.4366
2008-C	0.0428	0.0319
2008-C	0.0122	0.1030
2009-C	0.1901	0.1721
2010-C	-0.1032	-0.1003
2011-C	0.1092	0.1722
2012-C	0.1092	0.1811
F-test time dummies	0.2101	0.1200
Observations	319	319
Period	1997-2012	1997- 2012
R^2 within	0.8902	0.4818
R^2 between	0.9058	0.0237
R^2 0verall	0.9702	0.0595
Hausman test *(p-value)*	0.0699	0.8780
S E of Regression	3.1729	0.2980
Durbin-Watson statistic	4.0424	0.4128
Sum squared resid.	279.0631	79.3007

Note: Figures in parentheses are t-statistics
*Significant at 1 percent
**Significant at 5 percent
Source: Authors calculation

Table 4.17: Period random effects test equation

Dependent variable: Δl_HD				
Method: Panel least squares				
Sample (adjusted): 1997 2012				
Included observations: 15 after adjustments				
Cross sections included: 20				
Total pool (unbalanced) observations: 319				
	Coefficient	Std. Error	t-statistic	Prob.
C	0.0575	0.0541	1.0631	0.2903
Δl_ED	0.0035	0.0837	0.0869	0.9309
Δl_HT	0.0085	0.1201	-0.6332	0.5280
Δl_AG	0.0051	0.1172	-1.2773	0.2045
Δl_RD	0.00077	0.0547	2.2499	0.0267
Δl_EN	-0.0863	-0.0072	0.0992	0.081
Δl_HS	-0.0795	-0.0428	-1.05210	0.5623
Δl_EP	-0.1095	-0.4023	-1.0452	0.2857
Δl_WR	0.0032	0.0029	0.5950	0.3249
R-squared		0.9220		
Adjusted R-squared		0.8841		
SE of regression		0.4885		
Sum squared resid.		3.6202		
Log likelihood		-71.4202		
F-statistic		117.0354		
Prob. (F-statistic)		0.0000		

Source: Authors' calculations.

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