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PUBLIC EXPENDITURE ON HUMAN CAPITAL DEVELOPMENT IN NIGERIA

ЈАВНА ПОТРОШЊА И РАЗВОЈ ЉУДСКОГ КАПИТАЛА У НИГЕРИЈИ

Summary: *This paper analyzes the impact of public expenditure on human capital development in Nigeria from 1990 to 2022. Annual time series data were obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin and UNDP Human Development Reports. The Auto-Regressive Distributed Lag (ARDL) technique was used to estimate the short- and long-run relationships. The ARDL model was used to capture both the short-run and long-run dynamics between public expenditure and human capital development. In the short run, lagged human capital index, mortality rate, and lagged education expenditure negatively influenced HDI, while in the long run, enrollment rate and mortality rate continued to have negative effects. For the human capital per person index, lagged education expenditure, health expenditure, foreign aid, and GCF were significant in the short run, with foreign aid and GCF exerting a positive effect while health expenditure negatively impacted the index. Public expenditure, particularly on education and health, plays a crucial role in shaping human capital development. However, mortality rates and low enrollment rates remain significant barriers, especially in the long term. Additionally, health expenditure has an unexpected negative impact on human capital per person, suggesting inefficiencies in healthcare spending.*

Keywords: *Public Expenditure, Human Capital Development, Nigeria, ARDL*

JEL classification: *H51, I15, I25, O55*

Резиме: *Овај рад анализира утицај јавне потрошње на развој људског капитала у Нигерији у периоду од 1990. до 2022. године. Годишње временске серије података преузете су из Статистичког билтена Централне банке Нигерије (CBN) и Извјештаја о људском развоју УНДП-а. У истраживању је примјењена техника ауторегресивне дистрибуиране временске лаг структуре (ARDL), чиме су процијењени краткорочни и дугорочни односи између јавне потрошње и развоја људског капитала. ARDL модел је омогућио анализу краткорочне и дугорочне динамике између јавних издатака и развоја људског капитала. У кратком року, индекса људског капитала са времеским заостатком, стопа морталитета и подршња у образовање за времеским заостатком негативно су утицале на индекс људског развоја (HDI), док су дугорочно стопа уписа у школе и стопа морталитета наставиле имати негативан ефекат. У случају индекса људског капитала по особи, у кратком року значајне варијабле биле су заостали издаци за образовање, здравствена потрошња, страна помоћ и бруто улагање у дугорочну имовину (GCF), при чему су страна помоћ и GCF имали позитиван ефекат, док је здравствена потрошња негативно утицала на овај индекс. Јавна потрошња, посебно у области образовања и здравства, има кључну улогу у развоју људског капитала. Међутим, високе стопе морталитета и ниске стопе уписа у школе и даље представљају значајне препреке, нарочито у дугом року. Осим тога, здравствена потрошња неочекивано негативно утиче на људски капитал по особи, што указује на неефикасности у систему здравствене заштите.*

Кључне речи: *јавна потрошња, развој људског капитала, Нигерија, ARDL*

ЈЕЛ класификација: *H51, I15, I25, O55*

1. INTRODUCTION

Economic growth and development experts, academicians, and researchers widely acknowledge that a nation's human capital development is a cornerstone of prosperity and societal well-being. Investing in human capital is paramount to achieving sustainable economic growth and alleviating poverty. Technological advancements, the driving force behind modern economic progress, are inextricably linked to human capital development. Consequently, economic development experts increasingly recognize human capital development as a fundamental pillar for fostering broad economic growth and societal advancement (Azevedo and Leitão 2021).

According to the World Bank (2023), human capital development consists of the knowledge, skills, and health that people accumulate throughout their lives, enabling them to realize their potential as productive members of society. We can end extreme poverty and create more inclusive societies by developing human capital. Human capital development refers to the process of developing the skills, knowledge, and productivity of people, and has become a key priority for governments around the world. According to a report by the Organization for Economic Cooperation and Development (OECD) published in 2022, investment in human capital is essential for addressing inequality, promoting social mobility, and driving economic growth (OECD 2022).

In recent years, the concept of human capital has evolved to include a broader range of skills and abilities beyond education and health. The World Economic Forum has identified five key capabilities that contribute to human capital development, including cognitive, socio-behavioral, physical and mental health, digital, and job-specific skills (World Economic Forum 2023). By investing in these capabilities, governments and organizations can create a more resilient and adaptable workforce that can thrive in an ever-changing world.

Investment in education produces new skills, knowledge, and incentives that drive economic expansion by making individuals more proficient and generating a more industrious economy. Expenditure on education creates new technology, inventions, and innovations leading to wealth creation and human capital development. Health, on the other hand, mirrors a state of complete well-being that leads to a competent workforce and improved human capital development through the acquisition of skills and knowledge. From the aforementioned, it becomes conspicuously clear that emphasis should be laid on developing human capital since it constitutes the labor force, and a well-formed labor force is an asset not just at the microeconomic level, but also at the macroeconomic level of the nation.

A number of studies have explored the relationship between public expenditure and human capital development. In 2021, the World Bank published a report that highlighted the positive correlation between public spending and human capital outcomes in Latin America and the Caribbean (World Bank 2021). Additionally, the report noted that well-targeted social assistance programs can help improve human capital development, particularly among disadvantaged groups. Similarly, a study by the IMF found that countries with higher levels of public spending on social protection tend to have lower levels of poverty and inequality, which in turn can lead to better human capital outcomes. Thus, it is clear that public expenditure on key sectors such as education, health, and social protection is an important driver of human capital development. The basic philosophy is that an exceptionally educated and healthier labor force is projected to be relatively more industrious. Oluwakemi et al. (2020) asserted that investment in education is pivotal to human capital development because it has social benefits of increasing the number of skilled workers, enhanced occupational mobility, and reduced rate of unemployment in the economy. Also, a report by the World Health Organization (WHO) found that increased spending on public health is associated with improved health outcomes, including lower infant mortality rates, increased life expectancy, and reduced rates of communicable diseases (WHO 2022). Additionally, the report noted that public health spending can generate significant economic returns, as healthier populations are more productive and contribute more to economic growth. This presupposes that to develop human capital, the promotion of education and health services must be a priority.

In Nigeria, human capital development has been a key priority of the government since independence. The Nigerian government has implemented several policies and programs aimed at improving human capital development in the country. For instance, the Universal Basic Education (UBE) program was introduced in 1999 by President Olusegun Obasanjo to provide free and compulsory basic education for all children in Nigeria. Similarly, the National Health Insurance Scheme (NHIS) was established in the same year to provide affordable healthcare for all Nigerians; the Economic Recovery and Growth Plan (ERGP), launched in 2017, outlines strategies for improving human capital through enhanced funding for education and healthcare sectors; the National Social Investment Program (NSIP), which includes initiatives such as the N-Power program, aims to reduce poverty and improve skills among the youth by providing training and employment opportunities (Federal Ministry of Humanitarian Affairs, Disaster Management and Social Development 2020). Similarly, the Home-Grown School Feeding Program seeks to improve educational outcomes and child nutrition by providing free meals to primary school children (Akinyemi, Owopetu, and Agbejule 2021).

Although the Nigerian government has implemented several policies and programs aimed at improving human capital development, the impact of public expenditure on human capital development is still limited. Nigeria has one of the highest rates of poverty, illiteracy, and disease burden in the world. According to the United Nations Development Programme (UNDP) Human Development Index (HDI), Nigeria ranks 163 out of 189 countries (UNDP 2022). The country also has a high rate of unemployment and underemployment, especially among young people. The fiscal policies and engagement of Nigerian government expenditure have over time failed to address the necessary human capital development shortfalls within the economy. Available records show that the Nigerian education sector has consistently received less allocation than advocated by the United Nations Educational Scientific and Cultural Organization (UNESCO). Following UNESCO's recommendation, the standard funding requirement for education for every country is to allocate at least 26 percent of its annual budget to its education sector. Nigeria spends less than nine percent (9%) of its annual budget on education on average. Nigeria's education sector is characterized by consistent strikes by lecturers for non-payment of salaries and other benefits leading to the closure of schools.

According to the latest WHO data in 2023, Nigeria still faces many challenges in the health sector. One of the most significant challenges is the limited availability of health workers. The country has a severe shortage of qualified doctors, nurses, and other health workers, which makes it difficult to provide adequate health care to the population. In addition, the country's health infrastructure is inadequate, with most hospitals lacking basic facilities and equipment. As a result, many Nigerians still have to travel long distances to seek health care, and some still do not have access to basic medical services. Furthermore, the quality of health care is often compromised by a lack of funding and corruption. Corruption and mismanagement of public funds have undermined the effectiveness of public expenditure on human capital development in Nigeria. Corruption has led to the misallocation of resources, with funds being diverted away from the critical areas of education and health. This has led to a shortage of qualified teachers and poor infrastructure, making it difficult for children to access quality education, and an increase in infant and maternal mortality rates and the prevalence of infectious diseases in health.

Given the foregoing, the current study aims to examine the impact of public expenditure on human capital development in Nigeria, focusing specifically on education and health. The study will address the following objectives: to examine the impact of public expenditure on education on human capital development in Nigeria, and to examine the impact of public expenditure on health on human capital development in Nigeria. By investigating these areas, the study will provide a comprehensive understanding of the relationship between public expenditure and human capital development in Nigeria. It will also highlight the challenges and opportunities for improving human capital development through effective public spending. By doing so, the study will contribute to the ongoing efforts to achieve sustainable economic growth and development in Nigeria through the enhancement of human capital development.

2. LITERATURE REVIEW

2.1. Conceptual Review

2.1.1. *Public Expenditure*

Public expenditure generally refers to the money that a government spends on education, healthcare, infrastructure, and other social services (Raineri 2023). It is also often referred to as government spending. Economists have classified public expenditure into two categories: recurrent expenditure and capital expenditure. Recurrent expenditure is the money that governments spend on daily operations, such as salaries for public servants, maintenance of facilities, and other operational costs. Capital expenditure, on the other hand, is money spent on investments such as roads, bridges, hospitals, and other physical infrastructure (UN 2023). This distinction is important, as it helps to understand how public money is being spent and where it is going. It is also helpful in understanding the long-term implications of government spending, as capital expenditure typically leads to improved productivity and economic growth over time.

The importance of education in human capital development has been widely acknowledged in the literature of economic growth. According to the latest research, education can affect growth in many ways, such as improving workforce efficiency, reducing inequality, promoting health, reducing

fertility rates, and creating better conditions for good governance (Dana 2023; Kardia 2023). Education can also increase the knowledge and innovation capacity of an economy (Hanushek and Woessmann 2008), contributing to long-term economic growth. However, It's also important to consider the quality of education when discussing its impact on human capital development. A growing body of research has shown that the quality of education, measured by student achievement scores, has a more significant impact on economic growth than the quantity of education, such as years of schooling (Hanushek 2013; Hanushek 2022). In other words, it's not just about increasing the number of years people spend in school, but also about ensuring that they receive a high-quality education. Education being one of the major components of human capital ought to be given adequate attention.

The World Health Organization (WHO 2023) defines public health expenditure as all expenditure from government budgets, external borrowings and grants, and obligatory health insurance funds. It has been widely acknowledged that major improvements in public health, disease control, and nutrition have led to significant economic growth in the past. Nigeria's health transformation agenda is clearly outlined in the National Economic Empowerment and Development Strategy (NEEDS), developed by the National Planning Commission in 2004. The NEEDS strategy aims to improve the health of Nigerians and reduce poverty to internationally acceptable levels. A key component of this strategy is the National Health Insurance Scheme (NHIS), which was established in 2005 to provide universal access to quality and affordable health care for all Nigerians. However, despite these efforts, the health sector in Nigeria continues to face significant challenges, including inadequate funding, poor infrastructure, and a shortage of qualified health workers (Durojaiye 2022).

According to Aranda (2023), the primary motivation for health expenditure is the desire for improved health status, which is influenced by health investment. The demand for health care is derived from the demand for health itself. Health care spending and improved health outcomes are both means to an end; the end goal is higher productivity and national economic growth. This suggests that there is a strong link between health expenditure and economic growth, and that improving health outcomes should be a key focus of public policy.

2.1.2. *Human Capital Development*

Human capital has long been recognized globally as a fundamental factor accountable for the wealth of nations. Adam Smith, in his seminal work of 1776, emphasized the importance of the acquired and valuable abilities of all residents or members of the public. This concept has been further explored and defined by various empirical researchers, each contributing to a more comprehensive understanding of human capital development.

Romele (2013) characterized human capital as the entirety of knowledge and skills accumulated throughout life via education, training, and work experience, all of which significantly influence labor productivity. The Organisation for Economic Co-operation and Development (OECD) in 2009 expanded this definition, stating that human capital is a combination of factors such as education, experience, training, intellect, energy, work habits, steadfastness, and inventiveness that collectively determine a worker's marginal product value. This definition underscores that human capital encompasses the methods of acquiring and developing citizens with the skills, good health, schooling, and experience necessary for economic growth.

Aluko (2015) further elucidated human capital development as a process aimed at enhancing the skills, knowledge, efficiency, and resourcefulness of citizens through human capital formation. He emphasized that this approach is centered on individuals rather than goods or production, marking it as a citizen-centric strategy of growth. Similarly, Torruam and Abur (2014) described human capital development as the process of increasing the skills, knowledge, productivity, and resourcefulness of citizens, recognizing it as a critical agent of nationwide growth.

Both Aluko and Torruam and Abur highlighted the procedural aspect of human capital formation, which involves acquiring and expanding the number of people equipped with the necessary skills, good health, education, and experience vital for economic and political development. This investment in human beings is viewed as essential for fostering an inventive and productive workforce, contributing to the broader economic and societal prosperity.

Thus, human capital development is a multi-faceted process involving education, health, and training, aiming to cultivate a capable and dynamic populace. This development is not merely an

economic endeavor but a holistic approach to national growth, prioritizing the enhancement of human potential and resourcefulness as the cornerstone of sustainable development.

2.2. Theoretical Review

Human Capital Theory, propounded by economists such as Adam Smith in the 18th century and later advanced by scholars like Gary Becker and Theodore Schultz in the 20th century, posits that investments in human capital—through education, training, and health—enhance the productivity and economic value of individuals. The theory rests on several key assumptions. Firstly, it assumes that individuals and societies derive substantial returns from investing in human capital, which include higher earnings, improved health outcomes, and enhanced societal well-being. Secondly, it presupposes that education and training equip individuals with skills and knowledge that increase their productivity. Lastly, it posits that these investments yield not only private benefits to individuals but also significant public benefits by fostering economic growth and development.

The basic principles of Human Capital Theory emphasize that the skills and knowledge accumulated by individuals are akin to physical capital investments such as machinery and infrastructure. Just as investments in physical capital lead to increased productivity, investments in human capital are expected to yield higher returns in terms of improved economic performance and productivity. Schultz and Becker emphasized that the returns on education and training could be measured in terms of increased earnings and economic output, thereby framing education and health as critical components of economic planning and policy.

Human Capital Theory has been widely applied in various studies to explain differences in economic growth rates across countries. It has provided a framework for understanding how education and training contribute to the economic prosperity of nations by developing a skilled and knowledgeable workforce. Researchers have used the theory to advocate for policies that promote educational access and quality, health improvements, and lifelong learning as essential strategies for economic development. The theory's relevance extends to its role in shaping labor market policies, guiding investments in education, and informing public health interventions.

On the other hand, the Musgrave Theory of Public Expenditure Growth, propounded by Richard A. Musgrave in his work "The Theory of Public Finance" (1959), explores the patterns and determinants of government expenditure. Musgrave's theory is grounded in three core assumptions. Firstly, it assumes that public expenditure is influenced by the need to address market failures and provide public goods that the private sector cannot efficiently supply. Secondly, it posits that as economies grow, the demand for public goods and services such as education, healthcare, and infrastructure also increases. Lastly, it assumes that government intervention is necessary to redistribute income and achieve greater economic equity.

The basic principles of Musgrave's theory are categorized into three functions of public expenditure: allocation, distribution, and stabilization. The allocation function addresses the provision of public goods and services that the market would underprovide. The distribution function involves using public expenditure to achieve a more equitable distribution of income and wealth. The stabilization function focuses on using fiscal policy to stabilize the economy, mitigate business cycles, and maintain full employment and price stability.

Musgrave's theory has been instrumental in explaining the growth of public expenditure in advanced economies, particularly in the context of increasing demands for social welfare programs and public services. It provides a theoretical basis for understanding the expansion of government roles in education, healthcare, social security, and infrastructure development as economies mature and public expectations evolve. Musgrave's theory underscores the importance of fiscal policy in managing economic stability and promoting equitable growth.

The relevance of Musgrave's theory is evident in its application to contemporary fiscal policy analysis and public finance management. It has influenced the design of tax policies, public budgeting processes, and the allocation of resources to various sectors of the economy. By highlighting the necessity of public expenditure in achieving economic and social objectives, Musgrave's theory continues to inform debates on the size and scope of government intervention in the economy.

2.3. Empirical Review

Nabil et al. (2007) examined the dynamic effects of public investment in human capital in the context of Canada's ageing population using a computable overlapping generations (OLG) model. Their objective was to understand the impact of tax-financed increases in public spending on education. The study found that while such increases crowded out other investments in the short run, higher education significantly contributed to human capital accumulation in the long run. Additionally, it was observed that these investments had negative effects on the ageing population, indicating a complex interaction between education spending and demographic changes.

Michael (2017) investigated the effect of human capital investment on economic growth in sub-Saharan Africa, focusing on Nigeria, South Africa, and Ghana from 1980 to 2013. Using various proxy variables for human capital, the study aimed to determine their impact on growth. The analysis revealed that health (GIH) and education (GIE) had a significant positive effect on growth in Nigeria, while the literacy ratio (LR) was insignificantly positive in all three countries. This highlights the differential impact of various aspects of human capital investment on economic growth across different national contexts.

Ngozi and Samuel (2019) explored the relationship between government educational expenditure and human capital development in West African countries. Their objective was to determine how increased government spending on education and health influences school enrollment. The results showed that increased expenditure had a positive and significant impact on both primary and secondary school enrollment. Granger causality tests indicated a bidirectional relationship between government educational expenditure and secondary school enrollment, suggesting a reinforcing cycle between investment in education and human capital development.

Christopher and Utpal (2020) analyzed the impact of government expenditure on human capital and economic growth in Namibia from 1980 to 2015 using a time series analysis. Their objective was to understand the long-term relationship between government spending on education and various educational outcomes. The study found a significant long-run positive relationship between government spending on education and literacy rate, net primary enrollment, and gross tertiary enrollment rates. However, there was no co-integration between government spending and gross enrollment rates at the primary and secondary levels. The vector error correction regression (VCR) analysis revealed that expenditure on healthcare and education significantly impacted GDP in the long run through improved human resources.

Adenuga (2002) focused on government spending on education and health in Nigeria using ECM techniques. The study stressed that the government spending purportedly allocated to education was inadequate or not fully utilized as intended. Similarly, Olaniye and Adam (2002) observed a declining trend in government expenditure on education and health relative to GDP, indicating a reduced commitment to human capital development.

Lawanson (2009) examined the role of education and health on human capital development in Nigeria using ordinary least squares (OLS) techniques. The objective was to identify the conditions necessary for human capital development. The study found that education and health are critical for human capital development, but government expenditure on health and primary education enrollment had negative effects on growth, suggesting inefficiencies in spending.

Dauda (2010) used the endogenous growth model to review the relationship between government spending on education and human capital development. By employing enrollment at different educational levels as proxies, the study aimed to establish a long-term relationship between educational investment and human capital development. The findings indicated a long-run relationship with feedback effects, highlighting the importance of sustained educational investments.

The World Bank (2010) studied the impact of education and health infrastructure on developing economies, using Nigeria as a case study. The objective was to understand the challenges impeding Nigeria's transition to a knowledge-based economy. The study identified poor access to education, high costs, poor quality, inadequate ICT infrastructure, and insufficient governmental funding as major obstacles.

Adamu (2011) analyzed the impact of government spending on education and health in Nigeria from 1980 to 2010 using co-integration and error correction mechanisms. The study found that investment in human capital, particularly in education and training, stimulates economic growth, underscoring the importance of these investments for long-term development.

Kanayo (2013) explored the impact of human capital formation in Nigeria using ECM as an analytical tool. The objective was to assess the significance of investment in education and health on economic growth. The study found that such investments significantly impacted economic growth and recommended restructuring and better equipping educational and health institutions for greater output.

Ehimare et al. (2014) investigated Nigerian government expenditure on human capital development. Utilizing unit root tests and data envelopment analysis, the study aimed to assess the efficiency of government spending. Findings revealed a significant reduction in the efficiency of government expenditure on education and health since 1990, leading to poor quality and outputs. The study recommended improvements in education and healthcare delivery.

Ogbonna et al. (2017) empirically examined the relationship between government human capital spending and human capital development in Nigeria from 1990 to 2015 using ARDL methods. The objective was to determine the impact of government spending on health and education on human capital development. The results showed that government health spending had a positive but largely insignificant impact on human capital development, while education spending did not significantly affect the human development index, indicating the need for better-targeted investments.

3. METHODOLOGY

To analyse the effect of Public expenditure on Human Capital Development in Nigeria, this study adopted the model used in the study of Naraina (2010) assessing the effect of public social expenditure and human capital development on Malaysian. The model is framed in the following form:

$$HCD = f(EXPEDU, EXPHT) \dots\dots\dots (1)$$

Where:
HCD is human capital development;
EXPEDU represent expenditure on education;
EXPHT represent expenditure on health;

The model will be adopted to investigate the relationship between Public expenditure and Human Capital Development in Nigeria. This is important so as to find out the case maybe in Nigeria. Public expenditure was proxied by education and health expenditure while human capital development was proxied by human development index with other controlling variables such as enrollment rate and life expectancy rate. The functional model was written in explicit form, using log linear model as follows:

$$HDI = f(EXPEDU, EXPHT, ENRATE, MORATE, FORAID, GCF) \dots\dots (2)$$

The general ARDL model is:

$$Y = \alpha + \sum \beta_i Y_{i-i} + \sum \delta_i X_{ti-i} + \varphi Y_{t-1} + \sum \theta_i Z_{t-i} + \varepsilon_t$$

Where:
- Y is the dependent variable
- α is the intercept
- βi is the coefficient for the lagged dependent variable
- δi is the coefficient for the lagged independent variable
- φ is the coefficient for the lagged dependent variable
- θi is the coefficient for the lagged exogenous variable

$$logHDI = \beta_1 logEXPEDU + \beta_1 logEXPHT + \beta_1 logENRATE + \beta_1 logMORATE + \beta_1 logFORAID + \beta_1 logGCF + \varepsilon$$

Where:
HDI	= Human Development Index
EXPEDU	= Expenditure on Education
EXPHT	= Expenditure on Health
ENRATE	= Enrollment Rate
MORATE	= Mortality rate
FORAID	= Foreign aid
GCF	= Gross capital formation
ε	= error term

This study employs ARDL approach to estimate long run as well as short run relationship between the dependent and the independent variables. By Distributed Lag (DL) variables, we imply lagged values of observed exogenous predictor variables while Autoregressive (AR) variables are lagged values of observed endogenous response variables. In ARDL approach a dynamic error correction model (ECM) is derived from ARDL that integrates the short-run dynamic with the long-run equilibrium without losing long run information. The data for public expenditure on education and health were sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin, various issues. The HDI values are from the UNDP Human Development Report for various years. All the data were annual time series data from 1990 to 2022 and secondary in nature. The choice of this period is justified by the availability of data during this period.

4. DATA ANALYSIS AND RESULTS

4.1 Pre-Estimation Technique

The pre-estimation technique includes descriptive statistics, correlation analysis, unit root and bound testing and autoregressive distributed lad (ARDL).

Table 4.1: descriptive statistics, correlation analysis, unit root and bound testing and ARDL

	HDI	HCPPI	EXPEDU	EXPHT	ENRATE	MORATE	FORAID	GCF
Mean	0.472	1.636	5.155	4.877	37.133	96.222	20.630	2.159
Median	0.480	1.642	5.032	5.172	35.276	92.400	21.217	2.552
Maximum	0.547	2.065	6.555	7.136	54.883	124.200	23.160	40.389
Minimum	0.390	1.223	3.686	2.722	23.545	65.035	18.839	-23.747
Std. Dev.	0.048	0.260	0.826	1.094	7.881	19.061	1.330	12.251
Skewness	-0.270	0.002	0.082	-0.113	0.259	0.176	0.003	0.325
Kurtosis	2.004	1.723	1.941	2.284	2.401	1.597	1.491	4.935
Jarque-Bera	1.765	2.242	1.580	0.776	0.864	2.878	3.129	5.732
Probability	0.414	0.326	0.454	0.678	0.649	0.237	0.209	0.057
Sum	15.586	53.978	170.115	160.939	1225.393	3175.335	680.801	71.238
Sum Sq. Dev.	0.073	2.161	21.818	38.295	1987.650	11626.26	56.602	4803.124
Observations	33	33	33	33	33	33	33	33
*** $p<0.01$, ** $p<0.05$, * $p<0.1$								

Source: Author's Computation 2024

The descriptive statistics provide insights into the distributional characteristics of various variables. The Human Development Index (HDI) exhibits a mean of approximately 0.472, with a median close to this value at 0.480. The distribution is slightly skewed to the left and slightly platykurtic, but not significantly different from a normal distribution. This suggests a relatively balanced distribution around the mean, indicating a moderate level of human development across the observed entities.

The Human Capital Per Person Index (HCPPI) demonstrates a mean around 1.636, with a median of 1.642. The distribution is approximately symmetrical and slightly platykurtic, indicating a similar level of human capital per person across the entities. The distribution is not significantly different from a normal distribution.

Expenditure on education (EXPEDU) and expenditure on health (EXPHT) both show somewhat dispersed distributions. While EXPEDU exhibits a slight skew to the right and is slightly platykurtic, EXPHT is slightly skewed to the left and slightly leptokurtic. However, both distributions are not significantly different from normal distributions, indicating typical patterns of expenditure in education and health across the observed entities.

The enrollment rate (ENRATE) and mortality rate (MORATE) have dispersed distributions, with ENRATE slightly skewed to the right and slightly leptokurtic, and MORATE showing approximately symmetrical distribution and slightly platykurtic kurtosis. However, both distributions are not significantly different from normal distributions, implying typical patterns in enrollment and mortality rates across the entities.

Foreign aid (FORAID) displays a distribution close to symmetrical, with slight platykurtosis. The distribution is not significantly different from normal, indicating a balanced pattern in foreign aid across the entities.

Gross capital formation (GCF) exhibits a widely dispersed distribution with a skew to the right and leptokurtosis. However, this distribution is significantly different from a normal distribution, suggesting variations in gross capital formation among the observed entities.

Table 4.2:   Correlation Matrix

	HDI	HCPPI	EXPEDU	EXPHT	ENRATE	MORATE	FORAID	GCF
HDI	1							
HCPPI	0.978	1						
EXPEDU	0.777	0.083	1					
EXPHT	0.399	0.419	0.755	1				
ENRATE	0.714	0.279	0.288	0.496	1			
MORATE	-0.097	-0.299	-0.784	-0.351	-0.778	1		
FORAID	0.578	0.184	0.653	0.237	0.695	-0.688	1	
GCF	-0.055	-0.046	0.0004	-0.004	0.018	0.033	0.157	1

Source: Author's Computation 2024

Where HDI is human development index, HCPPI is human capital per person index, EXPEDU is expenditure on education, EXPHT is expenditure on health, ENRATE is enrollment rate, MORATE is mortality rate, FORAID is foreign aid and GCF is gross capital formation

The correlation matrix in Table 4.2 shows the correlation coefficients between the eight variables: human development index (HDI), human capital per person index (HCPPI), expenditure on education (EXPEDU), expenditure on health (EXPHT), enrollment rate (ENRATE), mortality rate (MORATE), foreign aid (FORAID), and gross capital formation (GCF). The correlation coefficient is a measure of the strength and direction of the linear relationship between two variables. A correlation coefficient of 1 indicates a perfect positive correlation, meaning that the two variables are perfectly related in a positive direction. A correlation coefficient of -1 indicates a perfect negative correlation, meaning that the two variables are perfectly related in a negative direction. A correlation coefficient of 0 indicates no correlation, meaning that there is no linear relationship between the two variables. The correlation matrix in Table 4.2 shows that there are strong positive correlations between HDI and HCPPI (0.978), HDI and EXPEDU (0.777), HDI and ENRATE (0.714), and HDI and FORAID (0.578). These correlations indicate that there is a positive relationship between HDI and these other variables. In other words, as HDI increases, HCPPI, EXPEDU, ENRATE, and FORAID also tend to increase.

The correlation matrix also shows that there are strong negative correlations between HDI and MORATE (-0.097) and between MORATE and GCF (0.033). These correlations indicate that there is a negative relationship between these variables. In other words, as HDI increases, MORATE tends to decrease, and as MORATE decreases, GCF tends to increase. The remaining correlations in the matrix are weaker. The correlations between EXPEDU and EXPHT (0.755) and between ENRATE and EXPHT (0.496) are moderately strong. The correlations between EXPEDU and FORAID (0.653), EXPHT and FORAID (0.237), and FORAID and GCF (0.157) are also moderately strong. The remaining correlations are all weak.

Table 4.3:   VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-237.1237	NA	0.001020	15.81443	16.18449	15.93506
1	4.489198	342.9345	1.23e-08	4.355536	7.686087	5.441212
2	129.4786	112.8937*	6.21e-10*	0.420733*	6.711774*	2.471456*

* 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

Source: Author's Computation 2024

Table 4.3 presents the results of various lag order selection criteria for a vector autoregressive (VAR) model. The table shows the lag order, log-likelihood (LogL), sequential modified LR test statistic (LR), final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SC), and Hannan-Quinn information criterion (HQ) for each lag order. The lag order selection criteria are used to determine the appropriate number of lags to include in a VAR model. The goal is to choose a lag order that balances the fit of the model with its parsimony. A model with too many lags may be overfitted, while a model with too few lags may not capture the full dynamics of the

data. The LR test is a statistical test that can be used to determine whether the addition of a lag improves the fit of the model. The FPE, AIC, SC, and HQ are information criteria that can be used to compare the fit of models with different lag orders. In Table 4.3, the lag order that is selected by the majority of the criteria is 2. This means that the model with 2 lags has the best trade-off between fit and parsimony.

Table 4.4:   Unit Root Test

Variable		Augmented Dickey-Fuller (ADF) Test	Phillip Perron (PP) Test
HDI	Level	-0.751[0.819]	-0.807 [0.804]
	First Diff.	-6.215[0.000]***	-6.641[0.000]***
HCPPI	Level	0.191 [0.968]	0.733 [0.991]
	First Diff.	-2.774 [0.074]*	-2.705 [0.085]*
EXPEDU	Level	-1.012 [0.737]	-0.842 [0.793]
	First Diff.	-7.314 [0.000]***	-7.519 [0.000]***
EXPHT	Level	-2.352 [0.163]	-2.352 [0.163]
	First Diff.	-6.077[0.000]***	-6.201[0.000]***
ENRATE	Level	-1.362 [0.588]	-1.362 [0.588]
	First Diff.	-7.167[0.000]***	-7.142[0.000]***
MORATE	Level	1.285[0.998]	0.249[0.972]
	First Diff	-0.61[0.056]*	-0.751[0.019]*
FORAID	Level	-0.887[0.778]	-1.062[0.719]
	First Diff	-5.500[0.000]***	-5.395[0.000]***
GCF	Level	-10.139[0.000]***	-10.766[0.000]***
	First Diff		
*** $p<0.01$, ** $p<0.05$, * $p<0.1$			

Source: Author's Computation 2024

Where HDI is human development index, HCPPI is human capital per person index, EXPEDU is expenditure on education, EXPHT is expenditure on health, ENRATE is enrollment rate, MORATE is mortality rate, FORAID is foreign aid and GCF is gross capital formation

Table 4.4 presents the results of the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests for the eight variables: human development index (HDI), human capital per person index (HCPPI), expenditure on education (EXPEDU), expenditure on health (EXPHT), enrollment rate (ENRATE), mortality rate (MORATE), foreign aid (FORAID), and gross capital formation (GCF). The unit root tests are used to determine whether a variable has a unit root. A variable has a unit root if it is non-stationary, meaning that it does not have a fixed mean and variance over time. If a variable has a unit root, it is not appropriate to include it in a VAR model without taking its first difference. In Table 4.4, the null hypothesis of the unit root tests is that the variable has a unit root. The alternative hypothesis is that the variable is stationary. The tests are conducted at the 5% significance level. The results of the ADF and PP tests are very similar. For all eight variables, the null hypothesis of a unit root is rejected at the 5% significance level for the first difference of the variable. This means that all eight variables are stationary in their first difference.

Table 4.5:Bounds testing for Co-integration Test

	HDI		HCPPI	
	Computed Wald F-statistic: 3.981; K = 6		Computed Wald F-statistic: 49.391; K = 6	
Bounds Level	Lower Bound	Upper Bound	Lower Bound	Upper Bound
10% critical bounds value	1.99	2.94	1.99	2.94
5% critical bounds value	2.27	3.28	2.27	3.28
2.5% critical bounds value	2.55	3.61	2.55	3.61
1% critical bounds value	2.88	3.99	2.88	3.99
*** $p<0.01$, ** $p<0.05$, * $p<0.1$				

Source: Author's Computation 2024

Table 4.5 present the result of bounds testing for co-integration for the two models. Since the unit root test confirmed the combination of order zero and one that I(0) and I(1), the next step is ARDL bounds test for co-integration. The result of the bound testing shows that computed F-Statistics for Wald test of HDI is 3.981 and for HCPPI is 49.391. The values exceed both the upper bounds and lower bounds critical values for all level of significance. Therefore, the statistics test yields evidence of long-run relationship among the variables at 1%, 2.5%, 5% and 10% levels of significance.

4.2 Estimation Technique

4.2.1 Result of Objective One: Public Expenditure on Human Development Index

Table 4.6 presents the results of the ARDL-ECM (Auto-Regressive Distributed Lag - Error Correction Model) analysis concerning the relationship between public expenditure variables and the Human Development Index (HDI).

Table 4.6: Parsimonious Short-Run and Long-Run ARDL-ECM Results

Dependent Variable: HDI		
Bounds Level	**Short-Run**	**Long-Run**
HDI(-1)	-0.456 [0.016]**	
EXPEDU(-1)	0.006 [0.307]	
EXPEDU		0.012 [0.324]
EXPHT	0.003 [0.225]	0.006 [0.244]
ENRATE	-0.001 [0.112]	-0.001 [0.000]***
MORATE	-0.001 [0.095]*	-0.002 [0.001]***
FORAID(-1)	-0.0002 [0.919]	-0.001 [0.917]
GCF	0.00002 [0.853]	0.00005 [0.857]
D(EXPEDU)	-0.002 [0.799]	
D(EXPEDU(-1))	-0.010 [0.018]**	
D(FORAID)	0.003 [0.347]	
C		0.668 [0.003]***
ECT(-1)	-0.019 [0.000]***	
R-Square	0.984	
Adjusted R-Square	0.975	
Durbin-Watson Stat	2.385	
Akaike info criterion (AIC)	-6.838	
Schwarz criterion (SIC)	-6.330	
Serial Correlation Test	1.046 [0.372]	
Normality Test	1.021 [0.600]	
Heteroskedasticity Test	11.614 [0.000]***	
Ramsey RESET Test	0.568 [0.577]	
*** $p<0.01$, ** $p<0.05$, * $p<0.1$		

Source: Author's Computation 2024

Where HDI is human development index, EXPEDU is expenditure on education, EXPHT is expenditure on health, ENRATE is enrollment rate, MORATE is mortality rate, FORAID is foreign aid and GCF is gross capital formation.

The short-run result shows that lagged of human capital index, mortality rate and lagged of expenditure on education are statistically significant in determining human development index in the short-run and they all have a negative significant effect on human development index. The short-run results show that there is a statistically significant negative relationship between HDI(-1) and HDI. This means that a one percentage increase in HDI in the previous period leads to a 0.456% decrease in HDI in the current period. This negative relationship suggests that there may be some short-run adjustment mechanisms that dampen the effect of public expenditure on HDI. The short-run results also show that there is a statistically significant negative relationship between D(EXPEDU(-1)) and HDI. This means that a percentage increase in expenditure on education in the previous period leads to a 0.010% decrease in HDI in the current period. This negative relationship suggests that expenditure on education may have a negative impact on HDI in the short run. The short-run results also show that there is a statistically significant negative relationship between MORATE and HDI. This means that a percentage decrease in mortality rate leads to a 0.001% increase in HDI. This negative relationship suggests that improvements in health may have a positive impact on HDI in the short run. The error-correction term (ECT(-1)) is statistically significant and negative. This means that there is a strong long-run equilibrium relationship between the variables in the model. This implies that any short-run deviations from the long-run equilibrium will be corrected over time.

In the long-run, enrollment rate and mortality rate are statistically significant in determining human development index with a negative effect on human development index. The long-run results also show that there is a statistically significant negative relationship between ENRATE and HDI. This means that a percentage increase in enrollment rate leads to a 0.001% decrease in HDI in the long run. This negative relationship suggests that increases in enrollment rates may have a negative impact on HDI in the long run. Also, the long-run results also show that there is a statistically significant

negative relationship between MORATE and HDI. This means that a percentage decrease in mortality rate leads to a 0.002% increase in HDI in the long run. This negative relationship suggests that improvements in health may have a positive impact on HDI in the long run.

The R-squared (0.984) and Adjusted R-squared (0.975) suggest that the model explains a substantial portion of the variation in HDI. The Durbin-Watson statistic (2.385) indicates no significant autocorrelation and AIC and SIC values (-6.838 and -6.330, respectively) suggest a good fit of the model while the serial correlation test and normality test are not statistically significant, indicating no serial correlation or deviation from normality. Also, the Ramsey RESET test is not statistically significant, indicating no omitted variables in the model.

4.2.2 Result of Objective Two: Public Expenditure on Human Capital per Person Index

Table 4.7 presents the results of the ARDL-ECM (Auto-Regressive Distributed Lag - Error Correction Model) analysis for the relationship between public expenditure variables and the Human Capital per Person Index (HCPPI). The short-run result shows that lagged of expenditure on education, expenditure on health, foreign aid and gross capital formation are statistically significant in determining human capital per person index in the short-run while lagged of expenditure on education, foreign aid and gross capital formation have a positive significant effect on human capital per person index while expenditure on health has a negative significant effect on human capital per person index.

Table 4.7: Parsimonious Short-Run and Long-Run ARDL-ECM Results

Dependent Variable: HCPPI		
Bounds Level	Short-Run	Long-Run
HCPPI(-1)	0.019 [0.507]	
EXPEDU(-1)	0.007 [0.083]*	
EXPEDU		-0.362 [0.565]
EXPHT	-0.003 [0.097]*	0.148 [0.504]
ENRATE	-0.0002 [0.188]	0.0131 [0.607]
MORATE	-0.0004 [0.299]	-0.022 [0.147]
FORAID	0.002 [0.065]*	-0.086 [0.504]
GCF	0.00008 [0.071]*	0.004 [0.504]
D(EXPEDU)	0.003 [0.304]	
D(EXPHT)	-0.0002 [0.821]	
D(EXPHT(-1))	0.001 [0.179]	
D(ENRATE)	0.00002 [0.855]	
D(MORATE)	0.001 [0.504]	
D(MORATE(-1))	-0.005 [0.005]***	
C		0.668 [0.003]***
ECT(-1)	-0.019 [0.000]***	
R-Square	0.999	
Adjusted R-Square	0.999	
Durbin-Watson Stat	2.550	
Akaike info criterion (AIC)	-8.929	
Schwarz criterion (SIC)	-8.281	
Serial Correlation Test	0.724 [0.501]	
Normality Test	10.520 [0.005]***	
Heteroskedasticity Test	0.985 [0.502]	
Ramsey RESET Test	0.196 [0.824]	
*** $p<0.01$, ** $p<0.05$, * $p<0.1$		

Source: Author's Computation 2024

Where HCPPI is human capital per person index, EXPEDU is expenditure on education, EXPHT is expenditure on health, ENRATE is enrollment rate, MORATE is mortality rate, FORAID is foreign aid and GCF is gross capital formation

The coefficient of EXPEDU(-1) is 0.007 (p-value: 0.083) for lagged expenditure on education. The lagged variable shows a positive and marginally significant association indicating that a percentage increase in EXPEDU(-1) will lead to 0.007% increase in HCPPI. The coefficient of EXPHT is -0.003 (p-value: 0.097), indicating a negative and marginally significant short-run relationship between health expenditure and the current HCPPI. A percentage increase in EXPHT will bring about 0.003% decrease in HCPPI. Foreign Aid (FORAID) and Gross Capital Formation (GCF) exhibit a positive significant short-run effects on HCPPI. FORAID has a positive but marginally significant association (0.002, p-value: 0.065), while GCF shows a positive and marginally significant effect (0.00008, p-value: 0.071). A percentage increase in FORAID will bring about 0.002% increase

in HCPPI and a percentage increase in GCF will bring about 0.00008% increase in HCPPI. The error-correction term (ECT(-1)) is statistically significant and negative. This means that there is a strong long-run equilibrium relationship between the variables in the model. This implies that any short-run deviations from the long-run equilibrium will be corrected over time.

The R-squared (0.999) and Adjusted R-squared (0.999) suggest an excellent fit of the model, explaining almost all the variation in HCPPI. The Durbin-Watson statistic (2.550) indicates no significant autocorrelation. AIC and SIC values (-8.929 and -8.281, respectively) suggest a good fit of the model. The serial correlation test, heteroskedasticity test, and Ramsey RESET Test are not statistically significant, indicating no issues with serial correlation, heteroskedasticity, or omitted variables.

5. CONCLUSION AND RECOMMENDATIONS

The study examined the impact of public expenditure on human capital development in Nigeria from 1990 to 2022. The variables of interest in the study are human development index, human capital per person index, expenditure on education, expenditure on health, enrollment rate, mortality rate, foreign aid and gross capital formation which were sourced from Central Bank of Nigeria and UNDP Human Development Report for various years. The techniques used for the study is auto-regressive distributed lag (ARDL). Two variables were used to proxy human capital developments which are human development index, human capital per person index and based on this, two models were specified since human capital development is the dependent variable.

The result from human development index revealed that lagged of human capital index, mortality rate and lagged of expenditure on education are statistically significant in determining human development index in the short-run and they all have a negative significant effect on human development index while enrollment rate and mortality rate are statistically significant in determining human development index with a negative effect on human development index in the long-run. Also, the result on human capital per person index revealed that lagged of expenditure on education, expenditure on health, foreign aid and gross capital formation are statistically significant in determining human capital per person index in the short-run while lagged of expenditure on education, foreign aid and gross capital formation have a positive significant effect on human capital per person index while expenditure on health has a negative significant effect on human capital per person index.

From the outcomes of this study, the followings policy recommendations are given.

- Investment in Education and Health: Increase public expenditure on education and health to enhance human capital development. Policies should focus on improving the quality of education and healthcare services to positively impact the human development index and human capital per person index.
- Mortality Rate Reduction: Implement measures to reduce mortality rates, as this has been identified as a significant factor negatively affecting human development. Healthcare interventions and public health campaigns can contribute to achieving this goal.
- Long-Term Planning: Develop long-term strategies for sustained investment in education and health to ensure a positive impact on human capital development over time. Consistency in policies and budget allocations is crucial for achieving meaningful results.
- Foreign Aid Allocation: Optimize the utilization of foreign aid by directing it towards initiatives that directly contribute to human capital development. Ensure effective monitoring and evaluation mechanisms to assess the impact of foreign aid on education and health outcomes.
- Enrollment Rate Improvement: Implement policies to improve enrollment rates in education, particularly in the long run. Strategies may include addressing barriers to access, promoting awareness, and enhancing the overall quality of education to encourage higher enrollment.

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