Brain drain incidence and health-care infrastructural deficit challenges: the role of capacity development among "JAPA" physicians in Nigeria

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Abstract

Purpose – The brain drain challenge has become a cankerworm confronting not only the public health-care sector in Nigeria but almost all sectors of the national economy. This study aims to explore the push factors responsible for brain drain incidence among the migrated, JAPA, physicians to other global work environments. The study investigates the mediating role of capacity development among migrated, JAPA, physicians between the health-care infrastructural deficit and brain drain syndrome.

Design/methodology/approach – This study used a survey cross-sectional research design to examine the 214 migrated physicians in four notable perceived countries (UK, USA, Canada and Australia). The study used a probability sampling strategy to survey a self-administered online research instrument. The study adapted a battery of scales from several authors to measure the relevant constructs of this study. Hierarchical multiple regression was used to examine factors that provoke the incidence of brain drain burden among the JAPA Physicians. While Macro Hayes Process was used to investigate the mediating role of capacity development among migrated physicians.

Findings – The study revealed from the "JAPA" physicians that working conditions are turbulent and utterly poor which led to the incidence of brain drain. The study indicated that poor remuneration and benefits are the predominant reason for JAPA physicians to European countries and USA/UK. The findings of the study demonstrated that restricted opportunities and poor standard of living in the country were additional factors responsible for the brain drain of Nigerian physicians to other international countries. The outcome of the study also illustrated that inadequate infrastructure and facilities are the dominant variables that pushed physicians to foreign nations. It was revealed that there is a toxic mix of several issues that led to a brain drain albatross among the migrated physicians from Nigeria. The last part of the study indicated that physicians' capacity development was a game changer that would discourage brain drain incidence and establish motivation for working in Nigeria's public health-care sector.

Originality/value – The study has given a direction for providing succinct solutions to the cankerworm of brain drain that has depleted the Nigerian public health-care industry. It has proffered a possible trajectory that will reverse the JAPA syndrome among the professional health-care workforce. This will not only benefit the public health-care personnel but also be significant for all the human capital across all the sectors of the national economy of Nigeria.

Keywords Brain drain, Health-care infrastructural deficit, Physician capacity development, JAPA syndrome, Poor working conditions and remuneration, Limited opportunities, Poor standard of living

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1. Introduction

Brain drain incidence has been perceived as the migration of skilled health-care professionals physicians, nurses and pharmacists away from their own countries of origin to other host nations in search of improved job opportunities, enhanced working conditions and quality of work-life (Akinwale and George, 2023) . This mass exodus of the professional medical workforce can essentially influence the health-care infrastructure and service delivery in the country of origin experiencing such brain drain challenge (Kar and Menon, 2024). However, this has been the case in African continents for over a decade and Nigeria's version has been exceptional to such an extent that they coined a peculiar concept called "JAPA theory". The meaning of this is that whenever you are able to embark on organised migration outside the confinement of Nigeria to another safe nation, never intend to return to Nigeria for life (Akinwale *et al.*, 2023). Therefore, the brain drain of physicians in Nigeria is connected to the issues and challenges posed by the nation's deficient health-care infrastructural burden. The challenges are interconnected and reinforce one another, establishing a difficult cycle of problems (Essien *et al.*, 2024).

The key emphasis is that the health-care infrastructure deficit has always reportedly led to inadequate facilities, equipment and resources. Health-care/medical professionals encounter poor working conditions and poor remuneration, restricted opportunities in the country for their professional growth and insufficient government investment in the health-care systems (Oduola, 2023). On the other hand, the incidence of brain drain influences the migration of skilled doctors and other medical professionals to foreign countries, promoting the loss of essential human capital and expertise in Nigeria's public health-care sector. This has aggravated the current shortage of health-care personnel and placed a terrible burden on the few professional health-care workforce available due to increased workloads (Katoue *et al.*, 2022). This unwholesome connection between the health-care infrastructure deficit challenge and brain drain hazard is cyclical and self-strengthening. The challenges of inadequate health-care infrastructure, coupled with poor working conditions, unhealthy work environment and restricted career prospects among others had influenced skilled physicians to seek enhanced opportunities in the foreign medical job market, contributing to brain drain (Iloh *et al.*, 2022). It further creates loopholes in the patient outcome often time compromising the delivery of quality health-care services and by extension creating loss of life.

In furtherance of this discourse, however, the capacity development of health-care professionals, especially doctors, makes a significant contribution to tackling the plethora of challenges (Bassey and Bassey, 2024). Investment in training and professional development, and establishing an appealing career trajectory in Nigeria's public health-care sector, the stakeholders and government can promote means of ameliorating the brain drain challenge and retaining the professional health-care workforce. Ingenuities like enhancing health-care infrastructural systems, offering sustainable compensation and benefits for health-care professionals, providing training capacity and advancement, creating a clear progression path and engendering partnership models with global firms and institutions can address the brain drain issue in Nigeria's public health-care sector (Goštautaitė *et al.*, 2024). By addressing the underlying factors contributing to brain drain and enhancing the capacity of Nigerian health-care professionals, it may be possible to retain valuable human resources, strengthen the health-care system and ultimately improve health-care outcomes for the Nigerian population. However, this study seeks to demonstrate the concern for brain drain among Nigerian physicians, investigating the possible push factors that cause a mass exodus of Nigerian physicians out of the public health-care system. And also to further explore the mediating impact of capacity development among migrated, JAPA, physicians

between the health-care infrastructural deficit and brain drain issues. Hence, this study is set to achieve these objectives:

- To analyse how poor working conditions and remuneration provoke brain incidence among the migrated physicians in Nigeria.
- To investigate how limited opportunities and poor standard of living lead to brain drain challenges among migrated physicians in Nigeria.
- To demonstrate how inadequate infrastructure and facilities provoke brain drain issues among migrated physicians in Nigeria.
- To analyse the role of capacity development between the effect of brain drain and health-care infrastructure deficit challenges.

To accomplish these objectives, the following hypotheses become imperative:

H1. Poor working conditions and remuneration do not provoke brain drain incidence among migrated physicians in Nigeria.

H2. Poor working conditions, remuneration, limited opportunities and poor standard of living do not lead to brain drain issues among migrated physicians in Nigeria.

H3. Poor working conditions, remuneration, limited opportunities, poor standard of living and inadequate infrastructure and facilities do not significantly provoke brain drain issues among migrated physicians in Nigeria.

H4. Capacity development does not mediate between the effect of brain drain and health-care infrastructure deficit challenges.

2. Literature review

A significant challenge bothering the public health-care industry across the globe, especially in low-income nations, is the incidence of brain drain, otherwise called mass exodus of expert, qualified and professional medical workforce migrating from developing/emerging countries to developed countries (Akinwale *et al.*, 2024). A study conducted by Jinah *et al.* (2024) demonstrated that brain drain results in a potential shortage of medical workforce, endangering the quality and availability of health-care systems in the country. Several factors which include unfavourable working conditions, poor remuneration and reward, a paucity of opportunities for medical professional health-care personnel growth and lack of resources in the medical world to work with have been associated with brain drain in the public health-care systems (Meo and Sultan, 2023). In a recent study by Bassey and Bassey (2024), the medical workforce's decision to migrate outside their country of origin is influenced by plethora of push factors such as instability in the political terrain, economic crises, rising living costs, insecurity and lack of personal growth and development.

The implications of brain drain to low and middle-income countries are too numerous and negative impact on their national economies as well as social well-being. Brain drain weakens the existing shortages of health-care professionals, leading to stress and burden for the few physicians remaining in the country, which have adverse consequences on patient safety (Leitão *et al.*, 2024). Also, brain drain incidence leads to a loss of human resource investment, as cogent resources are allocated to training health-care employees who later migrate to another country (Adovor *et al.*, 2021). Inadequate health-care infrastructure, such as poor hospital bedding, worrisome medical facilities and poor essential utilities like purified water and electricity, poses a key issue for the health-care industry, notably in

developing countries, severely limiting access to quality health-care (Goštautaitė *et al.*, 2024). Prior studies have established factors contributing to this infrastructural deficit challenges in health-care as poor funding, negative attitude of the government to necessities of health-care systems, poor maintenance culture, inadequate planning and management, rapid population growth and poor resource allocation (Goštautaitė *et al.*, 2024).

In addition, Feld and Feld (2021) expressed the consequences of inadequate infrastructure in the health-care world as poor health, high incidence of illness and death, rise in disease burden, inefficient resource utilisation, protracted hospitalisations and poor patient outcomes. Research has shown the association between brain drain and poor infrastructure in health-care as having grave implications of the society and its stakeholders. Khalil-Babatunde and Panichelli-Batalla (2023) claimed that brain drain and infrastructure shortfall are cyclical, whilst health-care infrastructural deficit promotes the emigration of professional health-care personnel, further aggravating infrastructure challenges due to deficiencies in the health-care workforce.

Current studies have demonstrated that the migration of professional health-care employees, otherwise called brain drain, may adversely influence health-care infrastructure and the delivery of quality services in the country of origin. Opeyemi *et al.* (2024) found that brain drain leads to medical facilities underutilisation, as there are few qualified employees to operate the facilities and equipment. In the same dimension, Oyedokun *et al.* (2024) argued that brain drain prevents the successful execution of health-care policies and interventions as there is a lack of qualified physicians to offer quality care. In addressing these multiple challenges, studies have offered techniques and tactics such as intentional investment in health-care infrastructure, improving working conditions and promoting a healthy work environment, and providing competitive compensation to prevent this mass exodus. Also, embarking on efficient planning, strategic allocation of resources and public and private partnership collaboration to advance medical infrastructure (Onu *et al.*, 2021). Summarily, a wholesome approach that will proffer solutions to brain drain and infrastructural gaps is eminent for reinforcing health-care systems and elevating population health outcomes.

2.1 Theoretical framework

2.1.1 Resource dependency theory. The resource dependency theory (RDT) was initiated by Emerson (1962) and later advanced by Pfeffer and Salancik (1978). The theory prescribes that organisations glue together to acquire resources significant to their progress and sustenance (Pfeffer and Salancik, 1978). This means that for corporate organisations to be successful, create impact, exert influence and establish enduring stability, it require certain resources from its environment of business. Organisations with adequate resource are at vantage position over those without adequate resource, which places them in a better position and offer them credible position in the industry. The emphasis is that organisations that are not in possession of these requisite resources will have to depend on the ones that have significant and sufficient resources. In other words, there is an inverse connection between power and resources. Therefore, it implies that whenever Organisation Y's dependence on Organisation Z's resources is the same as Organisation Z's control over Organisation Y, thus there is a relationship between resource dependence and power (Wang and Liu, 2021). The theory prescribes that for a corporate organisation to be successful and sustainable, it requires numerous resources from its external environment such as finance, adequate materials, necessary information, human capital and other significant resources. This portends that for a corporate organisation to achieve and retain the resources, it must relate to the external environment of business, which often engenders dependencies and uneven power dynamics (Febrianti *et al.*, 2024).

RDT provides a meaningful basis for understanding the issues and dynamic reliance relating to establishing and sustaining sufficient health-care infrastructure concerning infrastructure and facilities. For an organisation to accomplish successful operations such as clinical operations, hospitals and diagnostic models, it requires diverse external resources outside the domain of the organisation. For example, financial resources are vital for health-care infrastructure as it requires a large amount of funds for operational expenditures, medical facilities procurement and maintenance. These finances are often offered by the government, insurance firms, private partnerships and patients (Chiang and Chuang, 2024).

Also, human capital, professional health-care employees, physicians, nurses, pharmacists and allied employees are essential aspects of public health-care systems. To offer reliable and standard quality service delivery in the health-care industry, these human resources need to be accessible and surplus (Biermann and Harsch, 2017). Meanwhile, health-care infrastructure and supplies are yet another essential resource that public health-care service providers need. Management of health-care infrastructure procures supplies, prescription drugs and cutting-edge medical equipment from external suppliers and manufacturers to have a reliable supply. Furthermore, information and knowledge are valuable resources that are important for the health-care industry to thrive and remain viable and relevant.

Furthermore, the theory is of the view that health-care service providers may encounter deficiencies whenever they are inaccessible to key resources like adequate professionals and expertise, contemporary facilities, sufficient infrastructure and medical supplies. Ozturk (2021) claimed that these drawbacks may be harmful to patient outcomes, quality of care and efficiency of the entire health-care system. The theory further lends credence to the power connection and interdependence that occur when medical infrastructure depends on external sources for assistance. Health-care management, for example, may be reliant on public or private finances, which may provoke interest conflicts or limitations on decision-making. In the same dimension, health-care facilities may be vulnerable if they rely absolutely on particular supplies or medical equipment. Jiang *et al.* (2023) offered that policymakers and relevant stakeholders must be geared up to craft strategies that will reduce the dependencies and strengthen access to essential resources to tackle the health-care infrastructural deficit from the perspective of RDT. This may involve promoting and attracting more sources of funds, bolstering local suppliers, investing in health-care personnel training and development and establishing collaborating relationships with suppliers of essential resources.

Besides, RDT focuses on the need for efficient resource management and strategic decision-making to reduce the inequalities that arise in power and dependencies. Health-care facilities that are striving to mitigate their dependence on external resource suppliers and raise their negotiation power, may come up with optional resource supply techniques such as resource sharing, pooling of resources or both horizontal and vertical integration. Comprehensively, the RDT offers a significant viewpoint for understanding the dependencies and resource restrictions that underscore the health-care infrastructural deficit challenge. Policymakers and health-care service providers need to form alliances to enhance access to standard and quality health-care infrastructure and improve health-care infrastructure by establishing these dependencies and crafting techniques to achieve and maintain resources in a more effective way (Kohtamäki, 2023).

2.1.2 Human capital theory. Human capital theory (HCT) seems to be an economic theoretical framework for understanding human resources and capital shortfall. However, the theory finds expression in the fields of social sciences and behavioural sciences. HCT stipulates that individual knowledge, talent, skills and experience are capital that can be put

to use to enhance income and improve economic advancement and productivity. Becker and Schultz (1962) came up with this hypothesis of HCT, the initiative that an individual's skill set, knowledge and experience is a portfolio of capabilities that can be invested as a basis for elevating labour and remaining competitive in the job market (Ray *et al.*, 2023).

The understanding of investing in human capital and wage structures and remuneration needs a solid knowledge of this hypothesis. This theory contributes a critical pedagogical viewpoint in which to understand the professional health-care workforce as vital and valuable assets for the country's health-care systems when it comes to physicians' migration and brain drain infrastructure deficit issues (Mackenzie and Chiang, 2023).

The theory of human capital emphasizes that as physicians must ensure rigorous and extensive education and training to obtain expertise skills and talent, they signify a vital investment in human capital. Essential upfront expenses for acquiring these peculiar skills and training include tuition and training materials. Variety of cost implications involved in accomplishing this process. However, the country that loses her crucial human capital investment is the country that her health-care workforce leaving to migrate abroad. The health-care system does not only lose its initial investment incurred in the training but also the professionals, abilities, skills and potential contributions (Winterton and Cafferkey, 2019). The infrastructure for health-care in any country's health system may be influenced by this loss of human capital. If there are fewer professional physicians available, the overburdened health-care workforce may lead to protracted waiting times for patients and attendees, poor care treatment and high rates of medical errors and poor patient outcomes (Carlbäck *et al.*, 2023).

Inadequate professional and expert doctors may increase the existing challenges with medical infrastructural deficit challenge. Few skilled workforces can make it worrisome for health-care facilities to use modern equipment to offer advanced and high-tech specialised care. In all of these, it is human capital that can make it possible to provide excellent service delivery and delight the populace. The health-care system's deficiencies may worsen by underutilisation of the infrastructure and technology put in place. To address brain drain and infrastructural deficiencies, HCT argued how significant it is to develop and maintain skilled employees. Brain drain can be prevented by executing certain strategies such as enhancing working conditions, offering competitive pay and reward systems, and establishing unrestricted opportunities for skilled expertise and promotion (Jordão *et al.*, 2023). In the same trajectory, HCT states that fostering and elevating a multitude of competent health-care workforce, and sustainable investments in medical training and development programs are possibly crucial. Al-Watifi and Al-Sahlani (2024), argued that countries may reduce the impact of brain drain and create an enduring human capital supply by distributing relevant resources towards the training of intending physicians/doctors.

Critics, however, have claimed that the composite factors impacting brain drain and deficiencies in the health-care system excluded important and relevant information by HCT. In addition to financial incentives and professional paradigms, other aspects of considerations that impact brain drain intentions and decisions include political instability, social and cultural realities, and personal differences (Choudhury, 2022; Griffen, 2024). Generally, HCT provides a significant perspective for understanding the importance of a highly professional health-care workforce as human capital assets and the impact of brain drain on health-care infrastructure and facilities. Stakeholders, policymakers and health-care management can develop strategies to solve the brain drain and holistically strengthen the health-care system by recognising the importance of investing in the professional capacity development of doctors/physicians (Indrawati and Kuncoro, 2021).

3. Research methods

3.1 Research design

The study employed descriptive research using a cross-sectional research design to administer the research instrument to the migrated physicians from Nigeria across four international countries. The choice of cross-sectional design lies in its utilisation at a single point in time, enabling the researcher to select respondents without bias and ensuring that all characteristics, and members of the population are duly represented (Hunziker and Blankenagel, 2024).

3.2 Population and sample size

The study population is considered Nigerian physicians/medical doctors who have migrated to an international work environment. The study selected four nations, the UK, Canada, the USA and Australia. The justification for picking these four countries is that Nigeria's professional medical personnel have moved to those nations in a multitude in the last 10 years. Hence, the population is also considered as an infinite population because the research cannot establish the exact figure of those physicians who have moved to those nations to date. However, the sample size for this study is derived following the tradition of Cochran (1977) who established a scientific approach/formula to estimate a representative sample for proportion as follows:

$$no = \frac{Z^2 pq}{e^2},$$

where

no = Sample size;
Z = chosen critical value of preferred confidence interval/degree (choosing a confidence interval of 95%);
p = estimated proportion of an attribute present in the study population = (0.5); and
e = preferred degree of precision level.

$$\mathrm{q} = 1 - \mathrm{P} = (0.5)$$

Thus, $p = 0.5$, therefore, $q = 1 - 0.5 = 0.5$, $e = 0.05$; $z = 1.96$.

Hence,

$$\mathrm{no} = \frac{(1.96)^2 (0.5)(0.5)}{(0.05)^2} = \frac{0.9604}{0.0025} = 384$$

3.3 Sampling technique

The sampling strategy used for this study is the probability random sampling technique. The choice of taking this technique is that it fosters even representation among the migrated physicians into the four international nations of the world. It further enables the study to discourage any signs of bias and afford each physician of the main population the opportunity and likelihood of being selected since the participants are selected at random (Hazari, 2024). Thus, the study can safely assume that the estimates taken from simple random samples are both generalisable and non-biased.

3.4 Measuring instrument and method of data collection

The study adopted research scales for research instruments with a core focus on combining a constellation of question items that demonstrate a defined research questionnaire. For poor working conditions, the study adopted a scale from Arsalani *et al.* (2011) to measure working conditions and health problems among Iranian Nursing employees. The scale has three dimensions, working environment, allowance and opportunities on the job, cost of living/standard of living. Six question items for each of the dimensions for the nurse in the Iranian public health-care sector. The scale was adopted directly to suit migrated physicians out of Nigeria. The Cronbach's alpha value for the scale was 0.73, 0.71 and 0.70, respectively and this demonstrates the high reliability of the scale.

For remuneration, a suitable scale was adapted from the study of Hareendrakumar *et al.* (2021). The scale measured total reward satisfaction from public sector employees in India's work environment. The study adopted the items connecting with four major dimensions of remuneration and rewards systems, as well as capacity development for Nigerian physicians migrated to foreign workspace. The validated measuring scale has 23 items and seven dimensions for measuring total rewards and employee satisfaction based on their several reward dimensions. This study used only five dimensions of the scale total rewards, remuneration and capacity development. The instrument is put together and administered to physicians in four countries the UK, USA, Canada and Australia. The study obtained their details through their Nigerian counterparts and sent the questionnaire to their various mail. The questionnaire was administered through Qualtrics online survey to migrated Nigerian physicians.

3.5 Data analysis strategy

The strategy for data analysis employed for this study is the multivariate hierarchical regression model to estimate the factors responsible for brain drain incidence. The Macro Hayes process is used for mediating the role of capacity development between factors responsible for brain drain and infrastructural deficit challenge. The choice of using hierarchical regression helps to investigate the individual contributions of predictors/factors above and beyond previously investigated predictors, as a parameter for statistical control and for analysing incremental validity (Osborne, 2019). Another crucial reason for using it lies in its ability to establish the critical significant predictors/factors of brain drain incidence efficiently. In addition, it offers a path to make meaningful comparisons of various models and highlight the best model for predicting a given situation (Lininger *et al.*, 2015). The choice of using the Macro Hayes process is to analyse and investigate the mediating potentials between the constructs of interest of this study. It assists in demonstrating the connecting pin established between various variables/factors in an extended way (Hayes *et al.*, 2017).

4. Results and data analysis

Table 1 indicates the demographic profile of the physicians who migrated to those international countries. It shows that physicians who migrated to the UK were 62 (29%), physicians from Nigeria to the USA were 55 (25.7%) and those who left for Canada were 52 in number denoting 24.3%, Nigeria professional doctors migrated to Australia were 45 (21%). It further shows various departments and areas of their professionalism in the medical field, ranging from neurosurgeon, oncologist, orthopaedic, podiatrist, nephrologist, obstetrician, dermatologist and general medicine.

Profile	Frequency	%
Gender		
Male	112	52.3
Female	102	47.7
Education		
MBBS	120	56.1
Masters	68	31.8
PhD	15	7.0
Professional	11	5.1
Age		
27–35 years	100	46.7
35–40 years	80	37.4
40–45 years	20	9.4
45–50 years	14	6.5
Physicians category		
Neurosurgeon	25	11.7
Oncologist	30	14.0
Orthopaedic	28	13.1
Paediatrist	35	16.4
Nephrologist	40	18.7
Obstetrician	17	7.9
Dermatologist	19	8.9
General medicine	20	9.3
Migrated countries		
Nigeria–United Kingdom	62	29.0
Nigeria–USA	55	25.7
Nigeria–Canada	52	24.3
Nigeria–Australia	45	21.0
Physician department		
Clinical oncology	20	9.3
Emergency medicine	18	8.4
General practice	16	7.5
Developmental paediatric	20	9.3
Family medicine	22	10.3
Forensic psychiatry	20	9.3
Dental service	26	12.2
Geriatrics	25	11.7
Obstetrics and gynaecology	23	10.8
Oral and maxillofacial	24	11.2
Salary/income (annual in dollars)		
$60,600–$63,600	58	27.1
$70,500–$79,400	78	36.4
$80,200–$85,700	36	16.9
$90,400–$105,685	24	11.2
$115,584 and above	18	8.4

Source: Authors' creation from field survey, 2024

Table 1. Physicians' demographic profile

4.1 Analysis of data and test of hypotheses

Table 2 indicates the hierarchical regression analysis results output. The study used three-step analyses conducted at a three-step hierarchical process and it was done at three model levels. It indicates a model summary of multiple hierarchical regression analysis predictors of what triggered brain drain incidence within Nigerian physicians to the international labour market. A three-stage hierarchical multiple regression analyses were conducted to establish the association between brain drain and infrastructural deficit challenges. The first step of the regression analysis involves only two factors (poor working conditions and remuneration) as core predictors responsible for brain drain albatross among migrated doctors/physicians in Nigeria ($R = 0.691$, $R^2 = 0.65$, F2, 213 =, $p < 0.02$). This illustrates that there exists a robust connection between poor working conditions, poor remuneration and the incidence of brain drain at 69.1%, the R^2 shows a variance of 65% that occurred in brain drain incidence was attributed as a result of both poor working conditions and poor remuneration. It shows a very significant model at $p < 0.05$, which is $p = 0.02$. Poor working conditions and remuneration emerged as highly significant predictors causing brain drain among the migrated physicians in Nigeria. Thus, poor working conditions and remuneration provoke brain drain incidence among migrated physicians in Nigeria. This demonstrated the first hypothesis of this study.

The second stage/step of the model introduced limited opportunity and poor standard of living responsible for brain drain incidence among migrated Nigeria physicians to the global labour market, explaining 69.9% variation in limited opportunities and poor standard of living along the significant variables at the first step (F4, 212) = 15.45, $p < 0.01$. The $R =$ 68.9% relationship among the variables (poor working conditions, remuneration, limited opportunities, poor standard of living and brain drain incidence). This portends that a robust association is visible among these variables. Likewise, limited opportunities and a poor standard of living were significant contributors to brain drain challenges. In other words, limited opportunities and poor standard of living were added to the model. The model continued to significantly predict brain drain incidence. Limited opportunities significantly contributed to the prediction of brain drain incidence ($\beta = 0.758$, $p < 0.02$), and poor standard of living was also predicted ($\beta = 0.799$, $p = 0.05$). Thus, the study

Predictors	R	R^2	R^2-change	B	β	t	p	Sig.
Model 1	0.691	0.650	0.578					0.02
Poor working condition				0.407	0.610	7.76	0.01	
Remuneration				0.345	0.690	10.34	0.04	
Model 2	0.689	0.699	0.389					0.01
Poor working condition								
Remuneration				0.590	0.680	12.45	0.03	
Limited opportunities				0.504	0.758	8.45	0.02	
Poor standard of living				0.458	0.799	10.23	0.05	
Model 3	0.604	0.667	0.556					0.03
Poor working condition				0.456	0.763	7.56	0.04	
Remuneration				0.328	0.688	9.78	0.03	
Limited opportunities				0.521	0.789	12.90	0.03	
Poor standard of living				0.645	0.763	5.78	0.02	
Inadequate infrastructure/facilities				0.574	0.821	6.21	0.01	

Notes: $n = 214$, $p < 0.05$
Source: Authors' creation from field survey, 2024

Table 2. Summary of hierarchical regression analysis

demonstrates the second hypothesis supporting that poor working conditions, remuneration, limited opportunities and poor standard of living lead to brain drain issues among migrated physicians in Nigeria.

The third stage/step of the model is the final model and it involves the addition of inadequate infrastructure/facilities. The overall model continued to predict the brain drain incidence significantly [$R = 0.604$, $R^2 = 0.667$, $F\ (5, 213) = 15.89$, $p < 0.03$]. This portends that a 60.4% relationship occurred between poor working conditions, remuneration, limited opportunities, poor standard of living, inadequate infrastructure/facilities and brain drain incidence. $R^2 = 0.667$ or 66.7% variation that exists in brain drain incidence is explained by the combination of the five variables that predicted brain drain incidence, and a significant value at $p = 0.03$. However, poor working conditions maintained its strong predictive values ($\beta = 0.763$, $p < 0.04$), and remuneration remained a significant predictor ($\beta = 0.688$, $p < 0.03$), limited opportunities continued to maintain its predictive position ($\beta = 0.789$, $p < 0.03$), poor standard of living also showed that it predicts brain drain incidence ($\beta = 0.763$, $p < 0.02$). The addition of inadequate infrastructure/facilities showed a significant positive connection with brain drain incidence ($\beta = 0.821$, $p < 0.01$). The results highlight that after accounting for poor working conditions, remuneration, limited opportunities and poor standard of living, inadequate infrastructure/facilities demonstrated a highly robust coefficient of relationship with brain drain incidence. Thus, inadequate health-care infrastructure/facilities remained the dominant predictor in the final model, pointing out its critical role in explaining individual differences and contribution to the incidence of brain drain:

H5. Capacity development does not mediate between the effect of brain drain and health-care infrastructure deficit challenges.

Establishing the mediating role of physicians' capacity development between health-care infrastructural deficit challenge and brain drain incidence, this study used PROCESS Macro Model 4 in SPSS to investigate the mediating effect of physicians' capacity development on interrelationship within the study variables. The results from Table 3 indicate that physicians' capacity development significantly mediates the relationship between health-care infrastructural deficit challenge and brain drain incidence among migrated Nigerian physicians. The result illustrates that physician capacity development has ($\beta = 0.5646$, $p < 0.003$) direct effect, and ($\beta = 0.638$, $p < 0.002$) indirect effect and a total effect ($\beta = 0.6284$, $p < 0.001$) between health-care infrastructural deficit challenge and brain drain. This outcome showed that physician capacity development significantly mediates the relationship between health-care infrastructural deficit challenge and brain drain incidence. Therefore, the study established that capacity development serves as a mediating influence between health-care infrastructural deficit challenge and brain drain incidence.

Table 3. Mediating role of capacity development between health-care infrastructure deficit challenge and brain drain incidence

Type of effect	Variable	Effect	SE	*p*	LLCI	ULCI
Direct	HIDC → BD	0.5646	0.042	0.003	0.3565	0.6215
Indirect	HIDC → CD → BD	0.0638	0.033	0.002	0.0530	0.0724
Total	HIDC → CD → BD	0.6284	0.035	0.001	0.5273	0.7492

Notes: CD = Capacity development; HIDC = health-care infrastructure deficit challenge; BD = brain drain; LLCI = lower limit confidence interval; ULCI = upper limit confidence interval
Source: Authors' Creation from Field Survey, 2024

5. Discussions

The study has evidence that poor working conditions and unhealthy work environments have led to the migration of Nigerian physicians to the UK, the USA, Australia, Canada and other parts of the global world. The outcome of this study illustrated that the working conditions in Nigeria's public health-care sector were characterised by issues of hazard on duty, and negligence to the plights of the physicians in Nigeria's public health-care sector. The safety of the work environment is no longer guaranteed which has provoked the majority of Nigerian migrated doctors to the global work environment. Oftentimes, Nigerian physicians embark on strike action just to agitate for improved working conditions and this has always been met with disappointment each time. The study demonstrated that the working conditions are largely poor and also come with poor remuneration. The pay and salary of doctors in Nigeria are nothing compared to that of foreign nations and this is what led to the brain drain incidence among the multitude of physicians/doctors who have left for Canada, the USA, the UK and the like. The study shows that poor working conditions have played a significant influence in the mass exodus of virtually all Nigerian physicians to date. This result has a similar position to the study of Usman *et al.* (2022) whose study argued that doctors and nurses in South Africa and Ghana experienced major poor work environments. The results of their study illustrated that thousands of doctors have reported migrating the country to the UAE, USA, UK and other parts of European nations due to poor working conditions.

The outcome of this study also indicates limited opportunities and poor standard of living, as well as poor working conditions and poor remuneration, caused brain drain burden on Nigeria's public health-care sector and pushed Nigerian physicians to foreign countries. The study also showed that doctors had a dearth/paucity of opportunities available to them in Nigeria's public health-care systems which promoted their migration intention to other nations. The result of the study illustrated that over 10,000 medical physicians in Nigeria have left for the US, UK, UAE and other European countries due to restricted opportunities, inadequate remuneration and poor standard of living in Nigeria. These variables have pushed thousands of doctors overseas. The study explored the reason for the brain drain issue among migrated Nigeria physicians and variables influencing this exodus of the medical workforce from Nigeria, it discovered that the majority of physicians are not willing to return to Nigeria due to the high and rising cost of living in Nigeria, limited opportunities, poor remuneration and rising insecurity in the country. The proportion of doctors who are not willing to return to Nigeria is above those who are planning to migrate outside Nigeria for better working opportunities. The study has shown that there is a toxic mixture of problems including poor working conditions, poor remuneration, limited opportunities and poor standard of living that are attributed to brain drain incidence among migrated Nigerian physicians. The result of this outcome finds a similar expression with the study of Akinwale and George (2023) whose study claimed that the rising cost of living and poor standard of living of medical doctors in Nigeria had pushed over 65% of Nigeria to global workspace.

The final model and stage of the hierarchical model of this study indicated that inadequate infrastructure/facilities took a dominant stage in predicting brain drain burden. The outcome of the study showed that Nigeria's health-care system has lost between 7,000 to 15,000 physicians to brain drain incidents in the last five years due to poor and inadequate infrastructure/facilities. The study revealed that medical doctors were unable to afford basic necessities and Nigerian public hospitals lacked basic infrastructure for them to efficiently perform their duty. Hence, the urge to relocate to other global work environments where professional skills and talents would be appreciated and rewarded. This study has

revealed that there are a plethora of issues bothering the existence of Nigerian physicians in the public health-care sector which provoke brain drain incidence. They truly grappling with unreasonable and uncompetitive pay, especially when compared to the pay and salary paid in the foreign medical job market. With this reality, it will take great and loyal patriotism and dedication to keep physicians/doctors away from brain drain incidents to where they will be wholesomely rewarded and cared for in terms of remuneration, working conditions, a healthy work environment, an avalanche of opportunities, improved standard of living and adequate medical infrastructure. The outcome of this study takes a symmetrical position with the study of Verulava (2024) whose findings declared that poor and inadequate infrastructure has become a burden to practising nurses, doctors and the medical workforce in general.

The last finding of this study indicated that capacity building and physician development will be a game changer in all of these ineptitudes and medical infrastructural deficit challenges experienced by the public health-care sector in Nigeria. Physicians' capacity development has played a mediating impact between inadequate medical infrastructure/facilities deficit burden and brain drain. It implies that creating an enabling environment for physicians' development will deter them from migrating to the international medical job market. Hence, the study revealed that capacity development will mediate inadequate infrastructural deficit challenges and deter brain drain burden. This result takes the same position as the study of Radebe *et al.* (2024) whose finding indicated that capacity development is essential to the quality of work-life of professional workforce across all continents.

6. Conclusion

The study demonstrated that there is a toxic mix of issues that provoked brain drain challenges in Nigeria's public health-care industry. Likewise, this study revealed that thousands of doctors have been reported to migrate to foreign nations in search of better and improved livelihoods. This is connected to a rise in competitive pay and salary. Thus, the study concluded that the mass exodus of doctors from Nigeria to the UK, USA UAE, Canada and other parts of European countries has further worsened the country's health-care challenge largely by a shortage of professionals and inadequate medical infrastructure/facilities.

7. Recommendations

This study has exhibited a concerted effort in unravelling the issues surrounding brain drain among JAPA physicians. In light of the outcome of this study, the following recommendations are essential as an intervention to proffer solutions to the unending mass exodus of Nigeria health-care professionals and physicians:

- The government should urgently address the general welfare of physicians in Nigeria by providing rewarding and competitive remuneration and incentives for the medical workforce across all levels in Nigeria's public hospitals.
- The government should promote a healthy work environment and conducive working conditions for physicians in Nigeria's public health-care sector. This will discourage brain drain incidence and migration intention among medical professionals.
- The government should ensure and improve the standard of living for all citizenry that will match other counterparts of the world.

- The government should ensure that the medical profession in Nigeria is attractive in terms of benefits, adequate infrastructure, and medical professional development. If physicians are getting desirable and better treatment in Nigeria, they will not think of migrating to the country seeking opportunities. Just like Nigerian politicians who are not leaving the country to go and practice elsewhere. This is because the environment is conducive for only Nigerian politicians to derive their pleasurable affairs.
- Management of government/public hospitals should vigorously encourage Nigerian physicians to cultivate the act of managing their well-being by reducing stress and workload. This will afford the physicians more time for other areas of their life domains, and help them maintain a work-life balance culture.

8. Implication for practice

This study has demonstrated a significant trajectory and it has multiple implications for practice. It indicates a tremendous loss of tax revenue for Nigeria and a gain of tax revenue for host nations. It will discourage present and future medical entrepreneurs in the country. A shortage of crucial skilled and professional health-care personnel amounts to deterioration in Nigeria's health-care industry. This will further worsen the depleted health systems on the ground, patients' outcomes will be poor and may lead to loss of lives when there are no doctors to attend to patients in the public health-care sector. Another major implication of this is that it leads to the impoverishment of intellectuals, professionals and technical resources in Nigeria by enriching other foreign nations.

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