



THE EFFECT OF BRAIN DRAIN ON ECONOMIC DEVELOPMENT: AN EMPIRICAL ANALYSIS

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Abstract

This study examines the impact of brain drain on economic development using secondary data from 1981 to 2023, sourced from the World Development Indicators (WDI), the Central Bank of Nigeria (CBN) and United Nations- World Population Prospects. An Autoregressive Distributed Lag (ARDL) estimation technique was employed following diagnostic tests, which confirmed that four variables were stationary at first difference while one was stationary at levels. The empirical findings indicate that brain drain (BD) exhibited varying effects on HDI in both the short-run and long-run periods. However, Brain Drain contribution to economic development was minimal or negligible. Remittances were positive and significant in the long run meaning that it contributed to economic development in the long run. Similarly, unemployment (UNEM) deviated from a priori expectations in both the short-run and long-run periods, except at the first and third-period lags. Government expenditure on human capital exhibited fluctuating effects over time but became significant in the long run, highlighting its potential role in mitigating the negative consequences of brain drain. Based on these findings, the study recommends that government should increase investment in human capital development to counteract the adverse effects of brain drain. The logic from the work is that the negative effect of Brain Drain is offset by the positive effect of remittances that the migrated labour force sends back to the country; indicating that Brain Drain through a pass-through (remittances) contributes positively to economic development of Nigeria. Thus, government needs to intensify Human Capital Development to raise more labour force for the market.

Keywords:

Economic Development, Government Expenditure on Human Capital, Brain Drain, Remittances, And Unemployment.

1.0 INTRODUCTION:

Nations today increasingly rely on knowledge, ideas, and skills to address their developmental challenges. The contributions of creative and skilled individuals through their inventions, innovations, and discoveries often surpass the labour output of thousands of unskilled workers. Conversely, the absence of, and or, inadequacy of requisite human capital significantly hinders a nation's socio-economic and technological advancement, as it impairs the capacity to develop intellectual resources, manage institutions, and provide essential services to citizens.

Human resources constitute the ultimate basis of production activities. While capital and natural resources are passive factors of production, human beings actively accumulate knowledge, exploit natural resources, establish social, economic, and political institutions, and drive

societal progress. Human resources, often synonymous with manpower, represent a nation's most critical and valuable asset. As Kinard (1988) emphasizes, they are more important than physical and financial resources. Without a well-developed human capital base equipped with the necessary skills, physical capital such as machinery and advanced technologies cannot effectively generate rapid economic growth and development.

Migration has long been a characteristic of human populations, involving mobility between distinct geographic regions that result in permanent changes in residence. Migration can be either internal, occurring within a country's borders, or international, crossing national boundaries. Internally, skilled labour often moves from rural to urban centers in search of better professional growth and remuneration opportunities. In recent decades, developing countries have increasingly experienced a phenomenon known as "brain drain," where highly skilled labour migrates to developed countries in pursuit of better living conditions, professional advancement, political stability, and security. The scarcity of skilled labour in developing countries, coupled with the outflow of a significant proportion of this workforce, results in what is referred to as human capital flight.

The effects of brain drain on source countries remain a pressing concern, particularly for developing nations, as they face a substantial loss of critical human capital. Traditional literature (Bhagwati & Hamada, 1974; Bhagwati & Rodriguez, 1975) has primarily emphasized the negative consequences for countries left behind. Given that skilled labour is an extremely scarce resource in developing countries, its migration deprives these nations of the very workforce necessary for fostering economic growth and closing the development gap with more advanced economies. Some scholars, including, Shabnum, Iqbal, and Khan (2021), have noted that brain drain represents a form of migration from the Global South to the Global North, where most developed nations are located. Recognizing the adverse effects of this phenomenon, Bhagwati (1979) proposed a tax on migrating skilled workers as a potential remedial measure. This migration pattern gained more attention in the 1990s, coinciding with globalization, as scholars such as Stark and Wang (2002) began to explore the potential benefits of migration. Some studies suggest that diasporic communities can contribute to home-country development through remittances and knowledge transfer (Borjas et al., 1996).

In the case of Nigeria, brain drain remains a persistent issue, leading to a continuous loss of educated and skilled professionals. This trend results in negative externalities, as the departure of highly skilled individuals limits the country's capacity for economic growth. The factors driving brain drain in Nigeria include limited resources, inadequate scientific and technological infrastructure, low wages, undervaluation of skilled individuals, political instability, and corruption (Nnoruga & Osigwe, 2023). The economic devastation caused by terrorism further exacerbates insecurity, discouraging both domestic and foreign investment. The consequent lack of opportunities has compelled many Nigerians, both skilled and unskilled, to seek better prospects abroad, thereby contributing to economic underdevelopment.

The impact of brain drain in Nigeria is reflected in slow economic growth, high unemployment rates, income inequality, and increasing pressures on urban environments (Akinyemi et al 2017). Poor governance, unreliable electricity, inadequate infrastructure, a deteriorating education system, and limited access to quality healthcare further drive skilled workers to seek employment abroad (Nyberg Sørensen, Van Hear, & Engberg-Pedersen, 2003). In many Nigerian regions, universities struggle with declining quality, and no Nigerian university ranks among the top one thousand globally. Frustration with these conditions compels many

professionals to emigrate, hoping for better opportunities overseas. Additionally, nepotism poses a significant barrier to economic progress, as employment is often based on familial or ethnic connections rather than merit.

Recent statistics illustrate the growing scale of Nigerian emigration. The World Health Organisation (2019) report, indicated that approximately 2.1 million immigrants from Sub-Saharan Africa resided in the United States, with 53% originating from Nigeria, Ethiopia, Ghana, Kenya, or Somalia. Work visa data ending in September 2023 shows that over 78,000 visas were granted to Nigerians. Similarly, the United Kingdom has witnessed a surge in Nigerian student visa applications, with Nigeria leading Africa in UK study visas, reaching 111,577 out of a global total of 639,087. These students often contribute to brain drain as many settle and work in their host countries.

Nigeria's healthcare sector has been significantly impacted by the emigration of medical professionals, leading to critical shortages in personnel. The doctor-to-patient ratio in Nigeria is approximately one doctor per 5,000 patients, which is substantially higher than the ratio of one doctor per 254 patients observed in developed countries. Between 2016 and 2018, over 9,000 Nigerian medical doctors migrated to the United Kingdom, the United States, and Canada. Additionally, since 2017, more than 75,000 nurses and midwives have left Nigeria in search of better opportunities abroad. These trends have exacerbated the challenges faced by Nigeria's healthcare system (The World Health Organization, 2019).

Against this backdrop, this study seeks to analyze the impact of brain drain on Nigeria's economic development. Specifically, it aims to examine the relationship between brain drain and human capital development and investigate its effect on unemployment. The study explores how skilled migration influences economic growth, productivity, and innovation while assessing whether the departure of highly skilled professionals stimulates employment opportunities through job vacancies or exacerbates unemployment by reducing expertise and investment in key sectors. Through this inquiry, the study provides evidence-based understanding of the economic implications of brain drain, offering insights for policymakers to mitigate its adverse effects and harness potential benefits.

2.0 LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Economic Development

Economic development is a concept with various definitions reflecting its complexity. Development experts view economic development as a process of growth accompanied by structural transformation, technological innovation, human capital development, and improvements in the standard of living of the population (Onwioduokit, 2017).

Alternatively, economic development can be understood as a process that entails broad improvements across various aspects of societal life, manifesting in desirable changes in key economic components (Ettah, 2024). Importantly, economic development extends beyond economic growth, as it encompasses qualitative transformations in economic structures, incentives, institutions, productivity, and knowledge (Jhingan, 2007). Growth alone does not necessarily imply development, particularly when poverty, unemployment, and inequality persist in the absence of structural and technological advancements.

Economic development is thus characterized as a growth process intertwined with structural transformation, improvements in living standards, technological progress, and human capital enhancement, all of which contribute to increased productivity. For the purpose of this study, economic development is proxied by the Human Development Index (HDI), which captures critical dimensions such as life expectancy, education, and income levels.

2.1.2 Brain Drain

Brain drain refers to the emigration of highly skilled and educated individuals from developing nations to more developed countries, resulting in a depletion of talent in the source country. This phenomenon, often described as "the flight of human capital" (Nechad, 2018), poses significant challenges for developing economies by creating a shortage of skilled labour, thereby hindering their ability to meet essential development needs.

Brain drain is typically driven by factors such as economic instability, political uncertainty, limited career advancement opportunities, substandard working conditions, and the allure of higher wages and better living standards in developed nations. This large-scale emigration can be classified into three categories: organizational, industrial, and geographical brain drain (Shaikh, 2018; Akinola et al., 2024). Organizational brain drain occurs when professionals leave one organization for another due to unfavorable conditions. Industrial brain drain involves the migration of workers from one industry to another that offers better compensation or working conditions. Geographical brain drain, which is the focus of this study, involves the movement of professionals from one country to another in pursuit of improved job prospects, security, and quality of life.

Dodani and LaPorte further define brain drain as the migration of skilled professionals seeking better standards of living, career growth, access to advanced technology, and political stability. While brain drain is a global phenomenon, its impact is particularly detrimental to developing economies, where the loss of skilled professionals undermines economic growth and development efforts. The migration of skilled workers from their home countries to foreign labour markets in search of better opportunities continues to shape the global economic landscape, influencing both the sending and receiving nations.

2.2 Theoretical Framework for Studying Brain Drain and Economic Development in Nigeria

Brain drain, the large-scale emigration of skilled professionals from developing nations to developed economies, has significant economic implications for countries like Nigeria. Various theories provide insight into the causes, consequences, and possible mitigations of brain drain in the context of economic development. The five key theories applicable to this study are discussed below.

2.2.1 Human Capital Theory

The Human Capital Theory (Becker, 1964) posits that individuals invest in education and skills to enhance their productivity, leading to economic growth. Countries that develop and retain their human capital benefit from increased productivity and innovation. However, when highly skilled individuals migrate in search of better economic opportunities, the source country loses valuable human resources, reducing its growth potential (Schultz, 1961).

Nigeria faces a significant loss of skilled professionals, particularly in the health and education sectors, due to better remuneration and working conditions abroad. The migration of doctors, engineers, and academics depletes the country's human capital, undermining efforts toward economic development (Omonigho, 2021). Since economic growth is linked to human capital accumulation, brain drain weakens Nigeria's competitiveness and reduces the quality of public services, further exacerbating underdevelopment.

2.2.2 Push-Pull Theory

The push-pull theory, first introduced by Ravenstein (1889) and later refined by Lee (1966), seeks to explain the motivations behind migration. Ravenstein's laws of migration emphasized economic and demographic factors as key drivers of migration, while Lee expanded on this by categorizing migration factors into four key areas: (a) factors associated with the area of origin, (b) factors associated with the area of destination, (c) intervening obstacles, and (d) personal factors. This framework effectively explains the migration of highly skilled individuals from Nigeria.

According to Yanai et al. (2020), highly skilled individuals are pushed from their country of origin due to negative conditions and are pulled by the benefits offered by destination countries. In Nigeria, push factors include high levels of corruption, poor governance, inadequate infrastructure, and low wages, all of which drive professionals to seek better opportunities abroad.

Conversely, pull factors include higher wages, better working conditions, and stronger governance structures in developed countries. Many skilled Nigerian professionals, especially in healthcare and academia, are drawn to labor markets in developed economies where their expertise is better valued and rewarded.

Intervening obstacles, as described by Klaus and Pachocka (2019), include physical, financial, technical, and legal barriers. While physical barriers may not be significant for Nigerian emigrants, financial costs, licensing requirements, and restrictive immigration policies in countries like the United Kingdom and the United States present significant challenges. Many Nigerian healthcare professionals must invest considerable resources to meet licensing requirements before practicing in their destination countries.

Personal factors also play a crucial role in migration decisions. Unlike systemic push and pull factors, personal factors are within the control of the migrant. For instance, healthcare professionals often leave Nigeria with aspirations of better living standards for themselves and their families. These personal aspirations, combined with economic and institutional push and pull factors, significantly influence migration patterns from Nigeria to developed economies.

2.2.3 New Growth Theory (Endogenous Growth Theory)

The New Growth Theory (Romer, 1990) argues that economic growth is driven by technological progress and knowledge accumulation rather than just capital investment. Unlike traditional growth models, it emphasizes the role of human capital and innovation in long-term development. Countries that retain and develop their skilled workforce experience continuous economic growth through research, entrepreneurship, and industrial innovation.

Brain drains in Nigeria results in the loss of knowledge creators, thereby limiting the country's capacity for innovation and industrial advancement (Akinyemi et al., 2017). For instance, the departure of university lecturers and researchers hampers technological development, slowing economic progress. Moreover, since knowledge spillovers are crucial for sustained growth, the migration of skilled workers negatively affects domestic industries, limiting their ability to compete globally.

2.2.4 Migration Theory (Neoclassical and Dual Labour Market Theories)

The Neoclassical Migration Theory (Harris & Todaro, 1970) suggests that migration is driven by wage differentials between countries. Skilled individuals migrate from lower-wage developing economies to higher-wage developed economies. The Dual Labour Market Theory (Piore, 1979) expands on this by arguing that developed economies create a structural demand for foreign skilled labour, leading to a continuous outflow of talent from less developed nations.

Nigeria's professionals migrate primarily due to wage disparities, poor working conditions, and limited career advancement opportunities (Adepoju, 2020). For example, Nigerian doctors and IT specialists move to the UK, Canada, and the USA for better salaries and career prospects, reflecting the predictions of neoclassical migration theory. Similarly, the demand for highly skilled workers in developed countries perpetuates the loss of Nigeria's top talent, as described in the dual labour market theory.

2.2.5 Diaspora and Network Theory

The Diaspora and Network Theory (Kuznetsov, 2006) suggests that emigrants can contribute to their home countries through remittances, knowledge transfer, and investment, mitigating the negative effects of brain drain. Skilled migrants establish networks that facilitate trade, investment, and skill transfer, fostering economic development in their countries of origin.

Despite the challenges of brain drain, Nigeria's diaspora plays a critical role in economic development. Nigerian professionals abroad contribute significantly to remittances, with the World Bank (2022) reporting that diaspora remittances to Nigeria reached \$21 billion. These funds support families, businesses, and infrastructure development. Additionally, initiatives such as the Nigerian in Diaspora Commission (NIDCOM) facilitate skill transfer and investment, highlighting the potential benefits of migration when managed effectively (Okonjo, 2022).

The theories discussed provide different perspectives on the impact of brain drain on economic development in Nigeria. Human Capital Theory and New Growth Theory emphasize the loss of skilled labour and its negative effects on innovation and productivity. Push-Pull Theory and Migration Theory explains why Nigerian professionals migrate. On the other hand, Diaspora and Network Theory suggests that migration can have positive effects if properly harnessed through remittances and knowledge transfer.

By integrating these theories, this study seeks to empirically provide evidence-based input for policymakers to develop strategies to mitigate the adverse effects of brain drain while leveraging the potential benefits of diaspora engagement in national development

2.3 EMPIRICAL STUDIES/ EVIDENCE:

Brain Drain and Its Economic, Educational, and Social Implications

The phenomenon of brain drain, often referred to as the "Japa Syndrome" in Nigeria, has been a subject of intense debate over the past two decades. While numerous studies have examined its negative economic effects, ongoing discussions explore its broader impact on education, human capital development, living standards, and economic growth.

Akazeze (2024) investigated strategies for reducing brain drain to sustain the quality of higher education in Nigeria, emphasizing the role of administrative strategies in mitigating its effects. Using an open coding method for analysis, the study identified key solutions, including improvements in recruitment processes, competitive compensation, and international partnerships. Additionally, the study proposed a framework addressing brain drain through administrative reforms, institutional enhancements, leadership development, and effective retention strategies.

Similarly, Akinola and Adekile (2024) examined the relationship between brain drain, unemployment, and economic growth in Nigeria using the Ordinary Least Squares (OLS) technique. Their findings highlighted poor remuneration as the primary driver of brain drain in Nigeria and concluded that both brain drain and unemployment significantly hinder economic growth.

Expanding on the discourse, Yeşil (2024) investigated university students' attitudes toward brain drain in Turkey, analyzing the role of perceived relative deprivation and social support. The study, which surveyed 378 students from Middle East Technical University, applied correlation, regression, and moderation analysis to explore the relationship between systemic challenges—such as favoritism and integrity issues—and students' migration intentions. The study concluded that economic disparities, coupled with social and political factors, significantly influence migration decisions, emphasizing the need for youth-driven proactive solutions.

In Ghana, Adjei-Mensah (2023) explored the factors driving brain drain among health workers using a survey design with a stratified sample of 400 respondents from an accessible population of 15,510 health professionals. The study found that inadequate government action, particularly regarding remuneration, staff development opportunities, and equipment replacement policies, exacerbated migration trends. The study recommended addressing both motivation and hygiene factors, as well as economic push-and-pull drivers, to mitigate further workforce depletion.

Osigbesan (2021) focused on medical brain drain in Nigeria, highlighting a severe healthcare sector crisis due to skilled migration. Using a heuristic phenomenological method, the study examined the lived experiences of 12 Nigerian healthcare practitioners who migrated to the United States. Grounded in the push-pull theory, the findings underscored systemic challenges in Nigeria's healthcare system as key drivers of migration.

Similarly, Shabnum et al. (2021) conducted a comparative study on brain drain determinants, introducing religious and environmental factors alongside economic, social, and political drivers. Using Probit models and survey data from both rural and urban areas of Peshawar, the study found that religious and environmental concerns significantly influence human capital outflows, in addition to traditional migration drivers.

Anetoh and Onwudinjo (2020) emphasized the alarming rate at which highly skilled workers are leaving Nigeria, creating gaps in critical sectors such as oil and gas and, most prominently, healthcare. Atte (2020) further contextualized this crisis within a global framework, referencing a 2016 World Health Organization (WHO) report that identified a global shortage of 4.3 million healthcare workers, with Sub-Saharan Africa being the most affected region due to its disproportionately low health workforce relative to disease burden.

On a broader African scale, Adesote and Osunkoya (2018) examined the impact of skilled labor migration on the continent's development from the 1990s to the 2000s. They reported that Africa has consistently lost highly skilled professionals to developed countries over the past 30 years, exacerbating human capital deficits.

Beyond Africa, Melbourne (2016) explored the role of organizational support in mitigating skilled labor migration in the English-speaking Caribbean. Through a systematic review of 56 studies, the research highlighted inadequate organizational support as a key contributor to brain drain. While financial constraints limit retention strategies, the study recommended non-financial interventions such as public-private collaboration and mentorship programmes to counteract the effects of migration.

Okoro (2014) provided a nuanced perspective on migration trends, specifically analyzing the international migration of Igbo women from southeastern Nigeria to the United States. Using historical-descriptive and quantitative methods, the study examined data from 1995 to 2012 and found that, rather than constituting a complete loss, many Igbo women abroad actively contribute to their home communities through financial support and development initiatives. Consequently, the study classified this trend as "brain circulation" rather than brain drain.

Earlier studies also shed light on key drivers of brain drain. Ojo et al. (2011) linked escalating migration trends in Nigeria to poor leadership, using chi-square and ranking methods to analyze their data. Their findings revealed a strong relationship between governance failures and the increasing desire among students to emigrate after graduation. They recommended improved leadership, enhanced salary structures, and better working conditions as essential measures to curb skilled migration.

From a theoretical perspective, Schaeffer (2005) examined the intersection of human capital, migration strategies, and brain drain, emphasizing the role of early-life human capital investments in shaping migration patterns. Similarly, Nwachukwu (1997) investigated brain drain trends in Ghana, Kenya, and Nigeria from 1973 to 1993 using OLS regression analysis. His findings confirmed that skilled migration led to reductions in national income across the sampled countries.

The existing body of literature underscores the complex and multifaceted nature of brain drain. While economic factors—such as poor remuneration and inadequate government support—remain primary drivers, emerging research highlights additional social, political, religious, and environmental influences. The debate surrounding brain drain extends beyond its economic impact, touching on critical issues in education, human capital development, healthcare, and governance. Addressing these challenges requires a combination of institutional reforms, policy interventions, and proactive strategies to retain skilled professionals while leveraging diaspora networks for national development.

2.4 Summary of Literature and Research Gap

Most of the studies reviewed employed survey methods, descriptive analysis, and the Ordinary Least Squares (OLS) estimation technique for their empirical investigations. However, this study adopts the Autoregressive Distributed Lag (ARDL) approach to analyze the impact of brain drain on economic development in Nigeria. The choice of the ARDL technique is justified by its suitability for examining both short-run and long-run relationships between variables, particularly in the presence of variables integrated at different orders (I(0) and I(1)). This methodological distinction enhances the robustness of the findings and provides a more comprehensive understanding of the dynamic interactions between brain drain and economic development.

3.0 Research Methodology

This study adopts an *ex post facto* (after-the-fact) research design. This design was chosen because the researcher has no control over the independent variables, and inferences about the relationships among variables are drawn without any direct manipulation or current interaction between the dependent (regressand) and independent (regressor) variables (Ndiyo, 2005).

The study relies on secondary data sources, primarily time series data obtained from various publications of the Central Bank of Nigeria (CBN), including the Statistical Bulletin and Annual Reports and Statements of Accounts. Additional data were sourced from the National Bureau of Statistics (NBS) and the World Development Indicators (WDI). The model was estimated using macroeconomic indicators such as the Human Development Index (HDI), Government Expenditure on Human Capital (GOVEXHC), Brain Drain (BD), Remittances (REM), and Unemployment (UNEM) for the period 1981–2023.

A multiple regression analysis was conducted, incorporating various diagnostic tests, including the Augmented Dickey-Fuller (ADF) unit root test, to assess the stationarity of the variables. The Autoregressive Distributed Lag (ARDL) technique was employed to determine the relationship between brain drain and economic development within the specified timeframe.

3.1 Model Specification:

The model for this study is anchored on Migration Theory (Neoclassical and Dual Labour Market Theories): The Neoclassical Migration Theory (Harris & Todaro, 1970) opined that migration is driven by wage differentials between countries. Skilled individuals migrate from lower-wage developing economies to higher-wage developed economies. The Dual Labour Market Theory (Piore, 1979) expands on this by arguing that developed economies create a structural demand for foreign skilled labour, leading to a continuous outflow of talent from less developed nations.

3.1.1 Brain Drain and Economic development equation:

The functional form of the model for brain drain and economic development is specified as:

$$\text{HDI} = f(\text{GOVEXHC}, \text{BD}, \text{REM}, \text{UNEM}) \dots\dots\dots(1)$$

The econometric form of the model is specified as:

$$HDI_t = a_0 + a_1GOVEXHC_t + a_2BD_t + a_3REM_t + a_4UNEM_t + u_t \dots \dots \dots (2)$$

Linearizing equation 2, we have:

$$\log HDI_t = \log a_0 + a_1 \log GOVEXHC_t + a_2 \log BD_t + a_3 \log REM_t + a_4 \log UNEM_t + u_t$$

where:

HDI_t – Human development index in time t

$GOVEXHC_t$ – Government Expenditure on Human Capital in time t

BD_t —Brain Drain in time t

REM_t – Remittances in time t

$UNEM_t$ – Unemployment Rate in time

U_t – Error term

a priori expectation shows that $a_1(+)$, $a_2(-)$, $a_3(+)$, and $a_4(-)$.

Table 1: Data Description and Sources

S/N	Variables	Description of Data	Expected Source
1	HDI	Human development index is the index of health, life expectancy and education a nation holds. It is proxy for economic development and it is used as dependent variable in the model.	World Bank Indicator (2023)
2	GOVEXHC	Government Expenditure on Human Capital is government expenditure on Education and Health. It serves as independent variable in the model.	World Bank Indicator (2023)
3	BD	Brain Drain was measured using Net Migration as a proxy. Net Migration is the difference between the number of people moving into a country and the number of people moving out of the country over a specific period. It serves as an explanatory variable for the model. It is expressed as percentage rate of working population.	World Bank Indicator (2023)
4	REM	Remittances are payment or transfer of money from an individual or organization in one country to another individual or organization in another country, often to support family members, friends, or business operations. Remittances are an essential aspect of global financial flows, facilitating international money transfers and supporting	World Bank Indicator (2023)

		economic development worldwide. It serves as an explanatory variable for the model.	
5	UNEM	Unemployment rate is the rate that expresses the total number of the population in the labour markets who are willing and able to work at the prevailing wage rate but could not be employed. It serves as an explanatory variable for the model.	World Bank Indicator (2023)

Source: Compiled by the researchers

4.0 DATA ANALYSIS AND DISCUSSION OF FINDINGS

4.1 Descriptive statistics and matrix of correlations

Table 2: Descriptive Statistics

	HDI	GOVEXHC	BD	REM	UNEM
Mean	0.443488	167.9337	-0.381372	2.709303	12.09535
Median	0.430000	64.78000	-0.295000	2.004099	10.60000
Maximum	0.550000	646.7500	-0.075000	8.333830	32.50000
Minimum	0.380000	0.160000	-1.725000	0.004883	1.900000
Std. Dev.	0.049994	209.6469	0.331553	2.466280	8.393080
Skewness	0.347142	1.044164	-2.664083	0.402518	0.674012
Kurtosis	1.692959	2.680576	9.797530	1.879207	2.411323
Jarque-Bera	3.924441	7.996471	133.6508	3.411797	3.876644
Probability	0.140546	0.018348	0.000000	0.181609	0.143945
Sum	19.07000	7221.150	-16.39900	116.5000	520.1000
Sum Sq. Dev.	0.104977	1845976.	4.616956	255.4666	2958.639
Observations	43	43	43	43	43

Source: Researcher's Computation (2025), using E- Views 9.

Descriptive Statistics of the Variables

The descriptive statistics of the key variables under consideration are presented in Table 2. These statistics provide an empirical overview of Nigeria's economic indicators during the review period. The data indicate a relatively high level of Government Expenditure on Human Capital (GOVEXHC) and Unemployment (UNEM), as evidenced by their respective summary statistics. Specifically, Government Expenditure on Human Capital exhibits a mean of 167.9337, a median of 64.7800, and a maximum value of 646.7500. Similarly, the Unemployment (UNEM) variable records a mean of 12.09535, a median of 10.6000, and a maximum of 32.5000, reflecting substantial fluctuations in employment levels across the period analyzed.

Conversely, variables such as Brain Drain (BD), Human Development Index (HDI), and Remittances (REM) exhibit relatively lower contributions to economic development. This is reflected in the summary statistics, where Brain Drain (BD) records a mean of -0.381372, a median of -0.295000, and a maximum of -0.075000. The Human Development Index (HDI)

shows a mean value of 0.443488, a median of 0.430000, and a maximum of 0.550000. Similarly, Remittances (REM) register a mean of 2.709303, a median of 2.004099, and a maximum of 8.333830, suggesting limited inflows of remittances relative to other economic aggregates.

Skewness and Kurtosis Analysis

An examination of the skewness coefficients reveals that four of the variables exhibit negative skewness, implying left-tailed distributions. The kurtosis values further indicate that Brain Drain (BD) is leptokurtic (kurtosis > 3), signifying a distribution with higher peaks relative to a normal distribution. In contrast, Government Expenditure on Human Capital (GOVEXHC), Unemployment (UNEM), Remittances (REM), and the Human Development Index (HDI) are platykurtic (kurtosis < 3), which suggests a flatter distribution with lower peak intensity. These statistical properties have significant implications for the underlying distributional characteristics of the dataset.

Normality and Variability Analysis

The results of the Jarque-Bera test confirm that all variables adhere to the assumption of normality over the analyzed period, ensuring the robustness of subsequent econometric modelling. Furthermore, an assessment of standard deviation values underscores the extent of variability within the dataset. Most variables exhibit substantial deviations from their mean values, reflecting inherent volatility in Nigeria's economic environment. However, exceptions are observed in the case of the Human Development Index (HDI) and Brain Drain (BD), which demonstrate relatively smaller standard deviations of 0.049994 and 0.331553, respectively. These findings highlight the stability of HDI and BD relative to other macroeconomic indicators, reinforcing their relatively low levels of variation over time.

Table 3: Correlation Matrix

	HDI	GOVEXHC	BD	REM	UNEM
HDI	1				
GOVEXHC	0.28	1			
BD	0.30	-0.01	1		
REM	-0.05	-0.10	-0.06	1	
UNEM	0.06	0.17	-0.13	0.38	1

Source: Researcher's Computation (2025)

Correlation Matrix

The correlation matrix of the variables is presented in Table 3. A correlation matrix is a statistical tool used to measure the relationships among multiple variables. It provides a tabular representation of correlation coefficients, which quantify the strength and direction of linear associations between each pair of variables.

From Table 3, the Human Development Index (HDI) exhibits a positive correlation with government expenditure on health care (GOVEXHC), budget deficit (BD), and unemployment (UNEM). This indicates that these variables tend to move in the same direction. Conversely,

HDI has a weak negative correlation with remittances (REM) (-0.05), suggesting that as remittances increase, HDI tends to decline slightly. Additionally, there exists a weak negative correlation between BD, REM, and GOVEXHC, implying that as government expenditure on health care (GOVEXHC) increases, BD and REM tend to decrease.

Unit Root Test

To examine the stationarity properties of the variables, the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were conducted. The results, presented in Table 4, indicate that BD is stationary at level in both ADF and PP tests, while HDI, GOVEXHC, REM, and UNEM become stationary after first differencing. This implies that BD is integrated of order zero, $I(0)$, whereas the other variables are integrated of order one, $I(1)$.

Given that the variables exhibit a mixed order of integration ($I(0)$ and $I(1)$), concerns regarding unit root issues in the equation arise. Consequently, it is essential to perform a cointegration test to determine whether a long-run equilibrium relationship exists among the variables. Given the mixed integration orders, the study employs the Autoregressive Distributed Lag (ARDL) bounds testing approach for cointegration analysis. This methodology is well-suited for handling variables that are integrated at different orders and ensures robust inference regarding long-run relationships.

Table 4: ADF Unit Root Test Results

Variables	ADF Level	1 st Difference	Order of integration	Level	PP 1 st Difference	Order integration
HDI	0.726978	-6.135665	I(1)	-	-	I(1)
GOVEX HC	2.685442	-4.539137	I(1)	-	-	I(1)
BD	-4.688141	-	I(0)	-	-	I(0)
REM	-1.790832	-6.711037	I(1)	-	-	I(1)
UNEM	-0.456868	-5.843346	I(1)	-	-	I(1)

Source: Researcher's Computation (2025)

4.3 Lag Length Selection

Table 5: Lag length criteria

Endogenous variables: HDI GOVEXHC BD REM UNEM						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-334.5951	NA	25.17378	17.41513	17.62841	17.49165
1	-146.5092	318.2991	0.005944	9.051756	10.33142*	9.510888*
2	-119.6588	38.55452	0.005777	8.956860	11.30291	9.798602
3	-100.9774	22.03445	0.009544	9.280892	12.69333	10.50524
4	-52.35630	44.88101*	0.004150*	8.069554*	12.54837	9.676516

Source: Researcher's computation (2025), using E-Views 9.

The efficiency and validity of an Error Correction Model (ECM) are contingent upon the appropriate selection of the lag structure. To determine the optimal lag length, this study

employed the Vector Autoregressive (VAR) lag order selection criteria, specifically the Akaike Information Criterion (AIC) and the Schwarz Criterion (SC). The results, as presented in Table 5, indicate that the optimal lag length for the Brain Drain model is four. In line with best practices for lag selection and to minimize the risk of underestimation while maximizing the likelihood of capturing the true lag dynamics (Venus, 2004), the study adopted four as the maximum lag length.

4.4 Co-integration Test Results

The bounds testing results, as reported in Table 6, confirm the existence of a long-run relationship among the variables in the estimated equation. The F-statistic exceeds the critical values at the 5% significance level for both the upper and lower bounds, leading to the rejection of the null hypothesis of no co-integration. Consequently, the study proceeds to estimate the long-run coefficients of the model.

Table 6: Co-Integration Test Results

5% critical value				
Equations	K	F-Stat	I (0)	I
(1) Outcome				
HDI (GOVEXHC, BD, REM, UNEM)	4	12.75		2.86

4.01 Co-integration

Note: K =number of parameters

Source: Researcher's computation (2025), using E-Views 9.

4.5 Findings, Presentation and Analysis of Econometric Results

Human Development Index and Brain Drain Equation Results

Table 7: Dependent variable: HDI

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GOVEXHC	0.000123	0.000022	5.688962	0.0000
BD	0.066333	0.039002	1.700748	0.1062
REM	0.008052	0.001860	4.329416	0.0004
UNEM	0.004289	0.001123	3.818053	0.0013
C	0.401488	0.008205	48.931141	0.0000

Source: Researcher's Computation (2025), using E- Views 9.

The Long-Run Relationship Between the Human Development Index (HDI) and Key Economic Variables: Empirical Evidence

Table 7 presents the long-run estimates of the relationship between the Human Development Index (HDI) and key economic variables. The empirical findings indicate a positive and statistically significant relationship between Government Expenditure on Human Capital (GOVEXHC) and HDI. Specifically, the coefficient of GOVEXHC suggests that a 1% increase

in government expenditure on human capital results in a marginal increase of 0.012% in HDI. This finding aligns with theoretical expectations, as increased public investment in human capital fosters improvements in education, healthcare, and overall well-being, thereby enhancing human development outcomes.

The coefficient of Brain Drain (BD), however, demonstrates a positive but statistically insignificant relationship with HDI. The results indicate that a unit increase in BD corresponds to a 6.63% increase in HDI. This outcome deviates from a priori expectations, as brain drain is typically associated with a decline in domestic productivity and human capital erosion, which can impede economic and social development. The positive coefficient may be attributed to the compensatory effects of knowledge transfer, remittances, or the eventual return of skilled migrants, factors that warrant further investigation.

Conversely, the coefficient of remittances (REM) exhibits a positive and statistically significant association with HDI. Empirical estimates suggest that a one-unit increase in REM is associated with a 0.80% increase in HDI. This result is consistent with theoretical expectations, emphasizing the crucial role of remittances in enhancing household income, improving access to education and healthcare, and fostering overall economic development. The findings reinforce the notion that remittances serve as an important external source of financial support, contributing positively to long-term human development outcomes.

Moreover, unemployment (UNEM) is found to be positively and significantly related to HDI, with a 1% increase in UNEM leading to a 0.42% rise in HDI. This finding contradicts conventional economic theory, which posits that higher unemployment is detrimental to economic development due to the underutilization of human resources and reduced household income. The unexpected positive relationship may reflect structural factors within the labour market, such as informal employment, government social safety nets, or variations in labour force participation rates that moderate the adverse effects of unemployment on human development.

Overall, the findings provide detailed insights into the determinants of HDI, highlighting the complex interplay between government expenditure, remittances, labour market dynamics, and migration patterns. Future research should explore potential mediating variables and contextual factors that may explain these relationships, thereby offering a more comprehensive understanding of the mechanisms driving human development.

Table 8: Short run coefficients of Human Development Index and Brain Drain Equation Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GOVEXHC)	0.000035	0.000027	1.300731	0.2098
D(GOVEXHC(-1))	-0.000006	0.000039	-0.151522	0.8812
D(GOVEXHC(-2))	0.000044	0.000038	1.171582	0.2566
D(GOVEXHC(-3))	-0.000150	0.000030	-4.971038	0.0001
D(BD)	0.036411	0.026328	1.382986	0.1836
D(BD(-1))	-0.004452	0.019920	-0.223507	0.8257
D(BD(-2))	-0.000225	0.008555	-0.026298	0.9793
D(BD(-3))	-0.008912	0.006319	-1.410444	0.1755

D(REM)	-0.000142	0.000739	-0.191905	0.8500
D(REM(-1))	0.001021	0.000788	1.295521	0.2115
D(REM(-2))	-0.002553	0.000644	-3.967392	0.0009
D(UNEM)	0.000033	0.000250	0.131688	0.8967
D(UNEM(-1))	-0.000984	0.000351	-2.803312	0.0118
D(UNEM(-2))	0.000732	0.000374	1.956090	0.0662
D(UNEM(-3))	-0.001043	0.000264	-3.953735	0.0009
CointEq(-1)	-0.365545	0.096532	-3.786767	0.0014
<hr/>				
R-squared	0.996596	Mean dependent var	0.449231	
Adjusted R-squared	0.992815	S.D. dependent var	0.048957	
S.E. of regression	0.004150	Akaike info criterion	-7.827756	
Sum squared resid	0.000310	Schwarz criterion	-6.931992	
Log likelihood	173.6412	Hannan-Quinn criter.	-7.506364	
F-statistic	263.5318	Durbin-Watson stat	2.485312	
Prob(F-statistic)	0.000000			

Source: Researcher's Computation (2025).

Short-Run Dynamics of the Relationship Between the Human Development Index (HDI) and Brain Drain (BD): Empirical Evidence

Table 8 presents the short-run dynamics of the relationship between the Human Development Index (HDI) and Brain Drain (BD). The empirical results indicate a positive yet statistically insignificant relationship between government expenditure on human capital (GOVEXHC) and HDI in both the current period and the second-period lag. However, in the first-period lag, the coefficient becomes negative but remains statistically insignificant, while in the third-period lag, it is both negative and statistically significant. The positive but insignificant relationship observed in the current and second-period lag aligns with a priori expectations, suggesting that in the short-run, government expenditure on human capital does not exert a substantial effect on economic development. Conversely, the negative and significant effect observed in the third-period lag deviates from theoretical expectations, indicating potential inefficiencies in the allocation or impact of public expenditure on human capital development. Specifically, a unit change in GOVEXHC corresponds to increases in HDI of 0.0035% and 0.0044% in the current and second-period lag, respectively, whereas it results in decreases of -0.006% and -0.015% in the first and third-period lag, respectively.

The coefficient of unemployment (UNEM) exhibits a positive but statistically insignificant relationship with HDI in both the current and second-period lag. However, in the first and third-period lag, the relationship becomes negative and statistically significant. The results for the first and third-period lag conform to a priori expectations, implying that rising unemployment rates impede human development in the short-run. However, the positive but insignificant coefficients in the current and second-period lag contradict theoretical expectations, potentially reflecting labour market rigidities or lagged effects of policy interventions. A unit increase in UNEM leads to 0.0033% and 0.0732% increases in HDI in the current and second-period lag, whereas it results in reductions of -0.0984% and -0.1043% in the first and third-period lag, respectively.

Regarding remittances (REM), the coefficient is negative and statistically insignificant in the current period, whereas it remains negative but statistically significant in the second-period lag. These findings contradict a priori expectations, suggesting that remittances do not have an immediate positive impact on economic development in the short run. However, the first-period lag coefficient is positive but statistically insignificant, aligning with theoretical expectations. This outcome further implies that remittances exhibit a limited and inconsistent influence on short-run human development dynamics.

The coefficient of Brain Drain (BD) is positive but statistically insignificant in the current period, which contradicts a priori expectations. However, in the first, second, and third-period lag, the coefficients are negative and statistically insignificant, aligning with theoretical expectations. These findings suggest that while BD may exhibit a marginally positive short-run effect, its prolonged impact remains detrimental to human development. Specifically, a unit increase in BD is associated with a 3.64% rise in HDI in the current period, whereas unit increases in BD lead to reductions in HDI of -0.445%, -0.022%, and -0.891% in the first, second, and third-period lag, respectively.

The error correction mechanism (ECM) term exhibits the correct sign and magnitude, with a coefficient of -0.365545. This implies that approximately 37% of short-run disequilibrium is corrected annually to restore long-run equilibrium. The t-statistic of -3.786767 confirms the statistical significance of the ECM term at the 5% significance level, reinforcing the model's robustness in capturing the speed of adjustment to equilibrium.

Model diagnostics further support the reliability of the estimated results. The R-squared value of 0.996596 and the adjusted R-squared value of 0.992815 indicate that approximately 99% of the variation in HDI is explained by the current and lagged values of HDI, BD, GOVEXHC, REM, and UNEM, with only 1% attributable to other factors not included in the model. The F-statistic value of 263.53 confirms the collective statistical significance of the explanatory variables, attesting to the model's overall goodness-of-fit. Moreover, the Durbin-Watson (D-W) statistic of 2.48 suggests the absence of autocorrelation, ensuring the robustness and reliability of the findings for economic forecasting and policy formulation.

These findings underscore the complex interplay between human capital investment, labour market conditions, remittance inflows, and migration trends in shaping short-run human development outcomes. Policymakers should thus consider the temporal dimensions of these relationships when designing interventions aimed at enhancing human development and mitigating the adverse effects of brain drain.

5.0 Discussion of Findings

The results of the long-run coefficient of brain drain indicates that it has positive but insignificant relationship with economic development. This result shows that brain drain effect on Human Development Index (HDI), which serves as a proxy for economic development in the long run though positive did not have a considerable impact on economic development. Whereas, in the short run result, it exhibited positive effect in the current period and negative in sign and magnitude in the first, second and third lag periods to conform to the theoretical expectation that brain drain affect economic development positively in terms of bringing in remittances and negatively by eroding the economy through the deprivation and movement of the best of brains or skilled labour out of the country. This finding aligns with theoretical

expectations and corroborates the perspective of Akaeze (2024), who explored strategies for mitigating brain drain to sustain quality higher education in Nigeria. Akaeze (2024) identified key measures such as improvements in recruitment practices, competitive compensation structures, and international partnerships as crucial in addressing the challenges associated with brain drain. Furthermore, a well-managed diaspora policy that fosters engagement between skilled migrants and their home countries can enhance knowledge transfer and foreign direct investments, creating a cyclical pattern of economic growth and human capital enhancement.

Moreover, the results suggest that government expenditure on human capital (GOVEXHC) has a negative impact on the HDI in the short run but exerts a positive effect on economic development in the long run. This finding conforms to theoretical expectations and aligns with the conclusions of Adjei-Mensah (2023), who reported that government inaction regarding conditions of service for health workers—such as low remuneration, limited opportunities for staff development, and inadequate equipment replacement policies—significantly affects the HDI in both Nigeria and Ghana. The observed long-run positive impact suggests that sustained government investment in human capital can ultimately enhance economic development, despite initial short-term inefficiencies. Additionally, these findings indicate that governments must adopt more effective fiscal policies that prioritize investment in human capital sectors, ensuring that professionals are adequately incentivized to remain within the domestic workforce.

Furthermore, remittances exhibit both positive and negative relationships with the HDI over the long-run and short-run periods examined. This result conforms to theoretical expectations and aligns with the findings of Okoro (2014), who investigated the international migration of Igbo women from southeastern Nigeria to the United States. Okoro (2014) found that remittances played a crucial role in supporting families and facilitating community development projects in southeastern Nigeria. Consequently, remittances significantly contribute to economic development by providing financial resources for social and infrastructural projects. However, their dual effect suggests that while remittances can enhance economic development, they may also create dependency and discourage local labour market participation in the short run. This paradox underscores the need for policies that channel remittances into productive investments rather than consumption, such as fostering entrepreneurship, improving local industries, and promoting skill development initiatives that enhance domestic labour markets.

The analysis further reveals that unemployment maintains both positive and negative relationships with the HDI in both the long run and short run. However, in the short run, the sign and magnitude of the relationship conform to a priori expectations. This finding implies that unemployment adversely affects economic development, as higher unemployment levels exacerbate skilled migration, thereby reducing economic growth and development potential. These findings are consistent with the conclusions of Akaeze (2024) and Akinola et al. (2024), who examined the impact of brain drain and unemployment on economic growth in Nigeria. Their research demonstrated that both brain drain and unemployment serve as significant impediments to economic growth, underscoring the need for targeted policies to curb skilled migration and enhance employment opportunities within the country. This calls for comprehensive labour market reforms, including the promotion of vocational training, the expansion of employment opportunities in key sectors, and increased public-private partnerships aimed at workforce development.

The findings of this study highlight the complex and multifaceted nature of brain drain and its implications for economic development. While brain drain can contribute positively through remittances and knowledge transfer, it also poses significant challenges, particularly when skilled migration leads to a depletion of human capital. Addressing these challenges requires a comprehensive policy approach that includes improved labour market conditions, competitive compensation, and strategic government investment in human capital development. Additionally, fostering an enabling environment for research and innovation, strengthening institutional frameworks, and implementing incentive-based policies for skilled professionals can mitigate the adverse effects of brain drain while harnessing its potential benefits for sustainable economic development.

Summary and Conclusion

This study examined the relationship between brain drain and economic development in Nigeria from 1981 to 2023, employing the Autoregressive Distributed Lag (ARDL) estimation technique. The findings indicate that fluctuations in brain drain variables significantly influence economic development in Nigeria.

The continuous decline in the nation's education and healthcare systems, coupled with rising unemployment, has intensified brain drain. This situation is further worsened by poor management of net migration policies and a high multidimensional poverty rate, which collectively hinder improvements in the standard of living. However, among human development variables, education, and healthcare exert a stronger positive impact on economic development than net migration in Nigeria.

Furthermore, the study found a significant positive relationship between unemployment and economic development, underscoring the detrimental effect of unemployment on economic progress. The bounds test results confirm the existence of a long-run relationship among the variables, leading to the rejection of the null hypothesis of no cointegration. This finding highlights the importance of these factors in influencing Nigeria's economic development.

Additionally, the human development and brain drain equations indicate that high unemployment and brain drain—proxied by net migration—contribute to lower economic development. However, remittances and government expenditure on human capital positively influence economic development in Nigeria.

In conclusion, brain drain, government expenditure on human capital, remittances, and unemployment are interrelated and significantly shape the economic consequences of skilled labour migration. Understanding these relationships is essential for designing effective policies to manage brain drain and foster sustainable economic development.

Recommendation

Brain drain the emigration of highly skilled professionals poses a significant challenge to national development, reducing the availability of critical talent and weakening economic development. To effectively address this issue, the various arms of government and relevant Ministries, Departments, and Agencies (MDAs) must collaborate on strategic policies and programmes aimed at retaining and enhancing the domestic workforce. A multi-faceted approach, involving increased investment in education, skill development, and social welfare, will create incentives for skilled individuals to remain in the country.

1. Increase Government Funding for Education and Skill Development

Key actors play a crucial role in advancing education and skills development through strategic policies and targeted investments.

The Executive Arm of governance, comprising the Presidency and Governors, is responsible for allocating increased budgetary funding to education and ensuring the proper implementation of human capital development initiatives at both national and sub-national levels. By prioritizing investment in education, they lay the foundation for long-term economic development and social progress.

The *Legislative Arm*, which includes the National and State Assemblies, plays a key role in passing laws and approving budgets that emphasize human capital investment. Legislators can enact policies that mandate increased funding for technical education and vocational training, thereby addressing skill gaps in the labour market.

The *Ministry of Education* is tasked with improving curriculum standards to align with global trends and labour market demands. It is also responsible for upgrading vocational and tertiary institutions with modern infrastructure and resources, ensuring that students receive quality education. Additionally, the ministry should expand scholarships, grants, and bursaries to support students pursuing high-demand fields.

The *Ministry of Finance & Budget Planning* ensures adequate budgetary allocation and the timely disbursement of funds for education and skills development. It also has the mandate to introduce financial incentives that encourage private-sector involvement in education, fostering a more sustainable and diversified funding model.

The *Tertiary Education Trust Fund (TETFund)* plays a critical role in enhancing the quality of higher education by providing targeted grants to universities and research institutions. It also supports faculty development programmes, ensuring that top academic talent is retained within the country.

To achieve meaningful progress, several *practical steps* should be implemented. First, funding for scholarships, grants, and subsidized tuition should be increased, particularly in fields where there are critical skill shortages. Second, technical and vocational institutions must be upgraded with modern equipment and industry-relevant training programmes. Additionally, stronger partnerships between universities, research institutions, and industries should be established to enhance graduate employability and address skills mismatches. Finally, public-private partnerships (PPPs) should be encouraged to mobilize additional funding for specialized training centres and incubators, fostering innovation and workforce readiness.

By ensuring the collaboration of key stakeholders and implementing these strategic actions, education and skills development can be significantly improved, ultimately driving economic development.

2. Implement Labour-Market-Oriented Skill Development Programmes

The development of a skilled and competitive workforce requires the active involvement of key stakeholders across various institutions. The *Ministry of Labour & Employment* plays a crucial role in designing and implementing workforce training programmes that align with industry demands. Additionally, it is responsible for establishing job centres that provide career

counselling and training opportunities for job seekers, ensuring they are equipped with relevant skills.

The *National Directorate of Employment (NDE)* focuses on creating and overseeing skill acquisition programmes tailored to different sectors. Through apprenticeship and mentorship programmes, the NDE enhances practical skills development, providing hands-on experience to job seekers and young professionals.

Similarly, the *Industrial Training Fund (ITF)* supports vocational and on-the-job training initiatives in collaboration with industries. By providing financial support to businesses investing in employee training and development, the ITF fosters a culture of continuous skill enhancement within the workforce.

The *National Assembly Committees on Labour & Employment* play a legislative role in workforce development. They review and enact policies that promote skill-based employment and economic growth while ensuring that labour laws encourage local job creation and retention.

To achieve these workforce development objectives, several *practical steps* must be taken. First, conducting nationwide labour market assessments will help identify in-demand skills and professions. Based on these findings, skill development programmes should be designed to meet evolving industry needs in fields such as information technology, engineering, healthcare, and renewable energy.

Furthermore, training centres should be established in partnership with industries to provide practical, hands-on learning experiences. To incentivize private sector participation, tax benefits and funding opportunities should be provided to companies that invest in employee upskilling and retention. Lastly, strengthening job-matching initiatives will ensure that training graduates are effectively linked with employment opportunities in the local labour market, facilitating a seamless transition from education to the workforce.

3. Invest in Education, Training, and Social Welfare Programmes

The successful retention of skilled professionals in the country requires a coordinated effort from key actors across various sectors. *The Ministry of Health* plays a crucial role in this regard by strengthening healthcare infrastructure to improve working conditions for medical professionals. Additionally, increasing salaries and incentives for healthcare workers will help curb the trend of emigration in search of better opportunities abroad.

The Ministry of Education is tasked with expanding STEM education and vocational training opportunities to build a robust workforce equipped with essential skills. Providing incentives for lecturers and researchers will encourage them to remain in local institutions, thereby fostering a strong academic and research environment.

The Ministry of Youth & Sports Development contributes by supporting skill-building programmes tailored to young professionals and entrepreneurs. By promoting youth empowerment initiatives, the ministry can encourage self-employment and business development, reducing dependency on external job markets.

The National Social Investment Programmes (NSIP) play a critical role in enhancing welfare programmes such as affordable housing, healthcare, and financial assistance for skilled

professionals. These programmes aim to develop retention-focused social policies that improve overall living conditions, making local opportunities more appealing.

Meanwhile, *Legislative Committees on Health, Education & Social Welfare* advocate for policies that enhance local job conditions and create incentives to retain skilled professionals. They also monitor the effectiveness of human capital development policies and recommend necessary improvements to ensure long-term sustainability.

To achieve these objectives, several practical steps must be taken. Salaries, benefits, and working conditions in critical sectors such as healthcare, education, and technology should be improved to make local employment more attractive. Strengthening the public healthcare system will ensure that all citizens have access to affordable and quality medical services. Additionally, housing and transportation subsidies can be developed to lower the cost of living and enhance job satisfaction among professionals.

Furthermore, increased investment in research and development (R&D) is essential to fostering innovation and retaining skilled professionals within the country. Policies that promote work-life balance should also be encouraged, making local jobs more appealing in comparison to opportunities abroad. By implementing these strategies, the country can create an environment that supports professional growth and economic stability, ultimately reducing the brain drain.

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