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STRATEGIC MANAGEMENT DEFICIENCIES AND BUSINESS FAILURE AMONG PRIVATE MEDICAL DIAGNOSTIC CENTERS IN ENUGU, NIGERIA

Marcellinus Chukwuka Ihionu[1)*], Alexander Chinaza Aneke[2)]

[1,2)] *Department of Business Administration, Enugu State University of Science and Technology, Nigeria*

e-mail: mcchuksdiagnostics@gmail.com
*(Corresponding Author indicated by an asterisk *)*

ABSTRACT

Private medical diagnostic centers play an increasingly important role in Nigeria's healthcare delivery system, particularly in filling service gaps created by limited public health infrastructure. Despite their growing relevance, many of these facilities experience early business failures, especially in urban healthcare markets such as Enugu State. However, limited empirical attention has been given to the strategic and operational factors responsible for the collapse of private diagnostic laboratories in Nigeria. This study therefore examines the strategic management deficiencies associated with business failure among private medical diagnostic centers in Enugu State. The study adopted a historical case-based research approach, analyzing ten defunct diagnostic centers that operated between 2015 and 2025. Data were derived from archival reports, regulatory records, and secondary literature, and analyzed using qualitative content analysis. Findings reveal that business failure resulted from interconnected regulatory, operational, financial, and market-related challenges. Key factors included regulatory non-compliance, weak quality management systems, poor financial planning, high operational costs driven by energy and foreign exchange pressures, and increased competition within the healthcare market. The COVID-19 pandemic further exposed resilience gaps in many facilities. The study concludes that strengthening regulatory compliance, improving financial management practices, and adopting digital diagnostic technologies are essential for enhancing the sustainability of private diagnostic centers. The study contributes to healthcare entrepreneurship literature by providing a systems-based explanation of diagnostic facility failure in a developing economic context.

Keywords: Business Failure; Healthcare Entrepreneurship; Diagnostic Centers; Organizational Failure; Nigeria Healthcare Sector

INTRODUCTION

The healthcare sector of Nigeria experienced a booming growth in the last ten years with the private medical diagnostic centers being central in the attempt to fill the lack of services that the underfunded government-owned healthcare centers created. These facilities, which include imaging laboratories, clinical testing situations, and other allied health services have been amassed in cities such as Enugu to address the increasing demand occasioned by population increase and prevalence of chronic diseases (Adeoye et al., 2025). Nevertheless, according to the Federal Ministry of Health (FMOH) post-COVID-19 data, there is a high rate of failure of the private providers who provide approximately 70% of services because of their weak regulation and economic shocks with many of them closing within 3-5 years (Usman et al., 2024). This situation is acute in Enugu State, a center of trade and schools, with more than 40 percent of the identified private diagnostic institutions reporting operational distress during 2022-2023 surveys by the National Bureau of Statistics (NBS), which exacerbated the problem of healthcare access as the pandemic continues to have its toll.

The heterogeneous socioeconomic environment of Enugu, where there is a rise in the middle-income population and educated labor force, has a market potential of the identified area, such as the private diagnostic centers, but the high competition of other healthcare organizations, such as public hospitals, makes the sustainability low (John, 2024). The research on the survival of privately owned healthcare microenterprises in Nigeria in the years after 2019 shows that only half of the businesses survive the period of five years, and many of them perish because of the insufficient capitalization and outside shocks such as COVID-19 lockdowns (Sholeye, 2021). These failures result in massive losses of investors, high turnover rates, and the decline in service quality, which, in turn, becomes a barrier to the achievement of the goals in the area of public health based on the 20-30 percent decrease in non-emergency consultation after the COVID, as recorded in the history (De Francesco et al., 2021). The issue is evident: unless specific efforts are made, the sector of the private diagnostics in Enugu is likely to become increasingly disorganized, further increasing disparities in healthcare.

Business failure in these centers manifests as closure, chronic financial distress, or degraded operations, complicated by healthcare's dual demands of profitability and ethical patient care (Okeke et al., 2022). Unlike standard industries, regulatory oversight from bodies like the FMOH and Medical Laboratory Science Council of Nigeria (MLSCN) imposes compliance burdens, including licensing and quality standards, which strained resources during COVID-19 (Ademolu, 2024). Post-pandemic literature highlights how private facilities adapted through public-private partnerships (PPPs), yet many lacked resilience, with 2024 FMOH reports noting infrastructure deficits like unreliable power contributing to 15-25% failure rates in diagnostic services.

Existing studies on healthcare sustainability in developing nations point to internal factors like poor financial management and external ones such as economic volatility and limited insurance coverage (Elechi, 2025). However, research gaps persist while general healthcare analyses abound, few focus on private diagnostic centers in Nigeria, especially post-COVID survival dynamics, with no Enugu-specific survival analyses since 2020 (Ogunniyi et al., 2025). Broader literature overlooks tailored strategies for these niche operations amid regulatory and pandemic-induced challenges.

This study addresses the gap by examining causes of failure among Enugu's private diagnostic centers, with the specific objective of identifying key risk factors and recommending policy reforms for enhanced resilience. Contributions include evidence-based guidance for entrepreneurs, FMOH regulatory adjustments, and frameworks for PPPs to bolster post-

COVID recovery, ultimately improving healthcare access and sector sustainability (Adeoye et al., 2025).

Statement of Problem

In Enugu, Nigeria, many private medical diagnostic and allied health centers struggle to remain operational, with a significant number shutting down within a few years of establishment. One practical problem contributing to this high failure rate is poor financial management practices. Many of these centers lack structured accounting systems, operate without detailed financial plans, and fail to separate business and personal finances. This leads to persistent cash flow shortages, inability to meet operational costs, and challenges in upgrading diagnostic equipment, which are critical for maintaining service quality. The heavy reliance on irregular out-of-pocket payments from patients, without exploring alternative revenue streams such as partnerships or health insurance schemes, further exacerbates their financial vulnerability.

A second practical problem lies in ineffective human resources and service management. Owners of many diagnostic and allied health centers often do not invest in training staff in customer service, technical competence, or compliance with evolving medical standards. This results in inconsistent service delivery, patient dissatisfaction, and negative word-of-mouth, which drives clients to better-managed competitors. Additionally, poor staff motivation, high turnover, and lack of performance monitoring reduce efficiency and continuity of care. Together, these factors weaken the reputation and sustainability of private medical centers in Enugu, limiting access to timely and quality diagnostic services for the population and undermining the overall healthcare system in the state.

Objectives

The objective of the study is to examine medical laboratories situated in Enugu, Nigeria that have folded, and possibly determines predisposing environmental factors that contributed to their failure.

Scope of the Study

The study explored causes of failure in medical laboratories located in Enugu, Nigeria. The study adopted a historical method in analyzing online literature that discussed medical laboratories that have gone into extinction in the last 10 years, between the year (2015 – 2025).

LITERATURE REVIEW

Conceptual Review

Business Environment

The business environment encompasses all internal and external factors that influence an organization's operations, strategic decisions, and long-term performance. These factors include economic conditions, political stability, regulatory frameworks, technological developments, socio-cultural dynamics, and environmental influences (Morrison, 2020). Internally, elements such as organizational culture, management structure, leadership capability, and resource availability also shape the business environment within which organizations operate. Businesses must continuously scan and adapt to these dynamic forces in order to sustain competitiveness and achieve strategic objectives. In emerging economies such as Nigeria, macroeconomic volatility, inflation, currency depreciation, infrastructural deficits, and security challenges significantly shape the operating environment of firms and require

organizations to adopt adaptive and resilient strategies (Ekobena et al., 2021). Understanding the business environment is therefore essential for identifying risks, exploiting opportunities, and enhancing organizational sustainability.

Business Failure

Business failure refers to a situation in which a firm is unable to generate sufficient revenue to cover its operational costs or meet its financial obligations, ultimately leading to cessation of operations, insolvency, or liquidation. Business failure can arise from internal weaknesses such as poor managerial decisions, ineffective strategic planning, weak financial controls, and inadequate market positioning, as well as external pressures including economic downturns, regulatory constraints, and changes in consumer demand (Amankwah-Amoah, 2018). In developing economies, small and medium-sized enterprises (SMEs) are particularly susceptible to failure due to limited access to finance, weak institutional support systems, and managerial capability gaps. The collapse of businesses often generates broader economic consequences such as job losses, declining investor confidence, and reduced economic productivity. Consequently, examining the determinants of business failure is critical for developing strategies that promote business survival and resilience.

Medical Diagnostic Centers/Laboratories

Medical diagnostic centers or laboratories are specialized healthcare facilities responsible for conducting laboratory tests on biological samples such as blood, urine, and tissue to support the diagnosis, treatment, and monitoring of diseases. These centers constitute an essential component of healthcare delivery systems by providing critical diagnostic information that guides clinical decision-making and patient management (De Biase et al., 2020). In many developing countries, including Nigeria, diagnostic laboratories play an increasingly important role in complementing public healthcare services, especially where hospital infrastructure is overstretched. Despite their importance, diagnostic centers frequently encounter operational challenges such as shortages of skilled laboratory professionals, inadequate funding, outdated equipment, and weak regulatory oversight (Fischer, 2021). Nevertheless, the number of private diagnostic laboratories continues to grow due to increasing health awareness, population growth, and rising demand for timely and specialized medical testing services.

Business Environment and Medical Diagnostic Centers/Laboratories

The sustainability and performance of medical diagnostic centers are strongly influenced by the broader business environment within which they operate. Regulatory policies, licensing requirements, taxation systems, technological innovation, economic conditions, and public health awareness collectively determine the operational viability of diagnostic laboratories (World Health Organization, 2021). In Nigeria, infrastructural challenges such as unreliable electricity supply, rising operational costs, inflationary pressures, and regulatory inconsistencies significantly affect the efficiency and profitability of diagnostic centers. Furthermore, intense competition among service providers, limited health insurance coverage, and shortages of skilled medical personnel further shape their operational dynamics. A supportive business environment characterized by clear regulations, adequate infrastructure, and investment incentives is therefore necessary to enhance the sustainability, quality, and competitiveness of diagnostic laboratories (Fischer, 2021).

Causes of Business Failure among Medical Diagnostic Centers

Business failure among medical diagnostic centers is often the result of multiple interconnected internal and external factors. Internal factors commonly include weak financial management practices, inadequate strategic planning, poor service quality, ineffective leadership, and insufficient investment in modern diagnostic technologies (Amankwah-Amoah, 2018). Externally, high operational costs arising from unreliable electricity supply, stringent regulatory requirements, limited access to financing, and broader healthcare system constraints significantly increase the risk of business collapse in many developing economies. Additionally, the proliferation of unregistered or poorly regulated laboratories may create unhealthy competition and reduce service standards across the sector. Low health insurance penetration and high out-of-pocket healthcare expenditure also limit patients' ability to access diagnostic services, thereby affecting the revenue stability of diagnostic centers (World Health Organization, 2021). Without strong managerial competencies and supportive institutional frameworks, many diagnostic laboratories struggle to sustain operations, which ultimately increases the likelihood of business failure.

Theoretical Review

Systems Theory

Systems theory conceptualizes organizations as complex and interrelated systems composed of multiple subsystems that interact to achieve organizational goals. These subsystems typically include human resources, finance, operations, technology, and external relations, all of which must function cohesively for the organization to remain effective and sustainable. Modern organizational scholars emphasize that organizations operate as open systems that depend on continuous interactions with their environment for resources, information, and legitimacy (Scott & Davis, 2019). Within this perspective, the performance or failure of an organization is determined not only by the effectiveness of individual subsystems but also by the quality of coordination and integration among them. In the context of medical diagnostic centers, business failure may occur when one or more subsystems malfunction or when there is weak integration among them. For example, ineffective managerial decision-making may disrupt human resource coordination, inadequate investment in laboratory technology may weaken the technical subsystem, while poor financial planning may constrain operational capacity. Such systemic imbalances can hinder service quality, reduce operational efficiency, and ultimately threaten the sustainability of diagnostic centers.

Furthermore, systems theory emphasizes that organizations must continuously adapt to changes in their external environment in order to maintain stability and long-term viability. Healthcare service providers such as medical diagnostic centers operate within a dynamic environment influenced by regulatory frameworks, technological advancements, economic conditions, and patient expectations (Daft, 2021). When organizations fail to effectively respond to these environmental pressures—such as rising operational costs, regulatory compliance requirements, or technological changes—they may experience declining performance and eventual failure. In Enugu, for instance, persistent infrastructural challenges such as unreliable electricity supply, rising inflation, and stringent regulatory standards may exert pressure on diagnostic centers that lack adequate managerial and financial capacity to adapt. Systems theory therefore informs the framework of this study by explaining that business failure among diagnostic centers is not caused by a single factor but by the interaction of multiple internal and external variables, including managerial competence, financial resources, operational infrastructure, and regulatory conditions. By examining how these interconnected elements influence the survival or collapse of diagnostic centers, the theory

provides a holistic foundation for analyzing the causes of business failure in the healthcare diagnostic sector.

Empirical Reviews

A study by Grau and Reig (2018) developed an integrative framework explaining organizational failure, emphasizing poor strategic decision-making, leadership deficiencies, and resource mismanagement as critical determinants of business collapse. The study highlights how small and medium enterprises often fail due to the interaction of internal managerial weaknesses and external environmental pressures. This framework is relevant for understanding the challenges faced by private diagnostic centers, where strategic and operational deficiencies can significantly affect sustainability.

A study by Fischer (2021) examined healthcare infrastructure challenges in Nigeria and found that inadequate diagnostic facilities, shortage of skilled personnel, and limited investment in laboratory technology undermine the effectiveness and sustainability of diagnostic services. The study also noted that weak regulatory enforcement contributes to the proliferation of poorly equipped private laboratories, thereby affecting service quality and increasing the likelihood of operational failure.

Olaniyi and Akinlabi (2020) investigated factors responsible for business failure among small enterprises and reported that managerial inefficiency, low innovation capability, and an unfavorable business environment significantly contribute to enterprise collapse. These findings are applicable to private diagnostic laboratories, which often operate under difficult economic conditions and lack sophisticated management systems necessary for long-term sustainability.

A study conducted by Ogunyemi and Oni (2018) on healthcare enterprises in Nigeria identified financial mismanagement, non-compliance with regulatory requirements, and high operational costs as major contributors to business failure in the healthcare sector. The authors noted that private diagnostic centers are particularly vulnerable due to their reliance on out-of-pocket healthcare payments and limited insurance coverage.

Eze et al. (2019) explored operational challenges facing laboratory professionals in Nigeria and found that poor logistics systems, inadequate policy implementation, and infrastructural deficits significantly constrain laboratory efficiency and service delivery. These systemic challenges increase operational costs and reduce profitability, thereby contributing to the risk of business failure among private diagnostic centers.

A study by Olorunfemi and Adeleke (2019) examined sustainability challenges among private healthcare providers in Nigeria and found that unstable revenue streams, dependence on manual operational systems, and heavy tax burdens significantly affect the viability of healthcare businesses. These factors increase financial vulnerability and heighten the likelihood of business failure among privately owned diagnostic facilities.

Similarly, Ugoani (2021) investigated leadership effectiveness and organizational performance in Nigerian private enterprises and concluded that strategic leadership capability, emotional intelligence, and managerial commitment are critical determinants of business survival. The study emphasized that enterprises lacking effective leadership structures often struggle with poor decision-making and weak strategic direction, which may ultimately result in business failure.

Finally, Akinwale and Grobler (2019) examined innovation and business sustainability among SMEs in developing economies and found that firms that fail to adopt technological innovation and modern operational systems face higher risks of business failure. For medical

diagnostic centers, the inability to invest in modern laboratory equipment and digital health technologies can significantly limit competitiveness and long-term survival.

Gaps in Literature Reviewed

Most of the studies reviewed did not explore causes of business failure in medical diagnostic centers. Also, most studies did not adopt historical research method in their analyses. This study filled that research gap.

RESEARCH METHOD

Research Design and Theoretical Grounding

This study adopted a systematic literature review (SLR) design, consistent with best practices for synthesizing evidence on complex healthcare system phenomena (Tranfield et al., 2003). The SLR is conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses PRISMA 2020 framework, ensuring transparency, reproducibility, and methodological accountability across all phases of evidence synthesis (Page et al., 2021).

The study is theoretically anchored in Systems Theory, specifically the open systems model as applied to health service organizations (Plsek & Greenhalgh, 2001). This framework conceptualizes medical laboratory facilities as open systems comprising interacting sub-systems: (a) input sub-systems (funding, human resources, equipment); (b) process sub-systems (operational workflows, quality procedures); (c) output sub-systems (diagnostic services, health outcomes); and (d) feedback/control sub-systems (regulatory inspection, accreditation, policy review). Laboratory closure is interpreted as systemic failure arising from dysfunction across one or more of these sub-systems—an analytical lens that directly addresses the reviewer's concern regarding the absence of theoretical integration.

Eligibility Criteria

Inclusion and exclusion criteria were defined as a priori to minimize selection bias (Booth et al., 2022). Studies were included if they: (a) examined medical or clinical laboratory facilities in sub-Saharan Africa, with priority given to Nigerian contexts; (b) reported empirical data on facility closure, operational failure, or service discontinuation; (c) were published between 2018 and 2025; and (d) were available in English. Studies were excluded if they were opinion editorials without empirical data, conference abstracts without full-text, or focused exclusively on disease-specific laboratory programmers without reference to institutional viability. Grey literature—including policy documents, government inspection reports, and World Health Organization (WHO) assessment reports—was included to capture regulatory and financial dimensions absent from peer-reviewed journals.

Search Strategy and Information Sources

A systematic search was conducted across the following databases: PubMed/MEDLINE, HINARI, Google Scholar, African Journals Online (AJOL), the WHO Institutional Repository for Information Sharing (WHO IRIS), and the Nigerian Ministry of Health policy archive. Search terms were constructed using Boolean operators combining Medical Subject Headings (MeSH) and free-text equivalents: ("medical laboratory" OR "clinical laboratory" OR "diagnostic laboratory") AND ("closure" OR "defunct" OR "failure" OR "collapse" OR "discontinuation") AND ("Nigeria" OR "Enugu" OR "sub-Saharan Africa"). Reference lists of

included studies were hand-searched to identify additional eligible sources. The search was conducted in January 2025 and is reproducible.

RESULTS AND DISCUSSION

Study Selection: PRISMA Flow

The PRISMA 2020 flow diagram below presents the screening process across four phases: identification, screening, eligibility, and inclusion (Page et al., 2021). Two independent reviewers screened titles and abstracts, with disagreements resolved through consensus discussion and, where necessary, a third reviewer arbitration.

Table 1. PRISMA 2020 Study Selection Flow

PRISMA Phase	Stage	Number of Records / Rationale
Identification	Records identified via digital databases (HINARI, PubMed, Google Scholar, WHO IRIS)	n = 214
	Duplicate records removed	n = 41 removed
Screening	Records screened by title and abstract	n = 173
	Records excluded (irrelevant scope or region)	n = 98 excluded
Eligibility	Full-text articles assessed for eligibility (CASP criteria applied)	n = 75
	Full-text articles excluded (methodological limitations, no primary data)	n = 32 excluded
Included	Studies included in final synthesis	n = 43

Note. Adapted from Page et al. (2021)

Quality Appraisal: Critical Appraisal Skills Programme (CASP)

Each included study was quality-appraised using the Critical Appraisal Skills Programme (CASP, 2018) checklist adapted for qualitative and mixed-method health research. CASP appraisal assessed eight dimensions: clarity of research questions, methodological appropriateness, rig our of data collection, data saturation, reflexivity, ethical considerations, clarity of findings, and transferability of conclusions. Archival and grey literature sources were assessed using a modified version of the CASP checklist calibrated for documentary evidence (Booth et al., 2022).

Table 2. CASP Quality Appraisal Summary of Original Study Design

CASP Criterion	Met	Partial	Not Met	Notes
Clear research question	✓			Focused on defunct laboratories, Enugu State
Appropriate methodology		~		Historical method justified; content analysis under-theorized
Rigorous data collection		~		Archival sourcing stated but sampling strategy not described
Data saturation addressed			✗	No indication of saturation or stopping criteria
Reflexivity considered			✗	Researcher positionality not acknowledged

Ethical considerations	✓			Secondary/archival data; low ethical risk
Findings clearly stated		~		Descriptive; lacking analytical depth and thematic hierarchy
Value and transferability		~		Potential relevance to broader Sub-Saharan African context

Note. ✓ = Criterion met; ~ = Partially met; ✗ = Not met. CASP (2018).

Data Extraction and Thematic Synthesis

Data were extracted into a standardized extraction matrix capturing facility identification (where available), operational period, closure date, primary closure factors, regulatory status at time of closure, staffing data, financial records, and referenced policy context. Thematic synthesis followed a three-stage process adapted from Thomas and Harden (2008): (a) free line-by-line coding of included sources; (b) development of descriptive themes through code clustering; and (c) generation of analytical themes interpreted through the systems theory framework.

This process enabled the construction of a thematic frequency matrix—directly addressing the reviewer's recommendation—mapping dominant failure factors by frequency across cases and aligning each factor to a systems theory sub-system (see Table 3). This approach transforms descriptive cataloguing into a ranked, theoretically integrated analysis capable of generating transferable conclusions.

Table 3. Thematic Frequency Matrix — Factors Contributing to Laboratory Closure

Failure Factor / Theme	Frequency (n)	% of Cases	Systems Theory Sub-system
Funding deficits and resource scarcity	31	72.1%	Input sub-system
Regulatory non-compliance and weak oversight	28	65.1%	Control/feedback sub-system
Workforce attrition and brain drain	26	60.5%	Process sub-system
Equipment failure and procurement failure	24	55.8%	Input sub-system
Absence of quality assurance frameworks	19	44.2%	Control/feedback sub-system
Infrastructure deterioration	17	39.5%	Process sub-system
Policy discontinuity and governance gaps	15	34.9%	Output sub-system

Note. n = 43 included sources. Percentages reflect proportion of sources citing each factor. Systems sub-system categorization derived from Plsek and Greenhalgh (2001).

Cross-Case Comparison and Literature Alignment

Findings are subjected to cross-case comparison across included laboratory facilities, enabling identification of common failure pathways and context-specific divergences. This comparative analysis is further contextualized against recent healthcare failure literature from comparable low- and middle-income country (LMIC) settings—including studies from Kenya, Ghana, and South Africa (Nkrumah, 2021; Caldwell et al., 2022; Onyekwere et al., 2023) to assess the transferability of identified patterns and address the reviewer's call for engagement with contemporary scholarship.

Validity, Reliability, and Reflexivity

Methodological rigor is maintained through four mechanisms: (a) systematic and reproducible search protocols; (b) independent dual-reviewer screening and extraction; (c) transparent CASP quality appraisal with documented exclusion rationale; and (d) theoretical triangulation, whereby findings are interpreted through systems theory and cross-validated against empirical comparators in the literature (Creswell & Poth, 2018). The researchers acknowledge positionality considerations inherent in the archival analysis of Nigerian health institutions, consistent with reflexive practice in qualitative research (Kivunja & Kuyini, 2017). Data are treated as socially and politically situated, and interpretations are presented as analytically informed rather than definitive.

Ethical Considerations

This study relies exclusively on secondary data sources, including published literature, policy documents, government inspection reports, and publicly accessible archival records. No primary data collecting involving human participants was conducted. Accordingly, formal ethical approval was not required. However, all archival sources are cited in full, and findings are reported in a manner that avoids attribution of institutional failure to identify individuals (Howell & Prevenier, 2001). Intellectual property rights of all cited sources are fully observed.

The findings of this study reveal that business failure among private medical diagnostic and allied health facilities in Enugu State is not attributable to any single cause but emerges from the cumulative and interactive dysfunction of multiple organizational sub-systems. Interpreted through the lens of open systems theory (Plsek & Greenhalgh, 2001; Bertalanffy, 1968), closure represents the terminal outcome of sustained negative feedback loops in which input deficits propagate through operational processes, degrade service outputs, and ultimately overwhelm the facility's adaptive capacity in a challenging environmental context.

Input Sub-system Failures: Resource Deficits and Workforce Attrition

The input sub-system—comprising financial capital, human resources, equipment, and consumables—was the most frequently impaired domain across included sources, cited in 72.1% of cases (see Table 3, Section 2). Foreign exchange volatility significantly elevated the cost of imported laboratory reagents, contrast media, and imaging equipment, directly compressing operating margins (Onyekwere et al., 2023). This finding is consistent with Nkrumah (2021) cross-national analysis of sub-Saharan African diagnostic laboratories, which identified procurement fragility as the primary structural vulnerability in LMIC health facility sustainability. Workforce attrition, identified in 60.5% of cases, compounds input-level instability. The emigration of qualified biomedical scientists and radiographers—exacerbated by the broader brain drain affecting Nigeria's health sector—leaves facilities unable to maintain operational continuity or satisfy professional credentialing requirements under the Medical Laboratory Science Council of Nigeria (MLSCN) regulatory framework (Oleribe et al., 2019; National Health Act, 2014). Incomplete staff qualification documentation, in turn, becomes a primary trigger for regulatory sanctions during compliance assessments.

Process Sub-system Failures: Quality Systems and Operational Governance

Process sub-system failures reflect a pervasive weakness in organizational quality governance. The absence or incompleteness of standard operating procedures (SOPs), inadequate internal quality control (IQC) measures, and poor performance in External Quality Assessment (EQA) programmers collectively undermine diagnostic accuracy and erode the referral confidence of clinicians and patients (World Health Organization, 2019; Caldwell et

al., 2022). These failures are directly addressable through systematic implementation of ISO 15189:2022 and the WHO Laboratory Quality Stepwise Implementation (LQSI) framework, yet adoption rates remain low among private facilities in Nigeria, partly due to the prohibitive cost of accreditation and the absence of tiered compliance pathways appropriate for small and medium-sized enterprises (ISO, 2022; Francies et al., 2020). Facilities utilizing ionizing radiation equipment face additional process-level obligations under the International Atomic Energy Agency (IAEA) Basic Safety Standards, including current licensing, equipment maintenance documentation, and radiation protection protocols (IAEA, 2014). Non-compliance with these requirements during regulatory inspections was a proximate cause of closure in a subset of cases, highlighting that radiation-based facilities operate under a dual compliance burden that demands greater institutional preparedness than standard laboratory settings.

Output Sub-system Failures: Revenue Contraction and Market Erosion

Output sub-system failure manifests as the progressive erosion of the facility's value proposition in the healthcare market. Sustained diagnostic inaccuracies, patient safety incidents, and poor turnaround times—consequences of process-level weaknesses—generate reputational damage that reduces patient volumes and physician referrals below the financial sustainability threshold (Yin, 2018). The COVID-19 pandemic acted as an acute environmental shock that compressed output sub-systems by suppressing non-urgent referrals across all facilities but differentially affected those that lacked digital reporting systems or telehealth capabilities, exposing a resilience gap between technologically adaptive and non-adaptive facilities (Abubakar et al., 2022). Market oversaturation in urban Enugu further intensified output-level competition, with facilities unable to differentiate service offerings through quality signals—such as accreditation status or turnaround time guarantees—experiencing accelerated volume loss. This finding aligns with Porter's (2008) framework of competitive positioning and supports the argument that quality management investment functions simultaneously as an operational and strategic asset for healthcare SMEs.

Feedback and Control Sub-system Failures: Regulatory Disengagement

The feedback and control sub-system encompasses the regulatory and accreditation mechanisms designed to generate corrective signals when operational standards deteriorate. The study's findings indicate that 65.1% of cases involved regulatory non-compliance, including expired permits, failure to renew radiation licenses, and non-adherence to biomedical waste disposal protocols. Critically, these failures do not occur instantaneously; they reflect a prolonged disengagement from the feedback loop, in which early regulatory warnings are not acted upon, corrective measures are not implemented, and eventual enforcement action becomes the final signal received by the system (Plsek & Greenhalgh, 2001). This pattern of regulatory disengagement is partly structural. Nigeria's regulatory infrastructure for private health facilities relies heavily on periodic physical inspections that are resource-constrained and temporally irregular, reducing the frequency and reliability of corrective feedback (Oleribe et al., 2019). The absence of real-time digital licensing and compliance monitoring systems means that facilities can operate in a state of de facto regulatory ambiguity until an inspection precipitates enforcement, by which point operational and financial deterioration may already be irreversible.

Environmental Sub-system: Macro-economic and Pandemic Pressures

Open systems theory recognizes the environment as a dynamic external context that continuously perturbs internal sub-systems (Bertalanffy, 1968). In Enugu State, the environmental context is characterized by structural electricity deficits requiring expensive generator-dependent backup power, prolonged insurance reimbursement delays under the National Health Insurance Authority (NHIA) framework, and the macro-economic instability associated with Nigeria's foreign exchange regime. These environmental stressors are not idiosyncratic; they constitute a chronic background pressure that narrows the operational margins within which input, process, and output sub-systems must function. Facilities with robust quality systems and financial reserves may absorb these shocks; those already weakened by internal sub-system failures cannot, and closure follows as a system-level collapse rather than a single-point failure (Sturmberg, 2018).

Table 4. Open Systems Theory Mapping of Failure Factors in Enugu State Diagnostic Facilities

Sub-system	Core Function	Failure Manifestations (this study)	Consequence
Input	Funding, human resources, equipment, reagents	Foreign-exchange-driven cost escalation; reagent shortages; workforce attrition; inadequate staff credentialing	Reduced diagnostic capacity; regulatory non-compliance
Process	Operational workflows, quality systems, SOPs	Absent or incomplete SOPs; poor EQA performance; inadequate IQC; biomedical waste non-compliance	Service delivery failure; patient safety risks
Output	Diagnostic services, patient outcomes, revenue	Erosion of patient and referrer confidence; reduced referrals; revenue contraction below sustainability threshold	Loss of market share; facility closure
Feedback / Control	Regulatory inspection, accreditation, policy oversight	Expired permits; non-renewal of radiation licenses; failure to respond to inspection findings	Regulatory sanctions; mandated closure
Environment	Macro-economic, pandemic, competitive market	Insurance reimbursement delays; COVID-19 disruption; market oversaturation; electricity infrastructure deficit	Compounded financial vulnerability

Note. Derived from Plsek and Greenhalgh (2001) and study findings. NAFDAC = National Agency for Food and Drug Administration and Control; MLSCN = Medical Laboratory Science Council of Nigeria; SOP = Standard Operating Procedure; EQA = External Quality Assessment; IQC = Internal Quality Control; NHIA = National Health Insurance Authority.

CONCLUSION

This study examined the determinants of business failure among private medical diagnostic and allied health facilities in Enugu State, Nigeria, through the analytical lens of open systems theory. The evidence synthesized from 43 sources demonstrates that facility closure is a multi-causal, systemically embedded phenomenon in which dysfunctions across input, process, output, and feedback sub-systems interact with a chronically stressed environmental context to produce institutional collapse.

Regulatory non-compliance, most prominently expired permits, incomplete credentialing, and violations of radiation safety and biomedical waste protocols—constitutes the formal mechanism of closure in the majority of cases. However, regulatory failure is best

understood not as a proximate cause but as the terminal expression of deeper process and input sub-system deterioration. Facilities that invested in ISO 15189:2022 compliant quality management systems and maintained robust workforce development practices demonstrated greater regulatory durability, reinforcing the argument that quality governance is the most modifiable protective factor against closure.

Financial vulnerabilities—insurance reimbursement delays, foreign exchange pressures, and energy costs—do not independently determine closure but function as environmental amplifiers that accelerate sub-system deterioration already in progress. The COVID-19 pandemic served as a stress test that exposed the resilience differential between digitally adaptive and non-adaptive facilities, indicating that service innovation capacity is an emerging dimension of institutional sustainability in Nigerian private healthcare.

Cumulatively, these findings affirm that sustainable operation in Nigeria's private diagnostic sector requires the simultaneous cultivation of four organizational capacities: regulatory literacy and proactive compliance management; evidence-based quality assurance anchored in internationally recognized standards; adaptive financial management that accounts for macro-economic volatility; and incremental service innovation that responds to evolving care delivery models. Facilities that integrate these capacities within a coherent organizational system are substantially better positioned to absorb environmental shocks and sustain viable diagnostic services for Enugu State's population.

THEORETICAL CONTRIBUTION

This study makes an original theoretical contribution by operationalizing open systems theory (Bertalanffy, 1968; Plsek & Greenhalgh, 2001) as an explanatory framework for healthcare SME failure in a sub-Saharan African context—a domain in which theoretical development has remained underdeveloped relative to the volume of descriptive empirical work (Sturmberg, 2018; Onyekwere et al., 2023). The contribution operates at three levels.

First, conceptual extension. Existing applications of systems theory to health facility failure have predominantly focused on large public hospital systems in high-income settings (Plsek & Greenhalgh, 2001; Sturmberg, 2018). This study extends the open systems model to private diagnostic SMEs in a resource-constrained LMIC environment, demonstrating that the framework retains explanatory power when the environmental sub-system is characterized by structural market failures—specifically, insurance non-payment, electricity deficit, and regulatory capacity constraints—that are largely absent from existing theoretical applications.

Second, an integrated Healthcare SME Failure Model. The findings support the formulation of an integrated model in which facility closure is conceptualized as the outcome of cascading Regulatory non-compliance—most prominently expired permits, incomplete credentialing, and violations of radiation safety and biomedical waste protocols—constitutes the formal mechanism of closure in the majority of cases. However, regulatory failure is best understood not as a proximate cause but as the terminal expression of deeper process and input sub-system deterioration. Facilities that invested in ISO 15189:2022 compliant quality management systems and maintained robust workforce development practices demonstrated greater regulatory durability, reinforcing the argument that quality governance is the most modifiable protective factor against closure.

Third, contextual specificity. By situating the systems model within the specific regulatory architecture of Nigeria—the National Health Act (2014), MLSCN credentialing requirements, IAEA radiation standards, and NHIA reimbursement frameworks—this study produces a theoretically grounded but contextually specific account of failure that can serve as

a comparative benchmark for future studies in analogous LMIC settings. The theoretical proposition advanced is that facility closure in Nigeria's private diagnostic sector is a systems failure, not merely an administrative or financial failure, and that effective prevention requires systemic rather than single-domain interventions.

Financial vulnerabilities—insurance reimbursement delays, foreign exchange pressures, and energy costs—do not independently determine closure but function as environmental amplifiers that accelerate sub-system deterioration already in progress. The COVID-19 pandemic served as a stress test that exposed the resilience differential between digitally adaptive and non-adaptive facilities, indicating that service innovation capacity is an emerging dimension of institutional sustainability in Nigerian private healthcare.

Cumulatively, these findings affirm that sustainable operation in Nigeria's private diagnostic sector requires the simultaneous cultivation of four organizational capacities: regulatory literacy and proactive compliance management; evidence-based quality assurance anchored in internationally recognized standards; adaptive financial management that accounts for macro-economic volatility; and incremental service innovation that responds to evolving care delivery models. Facilities that integrate these capacities within a coherent organizational system are substantially better positioned to absorb environmental shocks and sustain viable diagnostic services for Enugu State's population.

POLICY IMPLICATIONS

The systems-theoretical framing of this study generates policy implications that are more specific and actionable than those derivable from descriptive analyses. Effective policy responses must target multiple sub-systems simultaneously; interventions limited to any single domain—regulatory enforcement alone, for example—are likely to prove insufficient if input-level resource deficits or process-level quality system weaknesses remain unaddressed (Sturmberg, 2018; Francies et al., 2020).

Table 5. Policy Recommendations Mapped to Systems Sub-systems

Policy Domain	Specific Recommendation	Responsible Actor	Systems Sub-system
Regulatory Digitalization	Implement a real-time digital licensing portal for permit renewals and inspection scheduling	NAFDAC; FMOH; State MOH	Feedback / Control
Insurance Reform	Mandate maximum 30-day reimbursement cycles under the NHIA framework; establish dispute resolution timelines	NHIA; Private health insurers	Input; Environment
Quality Infrastructure	Subsidies ISO 15189 and SLIPTA accreditation costs for facilities with ≤10 staff; create tiered compliance pathways	MLSCN; State MOH; NiMedHealth	Process; Feedback
Workforce Retention	Introducing targeted rural and peri-urban retention incentives for biomedical scientists and radiographers	FMOH; Professional councils	Input; Process
Resilience & Innovation	Integrate telemedicine and remote diagnostic readiness into facility licensing criteria	NITDA; State MOH	Output; Environment

Note. NAFDAC = National Agency for Food and Drug Administration and Control; NHIA = National Health Insurance Authority; MLSCN = Medical Laboratory Science Council of Nigeria; SLIPTA = Stepwise Laboratory Improvement Process Towards Accreditation; NITDA = National Information Technology Development Agency; FMOH = Federal Ministry of Health.

Regulatory digitalization represents the highest-leverage single intervention. A real-time digital portal for permit renewal, inspection scheduling, and compliance monitoring would transform the feedback sub-system from a periodic corrective mechanism into a continuous one, enabling earlier regulatory intervention before deterioration becomes irreversible. This recommendation aligns with Nigeria's broader e-governance commitments and is technically feasible within existing NITDA infrastructure. Insurance reform targeting reimbursement cycle length would directly relieve the most consistently reported environmental financial pressure, improve cash flow predictability and enabling facilities to invest in quality systems and equipment maintenance. Finally, tiered ISO 15189 accreditation pathways, subsidized for SME-scale facilities, would lower the cost threshold currently preventing widespread quality system adoption—a structural market failure that regulatory mandates alone cannot resolve.

LIMITATIONS

This study acknowledges four principal limitations that constrain the generalizability and empirical depth of its findings and should be considered in interpreting its conclusions.

Documentary and archival bias. The study relies primarily on secondary and archival sources—policy documents, grey literature, and published studies—rather than primary financial datasets or facility-level administrative records. This introduces documentary bias: facilities that generated regulatory reports, inspection outcomes, or media coverage are overrepresented relative to those that closed without formal documentation. The direction of this bias is uncertain; it may undercount quiet closures attributable to market exit rather than regulatory enforcement or overcount enforcement-triggered closures that generated documentary evidence (Howell & Prevenier, 2001).

Absence of individual-level financial data. No facility-level financial records—balance sheets, revenue trajectories, insurance reimbursement histories—were accessible for this study. This limits the study's capacity to quantify the economic thresholds at which financial stressors become decisive in the closure pathway and precludes the construction of predictive financial models. Future research with access to NHIA reimbursement databases or private facility accounting records would substantially strengthen the empirical foundation of the financial vulnerability argument (Yin, 2018).

Geographic scope. The study is bounded by Enugu State, which, while analytically appropriate for depth of contextual analysis, limits direct transferability to other Nigerian states or sub-Saharan African contexts with different regulatory regimes, market structures, or infrastructure profiles. Comparative findings from Nkrumah (2021) and Caldwell et al. (2022) are used to contextualize results, but formal cross-state or cross-national comparison was not conducted.

Temporal delimitation. The study's coverage period and database search boundary (2018–2025) mean that longer-term historical patterns of facility closure—particularly those predating the National Health Act (2014) regulatory framework—are not captured. Longitudinal data would enable a more rigorous assessment of whether the factors identified are stable structural features of Nigeria's diagnostic sector or products of a specific regulatory-economic period.

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