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EVALUATING THE ADOPTION OF LAPAROSCOPIC SURGERY IN NIGERIAN TEACHING HOSPITALS: SURGEONS' PERSPECTIVES AND OPERATIONAL CHALLENGES

A dissertation submitted in partial fulfilment of the requirements for the Msc. Medical Device Technology and Business

Innopharma Labs and Faculty of Science

Griffith College Dublin

By

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ABSTRACT

Abstract: Laparoscopic surgery has become an important modality for contemporary surgical practice, as a minimally invasive option with its many associated advantages such as shorter recovery times, decreased post-operative complications and enhanced patient outcomes. While laparoscopic surgery has widespread use in many high income countries, Nigeria has continued to struggle with the acceptance and integration of laparoscopic surgery to regular surgical practice, especially in teaching hospitals.

Objective: The study aimed to assess the experience of a cohort of surgeons using laparoscopic surgery in a selection of Nigerian Teaching Hospitals, as well as readiness, technical issues and perceptions; explore potential systemic delays to implementation, and suggest ways to sustainably introduce laparoscopic surgery into surgical training and surgical practice.

Methods: A mixed-methods research approach was used in the study which comprised qualitative data from 10 in-depth structured interviews with surgeons across a number of surgical specialities and quantitative data from 84 survey responses. In considering the data, both inferential and descriptive statistical analysis was performed, and the qualitative data was analysed thematically using the Braun and Clarke qualitative methodology.

Results: Findings revealed that although 78.6% of teaching hospitals reported performing laparoscopic surgery, only 4.8% conducted it daily. Technical and institutional barriers were prominent: 72.6% of surgeons had no formal training, and 81% rated training as inadequate. Equipment failure (reported by 46 respondents), power outages (49 respondents), and limited maintenance access (34.5%) were key challenges. Surgeons cited lack of institutional support, inadequate funding, and limited mentorship as key impediments. Qualitative themes included institutional inertia, inequity in access, and generational resistance from senior consultants. Many respondents called for government-funded training, insurance coverage for laparoscopic procedures, and locally produced consumables to address systemic inequities.

Conclusion: The research concludes that the present establishment of laparoscopic surgery is sporadic, inconsistent, and unsustainable in Nigerian teaching hospitals, challenged by systemic infrastructural, educational, and policy impediments. Meaningful change will require deliberate institutional leadership, national policy reform, established training programs, mentorship and development of appropriate infrastructure.

Keywords: Laparoscopic surgery, Nigeria, surgical training, institutional readiness, healthcare infrastructure, teaching hospitals, technology acceptance, surgical policy, mixed-methods research

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LIST OF ABBREVIATIONS

Abbreviation	Full meaning
CME	Continuing Medical Education
CT	Computed tomography
HIC	High income countries
LMICs	Low and Middle Income countries
MAS	Minimal Access Surgery
MIS	Minimal Invasive Surgery
NPMCN	National Postgraduate Medical College of Nigeria
NGOs	Non-governmental organisations
PEOU	Perceived Ease of Use
PU	Perceived Usefulness
SPSS	Statistical Package for the Social Sciences
TAM	Technology Acceptance Model
USD	US Dollars
WACS	West African College of Surgeons

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Minimally invasive surgery, particularly laparoscopic surgery, has been noted to represent a paradigm shift in how modern-day surgical practice is carried out. It allows for procedures which may be diagnostic and therapeutic to be carried out through a small incision using a camera and specialized instruments and leads to reduced postoperative pain, minimal scarring, shorter hospital stays, faster recovery, and lower risks of wound complications compared to traditional open surgeries, (Smiley et al., 2023). By using this surgical technique, individuals from low-income populations who are crucially reliant on their jobs for day-to-day income can be said to have the required surgical care they need and then return to their businesses quickly, (Ijah and Manuel, 2020). There are many challenges experienced by patients from lower-middle-income countries who do not have access to laparoscopy; these include large numbers of incision site complications, wound dehiscence, high cost, and limited availability of antibiotics causing difficult procurement (Smiley et al., 2023). These advantages make laparoscopic procedures especially relevant in low- and middle-income countries (LMICs), where it has been seen that delayed recovery can significantly impact the socioeconomic livelihoods of patients. Despite the global advancement and increasing adoption of laparoscopic techniques, Nigeria continues to face some significant challenges in integrating this unique surgical modality into the routine clinical practice, particularly within most of her public and teaching hospitals (Balogun et al., 2019). While laparoscopic surgery has become the standard for most surgical procedures in many high-income countries, its use in Nigeria is largely limited, both in its scope and its accessibility (Balogun et al., 2019). Teaching hospitals, which serve as primary centres for surgical training and tertiary healthcare delivery, often lack the infrastructure, funding, and technical expertise needed to implement laparoscopic procedures effectively in their practice (Ijah and Manuel, 2020). Furthermore, the teaching and transfer of laparoscopic skills are hindered by gaps that exist in the current training curricula, as well as insufficient mentorship and inconsistent exposure during surgical residency, (Awuah et al., 2024). Other issues, such as limited equipment, unreliable power supply, lack of maintenance infrastructure, and weak institutional support, further exacerbate these challenges (Awuah et al., 2024). In some cases, the dynamics that exist between stakeholders, both on the local and international levels, have impeded sustainable training initiatives, with programmes sometimes seen to be designed in a way to suit the

interests of external partners more than to ensure long-term local capacity development (Ahmad and Mishra, 2015). Given these issues, an assessment of the current status of laparoscopic surgery in Nigerian teaching hospitals is needed. This includes not only investigating the extent of its adoption but also assessing the institutional, technical, and educational barriers faced by surgeons in its practice. Understanding these dynamics from the perspectives of practising surgeons and surgical educators in the country is crucial to formulating strategies that can advance surgical care and training in Nigeria.

1.2 RESEARCH PROBLEM

Laparoscopic surgery is still underused in Nigerian teaching hospitals even if it has been clinically shown to lower postoperative complications and enhance recovery results (Ahmad and Mishra, 2015). Although this modality is still not widely adopted due to multifactorial issues, including low institutional capacity, insufficient training, financial constraints, equipment shortages, and infrastructure limits, some development has been achieved in adopting it (Ahmad and Mishra, 2015). Many surgical interns finish their education with either very little or no practical laparoscopic experience (Ajah, 2018). Functional laparoscopic suites are rare in teaching hospitals; where they exist, problems include inconsistent power supply, inadequate maintenance, and shortage of consumables, limiting their usefulness (Oyewale and Ariwoola, 2024). Furthermore, there are few experienced trainers available; hence, attempts to implement training programmes sometimes contradict local reality due to inadequate planning or outside-driven agendas (Oyewale and Ariwoola, 2024). Part of this is attributed to stakeholder dynamics; laparoscopic skills are expected to be taught by the most senior surgeons to the junior surgeons and transfer the skills through these means to the rest of the team; however, there is a certain level of disinterest, with no encouragement from the older surgeons and preceptors limiting the tendency for these surgical skills to be passed on to the residents (Adisa et al., 2012). Laparoscopic surgery is further complicated by the absence of uniform policy frameworks, uneven financing sources, and little government backing (Abdulwahab et al., 2025). Examining these problems holistically, spotting the institutional obstacles stopping development, and offering contextually suitable suggestions for enhancement are desperately needed.

1.3 RESEARCH QUESTIONS

The primary research question guiding this study is:

What is the current state of adoption of laparoscopic surgery in Nigerian teaching hospitals, and what are the key factors influencing its implementation and sustainability?

The study will also explore the following sub-questions:

- To what extent has laparoscopic surgery been adopted in Nigerian teaching hospitals, and what institutional and contextual factors influence its uptake?

- What are the key infrastructural, financial, and technical barriers faced by surgeons in implementing and sustaining laparoscopic procedures?

- How adequate are current training structures, mentorship opportunities, and surgical residency programs in equipping surgeons with laparoscopic skills?

- What are the perceptions of Nigerian surgeons regarding the comparative advantages, limitations, and long-term feasibility of laparoscopic surgery in the local context?

1.4 RESEARCH AIM

This study aims to evaluate the adoption of laparoscopic surgery in Nigerian teaching hospitals and examine the institutional, technical, and training-related challenges faced by surgeons in its implementation and sustainability. Based on the findings, the study will also propose evidence-based recommendations to enhance the adoption, training capacity, and long-term integration of laparoscopic surgery within Nigeria's tertiary healthcare system.

1.5 SPECIFIC OBJECTIVES

To achieve the research aim, the study will focus on the following objectives:

1. To assess the current level of adoption of laparoscopic surgery across Nigerian teaching hospitals and identify the institutional enablers or deterrents influencing its integration.
2. To examine the infrastructural and resource-related constraints including power supply, equipment availability, and maintenance, that affect the implementation of laparoscopic surgery.
3. To evaluate the quality, availability, and structure of training programs for laparoscopic surgery in residency curricula and continuing surgical education.
4. To explore the perceptions of surgeons regarding the benefits, limitations, and long-term prospects of laparoscopic surgery in the Nigerian healthcare setting.

1.6 RESEARCH HYPOTHESIS

Based on existing literature and policy frameworks, the study proposes to test the following hypotheses:

Null Hypothesis (H_0): There is no significant relationship between institutional support, training availability, and the adoption of laparoscopic surgery in Nigerian teaching hospitals.

Alternative Hypothesis (H_1): There is a significant relationship between institutional support, training availability, and the adoption of laparoscopic surgery in Nigerian teaching hospitals.

1.7 JUSTIFICATION FOR THE STUDY

Despite the benefits of laparoscopic surgery, which are well documented (Abdulwahab et al., 2025; Adisa et al., 2021), its adoption in Nigeria's surgical setting remains limited, inconsistent, and largely under-researched, especially within the context of teaching hospitals, which are noted to be the critical hubs for both patient surgical care and the training of future surgeons. While some institutions have made significant strides in starting off laparoscopic programmes, most of them still struggle with several challenges, including inadequate infrastructure, poor access to specialized training, limited mentorship, erratic power supply, and a general lack of institutional support (Adisa et al., 2021). The existing literature provides sparse, fragmented insights into these challenges, and this evidence is often limited to isolated case studies or pilot interventions, with few national-level evaluations of how systemic, technical, and educational factors interact to influence laparoscopic adoption (Adisa et al., 2021; Ekwunife et al., 2012). This study seeks to fill this significant research gap by providing a comprehensive, multi-dimensional assessment of the barriers and enablers to laparoscopic surgery within Nigerian teaching hospitals from the perspective of practising surgeons. In addition, insufficient coherent policy frameworks, lack of governmental investment, and insufficiently supported skills training infrastructure have led to an increasing gap in skills in minimal access surgery (MAS) (Balogun et al., 2020). Surgical residents often complete their training experience with little or no hands-on exposure to laparoscopic procedures, limiting their ability to be competent and thus inhibiting the country's long-term surgical capacity (Balogun et al., 2020). This study hopes to have evidence to systematically examine the challenges and position them in greater institutional and policy contexts that can lead to curriculum reforms, institutional investment from our organizations, national integrated surgical policies, and skills development. Ultimately, the findings will contribute to bridging the understanding of the gap that exists in surgical skills and modernization of surgical education towards enhancing the accessibility, safety, and quality of surgical care in Nigeria's tertiary health sector.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

The purpose of this literature review chapter is to critically assess the current state of knowledge of laparoscopic surgery in health systems, with a focus on the teaching hospitals in Nigeria. It seeks to synthesise trends in laparoscopic surgery worldwide, consider the experience in Nigeria, and evaluate contributing factors to the implementation and sustainability of laparoscopic surgery in health systems (infrastructure, education and training, clinical practice, and policy). Laparoscopic surgery is increasingly regarded as a surgical option worldwide, as it is minimally invasive, allows for quicker recovery, and prevents post-operative complications. While we can be excited about these results, the truth is that laparoscopic surgery is not widely used, and there are big differences in how much it is used in lower-middle-income countries, which face challenges in following surgical systems, including laparoscopic surgery (Balogun et al., 2020). The benefit of understanding international contextual landscapes as well as Nigerian contextual landscapes is that they provide richness to understanding what works or does not work to implement laparoscopic surgery. This chapter will cover the conceptual history of laparoscopic surgery, trends in the uptake of laparoscopic surgery in the world and in Nigeria, barriers to uptake in Nigeria, and institutional, technical, and educational barriers. The chapter ends with the identification of research gaps that provide the justification for this study's design.

2.2 CONCEPTUAL OVERVIEW OF LAPAROSCOPIC SURGERY

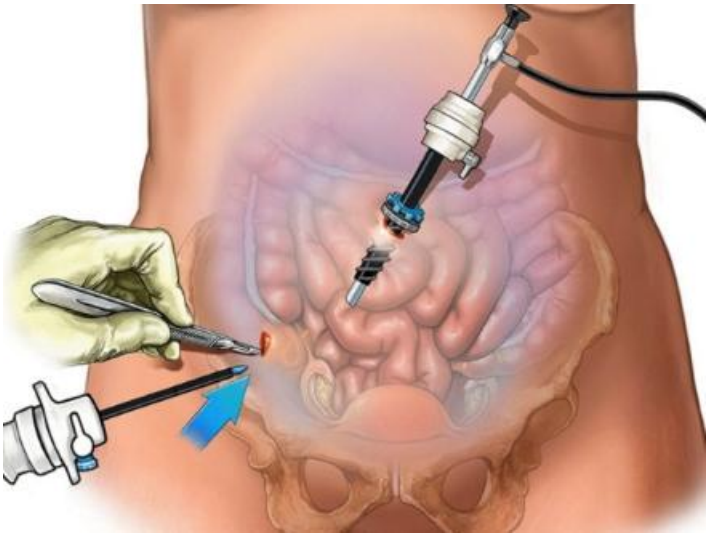

Figure 1: Image depicting laparoscopic surgery (Balogun et al., 2020)

Laparoscopic surgery, also known as minimally invasive surgery (MIS), represents a dramatic change in surgical technique because it enables internal surgery through small incisions made with specialised instruments. As seen in the figure 1 above the laparoscope is the main instrument used to perform laparoscopic surgery. It is essentially a skinny, rod-shaped object containing a high-quality camera and light source, which produces images of the internal anatomy and sends the video to a monitor outside the body. The use of a laparoscope enables surgeons to visualise and work within the surgical field without using large open incisions. The history of laparoscopic surgery began in the early 1900s with a German physician named George Kelling, who introduced endoscopy for diagnostic purposes (Balogun et al., 2020). However, laparoscopic surgery as a clinical practice emerged most recently in 1987 with Philippe Mouret's successful laparoscopic cholecystectomy (Balogun et al., 2020). At that time, a number of surgical techniques were recorded without open incision for the first time by laparoscopic surgery. As technology and tools have improved, arthroscopic techniques have expanded into many areas of surgery, such as general surgery, gynaecology, and urology. Procedures that utilise laparoscopic surgery routinely include appendectomy, cholecystectomy, hysterectomy, hernia repair, ovarian cystectomy, diagnostic laparoscopy and tubal ligation. The technique is recognised for its well-defined clinical benefits, including less post-operative pain, reduced trauma from surgery, reduced risk of infection, faster recovery for patients, and shorter hospitalisation times compared to traditional open surgery (Moorthy et al., 2004). While these benefits have contributed to the global traction toward

adopting laparoscopic surgery as a standard of care, particularly in high-resource environments, the conceptual complexity of laparoscopic surgery is met with considerable technical and ergonomic challenges (Moorthy et al., 2004). Laparoscopic surgery, unlike open surgery, is performed while holding rigid instruments and viewing the operative space with a loom on a two-dimensional video display (Fuchs Weizman et al., 2015). This leads to a loss of depth perception and a loss of tactile feedback. When suturing, tying knots, and moving delicate tissues in a space to work, hand-eye coordination and spatial orientation are critical (Fuchs Weizman et al., 2015). The limitations associated with laparoscopic surgery represent a steep learning curve, necessitating structured training and simulated environments to ensure competency and patient safety (Fuchs Weizman et al., 2015). Laparoscopic surgery can be regarded an amalgamation of modern technology, surgical skills, and clinical transformation. The conceptual technique underscores not just therapeutic benefits but also the necessary conditions for successful adoption, including the provision of infrastructure, surgical ability, and institutional capacity. As such, the wider dissemination of laparoscopic techniques, particularly in resource-constrained settings, hinges on addressing these interrelated factors.

2.3 GLOBAL ADOPTION OF LAPAROSCOPIC SURGERY

The global use of laparoscopic surgery shows a big gap between high-income countries (HIC) and low- and middle-income countries (LMIC), mainly due to differences in resources, training, and how health ministries are managed. In HIC, laparoscopic surgery was quickly received as best practice and accepted with lots of support through simulation labs, fellowships, and Continuing Medical Education (CME), and this has almost completely transitioned surgical services from open to minimally invasive practices (Sandeep, 2017). In LMICs, the extent to which laparoscopic surgery has been successfully implemented remains a vast challenge to overcome; in fact, we have evidence from Ahmad and Mishra (2015) that confirms that only 8% of surgical trainees in Africa have participated in a foreign residency, and 73% of students have reported no exposure to minimal access surgery (MAS) in their coursework. The conclusion to be drawn from these review articles is that there seems to be no doubt that we need a local response in regard to training that is contextually relevant and sustainable rather than international fellowships that only support the localised surgeons from HIC (Ahmad and Mishra, 2015; Awuah et al., 2024). The enthusiasm for training to adopt a minimally invasive approach remains.

Wilkinson et al. (2021) reported that 93% of surgeons in East and Central Africa reported that they were willing to adopt laparoscopic surgery. The inherent restriction to the level of acceptance is comprised of curricular and structural barriers with the gap between willingness and ability. Some countries are making decent progress. For instance, India has directly supported public-private partnerships and even promoted local manufacture of laparoscopic instruments, leading to cost-saving and wider access to the technology (Bareman, 2022). Kenya has established regional centres distributing laparoscopic services, and South Africa has formalised laparoscopic training as part of the postgraduate surgical curriculum (Bareman, 2022). All this points to the importance of local innovation and smart policy to drive progress. Yet, structural inequalities and inhibition of government support for sustainable implementation, and Falola et al. (2025) illustrate these inequities: robotic surgery and laparoscopic surgery, as types of minimally invasive surgery, are reserved for urban centres in Egypt and South Africa, amplifying the urban-rural gap in surgical access. Ganni et al. (2017) reported that only 26.8% of countries had developed some regulation for laparoscopic programmes, allowing quality control, standardisation, and equitable access to be a cause for concern. Pellegrini et al. (2004) considered commitment at the institutional level, availability of stable electricity, cheaper equipment, national policy, and strong training opportunities essential for benefiting from the opportunity laparoscopic surgery represents. These experiences from India, Kenya, and South Africa can help other countries, such as Nigeria, use theirs and attempt to replicate these kinds of approaches based on their own local landscapes. While the global trajectory of laparoscopic surgery is upward, success in LMICs hinges on closing training gaps, expanding infrastructure, and strengthening policy oversight to ensure equitable and sustainable adoption.

2.4 STATUS OF LAPAROSCOPIC SURGERY IN NIGERIA

Progress in laparoscopic surgery in Nigeria has been slow despite the well-established benefits of this surgical approach, which include less post-operative pain, shorter hospital stays, quicker recovery for patients, and several other advantages. The ramp-up to laparoscopic surgery theoretically started during the era of President Olusegun Obasanjo (1999 to 2007), for example, through some pilot projects and equipment donations (Oyewale & Ariwoola, 2024). Importantly, the early gain was not sustained in many instances because it was at the whim of the government and not embedded in the health system. The state of laparoscopy at present is underdeveloped and severely disadvantaged (Oyewale & Ariwoola, 2024). Balogun et al. (2019) found that 47% of teaching centres offered some aspect of laparoscopic services but only performed diagnostics and female sterilisation, with only very rare instances of therapeutic laparoscopic surgery. This represents the disingenuousness of the adoption of technology, whereby pockets of technology exist but lack systemic support to grow and become a part of the culture. There are many reasons for the lack of uptake. Balogun et al. (2019) identified that 46% of clinicians cited a lack of trained staff, and 38.9% cited equipment as the most significant barrier to laparoscopic surgery. These findings appear to be supported by Yankunze (2024), whose study found 0.5% laparoscopy utilisation overall in public hospitals. Abdulwahab et al. (2025) similarly reported utilisation in private hospitals as 1.6% compared to 0.5% for public hospitals. The underutilisation reflects not only the supply-side constraints but also the issue of equity between the public and private sectors in healthcare. Furthermore, capital costs are significant. Afuwape and Akute (2011) estimated that the cost of a laparoscopic cholecystectomy in Nigeria was approximately US$1,250, whereas an open cholecystectomy was approximately US$400. The cost when the patient is not insured limits access for many people and crowds out practice. Another pressing issue relates to diagnostics. As Adisa et al. (2014) reported, about 44.6% of patients could not afford to pay for CT (computed tomography) scans and therefore required laparoscopic surgery to be used as a default exploratory form of diagnostic study. It is a striking contradiction that laparoscopy is seen both as a sophisticated technique and as something to be used out of necessity as a result of diagnostic deficiencies. In gynaecology, Lim et al. (2017) found that fewer than 15% of hysterectomies and only about 60% of benign ovarian masses had laparoscopy performed, where much higher percentages are utilised globally. The discrepancies again reflected limited skill sets and institutional commitment to skills development in minimal access

surgery (MAS). In addition, systemic and institutional barriers remain a major issue. Galukande, Luboga and Elobu (2013)'s observation about a lack of mentorship pipelines, weak policy frameworks, and the availability of tangible incentives for educating and retaining laparoscopic surgeons is relevant. The existence of these problems decades after pilot programs were launched suggests some structural resistance. Adisa et al. (2012) emphasised that prior unsuccessful programmes showed the importance of slow, gradual, context-sensitive system innovation rather than top-down interventions or sporadically funded programmes from abroad. Symptoms of lack of integration and structural resistance in Nigeria's health systems are reflected in fragmented policies governing hospitals, largely inconsistent funding mechanisms, and uncoordinated, standardised mechanisms of procurement. The prospect of laparoscopic surgery in Nigeria is promising, but to translate it into reality, the country is hampered by human resource shortages, economic disenfranchisement, and system resistance (Oyewale & Ariwoola, 2024). Such evidence suggests a need for a national surgical plan to strategically embed minimally invasive surgery into curricula, budget processes, and policy frameworks. Without significant reform, laparoscopy in Nigeria may persist as a conceptualised feature of surgical modernisation (Oyewale & Ariwoola, 2024).

2.5 INSTITUTIONAL AND CONTEXTUAL FACTORS INFLUENCING ADOPTION

The successful implementation of laparoscopic surgery is dependent on an array of factors not limited to technology, such as institutional readiness and anatomical preparation. Successfully integrating laparoscopic surgery into a national health system involves more than mere access to technology; institutional readiness, strategic alignment, and systemic behaviour change must be present as well (Oyewale & Ariwoola, 2024). Nigeria's institutional and contextual environment has been seen to always imped the sustained practice of minimally invasive surgery (MIS) (Falola et al., 2024). Especially as it has not been able to set up operational conditions required for its practical disposal those being policy alignment, mentorship frameworks, leadership support, and nesting the mechanism into medical training and education. One of the most concerning impediments to the implementation of sustainability is the inertia from institutions, particularly teaching hospitals. Falola et al. (2024) suggest the inertia and resistance towards potentially integrating laparoscopy come from older generations of clinicians who have trained exclusively in open surgery and discourage younger

generations of clinicians from adopting laparoscopic practice or learning. This practice perpetuates and stagnates the transfer of skill but reinforces traditional hierarchies. Balogun et al. (2019) discussed that structured simulation-based laparoscopic training across postgraduate surgical programmes is highly limited in Nigeria; however, residents are more than willing to engage in laparoscopic simulation or training. The vast majority of training workshops in Nigeria have been sporadic and intermittent, with the vast majority of educational workshops being led by foreign associations. Relying solely on foreign-led, short-focus workshops instead of providing local, dedicated, continuous educational infrastructure for their surgical training limits comprehensive and deep learning for their purposes (Balogun et al., 2019). Wilkinson et al. (2021) also emphasize that laparoscopic surgery is not yet part of the formal surgical training in Nigeria, and this severely limits any long-term capacity-building efforts. There are further problems created by issues of policy and leadership failure. For instance, Imediegwu et al. (2024) noted that 39.6% of surgical professionals identified constraints on pursuing laparoscopic surgery because of government policy, and also 54.2% identified the lack of an enabling institutional environment as a limit to laparoscopic surgery in Nigeria. This indicates a disconnect between national health priorities and the modernisation of surgical practice at the level of individual hospitals. While Hamitoglu et al. (2024) highlight that Botswana and a few institutions in South Africa were able to link national health priorities and hospital-level decision-making, Nigeria does not have a coherent policy that clearly states the role of minimally invasive surgery in a public health agenda. Also, some international aid has supported laparoscopic surgery in terms of equipment donations or workshops (Wilkinson et al., 2021), but this has been mainly short-term with no sustainability, with one-off trips lacking any large systemic change involved in realising the fulfillment of routine laparoscopic services. Acquisition practices have similarly exposed the serious disconnect between resources and true clinical needs; for example, Ekwunife et al. (2021) described the frequency of disconnect between the equipment being procured and the user's needs in instances where equipment is acquired without consulting the end-users. This leads to equipment being either completely unused or entirely redundant. What underpins these inefficiencies remains a huge question. The practices that were instituted with no budget lines to maintain equipment had only resulted in the obsolescence of the original equipment barely after it had been installed. Relatedly, observing leadership bundles that enabled surgical innovation in MIS practice was revealing. As Gabriel et al. (2011) has reaffirmed, for example,

examples of laparoscopic work being pioneered in Nigeria were not through institutions but were through private individuals (from home), as there was neither institutional size nor an attempt to adopt same as an institution. This kind of leadership is not scalable, lacks institutional accountability and is unable to grant equity across the healthcare system. Consequently, the reality of research-led innovation reforms is circumstantially vulnerable to individual transition and donor fatigue, but similarly, didactic learning environments cannot institutionalise innovations clearly. As Adisa et al. (2012) has documented, surgical departments and Medical Colleges failed in 2008 to deliver a planned adoption of laparoscopic programs in South-West Nigeria that much later were reintroduced through limited upgrade capacity drives that were wholly institution-refurbished, but it underscored that reforming surgical services includes context-specific, institutional practices that embrace incremental learning processes. It is important to appreciate that adopting laparoscopic surgery in Nigeria is not purely framed as a technical or logistical consideration; rather, it has fundamental spatial problems (institutional and contextual). The procurement processes that are not structured, diffuse and unclear in leadership through the inadequate or unaccountable hierarchical levels of individuals and having gut-pulled right through the donor process mean that all evidence concerning policy alignment works only in favour of misaligned MIS types of surgery practices. For laparoscopic surgery to develop in Nigeria, it will need to be integrated into national surgical strategies, with a change in postgraduate surgical curricula to include simulation-based minimally invasive surgery (MIS) training, and development of policy and budget points that make rebuilding long-term infrastructure and capacity building viable to support these initiatives (Adisa et al., 2012).

2.6 TECHNICAL, FINANCIAL, AND INFRASTRUCTURE CHALLENGES

People frequently refer to the main deterrent to implementing laparoscopic surgery as an expensive capital outlay (Adisa et al., 2012). A full laparoscopic unit – with towers, insufflators, light sources, and high-definition cameras – can cost tens of thousands of dollars. To make matters worse, most of these machines are not produced locally or maintained in operable condition when they break down. Balogun et al. (2020) pointed out that even when critical equipment fails, it usually has to be procured internationally, which adds time and financial costs to the operation. Troller et al. (2024) noted that when units are beginning laparoscopic surgery, they commonly create an inventory that is second-hand and, therefore, prone to either breaking or becoming obsolete. A survey that was conducted by Ijah et al. (2020) found that 80% of facilities in the country had equipment failures or ran out of consumables (for example, carbon dioxide, sterile drapes, or optics), which reinforces the systemic nature of the issue. In part due to the unstable nature of Nigeria's power supply, poor technical systems are clearly a significant contributor to this inefficient health care system (Balogun et al., 2020). Intraoperative electricity interruptions can affect patient safety, as explained by Ray-Offor et al. (2014) and Ekwunife et al. (2012) and they also interfere with the workflow of the surgical team. For example, it is not uncommon for the lighting, imaging, and insufflation to be interrupted by electricity supply issues while patients are on the operating table. Such an event needs to be factored into the decision-making process surrounding planning and case selection, and Smiley et al. (2023) reported that some surgeons would forego laparoscopic approaches to surgery simply because they could either not rely on power supply for power or gas (or, in some cases, both). Falola et al. also identified significant deficits in electrical systems in Nigeria's health systems and noted that several institutions did not even have backup power supplies. There are many occasions when a laparoscopic tower may be in situ, but critical consumables are unavailable (including CO_2 gas), and there are extremely significant delays in completing the procedure or in the process itself. Hamitoglu et al. (2024) and Ray-Offor et al. (2014) found that participants often faced shortages of gas and sterile materials, highlighting the difficulties in the hospital supply chain and showing that video laparoscopic procedures rely even more on good material coordination than open surgery does. There are also important aspects related to the procedural costs between open and laparoscopic surgery, which serve as an infinitely bigger (and arguably better) disincentive to devices never being adopted. According to Afuwape & Akute (2011), laparoscopic

cholecystectomy involves a cost of approximately 1250 USD, more than three times the 400 USD (Us Dollars) for the open counterpart. The increase in cost is a function not only of the initial cost of purchasing the equipment but also of the continuity of costs associated with maintenance and consumables, which are typically not budgeted in institutionally based finance schemes. The absence of designated funding streams for minimally invasive surgery (MIS) has exacerbated the challenges public hospital administrations face in providing consistent operational funding, making it difficult for them to attract appropriately qualified surgical specialists. Furthermore, the clinical dimension reveals a positive correlation between infrastructure and equipment gaps and surgical outcomes. Balogun et al. (2020) described how resource limitations in the operating room often result in intraoperative conversion to open technique, especially if needed instruments fail or are exhausted during mid-surgical procedures. Such emergency conversion substantially increased the operative time and associated risk of comorbidity for the patient and risked patient safety. Gabriel et al. (2011) and Baker et al. (2015) described an increased incidence of bleeding, electrocautery errors, and unintended injuries in centres located in Nigeria; these results were related to poor-quality instruments and limited practitioner training or experience. Such complications undermine future surgical procedures, foster broad disenchantment among surgical teams, and create scepticism among hospital administrators. Together, these issues represent a self-reinforcing cycle: poor infrastructure and unreliable equipment create suboptimal outcomes, which reduce institutional confidence and investment in laparoscopic programmes. Without reliable electricity, sustainable procurement pathways, regular maintenance, and access to consumables, training and skill acquisition programmes, no matter how altruistic, do not translate into clinical practice. These findings indicate that technical adoption cannot occur without infrastructure reform. While the limited uptake of laparoscopic surgery in Nigeria is likely attributable to inadequacies in the skills of surgeons, the more entrenched overarching issues are due to the underlying infrastructure and logistics. If improvements are to be realised, the political necessity is to enact a coherent and integrated policy to develop investment in the infrastructure of hospitals, ensure reliable electricity, and develop procurement pathways that meet the basic surgical principles. It is only by working through these complex challenges collectively that Nigeria can achieve sustainable laparoscopic surgery integration into its healthcare systems.

2.7 TRAINING AND HUMAN RESOURCE CAPACITY

The growth of a strong laparoscopic surgery workforce in Nigeria is significantly hindered by various uncomplicated training issues, poor mentorship training programs, and the lack of a nationally integrated curriculum. While the necessity of minimal access surgery (MAS) is beginning to be recognised, the accompanying infrastructure and training programs associated with MAS remain fragmented, poorly funded, and largely inaccessible for most surgical trainees. The vast majority of Nigerian surgical residents did not receive adequate to minimal laparoscopic training. For example, Balogun et al. (2019) found that 90.7% of trainees had no formal laparoscopic training, and 66.7% reported that they participated in fewer than four laparoscopic procedures during their training. This situation highlights a concerning pattern of insufficient exposure, and when combined with the intricate skills required for laparoscopic surgery, it results in significant gaps in competency. Moreover, Imediegwu et al. (2024) attributed this lack of training to a lack of sufficient trainers and structured skills acquisition programmes, claiming even when they exist, they have a short course trajectory or are a single course opportunity from an external donor. The lack of integration of training into the curriculum represents a major impediment to sustainability. Achanga et al. (2025) and Balogun et al. (2020) found that most available workshops were short-duration, unstructured, and lacked incorporation into the postgraduate training system. This significantly hinders the continuity and progression required to master laparoscopic techniques. Furthermore, Pellegrini et al. (2004) stated that simulation-based education benefitted learning efficiencies and patient outcomes when integrated into structured curricula. However, this type of training is rare in Nigeria. Furthermore, simulation tools in Nigeria seemed to rely almost exclusively on basic box trainers without access to high-fidelity virtual reality systems or cadaveric laboratories. Nonetheless, studies by Ezeome et al. (2009) examined the impact of a 3-day simulation program, which significantly improved resident confidence levels. This positive response indicates that targeted interventions can lead to rapid gains if appropriately designed. Mentorship is similarly a key element of surgical training. Ajah (2018) indicated that as only 572 accredited residency positions existed in Nigeria, the opportunities for structured mentorship remained limited. The bottleneck reported by many residents may have contributed to the documented high failure rates for West African College of Surgeons (WACS) surgical exams and dissatisfaction with training quality. This finding was supported by Uzun et al. in a study of pediatric surgery programs,

where 61% of trainees were dissatisfied, and 15% reported no exposure of any kind to minimally invasive surgery. The absence of continuous mentorship perpetuates a steep learning curve and limits competence, and potentially increases the chance of intraoperative errors. Awuah et al. (2023) referred to strong mentorship programs as being supportive of long-term competency retention and thus emphasized the need for institutional change and development of all faculty. Balogun et al. (2020) noted that in laparoscopic procedures, senior surgeons tend to dominate surgical cases and ensure residents have little exposure to procedures. Gabriel et al. (2011) has noted previously that competence in laparoscopic suturing is generally achieved after 60–90 independent procedures, a milestone rarely accomplished in Nigeria due to low volume, limited access, and hierarchy limiting opportunities. Thus, even where there is an opportunity to train, few residents will experience it, usually only those who travel abroad or are able to pay for optional workshops. The training infrastructure is variable and not well-defined or established across institutions. The compounded effects of limited exposure, imbalanced training infrastructure, a too-few trainers-to-too-many trainees' ratio, and hierarchy reduce the sustainability and scalability of the MIS framework (Ekwunife et al., 2012). Therefore, a multi-faceted approach, which will include simulation as part of the national postgraduate curriculum, enhanced fellowship opportunities in MAS, investments in training technologies, and mentorship programmes to help residents learn progressively within increasingly guided skills, is important. If we do not implement these changes, the current pathway for surgical trainee development is likely to produce ill-prepared surgeons, which will hinder the broader acceptance of laparoscopic techniques within the Nigerian health system (Ekwunife et al., 2012).

2.8 SURGEONS' PERCEPTIONS AND CLINICAL PREFERENCES

Surgeons' attitudes towards laparoscopic surgery in Nigeria are influenced by societal, professional, and personal aspects of surgery practice, including an assortment of generational attitudes, practical skills, institutional limitations, and shifting patient expectations. These aspects shape the attitudes of surgeons about minimal access surgery (MIS) and determine the extent and speed of adoptions, particularly regarding practice preferences. There is clearly greater enthusiasm for laparoscopic surgery among younger surgeons than among the older generation of surgeons (Ijah and Manuel, 2020). Senior surgeons were challenged not because they were fundamentally opposed to laparoscopy; rather, it was obviously a question of exposure through residency training or perception of support and institutional commitment to the adoption of laparoscopy (Ijah and Manuel, 2020). Younger surgeons typically perceive institutional support for laparoscopy in Nigeria as an extinction-level event. On the other hand, younger surgeons are all excited about laparoscopic surgery, and as evidence, Balogun et al. (2019) found that 81% of Nigerian surgical residents intended to practice laparoscopy, mostly because they found the prospect of laparoscopy interesting, fun and requiring great dexterity, but linearly few shared this interest with real experience in an operating room. Only 3.7% of those interviewed in Balogun et al. (2019)'s paper had actual exposure to laparoscopy, which placed them within the surgery community as laparoscopic practitioners rather than spectators. Ijah et al. (2020) supported the conclusion that younger surgical colleagues professed interest in MIS even though limited resources and training environments limited this interest to minor electives. Though still latent, enthusiasm is frequently squashed by systemic deficits such as equipment shortages, inadequate support, and the lack of a formal laparoscopic module in postgraduate training (Ijah and Manuel, 2020). As a result, although there are enthusiastic surgeons interested in MIS, they cannot develop and maintain the requisite skills for competence. Conversely, older surgeons who received their training before the implementation of MIS seem to be the most sceptical and resistant. Afuwape & Akute (2011) and Ray-Offor et al. (2014) describe steep learning curves, lack of familiar instruments, and lack of tactile feedback as recurring deterrents in the senior cohort of clinicians as they adopt MIS. Fuchs Weizman et al. (2015) also reported that older surgeons identified disorientation with 2D imaging and laparoscopic suturing as significant challenges, contributing to the hesitancy to try new techniques. Gabriel et al. (2011) cited several senior gynaecologists preferring vaginal techniques to laparoscopic hysterectomies, presenting

a better sense of control for the surgeon and quicker operating time. Many of these concerns are understandable in low-resource environments, but they are often based on a sense of unfamiliarity rather than an evidence-based critique (Gabriel et al., 2011). Regardless of these generational barriers, there is increasing evidence that attitudes can change through experience and with success. Obayemi et al. (2025) demonstrated that 46.9% of surgeons had no confidence prior to training, indicating that resistance is often a result of lack of exposure rather than resistance to change. In a similar spirit, Awuah et al. (2024) and Adisa et al. (2012) reported improvement in perspective after an organised mentorship programme and after seeing favourable patient outcomes, especially when surgeons could witness the benefits of MIS first-hand in terms of complications and recovery time. Added to this resistance are some emerging influences from patients, particularly younger patients, women, and patients living in urban centres who are increasingly demanding laparoscopic surgery, primarily for cosmetics, less recovery time, and less post-operative injection pain (Ray-Offor et al., 2014). Evidence of patients' preferences and willingness to demand laparoscopic surgery will begin to influence surgeons' practices, as we anticipate younger clinicians more readily accommodating patients' preferences regarding laparoscopic techniques. Uzun et al. (2025) also established that there is increasing acceptance of 'paediatric MIS' in urban centres, reinforcing the patient-provider influence on practice change. If institutions can align training, access to equipment, and policy with patients' demands, we expect more widespread acceptance of MIS. Despite these developments, structural and emotional barriers remain. Gabriel et al. (2011) noted that the initial excitement experienced by early adopters was tempered by a plethora of technical difficulties and academic barriers, including low caseloads and little continuity in training. Additionally, Ojo et al. (2014) identified burnout and low morale in the overworked public hospital surgeons. These conditions have a negative causal impact on their desire to develop and invest time into learning challenging procedures such as laparoscopy. In many of these busy contexts, the last incentive to learn new skills, unprotected by the institution and including institutional support, does not exist. Surgeon perceptions with regards to laparoscopy in Nigeria are not only influenced by generational perceptions but also by systemic issues of access and training and the existence of trauma systems (including institutional) (Falola et al., 2025). Experience-based learning and mentorship have the potential to persuade older surgeons, who may initially be more obstinate in this scenario. With increasing patient access and emerging evidence for improved outcomes, the first step to moving the

surgeon's views forward is to address these human resource and training discrepancies. This will move the process of normalising laparoscopic surgery in Niger's medical system forward.

2.9 GAP IN LITERATURE

Even though there is a growing body of literature on laparoscopic surgery in Nigeria (and other similar low- and middle-income countries (LMICs), the current body of literature seems highly focused on clinical outcomes, technical feasibility, or single-institution experience (Falola et al., 2025; Ezeome et al., 2009). A serious shortcoming is the preponderance of case series, retrospective audits, or small observational studies, which have their merits; however, they do not adequately explore the institutional policies, training, and systems that influence laparoscopic surgery adoption and sustainability at scale. More importantly, there's the absence of comprehensive, surgeon-generated research examining how institutional readiness, educational capacity, and human resource development combine to influence adoption in the context of teaching hospitals. In most studies, there is minimal interrogation of how leadership support, policy direction, mentorship availability, and surgical training progressively interact to shape laparoscopic practice in Nigeria. There also is noisy but little published research with regard to differences in adoption in Nigeria by a surgeon's level of experience, mentorship engagement, or institutional policies. Moreover, while some studies acknowledge infrastructure and financing barriers, few studies approach the topic using critical lenses that incorporate the perspectives of clinical providers, administrators, educators, and policymakers. The involvement of governments, stakeholders, procurement, and policy integration in supporting or obstructing laparoscopic scale-up has not been thoroughly analysed. Even fewer studies explore how these macro factors translate into micro aspects happening within the operating room, examples like conversion rates, outcomes, or psychomotor skill acquisition. Importantly, the relationship between design aspects of training; the use or absence of simulation, standardised curriculum, and longitudinal mentorship and the formation of competence and clinical performance has also remained under-examined. This is important, as globally, simulation-based training and competency-based training have both established themselves as indispensable elements to the successful integration of minimally invasive surgery, particularly in resource-constrained conditions. There exists a void in the area of cross-institutional analysis, which should examine the technical, institutional, training, and policy aspects towards creating a

comprehensive overview of the factors influencing the take-up of laparoscopic surgery in Nigeria. The aim of the present study is to fill these gaps using a mixed-methods approach, adding an illustration in layers to the literature and providing a foundation for national surgical policy and institutional reform.

2.10 CONCLUSION

Laparoscopic surgery is a worldwide paradigm shift in surgical care; however, the movement towards readiness in adopting laparoscopic surgery into practice in Nigeria has occurred at a slow pace due to the complex interaction of multiple factors, including economic climate, health government policies, technical difficulties and cultural norms. Although much research has indicated the benefits of laparoscopic surgery at a macro level, and barriers exist, important challenges surrounding cost, training, and sustainability persist. The literature demonstrates that sustainability requires more than just equipment. It requires investment in training, system changes, policy changes, mentorship, and reliable infrastructure. This study will use existing information to explain the experiences and challenges Nigerian surgeons face when trying to include laparoscopic surgery in their work, aiming to create practical suggestions to help grow laparoscopic surgery in Nigerian teaching hospitals.

CHAPTER 3: METHODOLOGY

3.1 INTRODUCTION

This chapter presents the methodological framework for investigating laparoscopic surgery's adoption and technical challenges in Nigerian teaching hospitals. Given the study's goal to investigate measurable trends and nuanced surgeon experiences, a mixed-methods approach was adopted, combining quantitative data from structured online surveys with qualitative insights from semi-structured interviews. This dual approach facilitates a deeper understanding of the infrastructural, institutional, and individual factors shaping the integration of laparoscopy into Nigeria's surgical landscape.

3.2 THEORETICAL FRAMEWORK

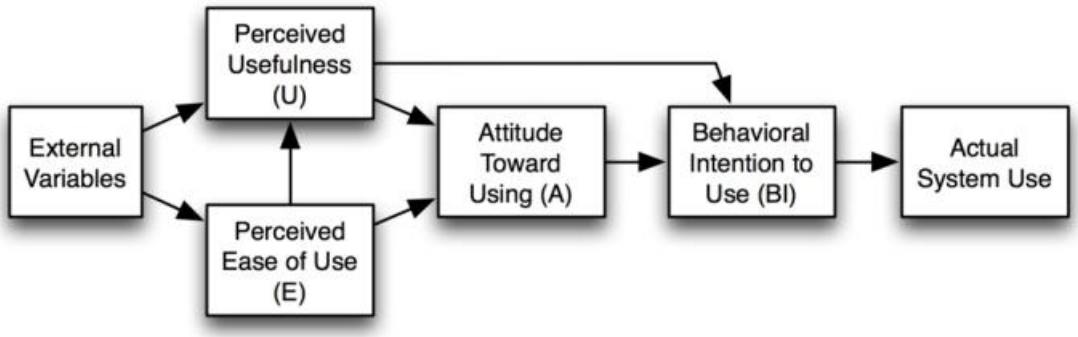

*Figure 2: Technology Acceptance Model (*Davis, 1989)

This study was guided by the Technology Acceptance Model (TAM) as illustrated in figure 2 above, an established theoretical model that Davis (1989) created to better explain and forecast user acceptance of new technologies. The key points of the TAM model were that two primary constructs (Perceived Usefulness (PU) points provided to build the case for technology acceptance and Perceived Ease of Use (PEOU) points provided to build a case for technology adoption – in this case, laparoscopic surgery, which is being discussed as that can point back to the larger issue of why the adoption

resistance exists among surgeons) (Abdullah, Ward and Ahmed, 2016). Perceived Usefulness, or PU, is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance". The second construct in TAM is Perceived Ease of Use or PEOU, and it is defined as "the degree to which a person believes that using a particular system would be free of effort" (Abdullah, Ward and Ahmed, 2016). In the research setting of this dissertation, the TAM methodological framework will be considered to understand the factors that influence the adoption of laparoscopic surgery by surgeons in Nigerian teaching hospitals. The TAM model structure was used to reflect how surgeons perceived laparoscopic techniques - engineering, safety, and learning/teaching curves. As an example, if surgeons perceive that laparoscopy improves accuracy in procedures, has better patient care results, or is integrated seamlessly into the workflow of existing surgery, then they may be more accepting of it for overall surgical technique improvement. In addition to PU and PEOU, this study incorporates several moderating variables that could impact adoption behaviours, such as practical exposure and experience, age, technological predisposition, accessibility of training, and institutional and organisational support. For instance, younger and more technology-savvy surgeons may have a greater willingness to adopt laparoscopy than their senior counterparts. Likewise, ample access to training opportunities and organisational policies can considerably raise both PU and PEOU associated with laparoscopic procedures. By considering TAM in this clinical and educational context, the study provides a framework to approach and elucidate the individual, organisational, and technological elements involved with laparoscopic adoption.

3.3 RESEARCH PHILOSOPHY

The study adopts a positivist paradigm. Positivism asserts that there is an objective reality that can be observed, quantified, and subjected to analysis by empirical methods (Ali, 2024). Positivism is suitable for this research because it allows us to identify and quantify relevant factors related to any relationship of interest that affects adoption, as well as to operationalise these variables and adjudicate hypotheses (Ali, 2024). In addition to quantitative measures, there are also some interpretive aspects that are introduced by way of qualitative interviews where possible in order to elaborate subjective experiences and contextual factors that are not quantifiable.

3.4 RESEARCH DESIGN

A mixed-methods design was selected to integrate both numerical and narrative data. The quantitative portion used an online survey of surgeons working in Nigerian teaching hospitals to quantify trends regarding adoption, training experience, perceived barriers, and institutional readiness. The qualitative portion employed semi-structured interviews with surgeons who were not purposively sampled (to get a sense of the saturation of the interviewers) to document specific examples of their experiences with laparoscopic procedures, training deficits, and systemic barriers. This design allows for triangulation of findings, supporting the integrity of the research findings.

3.5 DATA SOURCE

Primary data was collected from surgeons practising in Nigerian teaching hospitals. These included resident doctors and consultants from general surgery, gynaecology, and urology specialities. Survey responses were collected online via Microsoft Forms, while qualitative data were gathered through one-on-one interviews (in person or virtual), providing rich descriptive insights.

3.6 SAMPLING TECHNIQUE

A purposive sampling strategy (Campbell et al., 2020) was employed for both components of the study. Participants were selected based on their current involvement in surgical practice within teaching hospitals, ensuring they possess relevant knowledge or experience in laparoscopic procedures. For interviews, maximum variation sampling was applied to capture diversity in perspectives based on rank, institution, and surgical speciality.

3.7 SAMPLE SIZE CALCULATION

The sample size for the study was calculated using Cochran's formula, with a target of 80% confidence interval, a 7% margin of error, and an estimate of 84 participants. According to (Ajah, 2018), the total population of surgeons in Nigeria is estimated at 0.69 surgeons per 100,000 population

$$\text{Sample size} = \frac{\frac{z^2 \times p\,(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p\,(1-p)}{e^2 N}\right)}$$

Formula for sample size calculation (Pourhoseingholi *et al.*, 2013)

Using this formula:

n is the sample size required

N indicates the total number of surgeons in Nigerian teaching hospitals

Z is the Z-value which corresponds to 80% confidence interval at 1.282

p is the estimated proportion of the population with the attribute of interest, assumed to be assumed to be 0.5 for maximum variability

E is the margin of error at 7% (0.07)

0.07 (margin of error)

Using an estimated national population of surgeons in Nigerian teaching hospitals, the minimum sample size was calculated as 84 respondents. This methodology ensures sufficient data to detect patterns while considering study feasibility and resource constraints.

For the qualitative aspect of the study, respondents were selected through purposive sampling, which is a deliberate and systematic approach to sampling that is proficient in identifying qualifications due to relevant experience in laparoscopic surgery in Nigerian teaching hospitals. This approach was selected because the goal of the study was to include surgeons who had first-hand experience and depth of contextual knowledge surrounding the setting and institutional, educational, and technical forces that influence the practice of laparoscopic surgery. Given the exploratory nature of the qualitative component, purposive sampling enabled the researcher to focus on respondents who could provide enriched narratives and critical insights, in contrast to using a general population sampling technique (Campbell et al., 2020). Respondents were selected based on their professional ranks (residents and consultants), surgical specialities (general surgery, gynaecology, and urology), and institutional affiliation to provide a diversity of perspectives and ensure they covered a depth of variation in the centralised barriers and enablers to the adoption of laparoscopic surgery. Collectively, purposive sampling ensured a more comprehensive reflection of the complexity surrounding the barriers and enablers behind the adoption of laparoscopic surgery; purposive sampling through surgeons' professional ranks allowed the richness of depth and breadth of the respondents to help illuminate some of the realities of a training, policy, and practice context that may not have been discovered through random sampling (Campbell et al., 2020).

3.8 DATA TYPE

This study employed a mixed-methods approach, collecting quantitative data in the form of numeric responses from structured, closed-ended survey questions and qualitative data derived from in-depth, semi-structured interview transcripts. The integration of these two data types provided a comprehensive and multidimensional understanding of the research problem (Brannen and Halcomb, 2009). The quantitative component facilitated the identification of statistical trends, patterns, and relationships among variables such as adoption rates, training exposure, and institutional readiness. Meanwhile, the qualitative component offered rich, contextual insights into surgeons' lived experiences, perceptions, and challenges related to laparoscopic surgery. Together, this complementary combination of data types enhanced the study's analytical depth, enabling a more holistic exploration of both measurable outcomes and the nuanced realities of surgical practice in Nigerian teaching hospitals.

3.9 DATA COLLECTION

3.9.1 Quantitative Data Collection

The survey component of this study comprised 17 semi-structured questions carefully designed to capture quantifiable data on the adoption of laparoscopic surgery, perceived technical challenges, institutional support, and training exposure among surgeons in Nigerian teaching hospitals. To ensure broad accessibility and efficient data collection, the survey was administered online using Microsoft Forms, a secure and user-friendly platform well-suited for academic research. Distribution occurred through professional networks, surgical associations, and targeted email lists, thereby enhancing reach and encouraging participation from a geographically diverse pool of respondents. The data collection period spanned from April 1st to April 20th, 2025, providing a defined window during which participants could conveniently complete the questionnaire at their own pace while maintaining the integrity and structure required for quantitative analysis.

3.9.2 Qualitative Data Collection

Interviews were semi-structured and purposively sampled for surgeons to ensure that participants were experts with first-hand experience in laparoscopic surgery in teaching hospitals. Such an approach was critical to eroding the limit of context-specific knowledge and what we can garner from those who were very familiar with the subject. However, purposive sampling could be a limitation and introduce bias in that our study may not reflect surgeons in generality if they are operating in a less-resourced or non-teaching hospital where our study was conducted. The interview component of the study was designed to elicit rich experiential data from surgeons with respect to laparoscopic surgery. The interview also took into consideration several thematic areas to capture a full understanding of the challenges and enablers of adoption. Those sections included the background and surgical experience of participants to provide some context of their degree of exposure and expertise; the existence of laparoscopic facilities in their institutions to assess their institutional and infrastructural readiness; and the operational aspects of laparoscopic surgery and operational challenges during procedures. Subsequent sections examined the experience of the participants in terms of their training background, identified areas of deficit of skills and required training, outlined policy and financial perspectives, including the

availability of funding and support from the government or institutions, and concluded with a look toward the future and recommendations, where participants expressed ideas for improving laparoscopic surgery in teaching hospitals in Nigeria. The interviews were audio-recorded, transcribed, and anonymised for confidentiality purposes.

3.10 DATA ANALYSIS

3.10.1 Quantitative Analysis

Survey responses were exported to Microsoft Excel and Statistical Package for the Social Sciences (SPSS) for both descriptive and inferential statistical analysis. Descriptive statistics, including frequencies, percentages, and cross-tabulations, were utilised to identify patterns and summarise the demographic characteristics and response trends among participants. Chi-square tests were performed to test the relationships between key variables, such as institutional readiness, training access, and technology adoption. This enabled the identification of statistically significant associations and helped validate or refute the study's hypotheses.

3.10.2 Qualitative Analysis

In this study, we used an inductive approach to look at the interview data, which allowed themes to come up naturally from what the participants shared without following any set theories. This approach enabled the researcher to remain open to unexpected patterns, insights, and perspectives expressed by surgeons regarding their experiences with laparoscopic surgery in Nigerian teaching hospitals. The analysis followed the six-phase thematic analysis framework developed by Braun and Clarke (2006), which included (1) familiarisation with the data through detailed readings of transcripts; (2) initial coding to extract relevant data segments; (3) theme identification by clustering similar codes; (4) reviewing themes to ensure consistency and depth; (5) defining and naming themes to reflect their core meaning; and (6) reporting the findings with illustrative quotes from participants. To facilitate this process, a manual colour-coded technique was adopted for theme development. This method allowed for hands-on engagement with the data, enabling a more immersive and contextually grounded interpretation. The colour-coding approach supported a transparent audit trail that showed how raw

data evolved into meaningful themes. By combining this flexible, data-focused method with organised coding, the analysis provided detailed insights into the challenges of adoption, training issues, and institutional factors affecting laparoscopic practice, revealing aspects that might have been missed with a strictly logical approach (Braun and Clarke, 2006).

3.11 TRUSTWORTHINESS & RIGOR

To ensure rigour and credibility in this study, several well-established qualitative validation strategies were employed. First, triangulation was used by integrating quantitative survey data with qualitative interview findings to enhance the comprehensiveness and depth of the results (Creswell & Plano Clark, 2018). Member checking was conducted by sharing preliminary interpretations with selected participants to confirm the accuracy and authenticity of their responses, thus strengthening the credibility of the findings (Lincoln & Guba, 1988). An audit trail and reflective journaling were kept during the analysis to record decisions, reasons for coding, and the researcher's thoughts, which helped make the process clear and reliable. Peer debriefing sessions were also held with academic colleagues to review the data interpretation process, which served to reduce potential researcher bias and support confirmability (Nowell et al., 2017). Finally, the thick description was applied in reporting the findings to ensure that the context, meanings, and settings were richly conveyed, enabling readers to make informed judgements about the transferability of the results to other settings (Geertz, 1973).

3.12 ETHICAL CONSIDERATIONS

Ethical approval was gained from Griffith College Dublin's Ethics Committee, ensuring that this study aligned with protocols for research with human participants. There are a variety of ethical principles which guide the research process. Informed consent was obtained from participants during the initial stages of recruitment, and participants were provided with an overview of the aims, procedures, and rights associated with the study. Participation was completely voluntary, and respondents were made aware that they did reserve the right to withdraw from the study at any point without any repercussions. Furthermore, confidentiality was preserved by ensuring that no individual or identifiable information

was recorded and no identifiable information was linked to responses. In addition, personal data protection was preserved as audio recordings, transcripts, and digital files were securely stored, with access reserved for specific members of the research team only. Finally, a principle of academic integrity was preserved in the study process, as all data would only be used for research purposes, preserving research transparency, honesty, and respect for research participants.

3.13 LIMITATIONS OF THE STUDY

Limitations of the study were acknowledged that could affect the breadth, depth, and generalizability of the findings of this research. In the first instance, the issue of response bias could be identified, as participants may have embellished or downplayed their experiences given the self-report nature of both the survey and interview data. Second, although the sample size was suitable for an exploratory mixed-methods study, there is a likelihood that the sample was not sufficiently diverse to capture a range of experiences or institutional contexts in all Nigerian teaching hospitals. Moreover, due to time limitations as per the scope of a master's thesis, the researcher was limited to conducting a certain number and duration of interviews, which may have limited the qualitative richness of the findings. Compounding this issue was a failure to conduct on-site visits, and thus, the researcher was unable to view, in real-time, the laparoscopic infrastructure, training settings, and procedural practices. Finally, logistical constraints such as clinicians' busy clinical schedules, the surgeons' busy clinical schedules and vast distances between teaching hospitals interfered with the researchers' ability to achieve equivalent regional participation. Future studies could improve upon this study by exploring the research findings in a wider scope, with a longer time frame and deeper engagement with the institutions.

3.14 CONCLUSION

This chapter presented the structured methodology used to explore the adoption and technical challenges of laparoscopic surgery in Nigeria. By applying the Technology Acceptance Model (TAM), a positivist lens, and a deductive mixed-methods approach, the study integrates measurable trends with contextual narratives. The combined use of surveys and interviews enhances the reliability and depth of findings, laying a foundation for evidence-based recommendations aimed at improving laparoscopic practice in Nigerian teaching hospitals.

CHAPTER 4: RESULT

1.1 INTRODUCTION

This chapter outlines the significant findings from both quantitative and qualitative data pertaining to laparoscopic surgery's implementation in teaching hospitals in Nigeria. The results are organized along the themes that provided focus for this study, namely training exposure, institutional readiness, perceived barriers, and the surgeons' attitudes towards laparoscopy. The quantitative findings demonstrate measurable trends and patterns in structured survey responses from a diverse group of participants. These patterns and trends are further described thematically, as enunciated previously, with the supportive qualitative inquiry of the in-depth interviews to provide context and explain the lived experiences, barriers, and perspectives of surgeons engaged in laparoscopic practice. Together, these thematic findings provide a comprehensive view of laparoscopic surgery in Nigeria and make evidence-based recommendations.

4.2 QUANTITATIVE FINDINGS

Table 1: Socio- demographic and professional distribution among respondents

Variables	Frequency (n)	Percentages (%)
Age Group		
25–34	63	75.9
35–44	17	20.5
45–54	4	4.8
Surgical Specialty		
General Surgery	28	33.7
GP	1	1.2
Internal Medicine	2	2.4
Medical Officer	2	2.4
Neurosurgery	4	4.8
NYSC Corper Doctor	2	2.4
Obstetrics and Gynecology	30	36.1
Ortho	1	1.2
Orthopaedic	3	3.6
Paediatric Surgery	1	1.2
Paediatrics	1	1.2
Urology	8	9.6
Experience in Surgical Practice		
0–5 years	73	88.0
6–10 years	5	6.0
11–15 years	5	6.0
More than 15 years	1	1.2

Table 1 presents the sociodemographic and professional characteristics of the respondents. The majority of participants were aged 25–34 years (75.9%), followed by those aged 35–44 years (20.5%), and a smaller proportion aged 45–54 years (4.8%). Most respondents had 0–5 years of surgical experience (88.0%), with only 1.2% having over 15 years. The most common surgical specialty was Obstetrics and Gynecology (36.1%), followed by General Surgery (33.7%) and Urology (9.6%), while other specialties were less frequently represented.

Table 2: Adoption of Laparoscopic Surgery in Nigerian Teaching Hospitals

Variables	Frequency (n)	Percentages (%)
Hospital Performs Laparoscopic Surgery		
Yes	66	78.6
No	18	21.7
Frequency of Laparoscopic Surgery		
Daily	4	4.8
Do not	18	21.7
Monthly	21	25.3
Rarely	23	27.7
Weekly	18	21.4

Table 2 shows that out of 84 respondents, 78.6% reported that their hospitals currently perform laparoscopic surgeries, while 21.7% do not. Among all respondents, laparoscopic procedures were performed rarely by 27.7%, monthly by 25.3%, weekly by 21.4%, and daily by only 4.8%. These findings indicate that although most teaching hospitals have adopted laparoscopic surgery, its practice remains infrequent in many center.

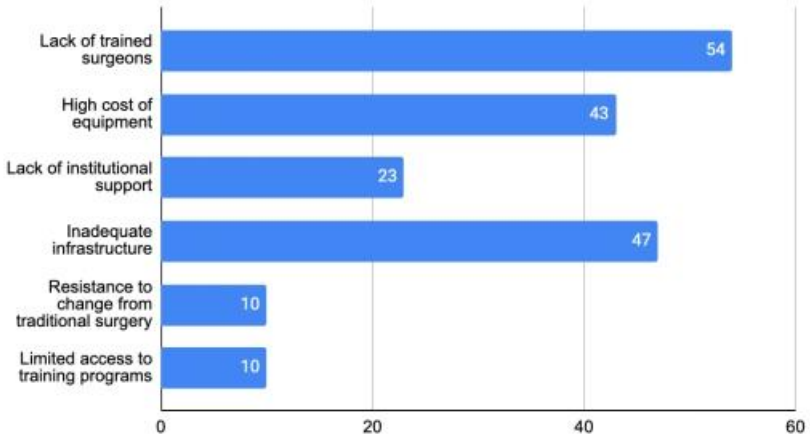

Figure 3: Reason for the slow adoption of laparoscopic surgery

The data presented in Figure 3 illustrate the primary factors contributing to the slow adoption of laparoscopic surgery. The most significant barrier identified was the lack of trained surgeons (n=54), followed by the high cost of equipment (n=43). Other contributing factors included inadequate infrastructure (n=47) and lack of institutional support (n=23). A smaller percentage of respondents indicated resistance to change from traditional surgery (n=10) and limited access to training programs (n=10) as reasons for the slow adoption.

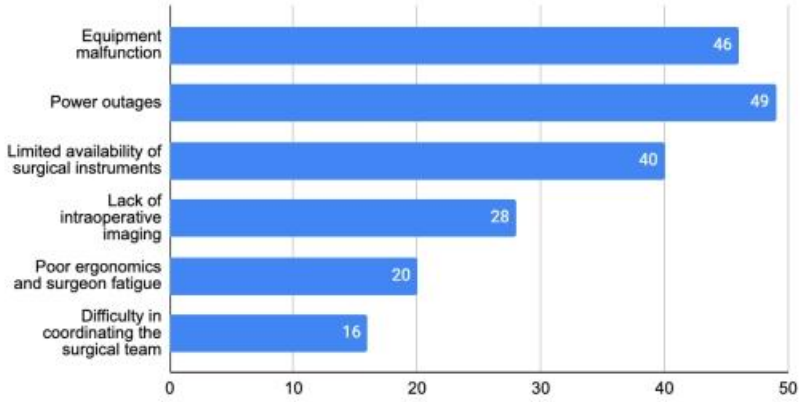

Figure 4: Common technical challenges faced performing laparoscopic surgery

Figure 4 highlights the common technical challenges encountered during laparoscopic surgery. The most frequently reported issues were power outages (n = 49) and equipment malfunction (n = 46), followed by the limited availability of surgical instruments (n = 40). Other challenges included lack of intraoperative imaging (n = 28), poor ergonomics and surgeon fatigue (n = 20), and difficulty in coordinating the surgical team (n = 16). These findings emphasize the need for infrastructure upgrades and team-based surgical training to support effective laparoscopic practice.

Table 3: Distribution of Technical and Institutional Challenges

Variables	Frequency (n)	Percentages (%)
Accessibility of maintenance and repair of laparoscopic equipment		
Easily accessible	2	2.4
Moderately accessible	53	63.1
Not accessible	29	34.5
Had to convert a laparoscopic procedure to open surgery		
No	42	50.0
Yes	42	50.0
Have received any formal training in laparoscopic surgery		
No;	61	72.6
Yes, internationally;	3	3.6
Yes, locally;	20	23.8
Rate the adequacy of training in laparoscopic surgery in Nigeria		
Inadequate	68	81.0
Somewhat adequate	15	17.9
Very adequate	1	1.2
Government policy play in the adoption of laparoscopic surgery in centre		
Limited support	34	41.7
No support	24	28.6
Significant support	25	29.8

Table 3 presents the distribution of technical and institutional challenges affecting the adoption of laparoscopic surgery. Most respondents indicated that maintenance and repair services for laparoscopic equipment were only moderately accessible (63.1%), with 34.5% stating they were not accessible. Half of the respondents (50.0%) reported having converted laparoscopic procedures to open surgery. A majority (72.6%) had not received any formal training in laparoscopic surgery, while only 3.6% had trained internationally and 23.8% locally. Additionally, 81.0% rated laparoscopic training in Nigeria as inadequate, and only 29.8% reported significant government policy support for its adoption in their centers.

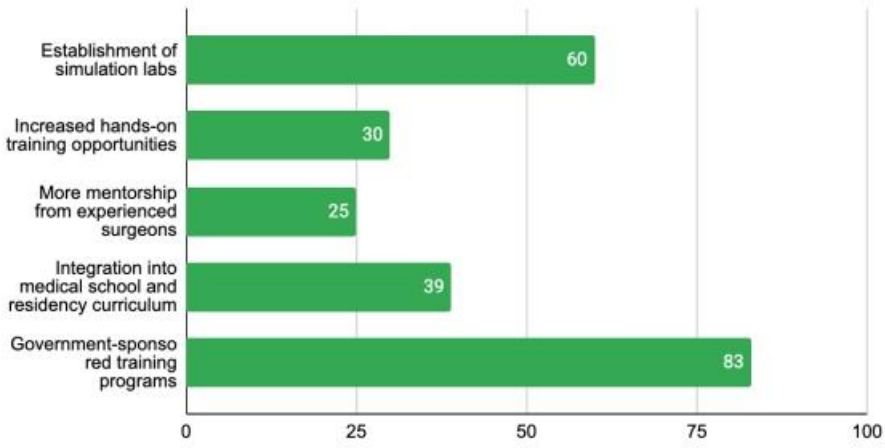

Figure 5: Factors to improve laparoscopic surgery training in Nigeria

The data indicate preferences for improving surgical training among respondents. The most frequently suggested intervention was government-sponsored training programs (n = 83), followed by the establishment of simulation labs (n = 60). Integration into medical school and residency curricula was endorsed by 39 participants, while increased hands-on training opportunities and mentorship from experienced surgeons were suggested by 30 and 25 respondents, respectively. These findings highlight a strong demand for institutional and government-level support in enhancing surgical education.

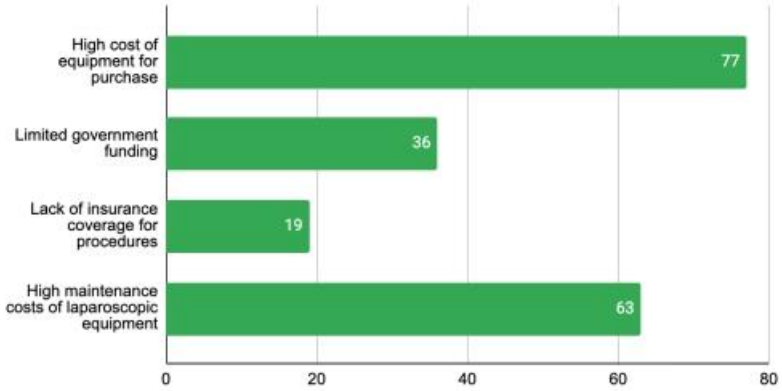

Figure 6: Financial barrier to the adoption of laparoscopic surgery

Figure 6 displays the financial barriers to the adoption of laparoscopic surgery as reported by respondents. The most commonly cited barrier was the high cost of equipment for purchase (n = 77), followed by the high maintenance costs of laparoscopic equipment (n = 63). Limited government funding (n = 36) and lack of insurance coverage for procedures (n = 19) were least mentioned.

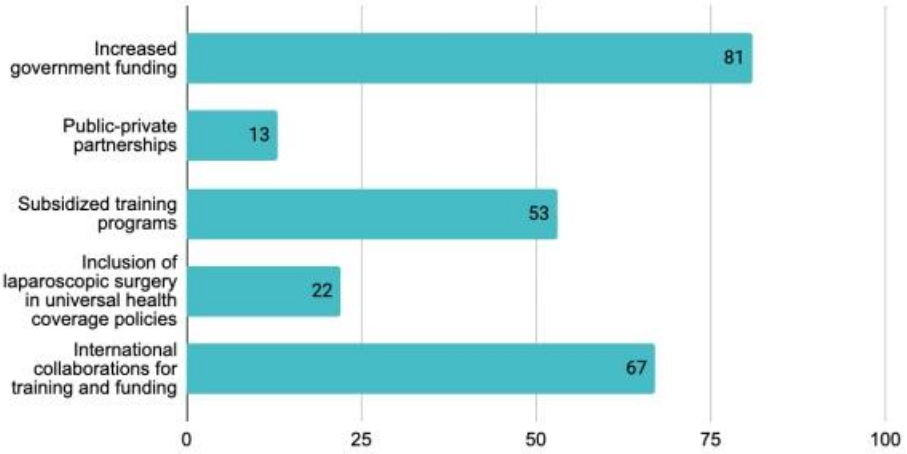

Figure 7: Recommendation strategies to improve the adoption of laparoscopic surgery

Figure 7 illustrates recommended strategies to enhance the adoption of laparoscopic surgery among respondents. The most frequently suggested approach was the implementation of government-sponsored training programs (n = 81), followed by the international collaborations (n = 67). Other notable strategies included development of subsidized training programs (n=53).

Table 4: Factors affecting the use of laparoscopic surgery among respondent's hospital

Variable	Category	Yes n (%)	No n (%)	Total (n)	χ^2	df	p-value
Age Group	**25–34**	**45 (69.2%)**	**18 (100%)**	**63**	**7.297**	**2**	**0.026***
	35–44	**17 (26.2%)**	**0 (0%)**	**17**			
	45–54	**3 (4.6%)**	**0 (0%)**	**3**			
Level of Surgical Experience	0–5 years	55 (84.6%)	18 (100%)	73	3.149	3	0.369
	6–10 years	5 (7.7%)	0 (0%)	5			
	11–15 years	4 (6.2%)	0 (0%)	4			
	>15 years	1 (1.5%)	0 (0%)	1			
Maintenance Accessibility	Easily accessible	2 (3.1%)	0 (0%)	2	7.904	2	**0.019***
	Moderately accessible	46 (70.8%)	7 (38.9%)	53			
	Not accessible	17 (26.2%)	11 (61.1%)	28			
Formal Laparoscopic Training	Yes, locally	16 (24.6%)	3 (16.7%)	19	0.686	2	0.710
	Yes, internationally	2 (3.1%)	1 (5.6%)	3			
	No	47 (72.3%)	14 (77.8%)	61			
Perceived Adequacy of Training in Nigeria	Inadequate	51 (78.5%)	17 (94.4%)	68	2.46	2	0.292
	Somewhat adequate	13 (20.0%)	1 (5.6%)	14			
	Very adequate	1 (1.5%)	0 (0%)	1			

Fischer exact test, p value at 0.05, * significant association

Table 4 presents the factors influencing the use of laparoscopic surgery among respondents. A statistically significant association was found between age group and use of laparoscopic surgery, $\chi^2(2) = 7.297$, $p = .026$, as well as between maintenance accessibility and its use, $\chi^2(2) = 7.904$, $p = .019$. However, level of surgical experience, formal laparoscopic training, and perceived adequacy of training in Nigeria were not significantly associated with laparoscopic surgery use ($p > .05$ for all).

4.3 QUALITATIVE FINDINGS

4.3.1 SOCIO-DEMOGRAPHIC FEATURES OF THE QUALITATIVE STUDY

The respondents from the different surgical specialties, such as general surgery, orthopaedics, urology, cardiothoracic surgery, ENT, and obstetrics and gynaecology, had work experience ranging from 2 to 10 years, with a mean value of 4.3 years, which classifies them as early-career professionals. They all reported that laparoscopic surgery was available in their hospitals, but availability differed among various facilities. Three facilities possessed it on a weekly basis, while other facilities possessed it on a quarterly basis, with one stating that they had not used it in over a year due to frequent maintenance issues and equipment failures.

4.3.2 SYNTHESIS OF QUALITATIVE EVIDENCE

From the interviews, the participants reported and discussed six themes, including institutional readiness and support, infrastructure and resource limitations, training, mentorship and skill transfer, surgeon attitudes and professional culture, external stakeholders and sustainability of interventions, and equity and access in skill acquisition.

4.3.2.1 Theme 1: Institutional Readiness and Support

This study reported that hospitals in Nigeria have different levels of institutional readiness for implementing laparoscopic surgery. Some had organised support, like subsidised laparoscopic services and facilities with a weekly laparoscopic day, while one respondent mentioned it was a national aim for tertiary institutions to possess a considerable number of laparoscopic units. Most hospitals are currently dealing with trans-systemic barriers such as a lack of funding, equipment, and integration of policy. Organizational gaps were also seen as one respondent noted, *"No one takes full responsibility for the laparoscopic tower."* Another indicated that laparoscopic procedures ceased for more than a year due to maintenance cycles. Many respondents attributed the lack of laparoscopic surgical use to poor national health policies, with one stating, *"Policies don't include laparoscopic surgery training or intervention."* While it was noted by respondents that some hospitals extend effort, such as sponsoring a laparoscopic team, they nevertheless stressed that sustainability remains elusive without system-wide restructuring. Policy reform was central for many respondents, along

with clearer administrative delineation of authority and purposeful directed funding, with one respondent commenting, *"With equipment, training, and subsidies, we'd have no problem.*"

4.3.2.2 Theme 2: Limitations in Infrastructure and Resources.

Equipment dependability, power supply, consumable costs, and support infrastructure were major concerns in all 10 interviews. These constraints are common across surgical specialities and institutions. Most responders complained about laparoscopic equipment malfunctions. One respondent said, *"Equipment malfunctions and power failures disrupt surgery schedules and force referrals to outside clinics*." According to another respondent, numerous instrument malfunctions have led to decreased trust and reliance on laparoscopic tools among surgical teams. Equipment failure and a lack of specialised or sufficient equipment per unit were major issues. One respondent said, *"There is just one... no designated laparoscopic towers... multiple units depending on one or two available devices,"* while another surgeon in another centre said, *"There is only just one laparoscopic tower for all use, this prevents surgery in other areas."* Centralisation reduces training and patient access due to scheduling delays and limited use. Operating theatre power outages were another cross-cutting barrier. A respondent noted, *"We occasionally have power outages in the theatre... could be in the middle of a procedure, and then the power goes off,"* while another reported, *"Poor lighting due to erratic power supply."* Furthermore, another person added that the *"problem with power outages and sometimes the equipment is not so well serviced"* affects efficiency and surgical risk. Another major obstacle was the cost of laparoscopic tools. A respondent noted that *"the instruments are quite expensive to acquire... the trainers can't easily give out their instruments,"* and that *"there is no dedicated body to take care of the instruments."* Another surgeon added, *"The ports, the working equipment... all the devices... have become essentially single-use and costly,"* with laparoscopic ports costing *"50 or 70k... he's importing it."* The high cost of surgery due to imported consumables limits its affordability and scalability.

4.3.2.3 Theme 3: Training, Mentorship, and Skill Transfer

A clear and consistent theme emerged: the training and mentorship framework for laparoscopic surgery in Nigeria is fragmented, inadequate, and largely informal. While there are isolated examples of formal exposure, most respondents described either an absence of structured training or experiences that are brief, externally facilitated, and lacking in sustainability. A recurring issue across the study was the lack of institutionalised training programmes. One respondent bluntly stated, *"I've not received anything [in terms of training]*" and further emphasised, *"I'm not aware of any training centre in Nigeria."* Similar sentiments were echoed by surgeons in other centres, who admitted, *"No, I have not received any formal training in laparoscopic surgeries,"* while another in Obstetrics and Gynaecology specialty gave a different picture and commented, "*Not formal training... my guys have received formal training... trying to impart the knowledge to us,"* indicating that most knowledge transfer happens peer-to-peer, not through structured institutional programs. Another finding was that in some facilities, training exists but lacks depth and continuity. One respondent described a three-day surgical course organised by the West African College of Surgeons but emphasi*sed, "Not much time for hands-on."* Likewise, another resident in cardiothoracic surgery reported attending *"a couple of workshops... laparoscopy simulation training... not institutionalised training*" and noted that all training he received was self-funded: *"All the ones that I have attended, I paid for myself... just because you also want to retain the learning and training."* These cases reflect the reliance on short-term, external workshops as substitutes for long-term in-house education. In another light a few respondents have experienced limited formal training early in their residency, as one shared: *"I have received formal training [in] laparoscopic surgery during my basic surgical skills in the beginning of residency."* However, even in such cases, opportunities to reinforce those skills are lacking due to funding gaps and infrequent surgeries: *"I've not actually been able to do some surgeries because of... the paucity of funds on the part of our patients."* There is a strong consensus on the need to incorporate laparoscopic training into earlier stages of medical education and residency programs. A resident suggested, *"The training should start even from way before residency, medical school,"* while another proposed that laparoscopic surgery should be "*incorporated into our medical school... as one of their courses in the final year."* Several respondents emphasised the need for simulation laboratories and hands-on practice environments. A respondent emphasised, *"There should be*

availability of simulation laboratories and then personnel who would train residents," and while another person bemoaned, *"Presently my facility has no laboratory for practicing... we don't have a standardised training lab."* Moreover, mentorship was discussed not only as a formal process but also as a potential internal solution where expertise exists. A surgeon in urology speciality advocated for a cascading model of knowledge transfer, stating, *"People that are highly skilled and are very fast... over time, they can now train others."* Another person also pointed to the necessity of passing knowledge along the training pipeline: *"Ensure that the surgeons are... equipped in terms of skills, and that way they can also pass the knowledge... to their residents."*

4.3.2.4 Theme 4: Surgeon Attitudes and Professional Culture

The findings revealed mixed feelings about laparoscopic surgery in Nigeria. Younger surgeons were optimistic; one respondent predicted, *"It'll be standard soon,"* citing shorter stays and smaller scars, noting patients often advocate for it. Another shared, *"I want to focus on minimal access surgery… Nigeria will get there, slowly."* A respondent added, *"It'll improve… Nigerians are resilient."* However, the findings demonstrate that challenges remain. A respondent noted, *"Older surgeons lack skills to teach,"* and another said, *"Consultants avoid using the equipment due to issues."* Economic barriers were clear as one respondent explained, *"Surgeons prefer faster open surgeries to earn more… Laparoscopic cases take longer for less pay."* Another went on to emphasise, *"Surgeons must want to adopt it."* Conversely, a respondent was doubtful, saying, *"I don't see it becoming common… But incentives could help,"* tying motivation to systemic support.

4.3.2.5 Theme 5: External Stakeholders and Sustainability of Interventions

Respondents called on government as well as outside support to help sustain laparoscopic surgery in Nigeria. These factors included funding, policy and insurance. *"Government is the main funder,*" one respondent said. *One respondent mentioned budget allocation, stating that the government should fund procedures and training to increase prevalence.* Another obstetrics and gynaecology resident s*tated, "The policy should provide necessary equipment; there has been a significant lack of support*

thus far." Another respondent emphasised the importance of insurance, stating, "It's crucial to have insurance," while another proposed using insurance to reduce expenses. Another resident highlighted how insurance could be used to encourage uptake, saying, *"Insurance for patients, not out of pocket*." Another cardiothoracic surgery fellow said, *"Paying people what they want (for laparoscopic materials) is tough*,*"* further stating the need for local production of the materials needed: "*We can make consumables locally."* The responses gathered from this study aimed to identify effective policy, partnership, and insurance models. One resident *concluded, "The government can do better. Subsidise equipment."*

4.3.2.6 Theme 6: Equity and Access in Skill Acquisition

Findings from this study indicated that disparities in access to laparoscopic training and benefits for patients (and vice versa) are seen both among institutions and in the Nigerian healthcare system, not to mention socioeconomic status. Training availability was uneven: *"Some facilities don't have training,*" a respondent in Orthopaedic Surgery said. Yet even when they did, sessions were limited in quality. *"There were only hands-on trainers – trainers who came from other departments,* "another person mentioned. Another respondent went on to buttress that, *"Sometimes there are more procedures done at some centres than others."* While there were suggestions for a regional training hub to curb this, *"regional facilities where surgeons can learn and return", Patient* access was limited by cost. A respondent in urology highlighted, saying, *"There is a preference for cheaper open surgery because laparoscopy costs too much."* Another general surgery resident agreed, noting*, "It is too expensive, so people leave it because they just have the other procedure." Surgeons also experienced inequity in resources,*" said a respondent, further elaborating, saying, "*I can explain it as a surgeon who actually buys his own tools to keep and develop his skills"."* There were concerns about the procurement of materials needed for laparoscopic surgery, with one person saying, *"There are some consumables which cannot be purchased in this country; you can't do certain procedures because certain items are not available.*" Nevertheless, training and access to laparoscopic surgery remain at the core of inequalities in this field due to institutional, regional and financial constraints, as demonstrated by the result of this study. The study highlighted the need for strategies such as targeted

investments into regional training centres, distribution of instrumentation, and health insurance schemes to address these gaps.

4.4 DISCUSSION

The results of this study illustrate that the institutional readiness and support for laparoscopic surgery among teaching hospitals in Nigeria continue to be an extremely disorganised and inconsistent process. Instead of a cohesive change from the past to the present, what is observed is a picture of variability both in systems and process organisation and capacity. Some institutions have moderate organisation and operational capacity, but there are some institutions that are working with an organisational status similar to pre-laparoscopic readiness, and the existing capacity for laparoscopic procedures is marginal or limited. Overall, we inferred this variability was part of a general structural challenge in the Nigerian healthcare system. The lack of systematic national plans or processes to integrate minimally invasive surgery into essential surgical services amplified this structural challenge. It was clear from this study that institutional commitment was one of the most critical variables of readiness that emerged from operational planning and organisational choices. When institutional leadership had a vision aligned with the surgical vision, there were examples of formal scheduling for laparoscopic procedures and subsidised patient services. However, these examples were relatively few and highlighted the importance of institutional leadership as an influential variable; they typically resulted from a combination of individual champions or efforts rather than being driven by any system policy as part of an institutional plan. These observations confirm more general anecdotal evidence presented in the African surgical literature that the development of MIS has usually been attributable to individual or standalone champions or projects rather than being policy-driven or systemic. For example, Balogun et al. (2020) illustrated that laparoscopic surgery was launched at Lagos University Teaching Hospital through a series of ad hoc workshops and diaspora contributions, and institutionalisation was impossible because it was never embedded. Smiley et al. (2023) similarly reported that early successes at their institution were due to one surgeon being trained abroad, which is a typical example of reliance on personal effort rather than working at a policy level to create a culture of surgical policy and practice. The findings of this study indicate

that, as discussed in the second report of this research study, institutional fragmentation is ubiquitous. In many of the centres studied, there was no clear ownership or operational accountability for laparoscopic resources such as laparoscopic towers, which is indicative of organisational stewardship failures. The absence of organisational accountability and stewardship perpetuates the absence of continuous ownership and sustainability of surgical interventions. Ekwunife et al. (2012) also reported a similar lack of stewardship when local laparoscopic instruments were procured without stakeholder involvement, resulting in programmatic failure.

Furthermore, national-level expectations for all tertiary facilities to have laparoscopic units are regularly unmet, not due to no ambition but because of weak governance and systemic planning of surgical development. And, of course, if policy goals are ignored, this is often compounded by policy inattention. National surgical plans largely exclude laparoscopic surgery, which indicates a disconnect between clinical innovators and health systems, as found in the quantitative and qualitative aspects of this study. There is significant evidence to support this. Imediegwu et al. (2024) observed that most surgical trainees in Nigeria felt that government policies purposefully obstructed the creation of laparoscopic centres. Ganni et al. (2017) reported that fewer than 30% of countries surveyed had policy-supported certification and regulatory oversight for laparoscopic surgery. Wilkinson et al. (2021) identified this gap and specifically concluded that the lack of curricula for formal training in laparoscopic surgery was a major barrier to institutionalisation among most low- and middle-income countries (LMICs). Structural dimension limitations on infrastructure and resources emerged as significant boundaries. Teaching hospitals in Nigeria, in particular, often reported a continued lack of equipment, use of malfunctioning systems, and poor power supply. The resource and equipment shortages and instability are systemic rather than isolated events and have been documented in multiple studies as intermittent power and equipment outages and non-availability of surgical consumables to impact trust and reliability in their laparoscopic resources and interrupt clinical schedules. For example, Ijah and Manuel (2020) and Ekwunife et al. (2012) reported high incidences of power and equipment failures that caused impacts that varied by case - some formed delays, and others caused cases to be converted to open procedures. Similarly, Balogun et al. (2020) and Falola et al. (2024) have shown similar trends across the continent. Deficiencies in

logistics and power supply were chronic issues in their results. A common theme is that there are insufficient resources and equipment centralised across multiple surgical units sharing a single laparoscopic tower. This process bottleneck can impact cases, volume of cases, training, and ultimately, retention of skill; all are critical in supporting a well-performed laparoscopic procedure. Alarmingly, this matches Troller et al. (2024), who discovered that "in most cases, laparoscopic programmes in Africa at the early stage rely on second-hand or donated instruments without maintenance systems". If a study factors in funding and spare parts, it can be unlikely that any equipment will be functional without also having a maintenance system. In addition, the role of an unstable power supply. Creating a vicious cycle, with many reports showing that procedures were delayed during operations because of power supply interruptions. Solving this issue is an unacceptable risk to the patient and can stop further scheduling of cases laparoscopically. Similarly, Smily et al. (2023), in the study, have shown that not being able to address electricity shortages was often the reason for stopping tears and reversing back to open surgeries. Moreover, deficient support infrastructure substandard imaging and surgical beds that often lack ergonomic designs represents clinical hurdles. The high cost of instruments and maintenance adds one more financial dimension to this barrier's infrastructure aspects, along with patients' limited funds (Afuwape and Akute, 2011).

The findings of this study show that there is lacking an organised, cohesive training and mentorship structures for laparoscopic surgery in Nigeria. There is an increasing interest in minimally invasive surgery by clinicians, but most training is formalised at a peer level, informal, or workshop-based, and there are no processes or training pathways in place which can substantiate continuity. Balogun et al. (2019) reported that nearly all surgical practitioners had not formally trained in laparoscopy or gained sufficient hands-on experience. We found a parallel assessment by Wilkinson et al. (2021), who confirmed that most training and deployment of laparoscopic surgery in low- and middle-income countries is externally funded and the outcome of intermittent efforts. Training that are workshops, and even excellent as they may be, are largely bankrolled by benefactors or overseas providers; they are brief and costly and make little attempt to provide practical experiences. Even though some training points will contribute to persistence in experience, the episodic opportunities to apply the new skill(s) hardly offer exposure to sustainable surgical competence. Usually, when laparoscopic

skills are offered by techniques like Basic Surgical Skills courses, the opportunities for practice when back at work are limited or non-existent, usually due to patient costs or a lack of consumables. Gabriel et al., (2011) suggested that to gain proficiency in advanced laparoscopic procedures, surgeons will require no less than 60 to 90 operatively authenticated procedures. Surgeons already struggling in low-volume, under-resourced locations are not achieving this benchmark with laparoscopic surgery. Simulation training, which is a crucial component of the education of laparoscopic surgeons worldwide, is almost exclusively absent from Nigerian institutions. There are studies, including those by Ezeome et al. (2009) and Obayemi et al. (2025), which demonstrated the utilisation of low-cost, locally developed simulation tools in mentoring laparoscopic surgeons and increasing their confidence in laparoscopy. Awuah et al. (2023) also reported that structured mentorship models, specifically telementoring, help contribute to skill retention, although these possible systems are not yet entrenched in Nigerian surgical training trajectories. Surgeons' perceptions of laparoscopic surgery are influenced by a combination of their generational, cultural, and economic circumstances. Younger surgeons are typically more amenable to laparoscopic surgery, acknowledging the advantages, including earlier recovery and better cosmetic results. Nonetheless, this optimism is tempered by the conservatism of older colleagues who lacked training and expressed scepticism due to complexity and time. The generational divide reflects, to some degree, wider hierarchical limitations around surgical mentorship and is consistent with the evidence presented by Afuwape & Akute (2011) and Ajah (2018), in which senior consultants shaped the clinical protocols and limited the juniors to new innovations by hierarchical constraints. Economic limitations also dominated clinical thought processes. The laparoscopic procedure had benefits, but it was very time and labour-intensive, with little reimbursement available. In a busy public hospital, surgeons opted for faster and higher-yield open procedures as alternatives. Smiley et al. (2023) noted that similar disincentives were common in West Africa, as there are time limitations for laparoscopic setups that could not be scheduled as a greater consideration than the case that could follow. However, Obayemi et al. (2025) showed that exposure to training and institutional support could reverse the disincentive and further elucidated the need for enabling environments.

The role of the external stakeholders in sustaining laparoscopic surgery is important but not fully realised. There is wide agreement on the government's role and responsibility to fund, create policy with, and support training; however, engagement has been minimal. Therefore, continued reliance on self-funded or donor-funded programmes is common. Ahmad and Mishra (2015) and Abdulwahab et al. (2025) confirmed that self-sponsorship dominates funding patterns, while only a fraction of LMIC governments provide any structured support for laparoscopic training or equipment acquisition. In comparison to many other contexts, public-private partnerships are also underutilised. Falola et al. and Smiley et al. (2023) provide insights into recognising successful collaborations in Nigeria and Botswana where engagement with ministry departments, non-governmental organisations (NGOs) and academic institutions can result in alignment and, ultimately, sustainability. The introduction of health insurance coverage was another mechanism that was underutilised in the study. There are advocates for including minimally invasive surgery (MIS) procedures in national health insurance initiatives. The scholarly literature presents emerging possibilities, including Wismayer (2022), who recognises that procedures like laparoscopic surgery may also be classified as elective under publicly funded plans, which paradoxically creates disincentives for both patients and surgeons. Another emerging notion is the "in-country" production of procedures, consumables, and instruments as a means to access MIS affordably. Although this is an encouraging option, success will depend on the industry's capacity to develop products and equipment and on political will to support industry development an aspect currently underexplored. Efforts to distribute accountability among stakeholders by utilising the triad model (i.e., surgeon, facility, and government) remain somewhat more aspirational than fully collaborative.

Even more fundamental is equitable access to training and service delivery in laparoscopic procedures. Training opportunities for residents are only available within urban-centric elite institutions, while barriers to mentorship, equipment, and simulation are far removed for surgeons working outside of tertiary care centres in rural environments. This geographical and institutionalised inequity is also echoed in access to patients, where only those who can afford the economic risk have the opportunity to pursue laparoscopic services. Both Imediegwu et al.'s (2024) and Adisa's (2014) studies showed that many patients refuse laparoscopic surgery on financial grounds. Unless there are

reforms to health financing, particularly to insurance, to increase coverage and subsidise care, these inequities will remain and worsen. I notice that medical education inequities also extend to the surgical workforce. In the literature, Ojo et al. (2021) discussed the very blatant gender disparity in surgical training in Nigeria and how under-represented and undervalued women in the surgical workforce are. Although gender was not explicitly addressed in this qualitative study, the absence of women in our data implies structural exclusion requiring further examination. Ultimately, laparoscopic surgery in Nigeria will change with more sustainable approaches that move away from ad hoc and individual initiatives and move towards policy-level institutional initiatives. This requires laparoscopic surgery as part of a national surgical plan, with budgets and sustainable funding for infrastructure and training, as well as inclusive mentorship and insurance policies. Without these systemic changes, the isolated positive changes we observe now will remain the exception rather than the norm.

CHAPTER 5: CONCLUSION AND RECOMMENDATION:

5.1 CONCLUSION

This study has established an important and multifaceted assessment of laparoscopic surgery in Nigerian teaching hospitals. Utilising both qualitative and quantitative data, it is clear that there has been some introduction of laparoscopic activities in many hospitals, but the overall level of adoption is low, sporadic, and largely unsustainable. This is influenced by systemic factors, such as institutional inertia, unreliable infrastructure, limited financial support, and very disjointed training or mentorship systems, to name a few. An essential finding of this study is that the challenges of laparoscopic surgery in Nigeria are not merely issues of funding or technical proficiency; they are systemic. Hospitals often lack formal leadership and supervision of minimally accessible surgery programs, and national policy rarely reflects what is required to support minimal access surgery (MAS). Moreover, younger surgeons, even with their passionate enthusiasm for MAS and acknowledgement of its clinical benefits, are dependent upon the infrastructure of simulation laboratories, accountability or supervisory mentorship, and the opportunity for hands-on surgical experience. The prevalence of short-term training workshops, which are typically funded by others and not followed up, demonstrates a fundamental reliance on day-to-day interventions rather than a reliable program within the institution. There are disparities between institutions and areas of speciality, therefore demonstrating inequities in skills acquisition and access for patients, creating additional difficulty in successfully introducing laparoscopy into surgical practice as normative. Geographic disparity, prohibitive costs for consumables, intermittent electricity supply and insufficient insurance mean that, even when the infrastructure exists, utilisation remains unpredictable and inequitable. Overall, the findings provide evidence of a fragmented and challenged ecosystem in need of an urgent overhaul. Without systemic and policy-level change, laparoscopic surgery will continue to be stigmatised in Nigeria, limited to the centres of excellence or the individuals with external funding, while the remaining health system is immobilised in its ability to deliver a modernised surgical offering.

5.2 IMPLICATIONS FOR RESEARCH AND PRACTICE

5.2.1 Implications for Practice

The findings of the current research study have important implications for the development of health delivery systems, medical education, and surgical systems in Nigeria. This indicates that teaching hospitals have to establish laparoscopic units with governance procedures and guidelines. This requires appointing responsible heads of units, budgeting for equipment maintenance cycles and controlling both equipment usage and patient outcomes. Surgical training institutions must reform their existing curricula to include laparoscopic procedures as a core competency instead of just an elective, optional workshop or course requirement that resident trainees can choose to participate in or not. Simulation-based training could be a part of undergraduate medical education as an early engagement in developing laparoscopic competencies. Laparoscopic surgery needs to be included in the broader surgical strengthening agenda by national health policy-makers and surgical governing bodies (for example, NPMCN and WACS) alongside provision and funding. Furthermore, hospitals should work with federal or state governments to add laparoscopic procedures to their public health insurance coverage so that more patients can benefit from it in a financially sustainable way for them, their institutions, and patient outcomes. It is urgent that senior consultants and skilled surgeons are motivated to continue to mentor colleagues less skilled in laparoscopic surgery. Facilitating infrastructures for systematic knowledge transfer, such as fellowship programs in laparoscopic surgery, mentorship consortiums and tele-mentoring initiatives, would help mitigate challenges posed by generation and institutional boundaries. We cannot forget rural and under-resourced hospitals. Policies related to regional training hubs and mobile surgical teams to access care access while also ensuring equity of training and delivery in some capacity.

5.2.2. Implications for Research

This research also identifies many areas for further research. Further studies could assess the impacts of different health system interventions, e.g. simulation labs, tele-mentoring, to enhance the volume of laparoscopic procedures as well as their sustainability. There is also little understanding of patient experiences and outcomes for laparoscopic procedures in Nigeria, which could demonstrate validity for future advocacy for their adoption through research on patient satisfaction, costs, recovery times

and longer-term outcomes. Also, there is limited attention to the under-representation of women in surgical training, especially in laparoscopic surgery. Research on women's gendered experiences, barriers to involvement, and opportunities to develop inclusive surgical training would be warranted. In particular, cost-benefit studies should compare laparoscopic and open surgeries, including long-term health system cost savings (shorter patient stay, fewer complications), which can provide evidence for policies and coverage decisions. Furthermore, studies on developing and using low-cost laparoscopic simulation and reusable instruments that are locally adapted could increase low-cost affordability. Research on local innovation may provide opportunities for local consumables manufacturing. Further studies across sites could also investigate scaling-up interventions for laparoscopic training and models for sustainability by comparing institutional capacity, outcomes and sustainability models.

5.3 RECOMMENDATIONS

Based on the findings of this study, the following recommendations are proposed to address the identified challenges and improve the adoption of laparoscopic surgery in Nigeria's teaching hospitals:

A. Policy and Institutional Support

- Integrate laparoscopic surgery into national surgical plans and health policies, ensuring targeted budget allocations for infrastructure, training, and maintenance.
- Mandate the inclusion of laparoscopic skills in residency programs, with minimum competency requirements established by regulatory bodies.
- Develop institutional frameworks that clearly designate responsibility for laparoscopic units, including equipment ownership, maintenance cycles, and procurement.

B. Training and Mentorship

- Establish regional laparoscopic training centers equipped with simulation labs to standardize and decentralize access to surgical training.

- Incorporate simulation-based laparoscopic training into both undergraduate medical education and postgraduate residency programs.
- Promote mentorship models by empowering skilled surgeons to train peers and junior colleagues through structured programs and continuous professional development workshops.

C. Infrastructure and Technology

- Invest in stable power solutions (e.g., solar or backup generators) in surgical theaters to reduce disruptions during procedures.
- Create centralized procurement systems or public-private partnerships to lower the cost of acquiring and maintaining laparoscopic tools and consumables.
- Promote local manufacturing of surgical consumables, especially reusable laparoscopic instruments, to reduce dependence on imports.

D. Financial and Insurance Coverage

- Include laparoscopic procedures in national health insurance schemes, to expand patient access and reduce out-of-pocket costs.
- Subsidize laparoscopic surgeries and training programs at public institutions to incentivize participation by both patients and practitioners.

E. Monitoring and Research

- Develop a national laparoscopic surgery registry to track usage trends, patient outcomes, and institutional readiness across the country.
- Support further research into gender disparities, regional inequalities, and long-term outcomes of laparoscopic training programs to ensure equity and impact.

5.4 PERSONAL REFLECTIONS

Beginning this study project has been one of the most academically and personally gratifying things to be a part of during my time at the university. It originally started out of mere curiosity about why laparoscopic surgery is not practised more in Nigeria but evolved into a full-scale study that required a lot of analysis and an understanding of how complex our healthcare system is. The unique aspect of this project was the mixed-method approach that allowed me to use both quantitative and qualitative methods. To be able to explore and implement a mixed-method study, I had to not only collect and analyse numerical and statistical data but I had to learn briefly about the lived experiences and complex perspectives of healthcare workers. In the beginning, using a mixed-method approach seemed quite difficult, but in the end, it provided greater depth and utility to my findings. This process allowed me to discover three distinct types of evidence, corroborate and identify patterns, and deepen my understanding of how tangible indicators and real-world experiences intersect'. I learned to use tools such as SPSS and Excel to identify important patterns in quantitative data, how to ask questions in a way that will yield clear answers, and how to use surveys to gauge value in structured data. The qualitative interviews took place in a different space: I needed to be purposeful, engage in open-ended questions, and notice the silences that did not raise issues. Conversations with varying types of doctor-surgeons from different areas of specialities illuminated the inequities, challenges, innovation, and hope of surgical care in Nigeria that I had not recognised until this point. The opportunity to apply the theories and frameworks that I had been learning initially in my career enhanced the satisfaction of this experience. The theories of health systems theory, innovation diffusion, policy analysis, and qualitative research methodology were no longer just theoretical ideas floating in the air. They provided substantial tools that were practical for me to structure my research and even understand what it all meant. The study became an important proof of concept for me with the application of what I had learned in school to significance. Throughout the trip, I was continually challenged to think critically, adjust rapidly, and act in accordance with my work in schools and the limits of the real world. I learned how to cope with a challenging deadline, dig into the rightness and wrongness of things, and be open to unexpected divergences. The project management, communication, data analysis, and synthesis skills I learned have proven invaluable and will stay with me. On a more personal note, this study has initiated a new lifelong interest in surgical education,

health systems improvement, and evidence-based advocacy. I now recognise that to improve surgical outcomes in Nigeria, there are some things you cannot teach: leadership, participation in decision-making, and an ability to collaborate with others. This experience has renewed my desire to be meaningful in the field of inquiry, either through teaching, being involved with policy, or contributing to the evidence. It was more than a school project; it was a process of understanding, struggle, and intention. It reaffirmed my belief that real change in healthcare begins with inquiry and is maintained by people who question, learn, and do.

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APPENDIX

PARTICIPANT INFORMATION SHEET

Title of Study: Evaluating the Adoption of Laparoscopic Surgery in Nigerian Teaching Hospitals: A Survey of Surgeons' Experience and Operational Challenges

I would like to invite you to take part in a research study. I want to encourage you to please take time to read the following information carefully. It is a guide to explain why the research is being conducted and what it willl requires of you

Participation is entirely voluntary, and you should take your time to decide whether or not to take part.

WHO I AM AND WHAT THIS STUDY IS ABOUT

I am a medical doctor conducting this research as part of my academic dissertation. This study aims to evaluate the adoption of laparoscopic surgery in Nigerian teaching hospitals,

analysing the challenges surgeons encounter in performing these procedures. By collecting the experiences of surgeons, this study aims to identify barriers to adoption and suggest possible solutions for improving minimally invasive surgery in Nigeria.

WHAT WOULD TAKING PART INVOLVE?

If you agree to participate, you will be asked to complete a survey about your experiences

with laparoscopic surgery. The survey will take approximately [estimated time] to complete. Some participants may also be invited for a brief follow-up interview, which may be audio-recorded for accurate transcription. All responses will remain confidential and will be used solely for research purposes.

WHY HAVE YOU BEEN INVITED TO TAKE PART?

You have been selected for this study because you are a practicing surgeon in a Nigerian teaching hospital with experience in surgical procedures, including laparoscopic surgery. Your insights are valuable in understanding the current state of laparoscopic surgery in

Nigeria and the challenges faced in its adoption.

DO YOU HAVE TO TAKE PART?

Participation in this study is entirely voluntary. You have the right to refuse to participate, skip any question, or withdraw at any time without giving a reason. If you choose not to take part, it will not affect your professional standing in any way. If you decide to withdraw, please contact (Babawale Emmanuel , +353874788064).

WHAT ARE THE POSSIBLE RISKS AND BENEFITS OF TAKING PART?

There are minimal risks associated with participating in this study. The primary concern is maintaining the confidentiality of your responses, which will be handled securely. There are no direct personal benefits; however, your participation will contribute to a better understanding of laparoscopic surgery adoption in Nigeria.

WILL TAKING PART BE CONFIDENTIAL?

Yes. All data collected will be strictly confidential as required by the data protection act(1998). Your responses will be anonymized, and no identifying information will be included in the final report. Data will be stored securely, and only authorized researchers will have access. However, confidentiality may be breached if there is a serious concern about harm to the participant or others (e.g., serious professional misconduct, legal violations).

HOW WILL INFORMATION YOU PROVIDED BE STORED AND PROTECTED?

No names or personal information will be kept on or stored with these questionnaires. All data will be stored securely in a locked filling cabinets and on a password-protected database accessible only to the research team. Signed consent forms and any audio recordings will be kept in a secure location until the research is completed. Transcribed interview data, with all personal identifiers removed, will be retained for up to two years before being permanently deleted.

WHAT WILL HAPPEN TO THE RESULTS OF THE STUDY?

The results of this study will be used for my academic research and may be presented at medical conferences or published in scientific journals. Findings may also be shared with hospital administrators and policymakers to support improvements in surgical training and resource allocation for laparoscopic procedures. A summary of the study's findings will be available upon request.

WHO SHOULD YOU CONTACT FOR FURTHER INFORMATION?

If you have any questions or require further information, please contact:

Babawale Emmanuel

Griffith College Dublin

Emmanuel.babawale@student.griffith.ie+

353874788064

Consent to Take Part in Research

Evaluating the Adoption and Technical Challenges of Laparoscopic Surgery in Nigerian Teaching Hospitals: A Survey of Surgeons' Experience

I,……....., voluntarily agrees to participate in this research study.

I understand that even if I agree to participate now, I can withdraw at any time or refuse to answer any question without any consequences of any kind.

I understand that I can withdraw permission to use data from my survey within two weeks after completion, in which case the material will be deleted.

I have had the purpose and nature of the study explained to me in writing, and I have had the opportunity to ask questions about the study.

I understand that participation involves completing a survey about my experiences with laparoscopic surgery, including challenges, adoption rates, and technical difficulties in Nigerian teaching hospitals.

I understand that I will not benefit directly from participating in this research.

I understand that all information I provide for this study will be treated confidentially.

I understand that in any report on the results of this research, my identity will remain anonymous. This will be done by changing my name and disguising any details of my responses which may reveal my identity or the identity of people I speak about.

I agree to my survey responses being recorded and analyzed for research purposes.

I understand that disguised extracts from my survey responses may be quoted in the (dissertation, conference presentations, published papers, e-journals, and library records).

I understand that if I inform the researcher that I or someone else is at risk of harm, they may have to report this to the relevant authorities. They will discuss this with me first but may be required to report with or without my permission.

I understand that signed consent forms and original survey responses will be retained in a secured database accessible only to the researcher until the exam board confirms the results of the dissertation.

I understand that a transcript of my survey responses, in which all identifying information has been removed, will be retained for two years from the date of the exam board.

I understand that under freedom of information legislation, I am entitled to access the information I have provided at any time while it is in storage as specified above.

I understand that I am free to contact any of the people involved in the research to seek further clarification and information.

Participant Name:

Signature:

Date:

Researcher Name: Babawale Emmanuel

Signature:

Date:

If you have any questions or require further information, please contact:

[Babawale Emmanuel]

[Griffith College Dublin]

[Emmanuel.babawale@student.griffith.ie]

[+353874788064]

Section A: Demographic Information

What is your age group?

a) 25-34

b) 35-44

c) 45-54

d) 55 and above

What is your surgical specialty?

a) General Surgery

b) Gynecology

c) Urology

d) Other (Please specify)

What is your level of experience in surgical practice?

a) 0-5 years

b) 6-10 years

c) 11-15 years

d) More than 15 years

Section B: Adoption of Laparoscopic Surgery

Does your hospital currently perform laparoscopic surgeries?

a) Yes

b) No

If yes, how often are laparoscopic surgeries performed in your hospital?

a) Weekly

b) Monthly

c) Rarely

What are the main reasons for the slow adoption of laparoscopic surgery in your hospital? (Select all that apply)

a) Lack of trained surgeons

b) High cost of equipment

c) Lack of institutional support

d) Inadequate infrastructure

Section C: Technical and Institutional Challenges

What are the most common technical challenges you face when performing laparoscopic surgery?

a) Equipment malfunction

b) Power outages

c) Limited availability of surgical instruments

d) Lack of intraoperative imaging

How accessible is maintenance and repair of laparoscopic equipment in your hospital?

a) Easily accessible

b) Moderately accessible

c) Not accessible

Have you ever had to convert a laparoscopic procedure to open surgery due to technical difficulties?

a) Yes

b) No

Section D: Training and Skill Development

Have you received formal training in laparoscopic surgery?

a) Yes, locally

b) Yes, internationally

c) No

How would you rate the adequacy of training in laparoscopic surgery in Nigeria?

a) Very adequate

b) Somewhat adequate

c) Inadequate

What would improve laparoscopic surgery training in Nigeria? (Select all that apply)

a) Establishment of simulation labs

b) Increased hands-on training opportunities

c) More mentorship from experienced surgeons

Section E: Financial and Policy Considerations

What is the main financial barrier to the adoption of laparoscopic surgery in your hospital?

a) High cost of equipment

b) Limited government funding

c) Lack of insurance coverage for procedures

What role does government policy play in the adoption of laparoscopic surgery?

a) Significant support

b) Limited support

c) No support

What strategies would you recommend to improve the adoption of laparoscopic surgery in Nigerian teaching hospitals?

a) Increased government funding

b) Public-private partnerships

c) Subsidized training programs

Would you like any modifications or additions based on your specific needs?

a) 25-34

Section A: Demographic Information

What is your age group?

a) 25-34

b) 35-44

c) 45-54

d) 55 and above

What is your surgical specialty?

a) General Surgery

b) Gynecology

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d) Other (Please specify)

What is your level of experience in surgical practice?

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b) 6-10 years

c) 11-15 years

d) More than 15 years

Section B: Adoption of Laparoscopic Surgery

Does your hospital currently perform laparoscopic surgeries?

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If yes, how often are laparoscopic surgeries performed in your hospital?

a) Weekly

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c) Lack of institutional support

d) Inadequate infrastructure

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a) Easily accessible

b) Moderately accessible

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Have you ever had to convert a laparoscopic procedure to open surgery due to technical difficulties?

a) Yes

b) No

Section D: Training and Skill Development

c) No

Have you received formal training in laparoscopic surgery?

a) Yes, locally

b) Yes, internationally

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How would you rate the adequacy of training in laparoscopic surgery in Nigeria?

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a) Significant support

b) Limited support

c) No support

What strategies would you recommend to improve the adoption of laparoscopic surgery in Nigerian teaching hospitals?

a) Increased government funding

b) Public-private partnerships

c) Subsidized training programs

INTERVIEW QUESTIONS

Section A: General Background

How many years of experience do you have in surgical practice?

Section B: Adoption of Laparoscopic Surgery

Does your hospital currently offer laparoscopic surgery? If so, how frequently is it performed?

What factors influence the adoption of laparoscopic surgery in your hospital?

Section C: Technical and Institutional Challenges

What are the main technical challenges you have encountered while performing laparoscopic procedures?
Are there frequent equipment malfunctions? If so, how are they handled?

Section D: Training and Skill Development

Have you received formal training in laparoscopic surgery? If yes, where and how effective was it?

Do you think the current training opportunities in Nigeria are sufficient for surgeons to master laparoscopic techniques?

What improvements do you suggest for laparoscopic surgery training in Nigeria?

Section E: Financial and Policy Barriers
How does government policy or hospital administration influence the use of laparoscopic surgery?

Are there any funding or subsidy programs that support laparoscopic procedures?

Section F: Future Prospects and Recommendations
What steps do you think can be taken to improve the adoption of laparoscopic surgery in Nigeria?

Do you foresee laparoscopic surgery becoming more common in Nigerian hospitals? Why or why not?

What policies or institutional changes would make laparoscopic surgery more accessible?

Ethics Application & Declaration Form

DISSERTATION TITLE: Evaluating the Adoption and Technical Challenges of Laparoscopic Surgery in Nigerian Teaching Hospitals: A Survey of Surgeons' Experiences"

RESEARCHER'S NAME: BABAWALE EMMANUEL ADEOBA

PROGRAMME OF STUDY: Msc. Medical Device Technology and Business

SUPERVISOR'S NAME: BRIAN KEARNEY

DECLARATION:
The information in this application form is accurate to the best of my knowledge. I undertake to abide by the principles outlined by Innopharma/Griffith College ethics policy in my research dissertation. I confirm that I have completed a full ethics assessment for my research dissertation as per the college guidelines. I will not begin my primary research until such approval from my supervisor and/or ethics Committee has been obtained.

I pledge to carry out my research according to the Innopharma/Griffith College academic integrity standards. Any results presented in my dissertation will be from my own, original research, I will reference and/or acknowledge any material or sources used in its preparation and I will not plagiarise the work of anyone else.

For Student:

Babawale Emmanuel

STUDENT SIGNATURE:

DATE:05/03/2025

The research contained within this research dissertation proposal has been approved.

For Supervisor:

Ethics Committee Approval Required: Yes ☐ No ☒ x

SUPERVISOR SIGNATURE: Brian Kearney

DATE: 28 Mar 2025

For Ethics Committee (if required):

Ethics Committee Approval Given: Yes ☐ No ☐

ETHICS COMMITTEE MEMBER

SIGNATURE: DATE:

NOTE: Supervisors are responsible for ensuring their students fill in this form correctly and that all ethical areas have been considered.

SECTION 1: DESCRIPTION OF RESEARCH STUDY

1.1 Purpose and objectives of research

The Purpose of this research is to assess the adoption and operational challenges of laparoscopic surgery in Nigerian teaching hospitals through a survey of surgeons' experiences.

Specific Objectives:

To achieve the research aim, the study will focus on the following objectives:

1. To assess the current level of adoption of laparoscopic surgery across Nigerian teaching hospitals and identify the institutional enablers or deterrents influencing its integration.

2. To examine the infrastructural and resource-related constraints including power supply, equipment availability, and maintenance, that affect the implementation of laparoscopic surgery.

3. To evaluate the quality, availability, and structure of training programs for laparoscopic surgery in residency curricula and continuing surgical education.

4. To explore the perceptions of surgeons regarding the benefits, limitations, and long-term prospects of laparoscopic surgery in the Nigerian healthcare setting.

words maximum/ use literature review findings to guide]

1.2 Research methodology:

This study will adopt a mixed-methods approach, using:

1. Quantitative Data (Surveys) – To assess adoption levels, common challenges, and readiness in terms of infrastructure.
2. Qualitative Data (Semi-Structured Interviews) – To explore technical challenges and personal experiences of surgeons.

Data Collection Methods

- Surveys: A structured questionnaire will be designed and distributed to surgeons in Nigerian teaching hospitals to quantify adoption rates and perceived challenges.
- Semi-Structured Interviews: Conducted with senior surgeons and surgical trainees to explore in-depth challenges and training gaps, as well as experiences and operational difficulties in laparoscopy

Selection Criteria for Study Participants

. Inclusion Criteria:

- Practicing general surgeons, gynaecologists, urologists, and surgical trainees in Nigerian teaching hospitals.
- Minimum 1 year of surgical experience.

- Direct involvement in laparoscopic or minimally invasive surgery.

. Exclusion Criteria:

- Surgeons with no prior exposure to laparoscopy.
- Non-surgical medical professionals.

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SECTION 2: POSSIBLE ETHICAL ISSUES

Answer 'yes ' or 'no ' to the following questions.

SUBJECT MATTER

Does the research proposal involve:

Research into specific company activities that would be deemed sensitive or confidential	Yes No
Research into politically and/or racially/ethnically and/or commercially sensitive areas	Yes No
Sensitive, personal, professional or corporate issues	Yes No

RESEARCH PROCEDURES

Does the research proposal involve:

Research that might damage the reputation of companies or participants	Yes No
Research that may negatively affect the reputation of Griffith College/Innopharma	Yes No
Use of personal records without consent	Yes No
Use of company data without consent	Yes No
The offer of any inducements to participate	Yes No
Audio or visual recording without consent	Yes No
Using a language other than English	Yes No

PARTICIPANTS

Does the research proposal involve:

People who are not competent and/or fluent in English	Yes No
Does your research group include any of the following vulnerable groups	Yes No

(Adults with psychological impairments; Adults with learning difficulties; Adults under the protection/control /influence of others (e.g. in care/prison); Relatives of ill people (e.g. parents of sick children); Hospital or GP participants recruited in a medical facility; persons under the age of 18)

If you have answered NO to ALL questions, please go straight to Section 4.

If you have answered YES to ANY question in SECTION 2, you must fill in SECTION 3.

SECTION 3: STEPS TAKEN TO AVOID ETHICAL ISSUES

[Only fill in this section ifyou answered YES to ANY of the questions in Section 3. For example, ifyou answered yes to including participants who are not fluent in English, you might put forward a plan that offers your survey in two languages to take this into account. Another example could be a study where the researcher wants to include information about the care received by children with a long-term condition but it would not be ethical to approach the children directly but it might be acceptable to instead ask parents questions about their child's care. If these plans are acceptable to your supervisor, you may not need to apply for ethical approval from the Ethics Committee].

3.1. If your ethics relates to ***Subject Matter***, outline your action plan to work around any sensitive issues.

3.2. If your ethics relates to ***Research Procedures***, outline your action plan to deal with possible ethical issues in your research procedures.

3.3. If your ethics relates to ***Participants***, outline how you will protect vulnerable persons or those that do not have English as their first language.

SECTION 4: ABOUT YOUR PARTICIPANTS

4.1. Outline your participant profile and why you have chosen them for this study *[Do not provide names except where it is deemed impossible to conceal identity].* For my study, the primary participants will be surgeons practicing in different teaching hospitals in Nigeria, the target participants will be the consultant General surgeons, Gynaecologists, Urologists, Pediatric Surgeons and surgical trainees/ residents in Nigerian teaching hospitals. I have chosen them for my study because the aim of my study is to evaluate the adoption and technical challenges of laparoscopic surgery in Nigerian institutions, the surgeons are primarily involved in the utilization of laparoscopic equipments and will be able to give a first-hand experience of how it works, generating valuable insights on the current situation of laparoscopic surgery in terms of its adoption, accessibility and effectiveness of the procedure

4.2 How do you plan to gain access to/contact/approach your participant(s).

Email invitations containing details of the study and survey links will be sent to surgeons through hospital directories. LinkedIn, ResearchGate, and other relevant professional platforms will be used to contact surgeons actively involved in laparoscopic surgery

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SECTION 5: INFORMATION, CONSENT AND CONFIDENTIALITY

5.1 **Participant Information Letter (PIL) for participants**

[You must submit an information letter for participants with this application, as part of your appendices document. For online surveys, it is sufficient to include a paragraph summarising and explaining the purpose of the research at the beginning of the survey. In all other research e.g. interviews, phonecalls, a PIL should be provided to each participant before they are asked for their consent to take part. A template PIL is available in Moodle].

Please confirm below that your information letter covers:

Description of the research topic and method	Yes No
Details of what participation will involve	Yes No
Rights to anonymity	Yes No
Confidentiality	Yes No
Rights to withdraw from the research	Yes No
The contact details of the researcher and supervisor (if necessary)	Yes No

5.2 **Informed Consent Form (ICF) for participants**

[Informed consent is required for most research. For online surveys, it is sufficient to get the participant to tick two boxes at the beginning of the survey – one to state they understand the research and one to give consent. In all other research e.g. interviews, phonecalls, a signed consent form is required. If the data is gathered online e.g. zoom, a signed consent form can be scanned and sent to the researcher. A template ICF is available in Moodle. The signed ICFs, along with the surveys, audio files or interview notes etc. must be stored in the primary data folder on moodle and can be accessed by Innopharma staff for the purposes of verifying the authenticity of the research carried out and the data collected].

Please indicate below if your research requires a signed consent form by selecting the relevant option only:

Yes: my research requires signed consent and I have attached an ICF in the appendices of my application.
No: my research study involves an online survey only and/or does not require signed consent

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SECTION 6: STORAGE OF DATA

[Please ensure that you are abiding by GDPR and the national Data protection laws https:/www.hrb.ie/funding/gdpr-guidance-for-researchers/gdpr-and-health-research/).

The student is responsible for storage of data and this will be handed over to the college in an electronic format as part of the thesis submission i.e. primary data and completed ICFs where applicable will be added to the primary data folder on moodle. The rationale is to keep data ***as long as it is still useful*** *and there is an intention to use it further* ***for research*** *so if this is not the case then this can be stipulated here and a shorter retention period given.]*

6.1. How will you store the research data and for how long? How will you manage data protection issues?

Data will be encrypted and kept secure in a cloud storage like google drive

SECTION 7: NON-DISCLOSURE AGREEMENT & STUDENT CONSENT

7.1 **Non-Disclosure Agreement (NDA)**
Will the final dissertation contain any information pertaining to any source what would warrant the use of a Non-Disclosure Agreement (NDA) e.g. industry-based research?

Yes No

7.2 **Student consent**
If a Non-Disclosure Agreement (NDA) is not required, does the Student consent to allow their completed dissertation to be held/published by Innopharma/Griffith College?

Yes No

SECTION 8: RECORDING AND RETENTION OF DISSERTATION VIVA

8.1 **Viva Recording**
The Dissertation viva will be recorded. This recording may be used to facilitate assessment by Innopharma staff, a third reader if necessary and/or if requested by the external examiner for the Programme. The recording will be held in line with current GDPR guidelines and will not be made publicly available.

SECTION 9: DOCUMENT CHECKLIST

NOTE: Applicants must attach the following documents in electronic format to the appendix.

Which documents are added to the appendix? Please tick N/A if not applicable:

9.1 Participant Information Letter (PIL) for participant — Yes N/A

9.2 Informed Consent Form (ICF) for participant — Yes N/A

9.3 Questions/survey for interviewees/focus groups etc *(can be in draft form)* — Yes N/A

9.4 Any other documents e.g. Non-Disclosure Agreement — Yes N/A

I confirm that this application is complete and all required documents are included in the appendix.

For Student:

Babawale Emmanuel

STUDENT
SIGNATURE
DATE:05/03/2025

SECTION 10: APPENDIX