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Human Capital Development, Poverty and Income Inequality in Nigeria (1985-2020)

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Abstract: Test and Error Correction Model were the tools that were used to estimate the relationship between the variables. Data is from the World Bank Development Indicators (WDI) online database, 2021, Official Gazettes of the Federal Republic of Nigeria, Federal Ministry of Education and Macrotrend, 2021. Empirical results showed that the ratio of human capital to government spending was positive at 5 per cent in the short term, in line with a previous expectation. The long-term relationship between human capital development, poverty and income inequality in Nigeria has been negative. The ECM has a weak rate of adjustment of 1.2 per cent and a 1 per cent significance of this imbalance is corrected annually. Therefore, among other things, it was recommended that the federal government should increase budget allocations for the education and health sectors, and improves living standards through empowerment and the acquisition of self-employment skill.

Keywords: ARDL, Human Capital Development, Inequality, Poverty.



1. Introduction

Nigeria is a country with a current population of 213,663,177 based on Worldometer elaboration of the latest United Nations data. As of 2020, the population is estimated at 206,139,589 according to UN data. Nigeria's population is 2.64% of the total world population, with the oil-dependent economy experiencing declining average economic growth over the years. This is part of bad human capital, bad human capital has a devastating effect on the development of any economy. Low income, hunger, poverty, disease, brain drain, optical flight, huge debt and political instability are the consequences of bad human capital. Nigeria's large population does not indicate a high value of human capital, as few people can access quality education, health care and other human development services. Human capital can be defined as the sum of the knowledge, skills, abilities and abilities of the people living in a given society [1]. Gary Becker have argued that human capital resembles physical means of production such as factories and machines. They also suggested that output depends in part on the return on the human capital one possesses. Human capital, therefore, according to these scholars, is a means of production in which additional investment leads to additional output. However, they found that human capital is interchangeable but not transferrable like other factors of production [2]. The Changing Nature of Work”, the frontier for skills is moving rapidly, bringing both opportunities and risks. Mounting evidence abound indicating that without reinforcement of human capital, countries cannot sustain economic growth, a country will not have a workforce prepared for the more highly skilled jobs of the future, and will not compete effectively in the global economy. The cost of inaction on human capital development is increasing in the “Knowledge economy” which is the new normal. World Development Report [3].

The concern is that less well-resourced countries like Japan and Israel have been able to overcome the challenges of poverty and other development problems. The secret to their success was that they could effectively develop their human resources for the sustainable development of their nations. The problem in Nigeria is that despite the large population since 1985; 83.56 million, 1995; 110.7 million, 2010; 158.5 million, 2020; 206.1 million and 2021; 213.3 million (UN projection, 2021), there is still a shortage of skilled workers who will chart the course of the nation's development goals. The Federal Government of Nigeria, in line with global best practices, has included human capital development in the Economic Recovery and Growth Plan (ERGP), a medium-term plan for 2017-2020 to restore sustainable economic growth while harnessing the creativity and flexibility of the Nigerian people the most priceless assets of nations [4].

According to the issue, despite all of the plans made by previous researchers to conduct rigorous research in order to produce robust results on the impact of human capital development, poverty, and income inequality in Nigeria, their studies are constrained by a variety of factors and errors. Among these errors are: that the study's scope is limited, that the unit root test is not being tested, and that the ADF and PP tests have already become the primary focus of research. The majority of time series data contain numerous trends and occasionally structural breaks. In some studies, the diagnostic check isn't done enough to make sure the model is free of autocorrelation, heteroskedasticity, and spurious regression, which can lead to a bad result. Ogunlaye, Owolabi, Sanyaola, and Lawal conducted two (2) studies; [5], findings are impacted by their failure to verify the presence of the time-series-associated unit root test. Additionally, the following studies did not perform a diagnostic check to ensure the model's stability; [6] [7] [8], and [9], as a result, these omissions from previous research must be filled.

In terms of the educational systems in Nigeria, there are a lot of government-owned primaries, secondary schools and universities in Nigeria, but the problem is the number of resources invested in education is insufficient. Due to the poor funding to the educational sector, quality of education becomes difficult to attain. As Nigeria's population increase in a geometrical ratio. This misallocation of resources results in a lot of pressure on existing infrastructure leading to depreciation. Many numbers of people pass out of primary, and secondary schools and Universities with little or no knowledge and no jobs to do. Because of the unfolding realities coupled with prolonged debate, it is, therefore, necessary to carry out an in-depth examination of human capital development, poverty and income inequality in Nigeria from (1985 to 2020).

The rest of the paper is arranged in sections, namely: a review of human capital development, poverty alleviation programmes, consequences of poverty, inequality in Nigeria, theoretical framework, empirical review of related literature, research methodology, data presentation and analysis, a summary of findings, and recommendations.

2. Literature Review

2.1. Human Capital Development

Human capital development according to Okojie [10] refers to the process of acquiring and increasing the number of persons who have the skills, education and experience that are cited for economic growth and development of a country's economy. According to Kayode [11], human capital is construed to pertain to the contributions of humans as a factor of production. It was further posited that human resources comprise a combination of knowledge, abilities, skills, and competencies. Nonetheless, among the factors of production, humans can learn, adapt to changes, innovate and be creative.

2.2. Nigeria's HDI Value and Rank

United Nations Development Report on Nigeria shows that in 1985, 43% of the population lived below the poverty line, the government spending in the social sector declined from 13.1% in 1985 to 9.3% in 1992. The report went further to state that over 20% of primary-school-age children as well as 80% of secondary-age children are not enrolled in schools. On the whole, most Nigerian felt poorer in 1995, than they were in 1992 with the incidence of individual poverty increasing while the absolute poor increased from 35 million in 1992 to 44 million by 1995 this indicates that 71% of Nigerians' households are poor, and half of them, very poor (living on below one US dollar a day, [12]. The general increase in food prices which occurred between June 2020 - June 2021 may have increased the percentage of Nigerians living below the national poverty line from 40.1 per cent to 42.8 per cent [13].

Table 1. Nigeria's HDI Trends Based on Consistent Time Series Data and New Goalposts

Year	Life Expectancy at Birth	Expected Years of Schooling	Mean Years of Schooling	GNI per Capita (2017 PPP\$)	HDI Value
1990	45.9	6.7	-	3,109	-
1995	45.9	7.2	-	2,776	-
2000	46.3	8.0	-	2,739	-
2005	48.3	9.0	5.2	3,675	0.465
2010	50.9	8.4	5.2	4,636	0.482
2015	53.1	9.7	6.2	5,356	0.526
2016	53.5	9.5	6.3	5,160	0.526
2017	54.0	9.7	6.4	5,032	0.531
2018	54.3	9.7	6.5	4,929	0.534
2019	54.7	10.0	6.7	4,910	0.539

Source: UNDP Report, 2020

Table 1 shows Nigeria's HDI value for 2019 is 0.539 which put the country in the low human development category positioning it at 161 out of 189 countries and territories. Between 2005 and 2019, Nigeria's HDI value increased from 0.465 to 0.539, an increase of 15.9 per cent, a review of Nigeria's progress in each of the HDI. Between 1990 and 2019, Nigeria's life expectancy at birth increased by 8.8 years, years of schooling increased by 1.4 years and expected years of schooling increased by 3.3 years. Nigeria's GNI per capita increased by about 58.0 per cent between 1990 and 2019.

Table 2. Nigeria's HDI & Component Indicators for 2019 Relative to Selected Countries and Groups

Countries	HDI Value	HDI Rank	Life expectancy at birth	Expected years of schooling	Mean years of schooling	GNI per capita (2017 PPP\$)
Nigeria	0.539	161	54.7	10.0	6.7	4,910
Democratic Republic of Congo (DRC)	0.480	175	60.7	9.7	6.8	1,063
Ethiopia	0.485	173	66.6	8.8	2.9	2,207
Sub-Saharan Africa	0.547	-	61.5	10.1	5.8	3,686
Low HDI	0.5131	-	61.4	9.4	4.9	2,745

Source: UNDP Report, 2020

Table 2 shows Nigeria's 2019 HDI of 0.539 is above the average of 0.513 for countries in the low human development group and below the average of 0.547 for countries in Sub-Saharan Africa. From Sub-Saharan Africa, Nigeria is compared with Congo (the Democratic Republic of the) and Ethiopia, which have HDIs ranked 175 and 173.

2.3. Poverty and Inequality Report in Nigeria

Recently released the "2019 Poverty and Inequality in Nigeria" report, which highlights that 40 per cent of the total population, or almost 83 million people, live below the country's poverty line of 137,430 nairas (\$381.75) per year. The latest round of the Nigerian Living Standards Survey was conducted in 2018-2019 with support from the World Bank's Poverty Global Practice and technical assistance from the LSMS program. The Nigerian Living Standards Survey (NLSS) is the official survey that is the basis for measuring poverty and living standards in the country and is used to estimate a wide range of socio-economic indicators including benchmarking of the Sustainable Development Goals. Between September 2018 and October 2019, the National Bureau of Statistics conducted the latest round of the NLSS, a decade after the previous one [14].

2.4. Poverty Alleviation Policies and Programmes in Nigeria

The first civilian administration at the national and regional levels carried out various entrepreneurial development initiatives aimed at combating poverty in Nigeria. These are in addition to the development plans, the First Development Plan 1962-1968, Second Development Plan 1970-1974, Third Development Plan 1975-1980, Fourth Development Plan 1981-1985 and Fifth National Development. Some of these initiatives/programmes set up to tackle poverty in Nigeria include:

2.5. The National Poverty Eradication Programme

The National Poverty Eradication Programme (NAPEP) is a programme put in place to eradicate poverty by the Obasanjo's Administration in 2001. The Programme was conceived as a result of the failure of the Poverty Alleviation Programme (PAP) in 1999-2000, it could not address the issue of poverty in Nigeria. NAPEP like every other programme is an improvement on the former both in scope and structure. The document titled National Poverty Eradication Programme (NAPEP) provides strategies for the eradication of absolute poverty and rationalization of existing poverty alleviation institutions and coordinated implementation and monitoring of relevant schemes and programmes at all levels of government.

Other activities include the Social Welfare Service Scheme (SOWESS) that deals with special education, primary health care services, establishment and maintenance of recreation centres, public awareness, facilities, youth and student hostels development, environmental protection facilities, food security, provision of agricultural inputs micro and macro credits delivery, rural telecommunication facilities, provision of mass transit and maintenance culture. More so, the National Resource Development and Conservation Scheme (NRDCS) deals with the harnessing of the agricultural, water, and solid mineral resources, and conservation of land and space, particularly for the convenient and effective utilization by small-scale operators and the immediate community.

Research has shown that earlier policies and programmes directed at alleviating poverty by different regimes have not made much impact for several reasons. For instance, Gowon's Accelerated Food Production Programme (AFPP), Obasanjo's Operation Feed the Nation (OFN), Shagari's River Basin Development Authority (RBDA) and Green Revolution (GR) Babangida's Mass Mobilization for Social and Economic Recovery (MAMSER), National Directorate for Employment (NDE), Directorate for Food, Road and Rural Infrastructural (DFRRI) Better Life for Rural Women Programme (BLP) National Agricultural Land Development Authority (NALDA), People's Bank of Nigeria (PBN) Nigerian Agricultural and Cooperative Bank (NACB), Abacha's Family Economic Advancement Programme (FEAP), Obasanjo's Poverty Alleviation Programme (PAP), Buhari's National Social Investment Programme (NSIP) etc. All failed not because of poor conception but on account of operationalization, haphazard, non-focused, blurred, corrupt and selfish implementation process. Most often these programmes are hijacked by corrupt, selfish and self-centred individuals or groups within the domain of power. The resultant end is always epileptic, with dismal implementation or performance of the programme. A good example is the Family Economic Advancement Programme (FEAP), a lot of enthusiasm, and a huge amount of money and human resources were committed to the programme but its impact in alleviating poverty is a disappointment because it was never felt.

2.6. Consequences of poverty

Poverty has proved to have adverse effects both on the poor and the society at large. Some of these consequences include:

- **Threat to national security**
Having mentioned earlier that many of the insurgencies that have been recorded in Nigeria are a result of government negligence and therefore, resulted in violence and terrorism further claiming the lives of thousands and millions of people. The crises in all six (6) geo-political zones in Nigeria.
- **Corruption**
This is one of the acts that have eaten deep into both private and public sectors. Corruption has so much bedevilled society up to the point that it has become a norm and is no longer seen as a crime in Nigeria. Every sector of the economy is not left out of this parasite called corruption.
- **Threat to economic growth**
Various factors have posed a threat to economic growth in the country. Unemployment is a very critical problem facing the growth of the Nigerian economy and has left its horrible marks on the financial status of the country. Unemployment results in poverty as people do not have the resources to earn a good living resulting in a decrease in individual per capita income and aggregate demand which is one of the factors used to measure economic growth. Also, health is a major measure of economic growth.

2.7. Inequality of Outcomes

Inequality of outcomes occurs when individuals do not possess the same level of material wealth or overall living economic conditions. Development theory has largely been concerned with inequalities in standards of living, such as inequalities in income/wealth, education, health, and nutrition. However, the lens through which economists gauge progress on these fronts has typically been income or consumption. Historically, development theory was concerned with income inequalities, in so much as it affected or was affected by the economic growth of the average income of the nation. Distributional concerns were mostly put aside, as growth was thought to eventually “lift all boats” (Kuznets curve). Slowly, studies began showing that growth had inconclusive effects on inequality, but income inequality was detrimental to economic growth. Further, as income inequality rose in many countries, a distributional bias in the growth process was made evident. Startling levels of poverty in the late 1990s pushed the income inequality debate to refocus on poverty reduction. Pro-poor growth approaches made their debut and growth and equity (through income redistribution) were seen as separate policy instruments, each capable of addressing poverty. The central concern was in raising the incomes of poor households. By the early 2000s, it was clear that growth and inequality were not separable, and the previous decade’s focus on extreme poverty was seen as falling short (indeed, there was progress in extreme poverty, but income inequalities were rising in many developing countries). Inclusive growth approaches emerged, advocating broadly-shared well-being and the extension of benefits of growth to a wider share of the population [15].

2.8. Marxist Opinion on Human Capital Theory

Human Capital in Marxist opinion can be linked to the concept of labour-power. Karl Marx opined that in a capitalist system, labourers in exchange for money (wages or salaries) sold their labour-power. Before the modern theories of Human Capital, Marx disagreed with two conflicting theories that construed the interest of human capital with the wages and salaries received. The first was that work must be done. Implying that the worker must work either in the form of exerting the body or the mind to earn his ‘interest’. He made a strong distinction between one’s capacity to work (labour-power) and the working activity. On the other hand, he thought that a free worker could not sell his human capital at once since it is not a liquid asset like shares or inventories. He posited that “a worker does not necessarily sell his skills but contracts to utilize those skills.” In the same way, an industrialist sells what he produces, not his machinery. Although an exception was made here on account of the slave trade because they could sell their human capital even without exchange for any source of income. Marx felt that an employer must be receiving a profit from his operations; this he felt was termed as ‘surplus value.’ This relates to sustaining their labour power by doing more work to create a new value. The presence of human capital has its benefits however a disadvantage would be that they still depend on non-human wealth owners to earn a living [16] [17].

2.9. Schultz and Becker Human Capital Theory

According to Karl Max and Fredrich Engels [18], the ground for this theory which was later advanced by Becker, a Nobel Prize winner in economics, in 1964 in his work on the economics of employer-provided training. The theory posits that the education or training of workers increases their productivity and income level as it raises their skills level and knowledge. In driving home, the main dictum of the theory, categorized human capital into specific and general for which a clear distinction was made available [19]. Specific human capital arises when workers acquire knowledge directly tied to their firms, such as how to use proprietary software. Companies are happy to pay for this kind of training since it is not transferable. On the other hand, general human capital bothers on the expertise acquired through training and education for which its application is across all facets of productive engagement (writing and reading skills fall into this category). Companies are often reluctant to go for this, because they may well jump ship to whichever company pays them most. In train of thought, human capital bears similarities with the traditional factors of production like property, plant and equipment. As such funds can be invested in the development of human capital through training, education, provision of quality health care, and the level of total output, like the tangible capital investment, varies partially with the rate of return on human capital owned. In this sense, human capital can be classified as a factor of production for which continuous investment results in an increasing level of output.

2.10. The Classical Theory of Human Capital

One of the greatest economic writings to date was authored by Adam Smith who is considered to be the leader of the Classical school of economic thought. In his book "An Inquiry into the Nature and Causes of The Wealth of Nations-Book 2; Of the Nature, Accumulation, and Employment of Stock" (Smith, 1776) he wrote "Fourthly, of the acquired and useful abilities of all the inhabitants or members of the society. The acquisition of such talents, by the maintenance of the acquirer during his education, study or apprenticeship always costs a real expense which is a capital fixed and realized, as it were, in his person. Those talents, as they make a part of his fortune, so do them likewise that of the society to which he belongs. The improved dexterity of a workman may be considered in the same light as a machine or instrument of trade which facilitates and abridges labour, and which, though it costs a certain expense, repays that expense with a profit." Also, within his work, a fascinating relationship, though the complex is displayed between the division of labour and human capital in Nigeria. The relationship was borne out of the blend observed in the level of productivity of different labourers depending on each human capital development index.

2.11. Theoretical Framework

This aspect of the research focuses on the discussion of relevant theories; several theories can be found explaining human capital development. Prominent among them include; Marxist opinion on human capital theory, Schultz and Becker's human capital theory and classical theory of human capital.

This study is anchored a Nobel Prize winner in economics, in 1964 in his work on the economics of employer-provided training. The theory posits that the education or training of workers increases their productivity and income level as it raises their skills level and knowledge. In driving home, the main dictum of the theory, categorized human capital into specific and general for which a clear distinction was made available. According to Schultz [19] specific human capital arises when workers acquire knowledge directly tied to their firms, such as how to use proprietary software. Companies are happy to pay for this kind of training since it is not transferable. On the other hand, general human capital bothers on the expertise acquired through training and education for which its application is across all facets of productive engagement (writing and reading skills fall into this category). As such funds can be invested in the development of human capital through training, education, provision of quality health care, and the level of total output, like the tangible capital investment, varies partially with the rate of return on human capital owned. In this sense, human capital can be classified as a factor of production for which continuous investment results in an increasing level of output [20].

2.12. Empirical Literature Review

According to Jaiyeoba [21], empirically investigated the relationship between investment in education, health and economic growth in Nigeria, using time series data from 1982 to 2011. The paper employed trend analysis, the Johansen cointegration and Ordinary Least Square techniques. The

findings indicated that there is a long-run relationship between government expenditure on education, health and economic growth. The variables health and education expenditure, secondary and tertiary enrolment rate and fixed capital formation with the expected positive signs and also statistically significant according to the paper have strong implications on education and health policy and recommended that to accelerate growth and liberate Nigerians from the vicious circle of poverty, the government should put in place policies geared towards massive investment in the education and health sectors.

Investigated the impact of human capital on economic growth using panel modelling of eleven (11) countries for the period 1992 to 2014 [22]. The econometrics analysis inferred that there is a long-term relationship between the real gross domestic product (GDP) and human capital in the fixed-effect model. Similarly, examined the role and contribution of primary, secondary and tertiary education to the economic growth of the SAARC region between 1960- 2013. The methodological approach employed was the Ordinary Least Squares (OLS) and the fixed effect model (FEM). Findings emanating from the studies showed that education had a significant positive effect on economic growth. It was recommended that the Government can achieve better results by investing heavily in the educational sector [23].

Examined the relationship between human capital indices and economic growth in Nigeria for the period 1980 to 2013. The ARDL Cointegration analysis was used for the econometrical analysis. The findings from the study revealed that an insignificant positive long-run relationship existed between secondary school enrolment, public expenditure on education, life expectancy rate, gross capital formation and economic growth. The results also affirmed a negative long-run relationship between primary, and tertiary school enrolment, public expenditure on health and economic growth [24].

Analysis to examine the impact of human capital development on economic growth in Nigeria employed the Ordinary Least Square (OLS) regression, using annual time series data from 1981 to 2005. The empirical result showed that human capital development has a significant impact on economic growth, as a proxy by the gross domestic product. And that in line with theory the human capital development indicators namely secondary and tertiary school enrolment, total government expenditure on health and education exhibit a positive and statistically significant impact on the economic growth of Nigeria. The result further revealed that life expectancy and primary school enrolment, however, exhibited a negative and statistically insignificant impact on the economic growth of Nigeria. The study, therefore, recommended that government should allocate adequate resources for the development of human capital to enhance economic growth in Nigeria [25].

Examined the impact of Nomadic education expenditure and economic growth in Nigeria. The study made use of time series data on real domestic products and total government expenditure on Nomadi education from 1986 to 2012 and employed Ordinary Least Square (OLS) which provides information about the long-run relationship between the variables. It also revealed that total government expenditure on nomadic education has a significant impact on Nigeria's economic growth. It is therefore recommended that the government should increase its budgetary allocation to the Nomadic education and other educational sectors because adequate investment in this sector will improve educational outcomes and induce the nation's economic growth [5].

Examined the Impact of Human Capital Development on Poverty Alleviation in Nigeria for the period of 1995 to 2017. Augmented Dickey-Fuller (ADF), Phillip-Perron (PP) and Granger Causality Test was used. The secondary method of data collection was employed. The study adopt two models which comprised the variables; Per capita Income (PCI) as a proxy for poverty, Government Expenditure on Health (GEH), Life Expectancy (LE), Infant Mortality (INF) proxy for health, gross enrolment rate (GER) and literacy rate (LIT) as a proxy for education. The result revealed that there is exists a positive long-run relationship between government expenditure (GEH), Gross enrolment rate on per capita income (PCI) in Nigeria and a negative long-run relationship exists between government expenditure on education(GEE), the infant mortality rate (INF), life expectancy (LE) on per capita income in Nigeria [7].

Examined the determinants of Human Capital Development in Nigeria: An ARDL technique was employed, using annual time series data from 1990 to 2018. The Auto-regressive Distributed lag Model (ARDL), Descriptive Statistics, Test for Cointegration, Augmented Dickey-Fuller (ADF) and Phillip-perron (PP), Godfrey serial correlation LM test, Heteroskedasticity test, CUSUM and CUSUM of Square to check the stability of the model was used for the econometrical analysis [26]. The variables are; Human capital (HDI), Tertiary School Enrolment (TER), Government Expenditure on Education (GXE), Government Expenditure on Health (GXH), and Life Expectancy (LI) and fertility

rate (FER). The findings from the study revealed that all the variables have an impact on human capital development at 1% except tertiary enrolment (TER), the negative sign of fertility rate (FER) affects human capital development negatively with 1.72% in the long run.

Table 3. Summary of Related Literature and Research Gap

Author	Title and Scope	Variables	Method	Major Findings	Weakness
[21]	Investigated the relationship between investment in education, health and economic growth in Nigeria (1982-2011)	Health, education expenditure, secondary tertiary enrolment rate and fixed capital formation.	Ordinary Least Square (OLS) and Johansen Cointegration	The study revealed that there is a long-run relationship between government expenditure on education, health and economic growth	This study only centres on education and health
[9]	Impact of human capital on economic growth using panel modelling of eleven (11) countries for the period of (1992–2014)	Gross Domestic Product and Human Capital	OLS and Fixed effect model (FEM).	Findings emanating from the studies showed that education had a significant positive effect on economic growth	The study is not country-specific and focuses only on education.
[24]	Impact of human capital development on economic growth in Nigeria (1981 to 2005)	Secondary and tertiary enrolment, total government expenditure on health and education	OLS	The study revealed that life expectancy and primary school enrolment, however, exhibited a negative and statistically insignificant impact on the economic growth of Nigeria	This study only centres on human capital development and economic growth
[5]	Impact of Nomadic education expenditure and economic growth in Nigeria (1986 to 2012)	Real Gross Domestic Product, total government expenditure on Nomadi	OLS	The study revealed that total government expenditure on nomadic education has a significant impact on Nigeria's economic growth	This study only centres on education.
[7]	Impact of Human Capital Development on Poverty Alleviation in Nigeria (1995 to 2017)	Per capita income, government expenditure on health, life expectancy, infant mortality, literacy rate and gross enrolment rate.	Unit Root and Granger causality test	The study revealed that there is a positive long-run relationship between government expenditure, gross enrolment rate on per capita income and a negative long-run relationship between government expenditure on infant mortality rate, life expectancy on per capita income	The method of analysis is not sufficient to obtain a valid result
[25]	Determinant of Human Capital Development in Nigeria: An ARDL Methodology (1990 to 2018)	Human capital, tertiary school enrolment, government expenditure on education, government expenditure on health, life expectancy, the fertility rate	Unit Root test, ARDL, Descriptive Statistics	The study revealed that all the variables have an impact on Human Capital development at 1% except tertiary enrolment.	ECM results were completely missing
[6]	Haman Capital Development and Economic Development in Nigeria (1981 to 2018)	Pupil-teacher ratio, government expenditure on health, government expenditure on education	OLS, Cointegration Test and ECM	The result revealed that the pupil-teacher ratio exerts a negative impact on the misery index during the study period, the pupil-teacher ratio causes other variables to exhibit identical movement in the long run.	Using the OLS method only cannot predict the good result for policy recommendations.

Examined Human Capital Development and Economic Development in Nigeria. The study made use of time series data on the pupil-teacher ratio (PTR), government expenditure on health (GEH) from 1981 to 2018 and employed ordinary least square (OLS), ADF Unit root test, Johansen Cointegration Test and ECM test. The result further revealed that the pupil-teacher ratio (PTR) exerts a negative impact on the misery index during the study period, the government spending is negative and insignificant, the government spending is negative and insignificant, the government spending on education (GEE), government expenditure on health (GEH) and pupil-teacher ratio (PTR) causes other variables to exhibits identical movement through the long-run [27].

2.13. Criticism of Empirical Work

All the studies used time-series data, but known of study exceed 30 years, except the study of [6] covered 37 years period from 1981 to 2018, and in such a scenario, another statistical technique should have been used in place of what was used in the various studies less than 30 years scope; [5] [7] [9] [21] [24] and [25].

3. Methodology

3.1. Model Specification

Empirically investigating the Human Capital Development, Poverty and Income Inequality in Nigeria, is appropriate for this study because it is theory-based and created by gathering, analyzing and presenting the results of the data collected. The theory that underpins this study is Karl Marx [18] and Schultz [19] human capital theory. In its simplest form, the human capital theory states that an individual will undertake training when the present discounted value of the benefits of training exceeds the cost of training. We first consider the situation with a single training opportunity available to an individual and where all values are known with certainty; that is, the individual has perfect foresight. For simplicity assume that the direct cost of training is borne at time zero and equals c . Consider two-income paths. Let y_t^0 , $t = 0, 1, \dots$ be the income path if the individual is not trained and y_t^1 , $t = 0, 1, \dots$ the income path when the individual is trained. Assume that capital markets are perfect and denote the market interest rate by r . The human capital theory states that an individual will undertake training when:

$$\sum_{j=0}^{\infty} \frac{y_j^1}{1+r^j} + \sum_{j=0}^{\infty} \frac{y_j^0}{1+r^j} \geq c \quad \text{Equation 1}$$

In the simple case where the per period return to investment is constant, $y_t^1 - y_t^0 = \alpha$ for $t = 1, 2, \dots$ and assuming that in period zero an individual earns zero if trained ($y_0^1 = 0$) and y_0^0 if not trained, an individual will invest in training if:

$$c + y_0^0 < \frac{\alpha}{r} \quad \text{Equation 2}$$

This simple model yields several predictions: An individual will be more likely to invest in training the lower the direct cost (c), the lower the opportunity cost (y_0^0), the greater the return (α) and the lower the cost of borrowing (r). The model that guided this study becomes:

$$HCD = f(GXE, LEX, PCI) \quad \text{Equation 3}$$

$$HCD_t = \beta_0 + \beta_1 GXE_t + \beta_2 LEX_t + \beta_3 PCI_t + \mu_t \quad \text{Equation 4}$$

where,

HCD = Human Capital Development (Primary School enrolment was proxy as HCD)

GXE = Government Expenditure on Education

LEX = Life Expectancy

PCI = Per Capita Income

3.2. Data

This study used annual time series data from 1985 to 2020 to examine Human Capital Development, Poverty and Inequality in Nigeria. This period was chosen due to the availability of data and the level of poverty and backwardness in Human capital development that took place within this period. The Description of variables, sources of data and a priori expectations are presented in Table 4.

Table 4. Description of Variables, Sources and a Prior Expectation

Variables	Description	Sources	A Priori Expectation
Human Capital Development (HCD)	The HCI calculates the contributions of health and education to worker productivity. The final index score ranges from zero to one and measures the productivity as a future worker of a child born today relative to the benchmark of full health and complete education.	World Bank Development Indicator (WDI, 2021)	Dependent Variable
Government Expenditure on Education (GXE)	General government expenditure on education (current, capital, and transfers) is expressed as a percentage of total general government expenditure on all sectors (including health, education, social services, etc.). It includes expenditure funded by transfers from international sources to the government. General government usually refers to local, regional and central governments.	Federal Republic of Nigeria official Gazettes, Federal Ministry of Education	Positive
Life Expectancy (LEX)	Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.	World Bank Development Indicator (WDI, 2021)	Negative
Per Capita Income (PCI)	Per capita income is a measure of the amount of money earned per person in a nation or geographic region. Per capita income can be used to determine the average per-person income for an area and to evaluate the standard of living and quality of life of the population.	Macrotrends 2020	Negative

3.3. Estimation Techniques

3.3.1. Unit Root Test for Stationarity of Series

The process involves examining the stationarity status of all variables under consideration. This determines the order of integration of a stochastic process order whether stationary or non-stationary. The test is adjudged to conform to stationarity premised on the condition that the F-stat exceeds the critical value at 10%, 5% or 1% significance levels respectively. It is tested at levels or first differences. The universally acceptable methodology for verifying unit root is the Augmented Dickey-Fuller (ADF) test pioneered by the works of [26], and the Phillip-Perron (PP) attributable to Pesaran and Shin [27]. ADF adjust higher-order serial correlation by joining lagged difference term on the right-hand side rejecting a null hypothesis of unit root (the series are non-stationary) in comparison with the alternative hypotheses of stationarity. The tests are also willing to test with and without a deterministic trend (t) for each of the series.

$$\Delta Y_t = \alpha_1 t + \alpha Y_{t-1} + \sum_{i=1}^m \alpha_i \Delta Y_{t-i} + \varepsilon_t \quad \text{Equation 5}$$

where, y is a time series, t is a linear time trend, Δ is the difference operator, β_0 is a constant, n is the optimum number of lags in the dependent variable and ε_t is the error time t.

3.3.2. The ARDL Estimation Technique

To choose a plausible time series model, the investigation of the time-series data to verify the stationarity and cointegration tests is central. This research paper adopted the autoregressive distributed lag (ARDL) bounds testing approach to cointegration developed by [29]. The technique is advantageous in comparison to other estimation techniques like [30] and [31] Firstly, the technique is

amenable for empirical investigation regardless of the order of the integration of the repressors at I(1) and I(0). In addition, the said technique is also a more statistically robust approach for examining correlation, especially in the event of a small data size as other techniques require a large data size for validity. Furthermore, the variables can possess different optimum lags, which does not apply to other techniques.

3.3.3. ARDL Long-run and Short-run Model

$$\Delta y_t = \beta_0 + \sum_{i=1}^p \lambda_i \Delta y_{t-i} + \sum_{i=0}^{q1} \delta_{1i} \Delta X_{1,t-i} + \sum_{i=0}^{q2} \delta_{2i} \Delta X_{2,t-i} + \phi_1 y_{t-1} + \phi_2 X_{1,t-1} + \phi_3 X_{2,t-1} + \varepsilon_{it}$$

Equation 6

$$\Delta HCD_t = \beta_0 + \beta_1 GEX_t + \beta_2 LEX_t + \beta_3 PCI_t + \theta_1 HCD_t + \theta_2 GEX_t + \theta_3 LEX_t + \theta_4 PCI_t + \mu_t$$

Equation 7

The error correction version of the Autoregressive Distributed Lag (ARDL) bounds testing model is expressed as:

$$\Delta HCD_t = \alpha_0 + \sum_{i=1}^p a_{1j} \Delta GEX_{t-i} + \sum_{i=1}^{q1} a_{2j} \Delta LEX_{t-i} + \sum_{i=1}^{q2} a_{3j} \Delta PCI_{t-i} + \lambda ECT_{t-1} + e_t$$

Equation 8

While the notations from a_{1j} - a_{3j} with summation signs corresponding to the short-run dynamics of the variable while α₀ connotes constant and ε_t is the disturbance term.

3.3.4. Hypothesis

To identify the existence of a long-run relationship, the Bound Test of [29] is conducted to test the following hypothesis:

$$H_0: \lambda_1 = \lambda_2 = 0 \quad \text{indicating the nonexistence of long run relationship among variables.}$$

$$H_1: \lambda_1 \neq \lambda_2 = 0 \quad \text{indicating the existence of long run relationship among variables.}$$

The null hypothesis is rejected when the value of F-statistics is higher than the upper critical Bound and the rejection of the null hypothesis indicates there is a long-run relationship between the volatility of the economic sectors.

4. Finding and Discussion

4.1. Unit Root Test

To avoid spurious regression results that characterize non-stationary time series data, [32] proposed that they should be subjected to a stationarity test. The tests of the variables at the level and first difference using both Augmented Dickey-Fuller (ADF) and Phillips-Peron (PP) unit root tests.

Table 5. ADF and PP Unit Root Test Results

Var.	ADF				PP			
	Level	Prob.	1 st Diff.	Prob.	Level	Prob.	1 st Diff.	Prob.
HCD	-3.3136	0.0218**	-5.8074	0.0000***	-3.4577	0.0154**	-7.0000	0.0000***
GXE	1.6574	0.9994	-4.8351	0.0004***	4.5031	1.0000	-4.7502	0.0005***
PCI	-2.2575	0.0251**	-6.1127	0.0000***	-2.2678	0.0245**	-6.5879	0.0000***
LEX	-2.6961	0.0857*	-0.7940	0.8073	-3.6976	0.0405**	-1.3065	0.6152

(*) indicates significant at the 10%, (**) significant at the 5% and (***) significant at the 1%

Using the ADF test at levels, the results suggested that some of the variables were stationary at levels, while in most cases, the PP test suggested non-stationary variables at levels. The PP test was preferred to augment the ADF test, due to the validity of its results even when disturbances are serially correlated and heterogeneous, unlike the ADF test, which is a non-parametric test. The results obtained are summarized in Table 5.

The unit root results presented in table 5 showed that all the variables are stationary at the level except Government expenditure on education (GXE) which was stationary after the first difference at a 1% level of significance. This implies that the variables are integrated in the order I(0) and I(1) using both the ADF and PP tests respectively. This is because the test statistics of all the variables at first difference are greater than their critical values at 5 per cent and 10 per cent levels of significance while the test statistic of the government expenditure on education (GXE) at first difference was greater than its critical value at the 1% per cent level of significance. This is also obvious from their respective probability values because they are all less than or equal to 0.05. Consequently, the ARDL bounds test for Cointegration was deemed appropriate to check for the long-run relationship among the variables in the models used in this study.

4.2. Lag Selection

Before testing for the long-run relationship among the variables the study tested for the optimum lags to be used in the ARDL bounds test and its short and long-run estimates using the VAR lag order selection criteria. The result obtained is presented in Table 6.

Table 6. VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-575.9897	NA	2.17e+10	35.15089	35.33229	35.21192
1	-429.2457	249.0201	7920060.	27.22701	28.13399	27.53218
2	-357.4004	104.5022	281415.4	23.84245	25.47500*	24.39176
3	-334.1413	28.19284*	205072.4*	23.40251*	25.76064	24.19595*

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

From Table 6, the different criteria suggested different optimum lags that can be used for the specified output. Sequential Modified LR test statistic (LR) choose 3 lags, Final Prediction Error (FPE) and Akaike Information Criterion (AIC) picked 3 lags out of a maximum of 3 lags while Schwarz Information Criterion (SIC) choose lag 2 and Hanna-Quinn Information Criterion, out a maximum of 3 lags. If there are limited observations in an ARDL model, it is often advised to use the Akaike Selection Criterion (AIC) in selecting the optimum lag length. Thus, this study used 3 lags to determine the long-run relationship among the variables in the output equation.

4.3. Optimal Lag Length in the VAR

A major requirement in conducting Johansen's (1992, 1995) co-integration tests and estimation of a VAR system either in its unrestricted or restricted Vector Error Correction (VEC) forms is the choice of an optimal lag length. In this study, this choice was made by examining the lag structure in an unrestricted VAR originally specified with three lags, using a combination of VAR lag order selection criteria and examination of the roots of the characteristic polynomial to verify if the VAR is stable. Table 6 presents the evidence based on the VAR Lag Order Selection Criteria, while Figure 1 presents the inverse roots of the AR characteristic polynomial associated with the different lag orders specified by the selection criteria. As shown in Table 6, the LR, HQ FPE and AIC criteria suggest the use of three lags and two lags. This shows that the VAR in Equation (2) will be unstable if only one is accommodated. Thus, subsequent analyses were based on VAR with three lags.

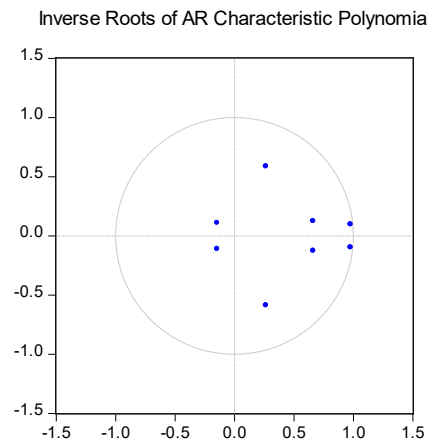


Figure 1. Inverse Roots of AR Characteristics Polynomial

4.4. ARDL Bounds Test for Cointegration

Having established the order of integration and the maximum lags to be used in the equations adopted for this study, it went further to ascertain if there is a long-run relationship among the variables using the autoregressive distributed lag (ARDL) bounds testing approach. The result obtained is presented in Table 7.

Table 7. ARDL Bounds Test

Test Statistic	Value	K
F-statistic	5.633258	3
Critical Value Bounds		
Significance Level	I(0) Bound	I(1) Bound
10%	2.37	3.2
5%	2.79	3.67

Table 7 showed the result of the ARDL bounds test for cointegration for human capital development, poverty and inequality in Nigeria. The first step in this procedure is to compare the value of the calculated f-statistic and critical value bounds. From table 7, the estimated f-statistic of 5.633258 calculated at k=3 (number of explanatory variables) and the estimated respectively exceeds the upper critical bounds at 10 and 5 per cent levels of significance respectively. Hence, the null hypotheses of no long-run relationship among the variables should be rejected. This implies that there is a long-run relationship between Human Development, Poverty and income inequality in Nigeria.

4.5. ARDL Short-run, Long-run and Error Correction Model

Table 8. ARDL Short-run Coefficient

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
HCD(-1)	0.216004	0.177433	1.217385	0.2353
HCD(-2)	-0.412557	0.155538	-2.652452	0.0139**
GXE	0.048932	0.016739	2.923176	0.0074**
LEX	30.83926	38.59013	0.799149	0.4320
LEX(-1)	42.61169	112.3841	0.379161	0.7079
LEX(-2)	-172.0871	118.5143	-1.452037	0.1594
LEX(-3)	94.93508	44.89394	2.114653	0.0450**
PCI	-0.005513	0.004956	-1.112356	0.2770
C	277.8119	65.72718	4.226743	0.0003***

(*) indicates significant at the 10%, (**) significant at the 5% and (***) significant at the 1%
Source: Computed by the Author using Eviews 10

The short-run estimate coefficient in table 8 revealed that a positive sign of government expenditure on education (GEX) has a positive impact on Human capital development with (0.048932) and is statistical significance at a 5 per cent level. This showed that a unit increase in government expenditure on education will increase the level of human capital development in Nigeria by 0.05 per cent. The positive sign of life expectancy LEX(-3) with (94.93508) and is statistical significance at 10 per cent, showed that a unit increase in life expectancy will increase the level of human capital development by 94 per cent in the short-run coefficient. This finding is also in line with the studies of Philips and Perron [25] and contrary to the study of Ogunleye et al [21].

Table 9. ARDL Long-run Coefficient

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GXE	0.040894	0.013647	2.996644	0.0063**
LEX	-3.093147	0.969088	-3.191814	0.0039**
PCI	-0.004607	0.004104	-1.122621	0.2727
C	232.1770	44.81492	5.180797	0.0000***

$$EC = HCD - (0.0409 * GXE - 3.0931 * LEX - 0.0046 * PCI + 232.1770)$$

(*) indicates significant at the 10%, (**) significant at the 5% and (***) significant at the 1%
Source: Computed by the Author using Eviews 10

Table 9 showed the long-run coefficient of government expenditure (GEX) with a positive sign (0.040894) and is statistical significance at 5 per cent, showing a unit increase in government expenditure will increase the level of human capital development by 0.04 per cent, even though the coefficient of government expenditure in short-run and long-run are almost equal. The negative sign of life expectancy (LEX) with (-3.093147) and its statistical significance at 5 per cent, showed a unit decrease in life expectancy will decrease the level of human capital development in Nigeria which is contrary to the studies of Philips and Perron [25].

Table 10. Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(HCD(-1))	0.412557	0.130342	3.165180	0.0042***
D(LEX)	30.83926	31.44225	0.980822	0.3365
D(LEX(-1))	77.15206	67.51258	1.142781	0.2644
D(LEX(-2))	-94.93508	39.80813	-2.384817	0.0253**
CointEq(-1)*	-1.196552	0.174230	-6.867666	0.0000***

(*) indicates significant at the 10%, (**) significant at the 5% and (***) significant at the 1%
Source: Computed by the Author using Eviews 10

Table 10 shows an estimated coefficient value of the Error Correction Model, ECM(-1) (-1.196552) indicating that the variable is well estimated given the condition of a negative sign of (-1.196552) which enables it to adjust to equilibrium position whenever the system is out of equilibrium. The ECM value is low and is statistical significance at 1 per cent. The estimated coefficient shows that about 1.2% of this disequilibrium is corrected annually. Table 10: Cumulative Sum of Recursive Residuals of Cusum and Cusum Square

Model stability is necessary for prediction and economic inference. This is regarded as a sufficient condition, hence the study employed stability tests for estimated parameters by using the cumulative sum of recursive residuals (CUSUM) and cumulative sum of square (CUSUM Q) tests. The graphical presentation of these tests is presented in Figure 2.

For robustness, therefore, the estimated model was evaluated for the presence or absence of serial correlation and Heteroskedasticity within the context of the Breusch-Godfrey Serial Correlation LM test and Breusch-Pagan-Godfrey Heteroskedasticity test, respectively. Both tests were conducted under the null hypotheses of “no serial autocorrelation” and “no Heteroskedasticity” respectively. The result indicated the estimated model was free from the econometric problems, as the F-statistics

in both tests were statistically insignificant (both P-values were greater than 0.05), leading to a rejection of the null hypotheses in the test as presented in Table 11.

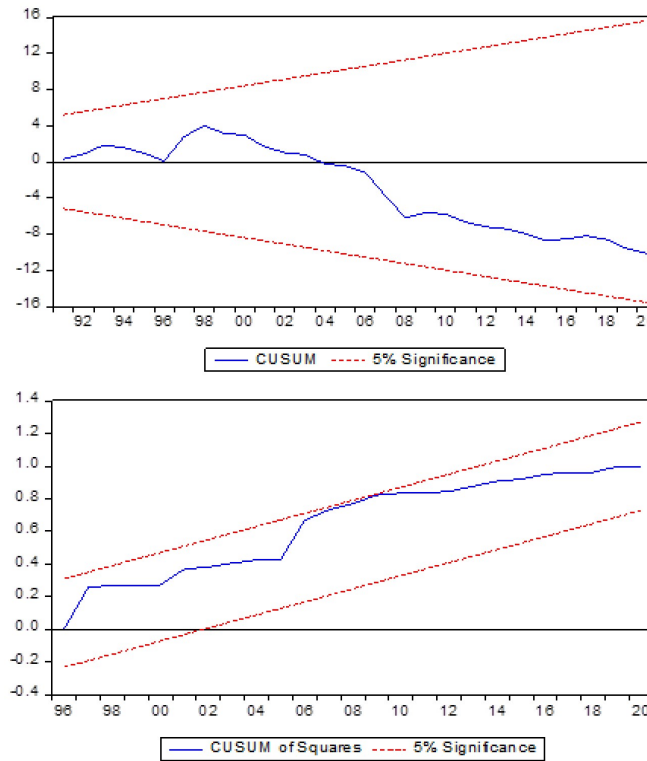


Figure 2. CUSUM and CUSUM Q) Tests

Table 11. Result of Heteroskedasticity and Serial Correlation Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
Null Hypothesis: No Heteroskedasticity			
F-Statistic	1559057	P-value	0.2280
Breusch-Pagan-Godfrey Serial Correlation LM Test			
Null Hypothesis: No Serial Correlation			
F-Statistic	1.073229	P-Value	0.3871

5. Conclusion

The finding of the study leads to conclusions, that human capital development, poverty and income inequality in Nigeria as supported by data sourced from secondary types. The ARDL short-run coefficient indicates that government expenditure on education and life expectancy has a positive impact on human capital development in Nigeria, in the long-run coefficient indicates that life expectancy and per capita income hurt human capital development and have a weak speed of adjustment of 19 per cent of this disequilibrium is corrected annually. The poverty rate of 43 per cent of the population lived below the line in 1985, now stood at 40.1 per cent in 2020 and moved to 42.8 per cent in 2021.

Therefore, it was recommended that the federal government should increase the budget allocation for education and health sectors, improve the standard of living through empowerment and skills acquisition and entrepreneurship skills should be part of all the tertiary institutions in Nigeria and the government should also create new policies and strengthen its existing policies to combat poverty in Nigeria.

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