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IMPACT OF EARLY AGE (3-14 YEARS) HUMAN CAPITAL DEVELOPMENT ON ECONOMIC GROWTH: EVIDENCE FROM NIGERIA

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Abstract

This study examined the impact of early age (3-14 years) human capital development on economic growth: evidence from Nigeria. The augmented ARDL model and bounds test for cointegration was employed to achieve the objectives of the study. The study utilized secondary data on GDP, government expenditure on basic education, pupil's enrollment rate in basic education, child mortality rate and labour force participation rate for a period of 100 quarters covering 1997Q1 to 2021Q4. The bounds test for cointegration shows a long run relationship between early age human capital development and economic growth. The study further reveals that government expenditure on basic education has a negative and significant impact on economic growth. pupil's enrollment rate in basic education, child mortality rate and labour force participation rate on the other hand have positive impact on economic growth, with child mortality rate being insignificant. Empirical results show that early age human capital development significantly enhances economic growth. As such, the study recommends that the Nigerian government should endeavour to check corruption and misappropriation of funds to reduce wastages in the basic education sector, improve on the quality and motivation of teachers and incorporate entrepreneurial and vocational education in basic education curriculum so as to improve the standard of education and enable children acquire skills necessary for active participation in the labour force and to contribute to Nigeria's economic growth.

Keywords: GDP, Basic Education, Child Mortality Rate, Labour Force Participation Rate.

1. Introduction:

The study examines how important human capital development is for promoting long-term economic growth and societal advancement, especially in early childhood. It emphasizes how important human resources who include skills, knowledge, and abilities are to the efficient mobilization and use of a society's other resources. In order to guarantee that people are knowledgeable, competent, and productive, scholars such as Oguijuba (2013) stress the significance of investing in human capital. This is in line with international frameworks that emphasize child survival, education, and well-being as markers of sustainable development, such as the UN Convention on the Rights of the Child and the Millennium Development Goals.

Early childhood development is especially emphasized as a time of transformation that molds emotional, social, and cognitive abilities. According to researchers like Boyden and Dercon (2012), early investments in human capital pay off handsomely by giving people the skills they need to be more productive at work. Globally, programs like UNICEF's GOBI and Education for All projects have boosted literacy and decreased child mortality, but many children still face obstacles to long-term gains, especially in places like Nigeria.

The contradiction of resource abundance and ongoing underdevelopment in Nigeria is explored, with particular attention paid to the country's high poverty rate, limited access to education, and poor health indicators. An estimated 20 million children in Nigeria

are still not enrolled in school, despite the fact that 42% of the country's population is under the age of 15. Although the Universal Basic Education Program and other initiatives try to eliminate these disparities, their effectiveness is weakened by structural issues. Research shows that economic growth and human capital development, as assessed by health and education, are positively correlated (Adelakun, 2011; Anyanwu et al., 2015). However, criticisms such as those made by Oladeji (2015) contend that there are only limited results when the health component of human capital is ignored.

Despite commendable programs, Nigeria faces significant setbacks, ranking poorly in global human capital indices due to inadequate educational facilities, insecurity, and a high number of displaced children. These problems hinder economic progress by contributing to the unequal distribution of skilled labor. A targeted strategy to early infant development that incorporates nutrition, health, and education is crucial to overcoming these obstacles. Nigeria can use its young population to boost economic growth and lessen inequality by doing this. This emphasizes how important it is for the development of a country to invest in human capital at a young age, in addition to being morally right. The study aims to assess how Nigeria's economic growth is impacted by early age human capital development, particularly for children ages 3 to 14. Its main objectives are to assess how government spending on basic education, pupil's enrollment in basic education, and child mortality rates affect economic performance. In order to shed light on how investments in this crucial developmental stage might promote sustained economic advancement, the study also aims to examine the long-term relationship between the development of human capital at an early age and the country's economic success.

2. Literature Review

Human capital development is a key component of overall development, with an emphasis on empowering people to actively participate in their own development processes and maximize their potential (Oladeji, 2015). Human capital development places a higher priority on enhancing people's knowledge, skills, productivity, and creativity than traditional development plans that place more emphasis on physical production. With a focus on early childhood care as a critical intervention in fostering lifetime development, the process of developing human capital is continuous and starts in early childhood and lasts throughout life (Maryam, 2013). High rates of child mortality and low school completion persist despite initiatives to enhance early childhood development in Nigeria, such as the Integrated Early Childhood Development (IECD) strategy and the Universal Basic Education Programme, particularly in conflict-affected areas like the North-East (Maryam, 2013; UNICEF, 2012).

Early age human capital development programs, including those focused on nutrition, health, and education, are critical to long-term economic success. According to research, spending money on early childhood development can have a big impact on a person's future education, income, and social contribution (Heckman, 2015; Action Against Hunger, 2018). It has been demonstrated that these kinds of interventions decrease the need for remedial schooling, decrease crime rates, and foster social stability (Early Childhood Peace Consortium, 2021). Research has shown that early childhood treatments, particularly high-quality stimulation, boost adult earnings and life outcomes (Gertler et al., 2014). Therefore, early investment in human capital not only helps the individual but also boosts the economy by creating a workforce that is more capable and productive, highlighting the significance of early intervention in determining a country's future economic success.

This study examines two major theories of economic growth that are connected to the development of human capital. Each theory offers a unique viewpoint on how human capital and other elements affect economic advancement.

The Human Capital Theory highlights the importance of skill development, education, and training in raising employee productivity. It makes the argument that a workforce with higher levels of education and ability is better able to do high-quality work, which improves

organizational performance and spurs economic growth. According to academics like McConnell, Brue, Macpherson (2009), and Gary (1964), human capital is made up of a wide range of qualities, from cognitive abilities to individual talent, all of which contribute to a person's economic potential. Higher education and skill levels are linked to better job possibilities and higher compensation, and organizations invest in human capital to maximize productivity and value generation.

The Endogenous Growth Theory contends that internal factors like technical advancement and the development of human capital propel economic growth, challenging previous neoclassical models. In order to support long-term economic growth, this theory highlights the importance of ongoing innovation, human capital, and investments in infrastructure, education, and research. Advocates contend that in order to maintain growth, regulations supporting intellectual property rights, technical advancements, and market competition are essential. As evidenced by the growing returns to scale from investments in innovation and human capital development, endogenous growth theorists contend that these sectors hold the key to increased productivity and long-term growth.

In conclusion, the combination of these theories emphasizes how important human capital is to promoting economic expansion. In order to promote productivity, competitiveness, and long-term economic growth, they support strategic investments in infrastructure, education, and technological innovation. The basis for this study is specifically the endogenous growth theory, which emphasizes the vital connection between investments in human capital and sustainable economic growth, particularly in the context of emerging nations like Nigeria.

Empirical studies examining the relationship between human capital and economic growth have gained significant attention, particularly in the context of education, health, and child development. Arthur, David, and Eugene (2007) conducted a seminal study that examined the psychological, social, and economic effects of child care and education initiatives in the US. According to their findings, early childhood programs especially those in the areas of health and education produce strong returns on investment, outperforming other public spending, and help save money on social services and criminal justice over the long run. These findings are in line with those of other studies, such as those by Oluwatobi and Ogunrinola (2011), who discovered that government spending on health and education has a positive impact on Nigeria's economic growth, while capital expenditures did not have the same effect, and Fadiya (2010), who identified important factors influencing educational outcomes in Nigeria, such as income, life expectancy, and enrollment at various education levels.

Additional research, like that conducted by Wakeel and Alani (2012) and Ali et al. (2012), confirmed the role that human capital—especially health and education—plays in promoting economic growth. According to Arshia and Ulf (2013), the effect of child health on GDP was also more noticeable in high-income countries, indicating that enhancing health could have a major positive impact on economic growth, particularly in low-income countries. This is consistent with Yuheng et al. (2014)'s findings, which highlighted the contribution of physical and human capital to China's economic growth.

However, research gaps are evident in the literature. One significant gap that has been brought to light by studies like Saheed et al. (2021) and Raymond and Ekponaannuadum (2021) is the neglect of early-age human capital development (ages 3–14) as a crucial factor in determining economic growth. Existing research frequently examines government spending on education and health, as well as primary and secondary school, but it ignores the critical significance of early childhood development..

Furthermore, a number of studies used forecasting techniques and descriptive statistics, such as those conducted by the U.S. President's Council of Economic Advisers (2014) and Arshia and Ulf (2013). Regression analysis—more especially, the co-integration and augmented ARDL model—allows for more reliable testing of the long-term association between economic growth and early childhood investments, which is how

this work sets itself apart. Since the majority of earlier studies only included data up to 2018, the study additionally updates the literature by extending the analysis until 2021. The current discussion on human capital and economic growth in Nigeria has benefited greatly from this methodological progress as well as the increased emphasis on early childhood development as a crucial part of human capital development.

3. Methodology

The research methodology presents the methods of data collection, describes the type of data collected and processes for generating them, and explains the methods and techniques used to analyze such data, as well as why such techniques of data analysis were preferred among others.

In line with the specific objectives of this study, the endogenous growth theory was chosen as the theoretical framework. An early form of the endogenous growth theory referred to as the AK theory as proposed by Frankel (1962) is given as follows:

$$Y = AK \quad - \quad - \quad (1)$$

From equation (1), *Y* refers to economic growth, *A* is a constant and *K* is stock of capital, which lumps together both physical and human capital. Unbundling the *K* component in the above equation, we get the following:

$$Y = AKL \quad - \quad - \quad -(2)$$

From equation (2), *Y* and *A* remain as in equation (1), while *K* and *L* represent physical and human capital respectively. Accordingly, following the specification in equation (2), the functional form of the model to be estimated for this study is presented in equation (3).

$$GDP = f(INV, GEB, PEB, CMR, LFP) \quad -(3)$$

Where:

GDP = Real gross domestic product

INV = Domestic investment

GEB = Federal government outlay on basic education

PEB = Pupils' enrolment in basic education

CMR = Child mortality rate

LFP = Labour force participation rate

From equation (3), a general econometric form of the relationship is derived and presented as follows:

$$GDP_t = \alpha + \beta GDP_{t-1} + \gamma INV_t + \delta GEB_t + \theta PEB_t + \varphi CMR_t + \sigma LFP_t + \mu_t \quad - \quad (4)$$

From equation (4), the variable names remain as previously identified, while the subscript *t* indicates time period, the parameter α denotes the constant, $\beta, \gamma, \delta, \theta$ and φ are parameters to be estimated, and μ is the stochastic disturbance term. A one-quarter lag of the dependent variable has been included since from the literature previous economic output is used as inputs in the current quarter production process. Considering that the variables are measured on different scales, it is important to take the natural logarithms to avoid spurious regression. Hence, equation (4) is restated as follows:

$$LnGDP_t = \alpha + \beta LnGDP_{t-1} + \gamma LnINV_t + \delta LnGEB_t + \theta LnPEB_t + \varphi LnCMR_t + \sigma LnLFP_t + \mu_t \quad (5)$$

4. Result and Discussion

Table 1: The descriptive statistics of the variables

	GDP	***GEB***	***PEB***	***CMR***	***LFP***	***INV***
Mean	56222.280	23.285	37.030	58.013	29.860	10913.710
Std. Dev.	47135.100	17.045	2.741	9.774	2.107	10098.320
Jarque-Bera	9.108	3.747	8.086	8.146	50.438	73.288
Probability	0.011	0.154	0.018	0.017	0.000	0.000

From Table 1, the dependent variable *GDP* has a mean value of 56,222.280 billion naira with a standard deviation of 47,135.100 billion naira. On the part of the explanatory variables, *GEB* has a mean value of 23.285 billion naira with a standard deviation of 17.045 billion naira; *PEB* has an average value of 37.030 percent with a standard deviation of 2.741 percent; *CMR* has a mean value of 58.013 index points with a standard deviation of 9.774 index points; *LFP* has a mean value of 29.860 percent with a standard deviation of 2.107 index points; while *INV* has a mean value of 10,913.710 billion naira with a standard deviation of 10,098.320 billion naira over the period covered by the data. This implies that going by the coefficient of variation (which is computed by dividing the standard deviation by mean), *INV* has the highest rate of dispersion followed by the dependent variable *GDP*. Meanwhile, *PEB* and *LFP* have the least level of dispersion among the variables.

Furthermore, considering the Jarque-Bera statistics and probability values as presented in Table 1, only *GEB* appears to follow a normal distribution, while the dependent variables *GDP* and other explanatory variables appear to follow a non-normal distribution. This is judged from the probability values when compared to 0.05 (or 5 percent).

Table 2: Summary of Stationarity Test Results

Variable	ADF		PP		Z-A		Remarks
Levels	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	
GDP	-3.272*	-	-2.516	-4.495*	-5.117*	-	I(0)
GEB	-2.917*	-	-2.893*	-	-4.782*	-	I(0)
PEB	-2.057	-2.943*	-1.521	-4.839*	-4.578*	-	I(1)
INV	0.291	-3.299*	3.740	-3.310*	-5.629*	-	I(1)
CMR	-1.944	-3.146*	-2.579	-4.283*	-4.916*	-	I(1)
LFP	-0.520	-2.929*	-0.280	-3.085*	-5.769*	-	I(1)
C-Val	−2.892		-2.892		-4.420		

Source: Computation Output of E-views 10, 2024

Table 2 shows that, although there are mixed decisions between some tests, the majority suggests that only *GDP* and *GEB* are stationary at levels, while *PEB, INV, CMR* and *LFP* are stationary after first differencing. This means thus, that our variables are characterised by a mixed level of integration.

Table 3: Augmented ARDL Cointegration Test Result

Lag length	**K**	**Statistic**	**Value**	**5% Upper Bound**
5, 4, 8, 1, 8, 8	5	F_1	6.876*	3.380
		t	-2.317*	2.021
		F_2	8.337*	3.900

Source: Computation Output of E-views 10, 2024

The first objective of this study is to analyze the relationship between early age human capital development and Nigeria's economic growth. Thus, to investigate the presence of long-run relationship among the variables and on the basis of the chosen lag distribution and model selection, the Augmented ARDL bounds test approach was implemented to determine the cointegration status of the variables. The results as summarised in Table 3 shows that the test statistic in the three different cases are greater than the critical value for each case. Specifically, the overall F test, the t test on the lagged dependent variable and the F test on the lagged explanatory variables all jointly provide evidence of cointegration without a degenerate case. This implies that government's expenditure on basic education, pupil's enrollment in basic education, child mortality rate and labour force participation rate are

good determinants of GDP in Nigeria. Therefore, the long-run estimates can be generated.

Having established the presence of a long-run integration between the variables, the long-run impact of the explanatory variables on the dependent variable were estimated. The results obtained are presented in Table 4 below.

Table 4: ARDL Long-run Results

Variable		Coefficient	Std. Error	t-Statistic	Prob.
	GEB	-0.115	0.054	-2.134	0.040*
PEB		0.149	0.060	2.487	0.018*
	INV	0.824	0.340	2.423	0.021*
	LFP	0.163	0.075	2.185	0.036*
	CMR	0.014	0.054	0.268	0.790
	C	-5.036	9.209	-0.547	0.588

Source: Computation Output of E-views 10, 2024

Despite predictions that investments in human capital would spur favorable economic outcomes, Nigeria's government spending on basic education (GEB) has a negative long-term relationship with economic growth, as evidenced by a coefficient of -0.115 and a significant probability value of 0.040. This outcome is consistent with the current state of affairs in Nigeria, where systemic corruption makes it difficult to implement the budget effectively and early education investments frequently don't pay off since so many students experience underemployment or unemployment. People are further prevented from contributing to the economy by poverty, insecurity, and the incapacity to pursue more education. This is consistent with Adeyemi and Ogunsola's (2016) findings.

On the other side, with a coefficient of 0.149, PEB enrollment positively affects economic growth; that is, a 1% increase in enrollment might result in a 0.149 billion naira increase in GDP. With a probability value of 0.018, this link is statistically significant, showing the significance of human capital development for economic growth, which is in line with several human capital theories. Higher enrollment encourages the development of critical abilities like reading and numeracy, which are necessary for both productive endeavors and further education. These findings align with research conducted by Yuheng et al. (2014) and Anochiwa and Maduka (2014).

The positive coefficient of 0.014 for the child mortality rate (CMR) indicates a positive correlation with economic growth; nevertheless, a probability value greater than 0.05 means that the finding is not statistically significant. The interdependence of economies, where immigration can offset a shrinking local labor, may be the reason for this lack of relevance. The results support Adeyemi and Ogunsola's (2016) conclusions.

As expected, there are favorable long-term correlations between economic growth and both labor force participation (LFP) and domestic investment (INV). Labor force participation promotes economic growth, while domestic investment increases physical capital; both variables exhibit statistical significance at the 5% level. Nonetheless, the constant value of -5.036 suggests that economic growth would decrease in the absence of these elements; yet, because of its high probability value, this conclusion is not statistically significant.

In the short run, lagged GDP shows mixed effects, with the first quarter positively influencing current economic growth, but the subsequent quarters exhibiting negative effects. Government funding on basic education has a short-term detrimental impact that is not statistically significant. Lagged government spending up to three quarters also has a detrimental impact, which is in line with long-term findings. On the other hand, economic growth is positively impacted in the short term by

student enrollment in basic education; enrollment up until the seventh quarter prior, with the exception of the fourth quarter, showed statistically significant associations. This validates the study by Saheed et al. (2021) as well as the long-term results.

Table 5: ARDL Short-run and Error Correction Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$D(GDP(-1))$	0.149	0.082	1.826	0.076
$D(GDP(-2))$	-0.041	0.074	-0.553	0.584
$D(GDP(-3))$	-0.035	0.063	-0.557	0.581
$D(GDP(-4))$	-0.913	0.093	-9.775	0.000*
$D(GEB)$	-0.015	0.010	-1.547	0.131
$D(GEB(-1))$	0.023	0.012	1.864	0.070
$D(GEB(-2))$	-0.002	0.010	-0.174	0.863
$D(GEB(-3))$	-0.001	0.006	-0.226	0.823
$D(PEB)$	0.030	0.004	6.810	0.000*
$D(PEB(-1))$	0.017	0.004	3.755	0.001*
$D(PEB(-2))$	0.013	0.004	3.002	0.005*
$D(PEB(-3))$	0.001	0.003	0.358	0.722
$D(PEB(-4))$	0.011	0.004	3.118	0.004*
$D(INV)$	-0.101	0.046	-2.215	0.033*
$D(LFP)$	0.046	0.008	5.899	0.000*
$D(LFP(-1))$	-0.008	0.008	-1.047	0.302
$D(LFP(-2))$	0.001	0.007	0.149	0.882
$D(LFP(-3))$	-0.003	0.006	-0.556	0.582
$D(LFP(-4))$	-0.012	0.005	-2.331	0.026*
$D(CMR)$	-0.232	0.077	-3.028	0.005*
$D(CMR(-1))$	0.105	0.108	0.969	0.339
$D(CMR(-2))$	-0.060	0.099	-0.604	0.550
$D(CMR(-3))$	0.080	0.159	0.503	0.618
$D(CMR(-4))$	0.422	0.157	2.683	0.011*
ECM	-0.184	0.025	-7.494	0.000*
R^2 = 0.927				
Adjusted R^2 = 0.870				
Durbin-Watson = 1.963				

Source: Computation Output of E-views 10, 2024

The analysis of Table 5 reveals a negative relationship between domestic investment and economic growth in the short-run, with a coefficient of -0.101, suggesting that a one billion naira increase in domestic investment could result in a 0.101 billion naira decline in economic growth. A probability value below 0.05 indicates that this finding is statistically significant. Even if this result defies theoretical predictions, it points to a crowding out effect in which higher capital investment is not accompanied by a sufficient labor force or economic absorptive capacity, obstructing the anticipated short-term positive growth outcome.

Further analysis of labor force participation shows an immediate positive impact on economic growth. On the other hand, growth is negatively impacted when labor force participation is delayed by five quarters. This might be explained by a decline in human capital and labor productivity as well as possible dissatisfaction brought on by low pay. Because of its detrimental effects on the labor force and the financial burden it places on healthcare investments, which in turn restricts resources for other economic activity, child mortality also has a short-term negative influence on economic growth. Nonetheless, a favorable economic impact is noted from the fifth to the seventh quarter, even though

expenditures in human capital take time to pay off. These results are consistent with Adyemi and Ogunshola's (2016) findings, highlighting the complex relationship between health outcomes and economic performance.

The error correction term (ECM) from Table 5 shows a coefficient of 0.184, indicating that the system adjusts towards long-run equilibrium at a rate of 18.4 percent following a short-run disturbance. This adjustment's statistical significance emphasizes the system's responsiveness even more. 92.7 percent of the variance in economic growth can be explained by the entire regression model, highlighting the significant impact of child development on Nigeria's economic growth trajectory.

Table 6: Diagnostic Results

	Test	Statistic	P-value
Serial Correlation	F-statistic	0.075 (2, 34)	0.928
Heteroskedasticity	F-statistic	1.424 (39, 36)	0.143
Normality	Jarque-Bera	22.680	0.000
Ramsey RESET	F-statistic	6.237 (1, 35)	0.067

Source: Computation Output of E-views 10, 2024

From Table 6, the results show that the estimates are free from serial correlation, heteroscedasticity and specification error. However, the normality assumption appears to be violated, but it does not have an impact on the estimates as the sample size is large enough and there is no serial correlation issue in the estimates so non-normality does not pose any threat to the integrity of estimates.

5. Conclusion and Recommendations

This study examines how Nigeria's economic growth is impacted by the development of human capital in the early years (3–14 years), utilizing indicators including government spending on basic education, enrollment patterns, and child death rates. The results show that whereas enrollment has a positive, significant impact on growth, government spending on basic education has a negative, significant impact. Despite being beneficial, the impact of child mortality is statistically negligible. Despite the data's deviation from normalcy, the model is statistically sound and free of heteroscedasticity, serial correlation, and specification errors. Stability tests lay the groundwork for further study by confirming model reliability within a 5% constraint.

Early human capital development especially child development—is essential for socioeconomic growth since it raises the caliber of the labor force and the productivity of the country. According to research, government expenditures on labor force participation, higher school enrollment, and basic education all considerably raise GDP. These benefits can be increased by expanding access to high-quality basic education and decreasing inefficiencies in the provision of services. The need for consistent healthcare investments is highlighted by the fact that short-term effects are still detrimental even while long-term evidence indicates a favorable correlation between economic growth and a decrease in child mortality. Child-focused investments are crucial for productivity, poverty alleviation, and sustainable growth since poverty and dangers like insecurity impede the development of children in countries like Nigeria.

The study makes significant recommendations and emphasizes the value of early human capital development in Nigeria. In order to improve quality and accessibility, the government should give basic education top priority by enhancing infrastructure and teacher professional development, particularly in rural areas. For all children of school age to be enrolled, social mobilization is necessary. To give students real-world skills, curricula should incorporate entrepreneurial and vocational education. Addressing security issues and financial embezzlement is essential to maintaining these initiatives. To enhance health, education, and life outcomes, social protection programs should be put in place that target vulnerable populations, such as children living in IDP camps.

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