

## Laparoscopic Management of Gall Bladder Diseases in Nigeria: A Systematic Review

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### Abstract

**Background:** Globally, the incidence and mortality from gallbladder diseases is on the rise. The gold standard for the management of symptomatic gallbladder disease is laparoscopic cholecystectomy. The practice of laparoscopic cholecystectomy is at a nascent stage in Low and middle-income countries like Nigeria despite its obvious advantages over traditional open cholecystectomy. This systematic review aims to assess the extent to which laparoscopic cholecystectomy is performed for the management of gallbladder diseases in Nigeria.

**Methodology:** The review was guided by the PRISMA model. We searched MEDLINE, Embase, CINAHL, Scopus, and Global health databases. All searches were conducted in August 2023. All study designs reporting laparoscopic cholecystectomy in Nigeria, in the past 10 years were included. Three authors conducted the data extraction using data extraction tables and two authors independently assessed the data for accuracy and completeness. The Joanna Briggs Institute critical appraisal tool was used to assess the data quality. Twenty-two articles with 1569 patients were included in this review.

**Results:** Females accounted for 69.5% of the patients and 30.5% were males. Twelve (54.5%) of the studies were from the Southwest of the country, 3 (13.6%) each from the South East and North Central regions, 2 (9.1%) South-South, and 1 (4.5%) each from the North East and North West. Study designs were mostly cross-sectional with sample sizes from 1 to 400. The highest and lowest number of laparoscopic cholecystectomies reported were 300 and 1 respectively. The majority (95.2%) of laparoscopic cholecystectomies were on account of calculous cholecystitis and the methods reported were the 4-port and 3-port techniques. The follow-up period ranged from 3 weeks to 2 years with 54 (3.4%) complications reported.

**Conclusions:** Laparoscopic cholecystectomy in Nigeria is relatively safe with minimal complications. Its demand and uptake are on the rise, though slowly owing to its relatively high cost.

**Keywords:** Nigeria; Gallbladder Disease; Cholecystitis; Cholelithiasis; Cholecystectomy; Laparoscopic; Minimal Access Surgery.

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## Introduction

Diseases of the gallbladder manifest commonly as gallstones (cholelithiasis), gallbladder inflammation (cholecystitis), and gallbladder cancers. The incidence and mortality of gallbladder-related diseases have been on the increase globally.<sup>1,2</sup>Cholelithiasis are hardened deposit in the gallbladder. They constitute a significant health problem in developed and developing countries and affect about 10 to 15% of the adult population.<sup>3,4</sup> They are a major risk factor for gallbladder cancers.<sup>5</sup>Cholecystitis is inflammation of the gallbladder that occurs due to obstruction of the cystic duct or impaired emptying of the gallbladder. This condition may be associated with the presence or absence of gallstones.<sup>6</sup>

The mainstay in the management of symptomatic gallbladder disease is cholecystectomy, which is the surgical removal of the gallbladder.<sup>6</sup> This may be either an open cholecystectomy (OC) or laparoscopic cholecystectomy (LC). However, the gold standard for the management of symptomatic gallbladder disease is LC. LC has revolutionized the management of gallbladder diseases since its inception in 1987 by Muret.<sup>7</sup> Despite the widespread practice of LC, its practice is still at its budding stages in low- and middle-income countries including Nigeria. This is largely due to the unavailability of facilities and expertise required for LC, and its high cost.<sup>8</sup> However, in a time when access to safe and timely surgery has become of great interest in the developing world, LC is quickly gaining more acceptance.<sup>9</sup>

The advantages of LC over OC include reduced postoperative pain, shorter recovery time, lower requirement for antibiotics, better cosmetic outcome, and faster return to work/daily activities. Also, the smaller incision used for LC results in a lower risk of postoperative infection, incisional hernia, and wound separation.<sup>9,10</sup>

Subsequently, this review aims to assess the extent to which laparoscopic cholecystectomy is performed for the management of gallbladder diseases in Nigeria.

## Methodology

### Review method.

This review was carried out guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) model.<sup>11</sup> The PRISMA Checklist was used to include the different relevant sections of the review while the PRISMA flow diagram was used to depict the search process used to arrive at the selected articles for the review.

### Search strategy and data sources.

A search of CINAHL, Embase, MEDLINE, Scopus, and Global Health databases was carried out in August 2023. The search terms “Nigeria”, “cholecystectomy”, “cholecystitis”, and laparoscopy\*” were combined using Boolean operators “OR” and “AND”. Reference and citation searches were carried out to further identify potential articles.

### Study selection (Inclusion criteria and exclusion criteria)

All studies carried out in Nigeria over the past 10 years from the search date that reported laparoscopic cholecystectomy were included in the study. Considering laparoscopic cholecystectomy is a relatively

new procedure in Nigeria, all study designs that reported LCs were included in the review. The full article for one study was unavailable, hence it was excluded from our review.

### Data extraction

Study characteristics like author, year, state, population, title of article, aim, study design, and sample size were extracted using a data extraction table. Similarly, specific study data like the number of LCs, indication for LCs, methods, follow-up time, and complications were extracted using another data extraction table. Three of the authors carried out the data extraction and a fourth author assessed the data for completeness and accuracy.

### Plan for quality assessment of studies.

The Joanna Briggs Institute (JBI) critical appraisal tools for case reports, cross-sectional studies, and randomized control trials (RCTs) were used to assess the quality of the data.<sup>12</sup> Each study was assessed as low, medium, or high quality using the relevant criteria for the study design. No study was excluded because of the high risk of bias.

### Ethical considerations

Being a systematic review using already published data, ethical issues are minimal.

## Results

### Search results.

Five databases; CINAHL, Embase, Medline, Scopus, and Global Health were searched and a total of 708 records were identified upon the first hit. Following automatic and manual screening (title and abstract screening) of the records, ineligible and duplicate records were removed leaving 22 articles that were fully reviewed, and two articles were excluded at this stage leaving 20 records. Two additional articles were retrieved, assessed, and added from the reference and citation search of the initial articles. Thus, 22 articles were included in the review. PRISMA diagram is shown in Figure 1.

### Study characteristics.

Twelve (54.5%) of the studies were from the Southwestern region of the country,<sup>9,13-22</sup> 3 (13.6%) Southeast and North-central each,<sup>23-28</sup> 2 (9.1%) South-south,<sup>29,30</sup> and 1(4.5%) each from Northeast and Northwest.<sup>31,32</sup> Majority of the studies were carried out in mixed-age populations. The total population from all the studies was 1569. Females made up 69.5% and males 30.5% of the population. Only 1 was carried out purely in the paediatrics population. Study designs were mostly cross-sectional studies. However, there were case reports, cohort studies, and clinical trials. The sample size from the included studies ranged from 1 to 400 with an average of 110. Details of study characteristics are shown in Table I.

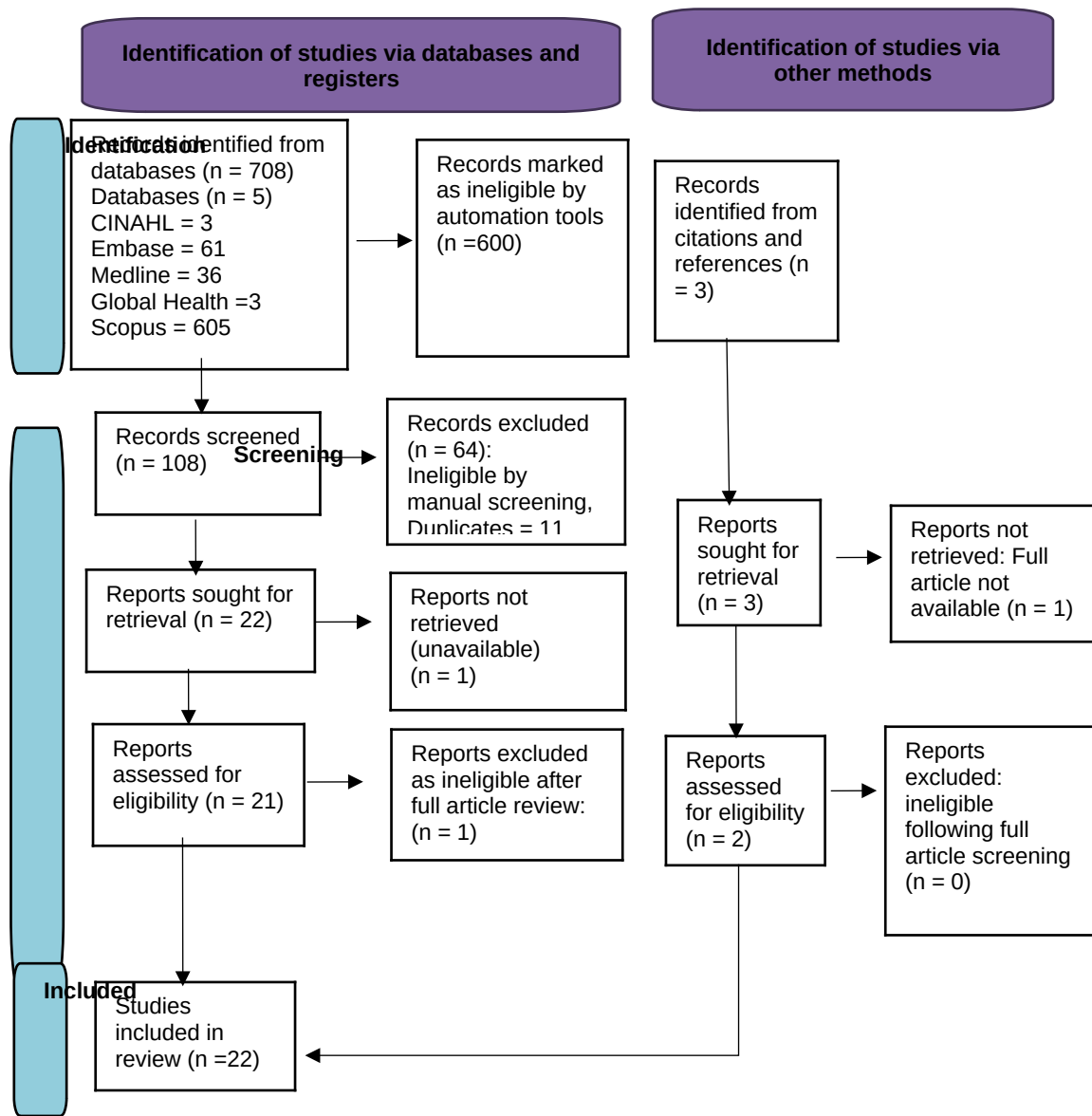


Figure 1: PRISMA Flow diagram

**Table I:** Study Characteristics

S/N	Author et.al	Year	State	Population	Title	Aim	Study design	Sample size	Female	Male	Mean Age ± S. D
1	Adedayo, A.A et. al.	2021	Oyo	Paediatric	Maiden Paediatric Laparoscopic Cholecystectomy in a Nigerian Hospital — a Worthwhile Adventure	A narration of the adventurous experience had during performing LC for the first time	Case Report	1	0	1	14
2	Adenekan, A.A et. al.	2019	Osun	mixed	Feasibility study for a randomized clinical trial of bupivacaine, lidocaine with adrenaline, or placebo wound infiltration to reduce postoperative pain after laparoscopic cholecystectomy	To assess the feasibility of performing an RCT to evaluate short-term postoperative analgesia after laparoscopic surgery in Nigeria using two local anaesthetics for port-site infiltration versus saline placebo. Methods:	External feasibility RCT	64	59	5	44 (i.q.r. 36–57, range 20–85)

3	AdisaA.O et al	2017	Osun	Mixed	Trend Over Time for Cholecystectomy following the Introduction of Laparoscopy in a Nigerian Tertiary Hospital	This study aims to describe the changing rate of cholecystectomy before and after the introduction of laparoscopy in our hospital	Cross-sectional	173	NG	NG	NG
4	AdisaA.O et al	2018	Osun	Mixed	Conversion and complications of elective laparoscopic cholecystectomy in a West African population	This study aims to determine the incidence of conversion and complications following elective LC	Cross-sectional	150	126	24	45.4 ± 13.38
5	Adisa, O.E et. Al.	2019	Ile-Ife. Osun		The Inflammatory Response to Surgery in Sickle Cell Disease Patients Undergoing Cholecystectomy	to assess differences in levels of proinflammatory and anti-inflammatory acute phase proteins after cholecystectomy in patients with HbAA and patients with HbSS.	prospective cohort study	23	20	3	21

6	Adisa, O.E et. Al.	2013	Ile- Ife. Osun		Local adaptations aid the establishment of laparoscopic surgery in a semi-urban Nigerian hospital	Experience implementing laparoscopic surgery in a general surgery unit and the associated modifications that were necessary for success	Cross-sectional	175	120	55	18-72
7	AfuwapeO.O et al	2017	Oyo	Mixed	Knowledge and Perception of Laparoscopic Surgery among Surgical Outpatients in a Nigerian Teaching Hospital	To determine the knowledge level and perception of laparoscopic surgery in patients attending the surgical outpatient for the first time in a teaching hospital in Nigeria	Cross-sectional	330	235	131	44.19
8	AghahowaM.E et al	2022	FCT	Mixed	Laparoscopic General Surgeries in a Developing Country: A 5-Year Private Hospital Experience in Abuja, Federal Capital Territory, Nigeria		Cross-sectional	119	71	48	43.4 ± 14.0
9	AghahowaM.E et al	2023	FCT	Mixed	The Trend of Cholecystectomies After the Introduction of Laparoscopic Surgery in a District Hospital in Abuja, North	To investigate the trend of cholecystectomies performed in the general surgery unit of a district hospital in Abuja before and after	Cross-sectional	96	NG	NG	NG

					Central Nigeria Michael	the commencement of laparoscopic surgery services in 2016						
10	Ayandipo O.O et al	2013	Oyo	Mixed	Laparoscopic cholecystectomy in Ibadan, Southwest Nigeria	This study describes the outcome of laparoscopic cholecystectomy at the University College Hospital (UCH), Ibadan, Nigeria over a two-year period	Cross-sectional	42	37	5	44.5 ± 10.17	
11	Balogun O.S et.al	2020	Lagos	Mixed	Development and Practice of Laparoscopic Surgery in a Nigerian Tertiary Hospital	To report the indications, management outcomes, and challenges in patients who had laparoscopic surgery in the institution and to document the trends in surgical practice.	Cross-sectional	137	89	48	38.8 ± 3.4	
12	Christopher N.E et al	2014	Imo	Mixed	First 100 Laparoscopic Surgeries in a Predominantly Rural Nigerian Population: A Template for Future Growth	To describe patient demographics, indication for surgery, procedure performed, length of hospital stay, morbidity and mortality data.	Cross-sectional	100	81	19	36.5 (median)	



13	Christopher N.E et al	2013	Imo	Mixed	Intent at Day Case Laparoscopic Cholecystectomy in Owerri, Nigeria: Initial Experiences	To determine the feasibility of carrying out day-case laparoscopic cholecystectomy in our hospital.	Cross-sectional	12	10	2	48.8
14	Christopher N.E et al	2014	Imo and Anambra	NG	Pioneering laparoscopic surgery in Southeastern Nigeria: A two-center general surgery experience	To review the early experiences of two general surgery units in laparoscopic surgery at two institutions in South-eastern Nigeria.	Cross-sectional	20	NG	NG	10 -68 (Age range)
15	Igwe P.O et al	2020	Rivers	Single	Laparoscopic cholecystectomy for giant gallstone: Report of two cases	To report two cases of giant gallstone treated laparoscopically	Case series	2	2	0	32 and 62
16	Igwe P.O et al	2021	Rivers	NG	Minimal Access Surgical Experience in Developing Economy: A Young Trainee Stimulant	To elucidate an experience of minimal access surgeons practicing in a developing economy with the hope of stimulating a young trainee surgeon in the same field of study	Cross-sectional	195	NG	NG	NG
17	Ismaila B.O. et al	2013	Plateau	Mixed	Laparoscopic Surgery in a Nigerian Teaching Hospital for 1 Year: Challenges	To determine the factors that affect the performance of laparoscopic surgery	Cross-sectional	21	13	8	34.1

18	Mba E.L. et al	2018	Gombe	Mixed	and Effect on Outcomes Is Laparoscopic Cholecystectomy Safe in Gombe, Nigeria?	To compare the outcomes of LC and OC in terms of duration of surgery, length of hospital stays, postoperative analgesia, and postoperative complications in order to determine the safety of LC	Cross-sectional	22	12	10	39
19	ObonnaG.C. et al	2021	Ondo	Mixed	Laparoscopic Subtotal Cholecystectomy: Our Experience	To examine the clinical spectrum of subtotal cholecystectomy and its postoperative turnout	Cross-sectional	400	NA	NA	NA
20	OlajideT.O. et al	2020	Lagos	Mixed	Experience with laparoscopic cholecystectomy in a tertiary hospital in Lagos, Nigeria	To review the experience of LC at LUTH	Cross-sectional	32	27	5	40.6 ±2.9
21	Sheshe A.A. et al	2014	Kano	Mixed	Early experience with laparoscopic surgical operations in Aminu Kano Teaching Hospital, Kano, Northwestern Nigeria	To describe early experience, challenges, and prospects with laparoscopic surgical operations in Aminu Kano Teaching Hospital Kano,	Cross-sectional	42	23	19	37

22	Smiley K.E. et al	2023	Osun	Mixed	An Outcomes-Focused Analysis of Laparoscopic and Open Surgery in a Nigerian Hospital	northwestern Nigeria To evaluate outcomes and costs associated with the most commonly performed laparoscopic and open general surgery procedures at OAUTH since the adoption of laparoscopy	Cross-sectional	261	166	95	38.5±15.2
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**Quality assessment**

Quality assessment (Tables II-V) on the 22 studies was carried out using the Joanna Briggs Institute (JBI) critical appraisal tools for case reports, cross-sectional studies, and randomized control trials (RCTs).<sup>12</sup> Two independent reviewers assessed the quality of the studies, and a third reviewer was required to resolve conflicting assessments. Only one study was adjudged to have high quality.<sup>9</sup> All others were of medium quality.<sup>13-33</sup>

**Table II:** JBI quality appraisal for cross-sectional studies

Author	1. Clear Inclusion Criteria	2. Detailed setting	3. Valid/Reliable Exposure	4. Objective/Standard Measurement Criteria	5. Confounding Factor Identification	6. Strategies to deal with confounders	7. Valid/Reliable Outcome Measurement	8. Appropriate Statistical Analysis	9. Ethical Consideration	Overall Quality
AdisaA.O et. al., 2017	Y	Y	Y	Y	N	N	Y	Y	N	MEDIUM
AdisaA.O et al, 2018	Y	Y	Y	Y	N	N	Y	Y	Y	MEDIUM
AdisaO.E et. al., 2013	Y	Y	Y	Y	N	N	Y	Y	N	MEDIUM
AfuwapeO.O et. al., 2017	Y	Y	Y	Y	N	N	Y	Y	N	MEDIUM
AghahowaM.E et. al., 2022	Y	Y	Y	Y	U	Y	Y	Y	Y	MEDIUM
AghahowaM.E et. al., 2023	Y	Y	Y	Y	N	N	Y	Y	Y	MEDIUM
AyandipoO.O et. al., 2013	Y	Y	Y	Y	U	Y	Y	Y	Y	MEDIUM
Balogun O.S et.al., 2020	Y	Y	Y	Y	N	N	Y	Y	Y	MEDIUM
Ekwunife C. N et. al., 2012	Y	N	Y	Y	N	N	Y	Y	N	MEDIUM
Ekwunife C. N et. al., 2013	Y	Y	Y	Y	U	Y	Y	Y	N	MEDIUM
Ekwunife C. N et. al., 2014	Y	Y	Y	Y	Y	Y	Y	Y	U	MEDIUM
IgweP.O et. al., 2021	Y	U	Y	Y	N	N	Y	Y	N	MEDIUM
Ismaila B.O. et. al., 2013	Y	Y	Y	Y	U	U	Y	Y	Y	MEDIUM
Mba E.L. et. al., 2018	Y	Y	Y	Y	N	N	Y	Y	Y	MEDIUM
ObonnaG.C. et. al., 2021	Y	Y	Y	Y	U	U	Y	Y	N	MEDIUM
OlajideT.O. et. al., 2020	Y	Y	Y	Y	N	N	Y	Y	Y	MEDIUM
Sheshe A.A. et. al., 2014	Y	Y	Y	Y	N	N	Y	Y	Y	MEDIUM
Smiley K.E. et. al. 2023	Y	Y	Y	Y	Y	Y	Y	Y	Y	HIGH

Y- Yes, N- No, U- Unclear

**Table III:** JBI appraisal for Adenekan, AA et. al. (2019) RCT

	<b>Adenekan, A.A et. al. (2019)</b>	<b>Response (Yes, No, Unclear, Not Applicable)</b>
<b>1</b>	Was true randomization used for the assignment of participants to treatment groups?	Yes
<b>2</b>	Was allocation to treatment groups concealed?	Yes
<b>3</b>	Were treatment groups similar at the baseline?	Yes
<b>4</b>	Were participants blind to treatment assignment?	Yes
<b>5</b>	Were those delivering the treatment blind to treatment assignment?	No
<b>6</b>	Were treatment groups treated identically other than the intervention of interest?	Yes
<b>7</b>	Were outcome assessors blind to treatment assignment?	Yes
<b>8</b>	Were outcomes measured in the same way for treatment groups?	Yes
<b>9</b>	Were outcomes measured in a reliable way?	Yes
<b>10</b>	Was follow up complete?	Yes
<b>11</b>	Were participants analyzed in the groups to which they were randomized?	Yes
<b>12</b>	Was appropriate statistical analysis used?	Yes
<b>13</b>	Was the trial design appropriate and were any deviations accounted for in the conduct and analysis of the trial?	Yes
<b>Overall Quality</b>		<b>Medium</b>

**Table IV:** JBI appraisal for Adedayo AA et. al. (2021) and Igwe PO et. al., 2020 case reports.

	<b>Adedayo, AA et. al. (2021)</b>	<b>Igwe PO et. al. (2020)</b>
	<b>Response (Yes, No, Unclear, Not Applicable)</b>	
<b>1</b> Were the patient’s demographic characteristics clearly described?	No	No
<b>2</b> Was the patient’s history clearly described and presented as a timeline?	Yes	Yes
<b>3</b> Was the current clinical condition of the patient on presentation clearly described?	Yes	Yes
<b>4</b> Were diagnostic tests or assessment methods and the results clearly described?	Yes	Yes
<b>5</b> Was the intervention(s) or treatment procedure(s) clearly described?	Yes	Yes
<b>6</b> Was the post-intervention clinical condition clearly described?	Yes	Yes
<b>7</b> Were adverse events (harms) or unanticipated events identified and described?	Yes	Yes
<b>8</b> Does the case report provide takeaway lessons?	Yes	Yes
Overall Quality	Medium	Medium

**Table V:** JBI appraisal for Adisa, O.E et. al. (2019) cohort study

	<b>Adisa, O.E et. al. (2019)</b>	<b>Response (Yes, No, Unclear, Not Applicable)</b>
<b>1</b> Were the two groups similar and recruited from the same population?		Yes
<b>2</b> Were the exposures measured similarly to assign people to both exposed and unexposed groups?		Yes
<b>3</b> Was the exposure measured in a valid and reliable way		Yes
<b>4</b> Were confounding factors identified?		Yes
<b>5</b> Were strategies to deal with confounding factors stated?		No

<b>6</b>	Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?	Yes
<b>7</b>	Were the outcomes measured in a valid and reliable way?	Yes
<b>8</b>	Was the follow-up time reported sufficient to be long enough for outcomes to occur?	Yes
<b>9</b>	Was the follow-up complete?	Yes
<b>10</b>	Were strategies to address incomplete follow-up utilized?	Unclear
<b>11</b>	Was appropriate statistical analysis used?	Yes
Overall Quality		Medium

**Numbers of reported LCs**

We extracted data from a total of 22 studies (Table 6). Of the 22 studies included in the systematic review, the highest number and lowest number of LCs reported were 300 and 1 respectively; one study assessed knowledge and perception of laparoscopic surgeries and thus reported no LCs. The trend of reported LC is shown in Figure 2. Rising from 9 in 2012 to over 130 in 2023.

S/N	Author	Year	Number of LCs	Indication				LC Method	Number of sites/Ports		Average Follow up time	Post LC complication(s)		Table VI: Data extraction from review articles
				Emergency / Acute	Elective	Gallstone related	Non- GS related		Single	Multiple		Surgery	Observation	
1	Adedayo, A.A et al	2021	1	0	1	1	0	4-port technique	NA	NA	4 weeks	0	NA	
2	Adenekan A. T et al	2019	69	NA	NA	NA	NA	4 -port technique		4	NA	1	0	
3	AdisaA.O et al	2017	29	NA	29	NA	NA	NA	0	NA	NA	6	NA	
4	AdisaA.O et al	2018	150	0	150	146	4	NA		150	NA	2	2	
5	Adisa, O. A et al	2019	23	NA	NA	NA	NA	4-port technique	NA	4	NA	0	NA	
6	Adisa, O.A et al	2013	48	0			0	NA	NA		3 weeks	NA	NA	
7	AfuwapeO .O et al	2017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
8	Aghahowa M.E et al	2022	59	NA	NA	53	6	NA	NA	NA	6 months	10	NG	
9	Aghahowa M.E et al	2023	46	0	46	NA	NA	NA	0	46	12 months	NA	NA	
10	Ayandipo O.O et al	2013	42	0	42	41	1	NA	0	42	6 months	4	7	
11	Balogun O.S et.al	2020	47	NA	NA	47	NA	NA	NA	NA	30 days	3	6	
12	Christopher N.E et al	2014	36	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
13	Christopher N.E et al	2013	12	0	12	12	0	Standard four-port technique	0	4	NA	0	3	
14	Christopher N.E et al	2012	9	0	9	9	0	Standard three-port technique	0	3	NA	0	2	
15	IgweP.O et al	2020	2	1	1	2	0	Standard three-port technique	0	3	NA	0	0	
16	IgweP.O et al	2021	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	



**NA:** Not Available

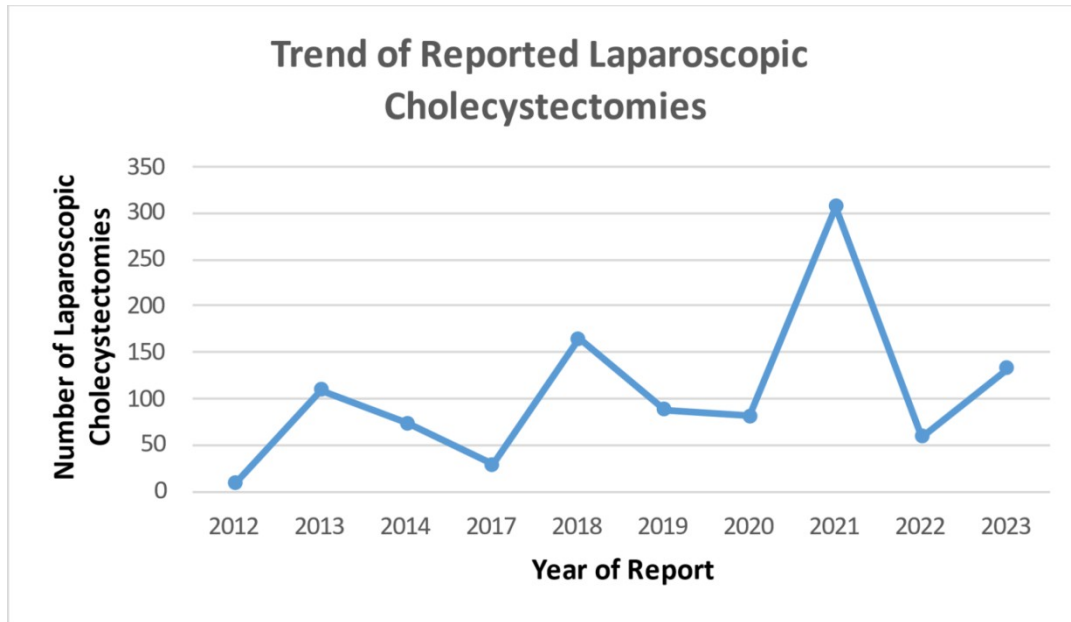


Figure 2: Trend of reported Laparoscopic Cholecystectomies

### Indications and methods for LC

The majority of LCs performed were elective cases with only 3 emergency cases reported. The majority (95.2%) of the cholecystitis requiring intervention in this review were calculous compared to 4.8% for the acalculous cholecystitis. The methods of LC reported were the 4-port and 3-port techniques. Six (27.3%) of the studies reported using the 4-port technique and three (13.6%) reported using the 3-port technique. For the remaining 13 studies, the method used was not clearly stated.

### Follow-up and post-LC complications

The average follow-up period ranged between 3 weeks and 2 years. Twenty-nine (0.18%) patients from all studies reviewed had surgical complications such as intraoperative biliary tree injury, duodenal injury, and the need to convert to OC. Other complications reported were biliary peritonitis, port site infection, intraoperative cardiac arrhythmias, and paralytic ileus. These other complications were reported by 9 of the 22 studies reviewed. A total of 54 (3.4%) complications were reported.

### Discussions

In this review, we set out to assess the practice of LC in Nigeria. Being a relatively new surgical procedure for the management of symptomatic gall bladder disease, this, to the best of our knowledge is the first systematic review on cholecystectomy in Nigeria. Our review assessed 22 articles, 1,569 patients, and over a thousand LCs.

Gallbladder disease increases with age and is generally more common in females than males.<sup>34</sup> This is in tandem with our review where adults accounted for most of the cases and more women were involved in

LC compared to males. In this review, calculous cholecystitis accounted for almost all the indications for the LC. This is consistent with what is known.<sup>35</sup>

The trend of LCs has been on a steady rise globally over the years with increasing demand for the procedure.<sup>9</sup> This is similar in Nigeria as our review shows. The benefit of reduced postoperative pain, shorter recovery time, lower requirement for antibiotics, better cosmetic outcome, and faster return to work/daily activities explains the increasing demand. However, the cost of the procedure may still be a major setback to its demand as many may not be able to afford it. Moreso, considering the country's less-than-ideal health insurance and Universal Health Coverage.

Elective and carefully selected cases are likely to guarantee better surgical outcomes.<sup>36</sup> As reflected in this review, most LCs were electives. The developing nature of the procedure and the realities of limitations of the Nigerian health system will require careful and thorough planning to ensure all personnel, facilities, and commodities are readily available for the procedure. However, our review reported few emergency LCs which reflects the improving readiness, proficiency, and facility support to take on such acute cases. LCs could be carried out using single or multiple port methods. Our review found that only multiple ports are being explored currently in Nigeria. This reflects room for continuous improvement of the procedure for better patient outcomes.

Close post-operative monitoring and follow-up of LC patients is important to prevent and manage complications when they arise. This review showed variable follow-up duration lasting up to 2 years for some. Long follow-up time is necessitated when complications arise. About 3 in 100 patients developed complications, less than 2% being surgical complications. This is comparable to a global systematic review.<sup>34</sup> This reflects the fact that the quality of LCs done in Nigeria despite the limitations is comparable globally. With better funding for skill development and facilities, this quality could improve to produce better patient outcomes.

The findings from this review have implications for policy, practice, and public health. Evidently, there is an increase in reporting of LCs in Nigeria. This may be related to increasing uptake. This is, however, limited by cost. The availability of insurance policy that covers LCs, wholly or partially, for both formal and informal sector populations will improve its demand and uptake. Clinicians should therefore counsel their patients to consider LC by clearly stating the advantages. It is important for the laparoscopic surgeon to improve his/her skills for LC. While institutions and the government should provide funding for training opportunities for surgeons, same should invest in personally funded training for improved practice. Moreover, improved surgical skills within the country will increase trust in the health system, reduce medical tourism, and improve the Nigerian economy as funds will be expended in its health sector. Moreover, reduced hospital stays and faster return to work will invariably improve the Disability Adjusted Life Years (DALYs) and Quality-Adjusted Life Years (QALYs), thus enhancing the individual's productivity and contribution to the nation's economy.

### Strengths

The fact that this is the first systematic review on this topic in Nigeria is worthy of note. This will help future researchers to build upon the findings. This review accessed 5 common databases, including reference and citation searches. This strengthens our evidence as it provides a wide net to cover several publications for a robust finding. Most of the articles selected were of medium quality thus providing fair evidence.

### Limitations

This review had only 1 RCT and 1 cohort study, most of the studies reviewed were cross-sectional studies and based on secondary data, which produces a lower strength of evidence. Moreso, some studies were reported from the same institutions and may have reported studies with overlapping sample

populations. This may exaggerate our findings. In addition, we had to exclude 1 article which may have added to the strength of our findings because we restricted ourselves to only articles whose full versions were free.

## Conclusions

This systematic review being the first on the topic in Nigeria found that reporting of laparoscopic cholecystectomy is increasing. The procedure is relatively safe with minimal complications as the quality is comparable globally. However, there is a need to provide insurance to increase demand and uptake. Also, funding is needed to improve skills and equipment. Future research in LC should focus on prospective studies and RCTs for better strength of evidence.

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