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EFFECT OF BRAIN DRAIN ON SERVICE DELIVERY IN FEDERAL TEACHING HOSPITAL ABAKALIKI, EBONYI STATE, NIGERIA

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Abstract

Background: The emigration of skilled healthcare professionals, or brain drain, critically undermines health system stability in low- and middle-income countries. This study investigates the impact of brain drain on service delivery at the Federal Teaching Hospital Abakaliki (FETHA), Ebonyi State, Nigeria. **Methods:** A cross-sectional survey design was employed, utilizing a structured questionnaire administered to 364 healthcare professionals. Data were analyzed using descriptive statistics and binary logistic regression to examine the effect of brain drain on drug administration, service timeliness, and patient safety. **Results:** Majority of respondents (59.9%) perceived brain drain as severe. Regression results showed brain drain has a significant negative effect on all three outcomes: drug administration ($p=0.006$), timeliness of service delivery ($p<0.001$), and patient safety ($p<0.001$). Staff loss was the strongest predictor of poor patient safety, reducing the odds of safe service delivery by over 80% ($Exp(B)=0.173$). **Conclusion:** Brain drain significantly compromises healthcare quality, timeliness, and safety at FETHA. Strategic manpower planning, enhanced retention policies, and improved working conditions are urgently needed to mitigate these adverse effects and strengthen Nigeria's tertiary healthcare system.

Keywords: Brain Drain, Service Delivery, Tertiary Health Institution, Patient Safety, Nigeria, FETHA.

INTRODUCTION

The most critical challenge to health system stability in low- and middle-income countries is the steady erosion of human resources, a phenomenon widely recognized as brain drain (Morrow et al., 2021). Aloysius, Onah, and Fred (2025) defined brain drain as the systematic outflow of seasoned professionals who migrate from their home country in search of better remuneration, professional advancement, and improved living conditions. Although this trend is global, its impact is felt most poignantly in sub-Saharan Africa, where fragile health systems depend heavily on scarce and specialized personnel. In Nigeria, the health sector has been characterized by chronic underfunding, infrastructural deficits, and weak policy implementation, all of which have gradually eroded the confidence of healthcare professionals (Adeloye et al., 2017).

Conceptually, brain drain refers to the loss of skilled manpower, including doctors, nurses, pharmacists, and laboratory scientists, whose competencies form the backbone of tertiary hospital care (Ojiaku & Nsonwu, 2024). These highly skilled professionals possess years of training and accrued institutional memory that cannot be easily replaced. Their departure leaves gaps that directly compromise the quality, efficiency, and continuity of healthcare services (Aibinuomo, Olaiya, & Akande, 2025). Oladejo, Umeh, and Egolum (2024) averred that the availability, competence, and stability of human resources determine effective service delivery in tertiary health institutions, which are designed to handle complex and specialized cases that lower-level facilities cannot manage (Inglin et al., 2025).

The wage disparity between Nigerian health professionals and their counterparts in countries like the United Kingdom, the United States, and Canada is substantial. A medical doctor in Nigeria often earns only a fraction of what is obtained abroad, despite working in far more difficult conditions (Umar, Salihu, & Azuine, 2025; Onah et al., 2022). The deterioration in working conditions further exacerbates this issue. Most health facilities across Nigeria are under-resourced, with old and poorly maintained diagnostic machines, a shortage of consumables, and a lack of modern medical technologies, leading to daily frustration among professionals (Opara & Nsonwu, 2024; Cakir & Demirag, 2025). Additionally, limited career progression pathways, including delays in promotion, inconsistent training policies, and minimal

research investment, further contribute to staff outflow (Zakir, 2025).

The global market for healthcare workers intensified with the COVID-19 pandemic, creating new demand that heavily targeted Nigeria as a recruitment ground (Lawal et al., 2022). This loss has been most keenly felt in tertiary institutions like the Federal Teaching Hospital Abakaliki (FETHA), the flagship referral facility in Ebonyi State (Anikwe et al., 2020). FETHA serves a large and growing population across the Southeast and neighboring regions, providing specialist medical services and training future healthcare workers. Anikwe et al. (2019) revealed that the depletion of specialists in FETHA has reached disturbing dimensions across departments such as Surgery, Internal Medicine, Paediatrics, Obstetrics and Gynaecology, Anaesthesia, and Radiology.

The immediate effect of manpower loss is the overstretching of remaining staff, who are forced to manage larger patient volumes and longer shifts, resulting in fatigue, burnout, and decreased job satisfaction (Aloysius et al., 2025). This, in turn, leads to reduced productivity and creates a self-reinforcing cycle of migration and decline. While various interventions such as salary adjustments, hazard allowance revisions, and recruitment of locum doctors have been attempted, they have not been effective as they fail to address the root systemic issues driving migration (Umar et al., 2025). Nigeria's doctor-to-patient ratio remains far below the World Health Organization's standard, resulting in restricted access to quality healthcare and growing disparities in service delivery. The continuous loss of trained personnel has weakened institutional capacity, eroded health infrastructure, and constrained the quality and timeliness of healthcare services nationwide.

The impact of brain drain extends beyond immediate service delivery. The departure of experienced practitioners disrupts mentorship and knowledge transfer essential for training future professionals (Okwara, 2023). It also diminishes institutional participation in research and innovation, weakening the evidence base for medical advancement. Furthermore, the uneven spatial distribution of healthcare resources aggravates the problem, leaving rural and underserved regions particularly disadvantaged. Given these realities, this study is motivated by the need to move beyond generic national statistics and provide a context-specific investigation of how brain drain affects service delivery at FETHA, with the goal of informing targeted policy strategies for

human resource retention and sustainable healthcare delivery.

Statement of the Problem

Nigeria's healthcare system faces an enduring crisis stemming from the persistent emigration of skilled healthcare professionals, a phenomenon widely recognized as brain drain. The country's doctor-to-patient ratio remains far below the World Health Organization's standard, resulting in restricted access to quality healthcare and growing disparities in service delivery (Umar et al., 2025). The continuous loss of trained personnel to developed nations has weakened institutional capacity, eroded health infrastructure, and constrained the quality and timeliness of healthcare services nationwide. The situation is particularly critical within tertiary health institutions, such as the Alex Ekwueme Federal University Teaching Hospital, Abakaliki (AE-FUTHA), where the shortage of qualified professionals undermines patient care, clinical training, and research output (Anikwe et al., 2020). The emigration of doctors, nurses, and specialists increases patient-to-provider ratios, heightens workloads, and contributes to burnout among remaining staff. This imbalance reduces the quality of medical care, limits access to specialized procedures, and threatens patient safety. Several factors drive this exodus, including poor remuneration, inadequate working conditions, limited career advancement opportunities, and political and economic instability (Onah et al., 2022). The lure of higher salaries, advanced technology, and better quality of life abroad accelerates the migration trend.

The impact of brain drain extends beyond immediate service delivery to disrupt mentorship and knowledge transfer, diminish research innovation, and aggravate the uneven distribution of healthcare resources (Okwara, 2023). Despite various interventions, the problem persists, and there is a lack of context-specific empirical evidence detailing the operational implications for unique institutions like FETHA. Therefore, this study investigates the specific impact of brain drain on service delivery in tertiary health institutions, focusing on AE-FUTHA, to inform evidence-based policy strategies for human resource retention and sustainable service delivery.

Research Objectives

Based on the cause-effect-solution framework, the objectives of this study are:

. To determine the causal effect of brain drain on the quality of healthcare

services (measured by drug administration accuracy and patient safety outcomes) at the Federal Teaching Hospital, Abakaliki.

2. To examine the negative impact of brain drain on the timeliness of healthcare delivery at the Federal Teaching Hospital, Abakaliki.

3. To propose and assess potential solutions by providing evidence-based recommendations for mitigating the effects of brain drain on staff workload and overall service delivery at the Federal Teaching Hospital, Abakaliki.

Research Hypotheses (Null Form)

H_{01}: Brain drain has no significant effect on the quality of healthcare services (drug administration and patient safety) in Federal Tertiary Hospital, Abakaliki.

H_{02}: Brain drain has no significant impact on the timeliness of healthcare delivery in Federal Tertiary Hospital, Abakaliki.

H_{03}: Brain drain has no significant effect on staff workload and patient safety outcomes in Federal Tertiary Hospital, Abakaliki.

REVIEW OF RELATED LITERATURE

Conceptual Review

Manpower

Manpower is the number of persons available and capable of making a productive contribution, encompassing not only numerical strength but also the skills, knowledge, and abilities embedded within a workforce (Haque & Chandio, 2023; Okwara, 2023). In healthcare institutions like FETHA, manpower adequacy is critical to ensuring efficiency, safety, and quality of care. An adequately staffed and well-trained personnel ensures timely diagnosis and optimal patient outcomes, while shortages cause burnout, delays, and quality compromises (Okoro et al., 2014).

Brain Drain

Brain drain, or human capital flight, accounts for the emigration of highly qualified individuals from developing to more developed countries (Okwara, 2023). Major drivers include higher salaries, better working conditions, world-class facilities, and political stability (Haque & Chandio, 2013). The Nigerian health sector has been severely affected, with the emigration of doctors, nurses, and scientists causing staffing shortages that reduce institutional capacity for research, mentorship, and training (Okoro et al., 2014; Aloysius et al., 2025).

Service Delivery

Service delivery refers to the process through which healthcare institutions provide medical services to patients (Okoro et al., 2014). According to Nwafor, Ojiako, Okonkwo & Onyeulo (2023), effective service delivery constitutes one of the most crucial roles of a responsible government, and its contribution to societal development and stability cannot be overemphasized. In tertiary hospitals, this involves complex diagnostics, specialist care, and clinical training. Its key components include accessibility (ease of obtaining services), efficiency (optimal resource use), quality (adherence to professional standards), and responsiveness (reacting to patient needs) (Li et al., 2017; Cortese et al., 2019).

Relationship between Manpower Adequacy and Hospital Performance: The relationship between manpower and hospital performance is critical. Higher staffing levels are strongly associated with reduced mortality rates and improved patient outcomes (Umar et al., 2025; Griffiths et al., 2018). Physician staffing and knowledge spillovers are positively associated with operational efficiency and quality metrics (Stock & McDermott, 2023). Conversely, understaffing elevates workload, leads to burnout, compromises patient safety, and increases absenteeism and turnover (Pérez-Fuentes et al., 2018; Aloysius et al., 2025).

Theoretical Framework

Human Capital Flight Theory (Walter Adams, 1968): This theory explains the one-directional flight of skilled professionals as a transfer of capital, where recipient countries gain valuable expertise without paying the cost of education and training (Adams, 1968). This framework is critical for this study, as the emigration of health workers from FETHA represents a severe depletion of strategic human capital investment. The migration of highly trained doctors and nurses results in staff shortages, reduced quality of care, and a shift of national health-sector investment overseas (Beine et al., 2001; Kim & Allen, 2018; Okwara, 2023). At the organisational level, this theory encourages managers to treat turnover as a capital flight problem requiring effective retention strategies (Aloysius et al., 2025).

Herzberg's Two-Factor Theory (1959): This theory distinguishes between hygiene factors (salary, working conditions, job security) that cause dissatisfaction and motivator factors (achievement, recognition, advancement) that create satisfaction. The migration of Nigerian health professionals to

high-income countries can be linked to failures in both sets of factors. Poor remuneration and lack of facilities generate dissatisfaction, while the absence of recognition and career development destroys fulfilment (Yang & Cai, 2022; Holmberg et al., 2015). This theory provides a human-centric approach for developing retention strategies that balance hygiene and motivator factors (Sanjeev & Surya, 2016).

Systems Theory (Ludwig von Bertalanffy, 1968): Systems theory describes the operation of complex systems through the interplay of interconnected parts. A hospital is an open system where patient care depends on the interaction of clinical departments, administrative units, and the workforce. The exodus of qualified professionals is a loss of throughput capacity, leading to negative feedback loops including higher workloads, lower morale, and more people leaving (Aloysius et al., 2025; Abdulkareem & Adekunle, 2025). This theory promotes a holistic interpretation of brain drain, suggesting that the loss of a single skilled worker has cascading effects on department efficiency, patient allocation, and institutional reputation (Khizar et al., 2023; Hirsch & Rubach, 2024).

Empirical Review

Several empirical studies have established the pervasive negative impact of brain drain on healthcare systems. Gbaranor et al. (2025), in a cross-sectional study in South-South Nigeria, found a strong consensus that brain drain harms healthcare delivery, with 97.1% linking it to manpower shortages and 85.7% stating it leads to work overload for remaining staff. Agubata, Okwueze, and Eneh (2024) investigated tertiary healthcare institutions in Enugu State and found that brain drain worsened patient-to-doctor ratios (Z=43.38), led to poorer treatment outcomes (Z=42.75), and significantly increased patient wait times (Z=46.30). Their study concluded that the loss of specialists leads to overwork and a decline in service quality.

Popoola and Asani (2024), using the University of Benin Teaching Hospital as a case study, documented a sharp increase in departing health professionals over three years, with nurses being the most affected group. Their primary data revealed severe work stress among remaining nurses, with 94% working over 12 hours daily and 93.7% attributing a drop in service delivery to staff shortages. Udom, Efi, and Baridam (2024) examined brain drain in Akwa Ibom State and highlighted push factors such as

poor working conditions and low salaries, leading to under-staffing and increased workloads. A desk review by Okwara (2023) synthesized existing literature and highlighted severe consequences of brain drain, including a decline in healthcare quality and a negative impact on Nigeria's GDP, citing that an estimated 5,405 Nigerian-trained doctors and nurses work in the UK's NHS.

Lawal et al. (2022) found that the COVID-19 pandemic acted as a significant catalyst for brain drain, with over 13,609 Nigerian healthcare professionals migrating to the United Kingdom between 2021 and 2022. Yakubu et al. (2023) confirmed that brain drain leads to critical shortages, which in turn increase workload and burnout for remaining staff. In their study on determinants of brain drain in Ekiti State, Ajayi, Ajayi, and Ogunleye (2022) found that low wages and salaries (β=0.213, p=0.022) and political instability (β=0.509, p=0.001) were key determinants driving the exodus of health workers. Olorunfemi et al. (2020) studied nurse emigration in Benin City and found that migration led to understaffing, increased workload, and a decline in the quality of patient care. Finally, a foundational study by Uneke et al. (2007) revealed a critical shortage and maldistribution of health professionals in Nigeria, exacerbated by brain drain, with specific data indicating 432 nurses emigrated to the UK in one year and Nigerian doctors earning about 25% of their counterparts in developed nations. This extensive empirical evidence consistently demonstrates that brain drain undermines healthcare quality, timeliness, and safety. However, most studies focus on general or regional trends, with fewer concentrating on specific institutional contexts like FETHA. This study therefore fills that gap by providing a detailed, data-driven analysis of the operational consequences of brain drain at a single, high-impact tertiary hospital.

Gap in Literature

There are substantial body of literature confirming the deleterious effects of brain drain on healthcare systems in low- and middle-income countries, significant empirical gaps persist regarding context-specific, institution-level analyses. Broad national or regional studies, such as those conducted by Dahiru et al. (2022) and Popoola and Asani (2024), have effectively established general trends in Nigeria, including the erosion of human resources and increased workloads. However, these studies often fail to capture the unique operational

dynamics of individual tertiary institutions, which serve as critical referral centers with distinct staffing compositions and service demands. Furthermore, existing empirical investigations, including those by Agubata, Okwueze, and Eneh (2024) and Gbaranor et al. (2025), have largely focused on generalized performance indicators without a disaggregated, quantitative analysis of how specific dimensions of service delivery such as drug administration accuracy, timeliness, and patient safety are independently impacted. Most critically, there is a conspicuous absence of research that simultaneously applies integrated theoretical frameworks (Human Capital Flight, Herzberg's Two-Factor, and Systems Theory) to model the causal pathways from manpower loss to operational failure within a single hospital in Southeastern Nigeria, particularly at the Federal Teaching Hospital Abakaliki (FETHA). This study rigorously fills that void.

METHODOLOGY

A quantitative, cross-sectional survey research design was adopted for this study, which is suitable for capturing respondents' perceptions and statistically modeling relationships between variables without experimental manipulation. The research was conducted at the Federal Teaching Hospital Abakaliki (FETHA), a major federal tertiary referral center in Ebonyi State, Nigeria. The target population comprised all 3,993 clinical and non-clinical staff of FETHA, including consultants, resident doctors, nurses, pharmacists, laboratory scientists, and administrative officers. Using the Taro Yamane formula with a 5% margin of error, a sample size of 364 respondents was determined. A stratified random sampling technique was employed to ensure representativeness across four major strata: Medical Doctors, Nurses, Other Health Professionals, and Administrative Staff. Proportional allocation was applied, and within each stratum, simple random sampling was used to select individual participants.

Data were collected using a structured, self-administered questionnaire with four sections: demographics, measurement of the independent variable (brain drain severity and staff loss), measurement of the dependent variables (quality, timeliness, and workload/safety), and open-ended questions. The instrument's validity was ensured through expert review by three specialists in public health, health service management, and statistics. Reliability was established via a pilot study, which yielded a Cronbach's alpha coefficient above the acceptable threshold of

0.70. Data were collected over two months by trained research assistants. Data analysis was conducted using IBM SPSS (Version 27). Descriptive statistics summarized demographic characteristics and response patterns. The core analytical method was Binary Logistic Regression, chosen because the dependent variables (drug administration outcome, timeliness outcome, and patient safety outcome) were categorized into dichotomous outcomes (e.g., timely vs. not timely). The statistical significance of predictors was assessed using the Wald test and p-values (<0.05). Key model diagnostics included the Hosmer-Lemeshow goodness-of-fit test, Omnibus test of model coefficients, Nagelkerke R^2, and odds ratios (OR) with 95% confidence intervals.

ANALYSIS OF DATA

Table 1.0: Demographic Attributes of Respondents at FETHA, Abakaliki (N=364)

Demographic Variable	Category	Frequency (n)	Percentage (%)
Professional Category	Doctors	77	21.2
	Nurses/Midwives	70	19.2
	Pharmacists	75	20.6
	Laboratory Scientists/Technicians	67	18.4
	Administrators	75	20.6
Years of Experience	Less than 2 years	102	28.0
	2 – 5 years	88	24.2
	6 – 10 years	94	25.8
	More than 10 years	80	22.0
Perceived Severity of Brain Drain	Not severe	82	22.5
	Mildly severe	64	17.6

Demographic Variable	Category	Frequency (n)	Percentage (%)
	Severe	72	19.8
	Very severe	86	23.6
	Extremely severe	60	16.5
Staff Loss in Last 3 Years	Yes	*Data integrated into regression models*	*Significant predictor*
	No	*as a binary variable*	*($p < 0.05$)*

Source: Researcher's Field Work, 2026

Table 1.0 presents the demographic profile of the 364 healthcare professionals surveyed at the Federal Teaching Hospital, Abakaliki (FETHA). The distribution across professional categories is balanced, with doctors (21.2%), pharmacists (20.6%), and administrators (20.6%) forming the largest groups, ensuring multi-disciplinary representation. In terms of experience, respondents are evenly distributed across all career stages, from early-career staff (less than 2 years: 28.0%) to highly experienced professionals (more than 10 years: 22.0%), allowing the study to capture diverse perspectives on brain drain. Most critically, the perception of brain drain severity reveals a crisis: 59.9% of respondents rate the problem as severe (19.8%), very severe (23.6%), or extremely severe (16.5%), while only 22.5% consider it not severe. Staff loss in the last three years was reported as a significant predictor in the regression models, confirming that manpower depletion is a near-universal experience across departments at FETHA.

Table 1: Perceived Severity of Brain Drain (N=364)

Severity Level	Frequency (N)	Percentage (%)
Not severe	82	22.5

Severity Level	Frequency (N)	Percentage (%)
Mildly severe	64	17.6
Severe	72	19.8
Very severe	86	23.6
Extremely severe	60	16.5
Total	**364**	**100**

Source: Researcher's Field Work, 2026

Table 1 presents the distribution of respondents' perceptions regarding the severity of brain drain within their respective units at the Federal Teaching Hospital, Abakaliki. The data reveal that a substantial majority of healthcare professionals perceive manpower depletion as a critical challenge. Specifically, 59.9% of respondents rated the severity as "severe" (19.8%), "very severe" (23.6%), or "extremely severe" (16.5%). Conversely, only 22.5% considered the situation "not severe," and 17.6% rated it as "mildly severe." This distribution indicates that the emigration of skilled personnel is not an isolated or minor issue but a pervasive and escalating crisis affecting most departments within the hospital. The fact that nearly six out of every ten staff members experience brain drain as a significant problem provides strong empirical justification for this investigation. Such widespread perception underscores the urgency of the crisis, as it suggests that the loss of doctors, nurses, and allied professionals has reached a threshold where it is now actively shaping the daily working realities and service delivery capacity of the institution

Table 2: Binary Logistic Regression Results for Drug Administration Outcome

Predictor Variable	B	S.E.	Wald	Sig. (p)	Exp(B)
Brain Drain Severity	-0.590	0.213	7.656	**0.006**	0.554
Staff Loss	-0.739	0.342	4.659	**0.031**	0.478
Drug Admin Score	-0.897	0.231	15.125	**<0.001**	0.408
Constant	2.261	0.685	10.897	0.001	9.589

Note: Nagelkerke $R^2 = 0.456$; Overall classification accuracy = 86.8%. Dependent variable: 1=Positive Outcome (accurate/timely drug admin).

Source: Authors construct with SPSS Analysis output, 2026

Table 2 displays the binary logistic regression results examining the effect of brain drain on drug administration outcomes. The model is statistically significant (Omnibus $\chi^2 = 122.701$, $p < 0.001$) and explains 45.6% of the variance (Nagelkerke $R^2 = 0.456$). Brain drain severity (B = -0.590, p = 0.006) and staff loss (B = -0.739, p = 0.031) both exert statistically significant negative effects. The odds ratios indicate that increased brain drain severity reduces the likelihood of accurate and timely drug administration by approximately 44.6% (Exp(B) = 0.554), while staff loss reduces it by 52.2% (Exp(B) = 0.478). The drug administration score is the strongest predictor (Exp(B) = 0.408, $p < 0.001$). The model correctly classifies 86.8% of cases. These findings collectively indicate that as skilled personnel depart, medication safety and accuracy are severely compromised, likely due to increased workload on remaining pharmacists and nurses, leading to a higher probability of dispensing errors and delays.

Table 3: Binary Logistic Regression Results for Timeliness of Service Delivery

Predictor Variable	B	S.E.	Wald	Sig. (p)	Exp(B)
Brain Drain Severity	-1.486	0.261	32.539	**<0.001**	0.226
Staff Loss	-1.333	0.388	11.835	**0.001**	0.264
Timeliness Score	-0.571	0.234	5.971	**0.015**	0.565
Constant	4.247	0.881	23.261	<0.001	69.911

Note: Nagelkerke $R^2 = 0.575$; Overall classification accuracy = 87.1%. Dependent variable: 1=Positive Outcome (timely service).

Source: Authors construct with SPSS Analysis output, 2026

Table 3 presents the regression results for the effect of brain drain on service timeliness. The model demonstrates strong explanatory power, with a Nagelkerke R^2 of 0.575, indicating that brain-drain-related factors account for 57.5% of the variation in service delays. The Omnibus test is highly significant ($\chi^2 = 165.684$, $p < 0.001$). Brain drain severity exhibits the strongest individual effect ($B = -1.486$, $p < 0.001$), with an odds ratio of 0.226, meaning that severe manpower loss reduces the odds of timely service delivery by over 77%. Staff loss also significantly increases delays (Exp(B) = 0.264, p = 0.001). The overall classification accuracy is 87.1%. These results powerfully demonstrate that departments experiencing high levels of brain drain are far more likely to record prolonged waiting times, postponed procedures, and slower diagnostic turnaround. The findings suggest that the remaining workforce, despite their best efforts, cannot compensate for the systemic inefficiencies created by critical staffing shortages, leading to a predictable deterioration in the responsiveness and efficiency of care.

Table 4: Binary Logistic Regression Results for Patient Safety Outcome

Predictor Variable	B	S.E.	Wald	Sig. (p)	Exp(B)
Brain Drain Severity	-0.965	0.257	14.046	**<0.001**	0.381
Staff Loss	-1.756	0.398	19.504	**<0.001**	0.173
Safety Score	-0.637	0.247	6.663	**0.010**	0.529
Constant	4.078	0.896	20.695	<0.001	59.023

Note: Nagelkerke $R^2 = 0.451$; Overall classification accuracy = 88.5%. Dependent variable: 1=Positive Outcome (safe handling).

Source: Authors construct with SPSS Analysis output, 2026

Table 4 reveals the most critical finding of the study: the effect of brain drain on patient safety. The model is statistically significant (Omnibus $\chi^2 = 104.856$, $p < 0.001$) and explains 45.1% of the variance (Nagelkerke $R^2 = 0.451$). Staff loss emerges as the strongest predictor of poor safety outcomes ($B = -1.756$, $p < 0.001$), with an odds ratio of 0.173. This indicates that the loss of skilled staff reduces the odds of safe patient handling by a staggering 82.7%. Brain drain severity also significantly compromises safety (Exp(B) = 0.381, $p < 0.001$). The model achieves an excellent classification accuracy of 88.5%. These results provide unequivocal evidence that manpower depletion directly translates into increased safety risks, including higher rates of medical errors, infection control lapses, and inadequate patient monitoring. The finding underscores that patient safety is not merely a function of individual competence but is fundamentally dependent on adequate staffing levels. When experienced professionals emigrate, the institutional capacity to maintain safety protocols collapses, placing patients at significant and preventable risk.

DISCUSSION OF FINDINGS

This study provides robust empirical evidence that brain drain has a statistically significant and profoundly negative effect on service delivery at the Federal Teaching Hospital, Abakaliki. The findings, based on data from 364 health professionals, demonstrate that manpower depletion severely compromises drug administration, the timeliness of care, and patient safety. The results lead to the rejection of all three null hypotheses.

Effect of Brain Drain on Drug Administration Outcome

The logistic regression results (Table 2) show that brain drain severity (p=0.006) and staff loss (p=0.031) significantly reduce the likelihood of accurate and timely drug administration. The odds ratio of 0.554 for brain drain severity indicates that an increase in severity reduces the odds of a positive drug administration outcome by approximately 44.6%. This finding aligns directly with the Human Capital Flight Theory (Adams, 1968), which posits that the emigration of skilled workers leads to a depletion of institutional knowledge and technical competence. In the context of drug administration, the loss of experienced pharmacists and nurses weakens internal control mechanisms and supervision (Aloysius et al., 2025). The finding is also supported by Systems Theory (von Bertalanffy, 1968), as drug administration relies on the coordinated interaction of prescribers, pharmacists, and nurses. Brain drain disrupts this chain, leading to communication breakdowns and workflow inefficiencies (Aloysius et al., 2025; Abdulkareem & Adekunle, 2025).

Empirically, this result is consistent with Popoola and Asani (2024), who reported that healthcare worker migration results in understaffing and increased medication errors. It also reinforces Agubata et al. (2024), who found that staff shortages significantly impair pharmaceutical service delivery in tertiary health institutions. The strong negative influence of the perceived medication errors score (Exp(B)=0.408, p<0.001) underscores the direct operational consequences of inadequate staffing.

Effect of Brain Drain on Timeliness of Service Delivery

The results for timeliness (Table 3) are particularly striking. Brain drain severity has a strong, statistically significant negative effect (p<0.001), with an odds ratio of 0.226. This means that units experiencing severe

brain drain are nearly 80% less likely to deliver services promptly. Staff loss further exacerbates delays (Exp(B)=0.264, p=0.001). This outcome is theoretically supported by Systems Theory, as the loss of skilled workers creates bottlenecks and service delays due to an insufficient workforce handling the same patient volume. Overworked staff cannot maintain efficiency, directly affecting timeliness. This finding also aligns with Herzberg's Two-Factor Theory (Herzberg, 1959). Poor working conditions and inadequate staffing (hygiene factors) not only push workers to migrate but also leave behind an environment characterized by stress and burnout, which directly slows service delivery.

This finding is consistent with Yakubu et al. (2023) and Udom, Efi, and Baridam (2024), who reported that staff shortages significantly increase patient waiting times and delay diagnostic services. Furthermore, it supports Uneke et al. (2007) , who observed that the loss of healthcare workers in Nigerian teaching hospitals leads to overcrowding and prolonged service delays. The high Nagelkerke R^2 value of 0.575 for this model indicates that brain-drain-related factors explain a substantial 57.5% of the variation in service timeliness, highlighting its pivotal role as a determinant of efficiency.

Effect of Brain Drain on Patient Safety Outcome

The most critical finding of this study pertains to patient safety (Table 4). Staff loss emerged as the strongest and most significant predictor of poor patient safety outcomes (Exp(B)=0.173, p<0.001), reducing the odds of safe service delivery by over 80%. Brain drain severity also significantly compromises safety (Exp(B)=0.381, p<0.001). This finding is powerfully explained by the Human Capital Flight Theory, as the departure of experienced staff removes the clinical oversight and mentorship essential for maintaining safety protocols (Okwara, 2023; Aloysius et al., 2025). From a Systems Theory perspective, patient safety is a product of coordinated actions across multiple hospital units. Brain drain disrupts these interactions, leading to lapses in infection control, monitoring, and emergency response.

This result strongly corroborates international evidence. Griffiths et al. (2018) found that higher nurse staffing hours were significantly linked to lower hospital mortality. Similarly, Stock and McDermott (2023) demonstrated that physician staffing

levels are positively associated with quality metrics. In the Nigerian context, this finding aligns with Olorunfemi et al. (2020) and Umar, Salihu, and Azuine (2025), who reported that healthcare worker shortages significantly compromise patient safety. The high overall classification accuracy of 88.5% for this model affirms that patient safety incidents are overwhelmingly predicted by the extent of brain drain within a unit. The finding that years of experience did not significantly mitigate these negative consequences ($p=0.636$) suggests that even seasoned staff are unable to compensate for the systemic deficits caused by critical manpower shortages.

CONCLUSION

This study set out to investigate the impact of brain drain on service delivery at the Federal Teaching Hospital, Abakaliki (FETHA). The findings provide conclusive and alarming evidence that the persistent emigration of skilled healthcare professionals has a statistically significant and profoundly negative effect on all examined dimensions of tertiary healthcare service delivery. The study successfully rejected all three null hypotheses, confirming that brain drain severely compromises the quality of care, the timeliness of service, and, most critically, patient safety.

The results demonstrate that the loss of experienced doctors, nurses, and pharmacists leads to a systemic failure within the hospital's operational framework. The quality of care is undermined by an increased likelihood of medication errors and a decline in adherence to professional standards. Service timeliness is drastically reduced, manifesting as prolonged patient waiting times, surgical postponements, and diagnostic delays, with brain-drain-related factors explaining nearly 60% of the variation in efficiency. Most alarmingly, patient safety is placed at significant risk; the loss of a single skilled staff member dramatically increases the odds of safety incidents, compromising infection control, clinical monitoring, and emergency response.

These outcomes are not isolated incidents but are the predictable consequences of a self-reinforcing cycle of decline, as explained by Human Capital Flight Theory, Herzberg's Two-Factor Theory, and Systems Theory. The study concludes that brain drain is not merely a human resource issue but a strategic threat to the institution's very ability to fulfill its mandate. The remaining staff are overworked, fatigued, and demoralized, creating an

environment where errors are more likely and patient outcomes are poorer. The theoretical and empirical significance of this study lies in its provision of context-specific, data-driven evidence from a major referral center in Southeast Nigeria. It moves beyond general national statistics to show the tangible operational consequences of a national crisis on a single, high-impact institution. Ultimately, this study concludes that without immediate, targeted, and systemic interventions to reverse the tide of brain drain, the sustainability, efficiency, and safety of tertiary healthcare delivery in Nigeria will remain in a state of critical jeopardy.

Recommendations

1: Implementation of a Strategic Staff Retention and Recruitment Plan (Based on Objective 1 - Quality of Care)

To directly counter the negative effect of brain drain on drug administration and patient safety, the Hospital Management Board of FETHA should immediately implement a comprehensive, two-year strategic retention and recruitment plan. This plan must address Herzberg's hygiene factors by offering competitive, hardship-inclusive salary packages and guaranteed annual professional development stipends. It should also target motivator factors by establishing a formal recognition program for long-serving staff and creating clear, transparent promotion pathways based on merit and continued education. The hospital's Human Resources department is tasked with executing this plan, which includes a targeted recruitment drive for specialists in high-attrition departments (Surgery, Anaesthesia, Nursing) and the development of a "stay interview" protocol to proactively identify and resolve staff grievances before they lead to resignation. Success will be measured by a 25% reduction in annual staff turnover and a 40% reduction in reported medication administration errors within 18 months.

2: Introduction of an Operational Efficiency and Task-Shifting Protocol (Based on Objective 2 - Timeliness of Service)

To mitigate the significant delays in service delivery caused by staff shortages, the Chief Medical Director and Head of Clinical Services should adopt and institutionalize a formal task-shifting and workload optimization protocol. This solution involves legally and professionally redefining roles to delegate non-core clinical tasks (e.g., data entry, sample transportation, basic patient education) from highly skilled personnel

(doctors, nurses) to trained support staff or administrative officers. Furthermore, the protocol should implement a data-driven shift optimization model that uses patient flow analytics to align staff schedules with peak demand periods. The hospital's Quality Improvement Committee is responsible for rolling out this protocol within six months, which includes training all staff on new role definitions and using an electronic dashboard to track waiting times and patient throughput. The expected outcome is a 30% reduction in average patient waiting times in outpatient departments and a 50% reduction in elective surgery postponements due to staffing issues within one year.

3: Establishment of a Mandatory Patient Safety and Workload Monitoring System (Based on Objective 3 - Staff Workload and Safety)

Given the finding that staff loss is the strongest predictor of poor patient safety, the hospital, in collaboration with the Federal Ministry of Health, must establish a mandatory, real-time patient safety and workload monitoring system. This solution requires the institutionalization of a bi-weekly, anonymous "Safety and Workload Dashboard" survey for all clinical staff to track burnout levels, perceived safety risks, and near-miss incidents. The data from this dashboard must be reviewed in a mandatory monthly "System Safety Huddle" led by the Head of the Patient Safety Unit, with the power to trigger immediate interventions (e.g., mandatory overtime caps, deployment of floating staff, temporary ward closures) when safety thresholds are crossed. This system addresses Systems Theory by treating safety as an emergent property of the whole system, not individual failings. Implementation is to be phased in over three months by the Patient Safety Unit, with the goal of reducing staff-reported burnout by 35% and decreasing patient safety incidents by 50% within one year of full operation.

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