

Personnel brain-drain syndrome and quality healthcare delivery among public healthcare workforce in Nigeria

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Abstract

Purpose – The mass exodus of the professional healthcare workforce has become a cankerworm for a developing nation like Nigeria, and this worsens the already depleted healthcare systems in underdeveloped nation. This study investigated the rationale behind medical workers' brain-drain syndrome and the quality healthcare delivery in the Nigerian public healthcare sector.

Design/methodology/approach – To stimulate an understanding of the effect of the phenomenon called brain drain, the study adopted a diagnostic research design to survey the public healthcare personnel in government hospitals. The study administered a battery of adapted research scales of different measures to confirm the variables of interest of this study on a probability sampling strategy. The study surveyed 450 public healthcare sector employees from four government hospitals to gather pertinent data. The study used a structural equation model (SEM) and artificial neural networks (ANNs) to analyse the collected data from the medical personnel of government hospitals.

Findings – The findings of this study are significant as postulated. The study discovered that poor quality worklife experienced by Nigerian medical personnel was attributed to the brain-drain effect and poor healthcare delivery. The study further demonstrated that job dissatisfaction suffered among the public healthcare workforce forced the workforce to migrate to the international labour market, and this same factor is a reason for poor healthcare delivery. Lastly, the study discovered that inadequate remuneration and pay discouraged Nigerian professionals and allied healthcare workers from being productive and ultimately pushed them to the global market.

Originality/value – Practically, this study has shown three major elements that caused the mass movement of Nigerian healthcare personnel to other countries of the world and that seems novel given the peculiarity of the Nigerian labour market. The study is original and novel as much study has not been put forward in the public healthcare sector in Nigeria concerning this phenomenon.

Keywords Brain drain, Healthcare migration, Nigerian healthcare workforce, Quality healthcare delivery, Poor quality worklife, Poor job satisfaction, Poor remuneration and pay

Paper type Research paper

1. Introduction

It is currently evident that majority of patients and attendees in Nigeria are experiencing poor healthcare delivery, and this is as a result of shortage and migration of skilled healthcare in the country. There is a need to critically demonstrate the understanding of quality healthcare delivery from different perspectives to offer intervention strategies. [Kuye and Akinwale \(2021\)](#) maintained that quality healthcare delivery in Nigeria is the provision of excellent healthcare service to attendees and patients in healthcare facilities at all times without prejudice.



The healthcare delivery system is the network of healthcare facilities and employees providing healthcare services to the individuals that attend the hospitals and clinics regardless of the social status of the patients. A recent trend in the healthcare field views quality healthcare delivery as multifaceted philosophy involving six categories: physical, mental, social, emotional, spiritual and occupational health (Zeng *et al.*, 2022). This is further illustrated as all formal and non-formal events that help provide essential healthcare services for a particular population or set of people without compromising quality (Lawal, Barry, & Omololu, 2018). Healthcare delivery portends the value of standard life facilities, which guarantee a patient to live in the fullness and function at their best (Amedari & Ejidike, 2021). An efficient healthcare delivery allows patients to obtain comprehensive, practical and self-managed emotions, minds and bodies working perfectly with combined psychometric capability. The healthcare industry is established to enhance physical and mental functioning by removing, testing, treating sickness and supporting the optimal health function of society.

Quality is considered a tactical and intentional differentiation tool for enduring a competitive edge among competing healthcare service providers across the globe. Enhancing quality through developed structures and processes influences waste reduction, improved costs, enhanced mistakes, delay and boost the positive organisational image. Quality healthcare delivery means different things to individuals attending hospitals at various times. In the view of Thornicroft and Semrau (2019), quality healthcare delivery illustrates an application of medical sciences and technology in such a manner that offers optimal gain to patients without an increased risk. Al-Dossary (2022) classified three core components of quality: (1) technical quality, (2) interpersonal quality and (3) facilities quality. The technical quality describes the efficacy of care in obtaining accomplished healthcare benefits.

The interpersonal quality aspect of healthcare delivery relates to how patients' needs and safety are accommodated and maximise patient benefit. Facilities involve the comfort of the physical hospital environment and the healthcare service provider (Ritchie & Leff, 2022). Dzau, Mate, and O'Kane (2022) described quality healthcare delivery as offering care that exceeds patients' anticipation and accomplishes the best possible hospital outcomes given the available resources (Moreno *et al.*, 2018). This emphasises a system of enhancing healthcare quality in line with the triad notions of quality measure: professional, client and management quality. Professionally, quality is premised on specialised and expert views of how professionally evaluated individual needs have been fulfilled using acceptable and standard processes and techniques. From the client's point of view, quality is associated with how the healthcare service providers have met individuals' expectations. Management has to do with how the leadership of the healthcare facilities ensures that services are delivered in a resourceful and efficient manner. In the view of Sony, Antony, and McDermott (2022), quality healthcare delivery is offering patients necessary and suitable services in a technically competent way, with the best communication, joint decision, social and intellectual passion. However, it is impossible to accomplish quality healthcare delivery in any healthcare facility, hospital and clinic without competent, skilled and professional physicians in place that will provide such an excellent service. Nigeria's public healthcare has qualified and experienced medical personnel to offer quality healthcare services. However, the leadership, management and government are not motivating them to connect and deliver optimal healthcare services. This leads to several medical professionals migrating to where their professional abilities will be appreciated and valued.

This points out that Nigeria has suffered from a massive brain drain of medical personnel, migrating to the international labour market to seek a better work environment. This is a fundamental reason why quality healthcare delivery has become a mirage in Nigeria to achieve. In another paradigm, some patients also travel abroad for medical services because competent experts who ought to provide such required services in Nigeria's medical industry have moved to foreign nations of the world. Brain drain is considered a transnational movement of resources in the form of human capital, which implies the migration of highly

learned and skilled personalities from developing nations to developed countries (Okafor & Chimereze, 2020). Medical personnel brain drain is described as the movement of healthcare physicians searching for a better living and quality of life. It provokes better wages and compensation and a better working environment in a more stable work region and cultural atmosphere (Kadel & Bhandari, 2018). This has adversely affected Nigeria's quality healthcare delivery and made the Nigerian health system experience several setbacks. It is hugely under-resourced when it comes to inadequate personnel and medical infrastructure.

Over the years, the transnational movement of medical doctors, nurses, pharmacists and other medical healthcare-associated personnel from Nigeria has grown beyond normal. This may be connected to poor job satisfaction, poor wages and remuneration, poor income and quality of worklife, among other factors expected from the government to provide to Nigerian medical professionals. The 2018 National Opinion Poll (NOI Poll) disclosed that 88% of Nigerian medical doctors sought better job placement overseas. Also, between 2015 and 2021, over 4,528 Nigerian professional doctors migrated to the United Kingdom (Nweke & Iheonu, 2021). This worrisome trend worsens the present Nigerian falling health system and, by extension, significantly obstructs the quality delivery of healthcare in the country. Perhaps, this may not likely stop, as daily, several medical personnel and physicians persistently seek a better workplace atmosphere outside the shore of Nigeria.

Anecdotal evidence, especially from World Health Organisation (WHO, 2012) narratives, shows that Nigeria is struggling with a doctor-patient ratio of 4 doctors per 10,000 patients and 5 hospital beds per 10,000 patients (Muanya & Onyenucheya, 2021). Given the large population of 200 million citizens in Nigeria, it may likely take over 15 years to produce sufficient physicians to manage the vast population, asserts the Nigeria Medical Association (NMA) (Kareem, 2021). This dreadful situation is part of the issue that prevents quality healthcare delivery, thus leading to poor health outcome in totality. Consistent child and maternal mortality rates are avoidable if enough doctors are eagerly available to work. The relationship between the number of medical personnel and mortality rates occurring in Nigeria has been recorded in the extant literature, demonstrating the poor magnitude of the paucity of doctors in Nigeria's healthcare sector (Rufai, Ogunniyi, Salman, Oyeyemi, & Salawu, 2019; Suleiman & Mikail, 2020). The core reason many physicians move outside Nigeria every day is the industry's lack of funding and inadequate salary compared to other developed countries. The 2021 health expenses denoted only 7% of the national budget. It is less than the 15% approved by African leaders and the WHO in 2001. The NMA reports that nearly 2,000 physicians emigrate to the country in another dimension. The specific number of doctors well-trained in Nigeria and presently practising in the UK soared higher astronomically between July 2020 and May 2021, ranking Nigerian doctors the third greatest in the United Kingdom (Awang *et al.*, 2021). In 2020, a Nigerian physician's most considerable earnings per month were US\$1,365. While in Sierra Leone, a physician takes home as higher as \$2000. Meanwhile, doctors in the United Kingdom, the USA and Saudi Arabia earn ten times higher than Nigerian doctors with a better work environment and retirement benefits (Amorha, Irobi, & Udoh, 2022). This naturally appeals to the sentiment of emigrating Nigerian doctors to these nations. In addition, inadequate equipment in hospitals in Nigeria and poor working conditions foster higher opportunity costs of emigration. Against this background, this study seeks to empirically investigate the rationale behind the brain-drain effect among Nigerian medical personnel in public healthcare systems.

2. Review of literature

The brain-drain challenge has been on for over centuries. Brain-drain syndrome is spurred by several factors such as economic, natural disasters, socio-political variables, family reunited and demographic growth (Carbajal & de Miguel Calvo, 2021). It has a point of concern for

emigrants' countries and brain gain for the immigrant nations. The mass exodus of skilled professional physicians across countries and regions has been a societal challenge worldwide over the years. The incidence is worrisome to developing nations, where healthcare experts notably move to the international market to expect a better life and opportunities. This constant movement of trained healthcare specialists jeopardises the healthcare infrastructures and quality delivery to such a extent of neglecting and putting the healthcare nature of underdeveloped countries, like Nigeria, in danger as obtaining satisfactory expert care from a skilled healthcare workforce becomes an illusion (Atte, 2020).

To synthesize the brain-drain effect in under-developed nations, Adesote and Osunkoya (2018) revealed that for the last 30 years, the African continent as a whole has gradually thrown away skilled workforce to foreign countries. Dohlman, DiMeglio, Hajj, and Laudanski (2019) also established that over 70% of Africa's healthcare professionals were lost to brain-drain malaise. They presently add up to 20% of the professional physicians in foreign nations. Anetoh and Onwudinjo (2020) pointed out that the migration effect of Nigerian doctors, nurses and pharmacists has created huge gaps in the healthcare system delivery of the country such that citizens have no trust in the sector anymore. Studies have established brain drain in the healthcare industry, especially with physicians as push and pull syndrome as drivers of migration choice. In the view of Quartey-Papafio, Islam, and Dehaghani (2021) and Dinbabo and Sergio (2015), push variables are those attributes that evolve within the area of origin, attracting the skilled and experts to move to other nations. While pull attributes are unintentional and voluntary movements that provoke healthcare professionals from the immigrant nation's policies, the push elements are poor career opportunities, inadequate remuneration, poor service condition, decreased job satisfaction, civil unrest and security issues. The pull components are the great demand for healthcare experts in foreign countries (For instance, the need to care for the ageing population), financial benefits, training prospects, career development and enhanced working conditions (Arenas, 2021; Hadj-Abdou, 2020). This is a shred of evidence that this study is rooted in the pull and push theory, which is the next point of discourse.

2.1 Theoretical framework

2.1.1 Pull-push theory. The push and pull theory was one of the theoretical paradigms that grounded this research. Ravenstein (1889) first established this theory; afterwards, it was popularised by Lee (1966). Ravenstein's (1889) perspective on this theory was that individuals and employees would desire to engage in transnational movement due to improved business and industries in a particular region, zones or country due to filling a gap by new immigrants. Some elements attracted employees to migrate to another place where their ability and endowed talent could be possibly utilised and well appreciated. The pioneer authors of the pull-push theory argued that the concept of brain drain has been in existence right from the creation of humanity.

The idea of brain drain is denoted as the stable change in residence for people. Lee (1966) further supported the theory and revealed that migration is discriminatory and provoked by pull and push syndrome (Faridi, 2018). From the perspective of Lee (1966), the intention to migrate is categorised into components connected with the origin, destination, prevailing challenges and individual factors (Urbanski, 2022). Therefore, migration is seen as a wise and discerning choice by the employees to obtain prospects and opportunities not enough in their home country. The push variables are those features of life situations that provoke dissatisfaction with a present individual location; the pull factors are those characteristics of distance places that appeal to employees. The push features responsible for migration include conditions that drive people to abandon their homes. These are classified into economic, social and political variables. The economic factors driven by migration involve inadequate

job opportunities. Ibrahim, Al-Sharif, Satish, Hassen, and Nair (2019) argued that just a few jobs and overpopulation of under-developed nations impact push migration to developed countries (Hatch, 2016). A low standard of living is another element that influences people to migrate to another country for possible better job placement. Individuals decide to migrate to another nation in search of prospects to enhance further their lives and that of their allies and family. Hence, it has been observed that migration to developed countries produces chances for the migrant to better their lives, earn a life they cherish and desire, increase their income and strengthen their market involvement in global space (Ljull, 2017). The pull components of migration are the opposite of push factors. They seem attractive to people in a peculiar work environment. Examples of pull components of a place are employment opportunities and better conditions of living, relaxed availability of land to settle therein, political and religious autonomy, better welfare advantage, improved transportation and communication infrastructure, stress-free environment and security-enabled region. Furthermore, the theory of pull-push is grounded and connected to this present study by succinctly associated with the brain-drain effect of this study and, by extension, negatively affecting the quality delivery of services offered from the immigrant's home country.

2.1.2 Word system theory. The world system theory originated from Wallerstein (1974), who employed historical, sociological and economic perspectives to drive the approach. The theory emphasises the function of history in illustrating the present degree of migration and its effect on cultural values in society. The theory demonstrates that the economic system is categorised into a system that exploits and benefits. It perceives the whole system as a web of global capitalism more excellent than one entity (Lechtner, 2009). The theory prescribes a society with "boundaries, structures, groups, legal direction and rationality" (Wallerstein, 2011, p. 347). The world system theory is characterised by several influential interest groups who persistently seek to modify and transform the system to fit into their ultimate goals and interests. The theory stipulates that even in the struggle for domination, there was never any individual able to achieve the centre permanently.

However, no entity is constantly fighting as one entity needs the other for better support. This means that a system is a co-dependent approach. Several parties need others for protection, shared goods and services, and support (Martinez-Vel, 2001). Furthermore, this theory suggests that one entity needs several other entities for better co-existence and co-value creation. The theory is connected to this study by linking the variables under study, quality of worklife, job satisfaction, improved wages and remuneration. These are parts of the reasons why people migrate to other nations. Ultimately, the receiving country will, in turn, benefit from the robust experience that the migrant is bringing; at the same time, the immigrant will take advantage of a better work environment, quality of worklife, job satisfaction and higher remuneration, among others.

2.2 Conceptual review and hypothesis development

2.2.1 Quality worklife and quality healthcare delivery. Quality of worklife is the extent to which employees in the healthcare field yield both individual and work satisfaction by accomplishing the organisation's aims. Quality of worklife appears to be a multifaceted concept that covers an employee's physical, social, psychological and environmental dimensions. It is the outcome of an investigation that an individual employee conducts by comparing his/her personal needs, hopes, aspirations and expectations with what he/she observes as reality (Storman, Storman, & Maciąg, 2022). The quality of worklife for physicians in the healthcare industry is an all-inclusive and unit-wide programme planned to foster workforce satisfaction, invigorate learning in the workplace and assist people in understanding change and evolution suitably. The concept of desirable quality of worklife to employees is always meaningful if the organisation enables the workforce to achieve

satisfaction from the company's cultural values. [Eche, Eche, and Aronowitz \(2022\)](#) pointed out that quality of worklife among physicians and professional medical care personnel is the degree to which they can satisfy essential individual desires and needs via their experience at work while offering quality healthcare delivery. The desired quality of worklife in Nigerian healthcare and other African countries is not available. That is the factor responsible for why Nigerian professional healthcare service providers lose their most skilled personnel and talented individuals to other nations through migration. Many factors influence the quality of healthcare delivery in the medical field. [Dhir and Dutta \(2020\)](#) asserted that inadequate quality of worklife experienced by physicians and other healthcare workers leads to mistakes at work, accidents and job dissatisfaction among employees in hospitals surveyed recently. The discovery of [Khalid and Urbanski \(2021\)](#), whose study showed that employees' inadequate quality of life pushed many outside the country, is worthy of note. In other words, the lack of quality of worklife among the physicians enabled them to support brain-drain syndrome and search for a better work environment where their expertise will be appreciated and valued. On these premises, we hypothesise that

- H1a.* Poor quality worklife is a predictor of the brain-drain syndrome among medical personnel in Nigeria government healthcare facilities.
- H1b.* Poor quality worklife affects quality healthcare delivery among medical personnel in Nigeria government healthcare facilities.

2.2.2 Poor job satisfaction and quality healthcare delivery. Job satisfaction is a drive that enables an employee to concentrate on the job and help minimise errors in the workplace. Job satisfaction for medical healthcare is essential if a favourable patient outcome must be accomplished. Job satisfaction played an influential role in eliciting positive work behaviour in organisations. [Akinwale and George \(2020\)](#) unravelled the mystery behind nurses' lack of job satisfaction in government tertiary hospitals. They discovered that nurses in the public healthcare sector experience a high level of job dissatisfaction, affecting patients' outcomes and the delivery of nurses' duties. The healthcare workforce deserves to be delighted when working for organisations in Nigeria. Job satisfaction fosters satisfying customers and patients. However, poor job satisfaction among physicians increased turnover and migrated to a better country to obtain desired job satisfaction. This, in turn, decreases the quality of healthcare delivery to people in the public healthcare sector. [O'Connor \(2018\)](#) argued that several factors determine professional healthcare employees' dissatisfaction, including inadequate communication, lack of recognition for their performance and inadequate opportunities for growth, supervision and pay. [Akinyemi, George, and Ogundele \(2022\)](#) posited that inadequate job satisfaction of nurses, doctors and pharmacists in Nigeria pushed most nurses to foreign nations.

Thus, this study hypothesises that

- H2a.* Poor job satisfaction influences brain-drain syndrome among medical personnel in Nigeria government healthcare facilities.
- H2b.* Poor job satisfaction adversely affects quality healthcare delivery among medical personnel in Nigeria government healthcare facilities.

2.2.3 Low wage/poor remuneration and quality healthcare delivery. Wages and employee remuneration are core aspects of motivation that provoke a positive work attitude in the workplace. In some developing countries, like Nigeria, wages and salaries are usually delayed and not provided until the following month before payment is provided to the workforce. That is another paradigm that has become a source of concern for healthcare professional personnel ([Ani, Okpala, Akese, & Obadijah, 2019](#)). As insufficient as the remuneration is, there is usually a delay in the payment of the workforce in Nigeria's public healthcare sector

(Ephraim-Emmanuel, Adigwe, Oyeghe, & Ogaji, 2018). This leads to an incessant industrial strike of doctors and other-related medical healthcare workforce in the industry. This does not apply to medical professionals alone but to all facets of national life in Nigeria (Akinwale & George, 2020). Wages and remuneration have been illustrated as hygiene elements that influence employee motivation, morale and performance (Martin, Jones, Miller, & Johnson-Koenke, 2020). A poor remuneration spurs healthcare personnel to embark on other activities to supplement their pay. Inadequate remuneration for medical employees discourages them from under-deliver in the course of their duty and often drives them to migrate to another country where better pay will be offered (Jeetoo & Jaunsky, 2022). Panagiotakopoulos (2020) argued that increased remuneration and wages in the healthcare industry, job prospects and advanced technology in global space attract healthcare personnel in less-developed countries to migrate. Low wages or poor remuneration has become a bane in the progress of Nigeria's healthcare sector, especially in government public healthcare. Low wages and inadequate remuneration in this industry have pushed the healthcare actors to hold multiple jobs, which negatively affects the quality of healthcare delivery in the sector (Mahmoud, Ekwere, Fuxman, & Meero, 2019). In support of this discourse, Idika (2022) claimed that relatively low wages cause dissatisfaction and demotivation among Nigeria's healthcare workforce. It causes brain drain favouring higher pay jobs opportunity for medical personnel. Therefore, from this explanation, this study proposed a hypothesis that

H3a. Low wage/poor remuneration influences brain-drain syndrome among medical personnel in Nigeria government healthcare facilities.

H3b. Low wage/poor remuneration adversely affects quality healthcare delivery among medical personnel in Nigeria government healthcare facilities.

2.3 Gap in the literature: significant superiority of present study over existing studies

Prior studies have investigated healthcare delivery in various populations and under several variables. The study of Quartey-Papafio *et al.* (2021) has examined supplier selection as essentials to healthcare industry service delivery using a mathematical model to establish suitable supplier that will minimise the error rate. Likewise, the research conducted by Amedari and Ejidike (2021) in Nigeria looked at how to enhance access, quality and efficiency in healthcare delivery through the lens of failed governance approach in the country. In another operating business environment, the recent study of Zeng *et al.* (2022) demonstrated the performance of Kenya's healthcare service delivery from government ineptitude nature through hybrid method. Another more recent study conducted by Amorha *et al.* (2022) established potentials of brain-drain challenges of skilled healthcare employees. It is worthy to establish that none of these studies as recent as they were investigated the personnel brain-drain effect on quality healthcare delivery as this present study. The present study has synthesised the rationale behind poor healthcare delivery in Nigeria from migration of Nigeria healthcare employees. No single study has examined the brain-drain effect along the path of quality healthcare delivery in Nigeria using public health as a study setting.

3. Research methods

3.1 Research design

The study adopted a diagnostic research design to survey the medical personnel in the government hospitals in Lagos State. The choice of using this design is that it assists in investigating the causes of association and relationships in the brain drain syndrome of the Nigerian medical workforce (Bairagi & Munot, 2019). The research design is employed to foster an understanding of the factors that provoked migration among Nigerian physicians

and healthcare workers in government hospitals in Lagos State. Diagnostic research design focuses on discovering associations.

3.2 Population and sample size

The study population comprises Federal Medical Centres, Lagos, Lagos State University Teaching Hospital (LASUTH), Lagos University Teaching Hospital (LUTH), Federal Medical Centre (FMC), Lagos, and National Orthopedic Hospital, Igbobi, Lagos. The medical staff population of LASUTH and LUTH are 3,565 and 2,775, respectively, (Akinwale & Kuye, 2022); FMC, Lagos State population strength is 1,200, and National Orthopedic Hospital, Igbobi, Lagos staff population is 1,250. Therefore, the cumulative population for this study is 8,790. The sample size was derived through a statistical analysis measure called power analysis of sample size determination (Kang, 2015). The formula is offered as follows:

$$n_o = \frac{Nt^2pq}{d^2(N-1) + t^2pq}$$

$$99\% \text{ probability of } t - \text{table value} = 2.57$$

where N = total number of participants in the population,

P = Frequency of sight the event to be investigated,

q = Frequency of absence of event to investigate,

t = Theoretical value found in the “ t ” table at a certain degree of freedom (0.01) and detected error level and

d = Deviation to be made in accordance with the frequency of occurrence of the event (0.05).

$$n_o = \frac{8790 (2.57)^2 * (0.5)(0.5)}{(0.05)^2 (8,790 - 1) + \{(2.57)^2 * (0.5)(0.5)\}} = 627$$

Therefore, for the evenly distributed approach of the questionnaire administration, 157 were administered to each of the hospitals and the total becomes 628.

3.3 Sampling technique

A probability random sampling strategy was used in administering the research instrument among the participants in government hospitals. The choice of using the probability sampling technique enables all the medical personnel in the population to be fully represented in the study. Also, it helps to accommodate all the elements in the study population. Furthermore, the outcome of the probability sampling strategy has been proved to possess high external validity and it has generalisable potential (Creswell & Creswell, 2018).

3.4 Research instrument

A battery of inventory scales was adapted for the physicians, nurses, pharmacists and other related healthcare personnel (X-ray, laboratory, technicians and anaesthesia) actively working in Nigerian public hospitals. The physician Job Satisfaction Scale (JSS) was adapted from Konrad *et al.* (1999). The scale was first administered to Japanese physicians, and it is relevant in every healthcare environment. The scale has eight items which include personal time, clinical administration, working with colleagues and autonomy. The physician quality of worklife scale adapted is from Aydin, Celik, and Ugurluoglu (2011). The study employed the quality worklife

scale developed by [Aydin et al. \(2011\)](#) to evaluate healthcare employees' degree of quality of worklife. The scale includes 6 subscales and 27 items: risks of occupational disease, physical working conditions and work accident (6 items); work discrimination (5 items); continuous development and improvement opportunities (5 items); social integration in the organisation (5 items); work stress and time pressure (3-items) and organisational codes (3 items). Positive items on the scale are scored from (1 – strongly disagree) to (7– strongly agree), while negative items take reversed score. The higher the total score is, the greater the physicians' quality of work life is. The coefficient alpha of the scale shows high consistency and reliability of 0.79. The physician income and remuneration scale were adapted from [Ozaki, Matsumura and Bito's \(2005\)](#) study and the JSS from the Japanese business environment. The scale has 13 dimensions which include autonomy, personal time, patient care issues, global job satisfaction and pay/remuneration, among others. This study only adapted the pay/income dimension of the scale since that is the only aspect relevant for this purpose. Also, the internal consistency of the pay/remuneration dimension is considered valid and reliable with an alpha score of 0.81. The quality healthcare delivery scale adapted was from [Marshall and Hays's \(1994\)](#) psychometric inventory scale of a short version of a 50-item patient satisfaction questionnaire III. The short-form questionnaire contains 18 items, and the seven dimensions are general satisfaction; technical quality; interpersonal manner; communication; financial aspect; time spent with the doctor; accessibility and convenience. The study employed only relevant dimensions to quality delivery in healthcare, which are technical quality, accessibility and convenience. The language of the instrument was in its initial form, the English version. The responses are on seven-point Likert scales with a high internal consistency of coefficient of 0.85. All the adapted scales from various scholars were put together as one research instrument for this study and administered to the physicians, doctors, pharmacists and laboratory technologists in the study population.

3.5 Data analysis technique

The data analysis for this study is the structural equation model (SEM) and artificial neural network (ANN). The justification for using SEM for this study is derived from its powerful and robust multivariate analysis model, which is commonly employed in quantitative studies recently ([Sarstedt et al., 2022](#)). It is an established statistical strategy adopted to investigate and evaluate the interconnection of observed and latent variables. The software for the SEM analysis is AMOS. Akin to conventional regression analysis, but stronger than regression, it analyses the linear causal connection among several sets of variables and concurrently checks for measurement error. SEM is used to evaluate the second-order hypotheses ([H1b](#), [H2b](#) and [H3b](#)) of this study. Also, the rationale for using ANN analysis is the ability of networks of the variable and power to predict the first-order proposed hypotheses of the study developed, ([H1a](#), [H2a](#) to [H3a](#)). It has a high degree of predictive performance tendency, and it can learn and model non-linear and intricate associations, which is essential as many relationships between inputs and outputs are often not linear and complex.

4. Results and data analysis

[Table 1](#) illustrates the demographic profile of the medical personnel within the survey hospitals. It shows that 450 participants were involved in the survey and it ranges from sex of the participants, educational profile, age, work experience with the hospitals and professional length of service in their entire career. The table further shows the hours of medical personnel duty call schedule in the week. It demonstrates the category and hierarchy of the personnel in the hospitals as well as the remuneration of the medical personnel.

[Table 2](#) explains the convergent validity and composite reliability for medical brain-drain, and the quality of healthcare delivery has been accomplished as all values of composite

Profile	Frequency	Percentage (%)	<i>n</i> = 450
<i>Gender</i>			
Male	210	46.7	
Female	240	53.3	
<i>Education</i>			
Bachelors	104	23.1	
Masters	191	42.4	
Professionals	82	18.2	
PhD	73	16.2	
<i>Age</i>			
20–30 years	155	34.4	
30–40 years	159	35.4	
40 years and above	136	30.2	
<i>Work experience with hospitals</i>			
1–5 years	95	21.2	
5–10 years	110	24.4	
10–15 years	96	21.3	
15–20 years	77	17.1	
20 years above	72	16	
<i>Professional length of service</i>			
1–5 years	91	20.3	
5–10 years	109	24.2	
10–15 years	100	22.2	
15–20 years	96	21.3	
20 years above	54	12	
<i>Weekly duty call schedule (hours)</i>			
42 h	113	25.1	
46 h	124	27.6	
50 h	127	28.2	
60 h	32	7.1	
Irregular	54	12	
<i>Medical personnel hierarchy</i>			
Junior staff	70	15.6	
Senior staff	74	16.4	
Management staff	74	16.4	
Supervisor	76	16.9	
Assistant manager	81	18	
Principal director	75	16.7	
<i>Profession</i>			
Physician	82	18.2	
Nurse	68	15.1	
Pharmacist	68	15.1	
X-ray operator	59	13.1	
Medical laboratory operator	59	13.1	
Technician	30	6.7	
Anaesthesia technician	64	14.3	
Record and admin	20	4.4	
<i>Salary/income (annually in Naira)</i>			
1 million	142	31.6	
1–3 million	157	34.9	
3–5 million	107	23.8	
5–10 million	21	4.6	
10 million	23	5.1	

Source(s): Field Survey, 2022

Table 1.
Medical personnel
demographic
characteristics

Construct	Measurement items	β	α	CR	AVE
<i>Physician quality worklife (PQWL)</i>			0.95	0.97	0.78
PQWL1	I communicate well with other physicians in my work-setting	0.89			
PQWL2	My work setting provides career advancement opportunities	0.93			
PQWL3	I feel like there is teamwork in my work setting	0.90			
PQWL4	I have adequate patient care supplies and equipment	0.85			
PQWL5	I feel safe from personal harm (physical, emotional or verbal) at work	0.90			
PQWL6	I feel a sense of belonging in my workplace	0.87			
PQWL7	The system of working hours in healthcare	0.86			
PQWL8	I have the autonomy to make patient care decisions	0.88			
<i>Physician job satisfaction</i>			0.85	0.99	0.60
PJS1	My organisation restricts my freedom in practice	0.65			
PJS2	My work schedule leaves me enough time for my family	0.74			
PJS3	I do not plan on leaving my work for another job	0.75			
PJS4	I am thinking of migrating to another country to practice	0.82			
PJS5	I am not discontent with my current position	0.77			
PJS6	I am proud of my current work	0.84			
PJS7	Overall, I am pleased with my work	0.78			
PJS8	I am satisfied with my career as a physician	0.81			
<i>Poor remuneration/pay</i>			0.9	0.91	0.68
PRP1	My total compensation package is fair	0.92			
PRP2	I am not well compensated given my professional training and experience	0.71			
PRP3	I am not well remunerated compared to physicians in other specialities	0.87			
PRP4	My pay is not satisfactory	0.82			
PRP5	My pay is nothing compared to other healthcare providers in other countries	0.86			
<i>Quality healthcare delivery</i>			0.95	0.96	0.80
QHD1	I think as a doctor and healthcare provider, my office has everything needed to provide complete care	0.89			
QHD2	As a pharmacist, the dispense of drugs is always available and immediately to the patients	0.93			
QHD3	There is easy access for doctors to patients at the right time	0.90			
QHD4	It is always too difficult to provide an appointment for instant medical care	0.89			
QHD5	I offer immediate medical care attention to the patients promptly	0.85			
QHD6	As physicians, I take time to explain the reason for any medical test	0.90			

Table 2.
Convergent validity
and composite
reliability

Source(s): Field Survey, 2022

reliability (CR) are higher than 0.70 and values of average variance extracted (AVE) are higher than 0.5 (Fornell & Larcker, 1981). All the factor loadings of the dimensions of brain drain and quality healthcare delivery are strong, which indicates that the model is fit. Therefore, the CR and convergent validity for brain-drain constructs have been attained

Table 3 presents the intercorrelation properties, reliability and validity of the study research instrument. In order to demonstrate whether the instrument investigates the exact measure, discriminant validity was employed in Table 2, and the validity shows a high value above 0.70 as stipulated by Fornell and Larcker (1981). The table also shows the descriptive statistics of standard deviation and mean statistics, and they are all within the standard measure.

Variable	SD	Mean	PQWL	PJS	PRP	QHD
Poor quality work life (PQWL)	0.63	4.15	(0.88)			
Poor job satisfaction (PJS)	0.68	4.22	0.080	(0.77)		
Poor remuneration/pay(PJP)	0.59	3.79	0.172	-0.013	(0.82)	
Quality healthcare delivery (QHD)	0.65	4.82	0.073	0.157	0.240	(0.89)

Note(s): $p < 0.01$; square root of average variance extracted (AVE) are shown in parentheses indicating discriminant validity; SD: standard deviation

Table 3.
Intercorrelation matrix
items and discriminant
validity

Data analysis of hypotheses (H1a, H2a and H3a) using artificial neural networks (ANNs).

Table 4 shows the neural network model fitness, and it denotes that a 4.7% incorrect prediction error was made on sample training cases regarding the prediction of brain-drain determinants among the medical workforce surveyed. Also, 7.5% error prediction was made on sample testing cases regarding the model, and it shows that the model is highly fit as the error terms were considered minimal. Figure 1 is another illustration that demonstrates a high level of prediction, the blue lines covariate relationship of prediction between the factors produces 17 lines while the grey colour shows 7 lines of non-covariance. Positive predictions were 71 and 43, respectively, for both sample training and testing concerning the variables of interest, on the best fit, that predicted brain-drain syndrome among the participants in relation to quality healthcare delivery. This indicates that the prediction error was largely low, and when this occurs, it then means that the model predicts accurately the variables of interest (Abraham & Rohini, 2018). In the same dimension, Table 5 also illustrates a neural network analysis of the predicted factors of the brain drain showing a consistent and high level of predictive performance concerning the model.

Cases	$n = 450$	%	Positive prediction	Negative error prediction
Training	301	66.9	71.665	0.047 (%)
Testing	149	33.1	43.438	0.075 (%)

Source(s): Field Survey, 2022

Table 4.
Artificial neural
network predictor
model fit/case
processing summary

Table 5 demonstrates that poor job satisfaction is the more important predictor that influences the brain-drain effect among the medical workforce in the surveyed environment given a 34.8% level of prediction at a robust 99.3% degree of normalised importance. It also shows that poor quality of work life is another predictor variable that influences the migration ability of medical personnel in Nigeria at 30.1% given the significant normalised degree of importance at 85.9%. Poor remuneration appears to be another germane factor that shows a higher degree of concern with the level percentage at the degree of prediction importance at 35.1% but shows a high level of normalised importance at a maximum of 100%. In summary, all the identified variables indicate that they are a pointer to brain-drain issues among medical personnel in Nigerian government hospitals. The predictive performance of this analysis indicates that the variables are suitably predicting the brain-drain effect among public healthcare employees.

Therefore, given Table 5, H1a: Poor quality worklife is a predictor of the brain-drain syndrome among medical personnel in Nigeria government healthcare facilities is fulfilled.

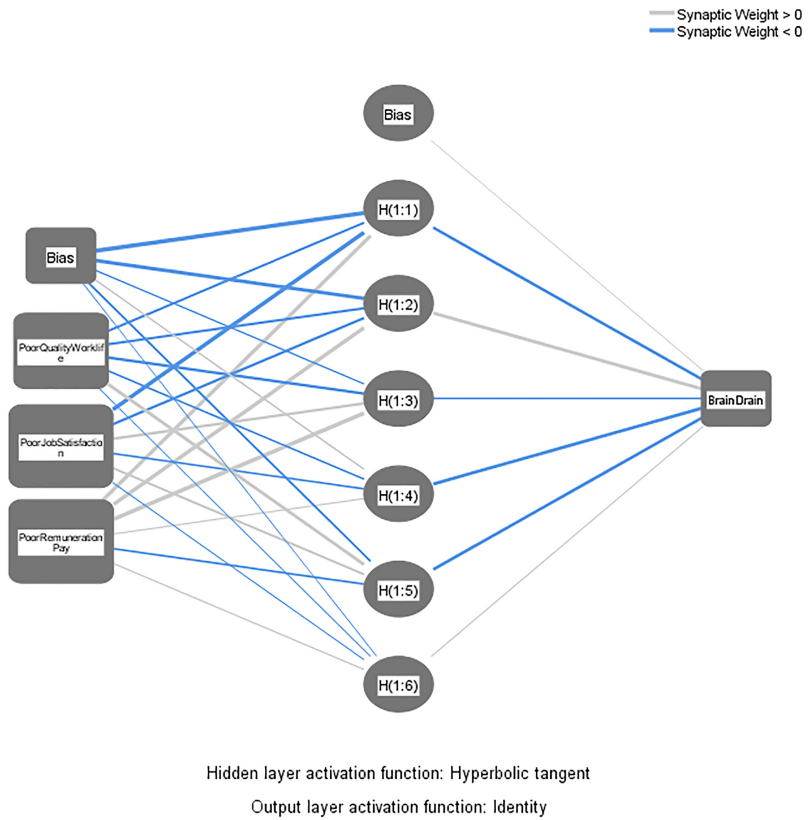


Figure. 1.
Artificial neural
network (ANN)
diagram predicting
brain-drain syndrome
architecture

Factors/variables	Importance/degree of prediction	Normalised importance (%)
Poor quality worklife	0.301	85.9
Poor job satisfaction	0.348	99.3
Poor remuneration/pay	0.351	100

Table 5.
Independent variables
predictor importance

Source(s): Field Survey, 2022

H2a indicates that poor job satisfaction influences brain-drain syndrome among medical personnel in Nigerian government healthcare facilities. Lastly, the prediction that **H3a**: Low wage/poor remuneration influences brain-drain syndrome among medical personnel in Nigerian government healthcare facilities is significant given the analysis offered above.

Analysis of hypotheses (**H1b**, **H2b** and **H3b**) through SEM (see **Figure 2**).

Table 6 illustrates measurement model fitness, which is through confirmatory factor analysis (CFA). It helps to validate and strengthen the model and the instrument. A multivariate normality assumption was fulfilled; thus, there was no issue concerning multivariate normality violation. A maximum likelihood approach of estimation and goodness of fit measures were used to investigate the measurement model fit. CFA adjusts and normalises the theoretical suitability and consistency of the model from the data gathered from the medical personnel. This also helps to further clarify if a SEM can be performed and

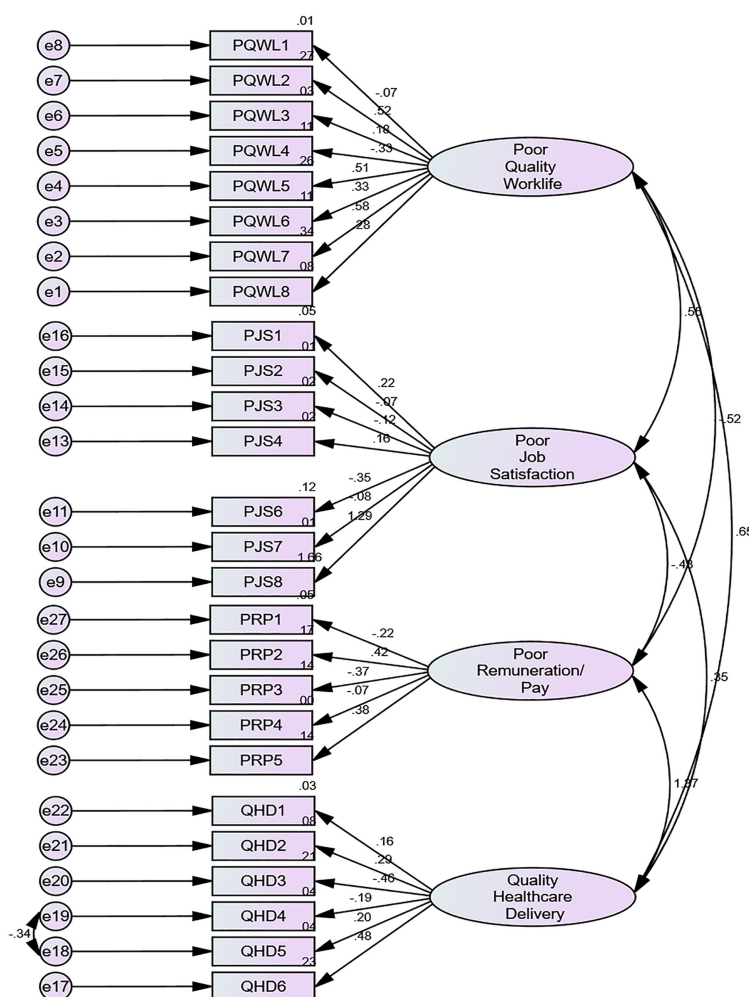


Figure 2. Measurement model fitness (CFA)

Indices	Threshold/good fit	Estimated results	Fitness/accepted
Chi-Square (χ^2/df)	<0.30	2.671	Fit/accepted
RMSEA	<0.50	0.081	Fit/accepted
GFI	>0.90	0.962	Fit/accepted
AGFI	<0.90	0.841	Fit/accepted
CFI	>0.90	0.943	Fit/accepted
TLI	>0.90	0.961	Fit/accepted
NFI	>0.90	0.920	Fit/accepted

Table 6. Summary of measurement model fitness indexes

assess the causal relationship that occurs among observed variables of the postulated hypotheses. Therefore, Table 4 shows the summary explanation of the fitness model of the study. The overall fitness indexes are shown indicating acceptable fit model, given chi-square/degree of freedom (χ^2/df) = 2.671; root mean square (RMSEA) = 0.081; GFI = 0.962;

NFI = 0.92; CFI = 0.943, AGFI = 0.841; TLI = 0.961. The measurement model illustrates a robust level of acceptance of the best fit with the data collected from the participants. These statistics further indicate that the model sustained the view of attaining a fulfilled overall fitness measurement model for all indices (Hu & Bentler, 1999) (see Figure 3 and Table 7).

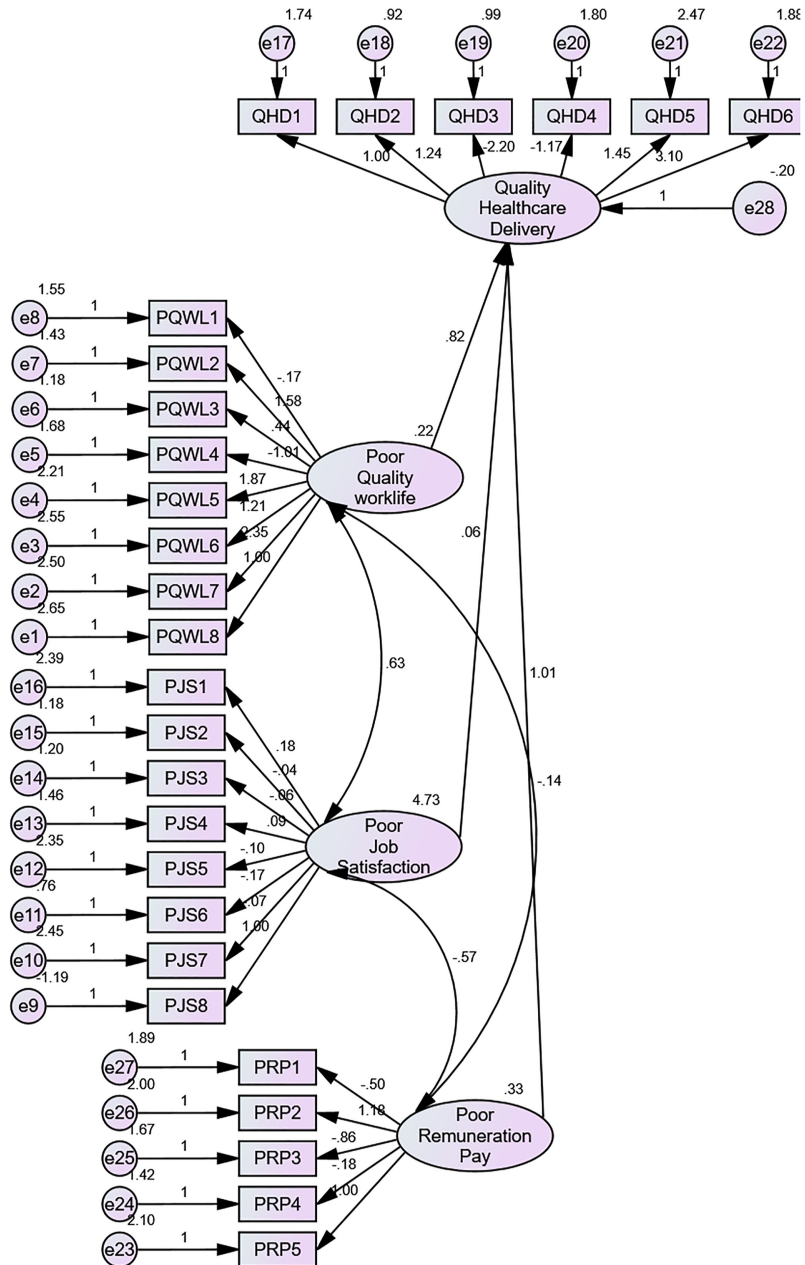


Figure 3.
Structural equation
model analysis

The outcome of the SEM showed that the model got a good fit as the total fitness measure portends excellent values ($\chi^2/df = 2.123$, CFI = 0.965, RMSEA = 0.056, TLI = 0.976 and GFI = 0.954). These statistics were proved to be above the validated threshold as suggested by Bagozzi and Yi (2012). The summary of the hypotheses evaluated in the table revealed that H1b poor quality work life has a significant positive impact on quality healthcare delivery among medical personnel in Nigeria government healthcare facilities with the regression relationship at ($\beta = 0.824, p = 0.005$). This shows that it is significant at ($p < 0.05$). This means that poor quality worklife has indeed affected the quality of healthcare delivery in Nigerian government hospitals. The second phase of the H2b – poor job satisfaction adversely affects the quality of healthcare delivery in government hospitals at ($\beta = 0.60, p = 0.020$). This illustrates that poor job satisfaction experienced by Nigerian medical personnel affected the quality of healthcare offered to citizens. The third phase of H3b – low wage/poor remuneration adversely affects quality healthcare delivery among medical personnel in Nigerian government healthcare hospitals given the level of analysis with an acceptance likelihood value ($\beta = 0.796, p = 0.000$). This shows a direct positive effect. In other words, it is empirically evident that low wage/poor remuneration unfavourably affects quality healthcare delivery among medical personnel in Nigerian government healthcare hospitals.

Hypotheses	Path description	Estimates	SE	CR	<i>p</i>	Acceptance level
H1b	PQWL → QHD	0.824	0.293	2.816	0.005	Accepted/Significant
H2b	PJS → QHD	0.600	0.026	2.295	0.020	Accepted/Significant
H3b	PRP → QHD	0.796	0.303	3.330	****	Accepted/Significant

Note(s): *****p*-value = 0.05

Table 7.
Structural equation
model (SEM) results
from analysis

5. Discussion of findings

From the analysis and evaluation, it is noteworthy to understand that poor quality worklife experienced among healthcare personnel in Nigeria pushed the majority of them to foreign countries where their expertise, experience and ideas would be favourably appreciated. The analysis clarifies that the Nigerian medical workforce is faced with poor and low-quality work life in the course of their duty, and this does not augur well for them. This also, by extension, affects the quality of healthcare delivery offered to the members of the public. It is noble to validate that quality of worklife is paramount not only to the entire workforce of government hospitals in Nigeria but also to everyone in the work environment. One point to ponder for medical personnel is the feeling of unsafe from medical harm that often time occurs in their duty schedule. This happened during the Ebola outbreak in Nigeria, eight years ago, where the very first doctor that received a patient with an Ebola case that was coming from Liberia got infected, which led to the doctor's death. This speaks negative volumes about their quality of worklife as well as the quality healthcare service delivery of this personnel. The finding of this study takes a symmetrical position with the study of Dhir and Dutta (2020) whose outcome of their research indicated the inadequate quality of worklife suffered by physicians and other allied healthcare workforce caused inefficiency and poor quality healthcare service delivery. Also, this study finds a similar posture to the study of Khalid and Urbanski (2021), whose discovery showed that workers' lack of quality of work life pushed many of them outside the country of their domain and promote the brain-drain effect.

The second important aspect of this study outcome is that low and poor job satisfaction experienced by physicians in Nigerian government hospitals is another pointer to inadequate quality healthcare delivery. The study indicates that poor job satisfaction is

experienced as most of them are not enjoying their career as medical personnel in the workplace. Lack of autonomy and restrictions in the practice of professional duty are some of the measures that brought dissatisfaction to Nigerian medical personnel working in government hospitals. Reward and recognition necessary to create a motivational strategy for the professional medical healthcare employees are lacking in greater measure, and this produces work discontentment for the workers. The outcome of this finding takes a similar dimension to the study of [Akinwale and George \(2020\)](#) whose research revealed the high level of job dissatisfaction among nurses in the public health industry in Nigeria was a result of a poor work climate. This is completely affecting patients' outcomes and healthcare excellent service delivery. In another dimension, the outcome of this study substantiates the recent study of [Akinyemi et al. \(2022\)](#) whose findings exposed the ineptitude nature regarding nurses, doctors and pharmacists' lack of job satisfaction, adding that this inadequate job satisfaction pushed the majority of the medical personnel to oversee countries for better job opportunities.

Lastly, another genuine pointer to brain-drain syndrome among Nigerian medical personnel working in the public health sector is poor remuneration and income. Several times, the public health sector has witnessed strike action, whereby the workforce embarked on industrial strike and jettison work. The industrial strike appears to be a strategy to demand an increase in their remuneration and better condition of their services. Every moment, the medical workforce is expressing their displeasure over the poor condition of their work engagement, which is evident in the analysis of this study. This has caused the majority of Nigerian medical workers not only to migrate to another country for higher pay and improved work psychological contracts but also give them the reason for not offering quality service delivery to patients and attendees. This outcome takes a similar position to the recent study of [Idika \(2022\)](#), whose study indicated that low wages and pay are part of the sources of dissatisfaction that demotivate the Nigerian healthcare workforce. The study discovered that poor remuneration promotes brain drain and favours robust pay job prospects for medical personnel. Also, the study of [Mahmoud et al. \(2019\)](#) is in support of the outcome of this present study. [Mahmoud et al. \(2019\)](#) study revealed that poor wages and income in the public health industry have forced medical actors to moonlight, and this adversely affects the patient outcome in the sector.

6. Conclusion and recommendations

Brain drain otherwise called migration is no longer new in the human workspace. It is pervasive across all sectors in Nigeria and human endeavour. It has been in existence long before now, but the reason behind the syndrome is yet to be given full attention by policymakers, management of organisations and governments in their respective domain. This study has unearthed the cogent rationale for the Nigerian medical workforce to migrate to other nations for improved work prospects. Little did government and policymakers alike understand that the migration of workers has a negative impact on the performance and efficiency of the public healthcare sector. This has eroded public interest in Nigerian medical facilities/hospitals in Nigeria today. This is forcing some patients who have financial ability to seek medical attention outside Nigeria as competent and professional medical personnel have left the industry for foreign nations. The core reasons that have driven the medical workforce in the Nigerian public health sector to migrate as evaluated in this study are poor quality of worklife, poor job satisfaction and inadequate remuneration and income. These are essential to mankind if better performance will be accomplished. Therefore, this study concludes that these main reasons and related ones that provoked brain drain among the healthcare workforce should be given the necessary attention in order to provide intervention and possible solutions to manage the incidence.

Also, the study suggests and recommends that the government and management of the Nigerian public healthcare sector should:

- (1) From time to time, government and management of the healthcare facilities should provide a meaningful and conducive work environment that will promote a better quality of worklife among the medical workforce. This will send a signal to the personnel that there is a conducive workspace free from physical harm as an enhanced quality of worklife is essential to attract and retain competent and motivated workers, which by extension leads to improved quality healthcare delivery in the public healthcare sector.
- (2) Government should ensure that adequate and attractive pay and remuneration are offered to the healthcare workforce in the industry and also, the provision of educational benefit packages for their children.
- (3) Government should make it a point of duty to reverse the brain-drain effect by providing substantial research grants and financial incentives, as well as service and support to the healthcare workforce. This will enable the workers to be dedicated to the national course and stimulate excellent quality healthcare delivery.
- (4) International bodies (World Health Organisation (WHO), WMA and Council of International Organisations of Medical Societies) also have an important role play to curb the brain-drain effect across all nations. This is achieved by making a provision on ethical guidelines governing the healthcare practice and international migration. Making a declaration in its ethical standard that any government of any country that maltreats her healthcare workforce will be sanctioned and penalised. This will alert the government to create a better work climate and always do the right thing for the workers.

7. Theoretical implication

In theory, this study has played a significant role by associating world systems theory with patient safety and quality healthcare. The theory indicated that quality healthcare delivery and patient safety is a developing paradigm of the whole healthcare programme. Another implication of the theory is that this theory illuminates that one entity of the entire systems theory needs several other entities of the stakeholders for an improved co-existence and co-value creation.

8. Implication for practice

The practical instance of this study is that when all the practical measures recommended are strictly adhered to, migration and the brain-drain effect will be drastically ameliorated in developing countries and reverse to brain gain, especially in the Nigerian government. Largely, Nigeria needs to improve her political atmosphere in order to boost its healthcare sector and retain the public healthcare workforce.

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