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Original Article

Laparoscopic Surgical Exposure and Training among Resident Doctors: A Cross-Sectional Multicenter Study in Southwest Nigeria.

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Abstract

Background: Laparoscopy is underutilized in underdeveloped countries. The residency program provides a good opportunity to introduce laparoscopy to gynecology trainees. This study aimed to evaluate residents' exposure and education on laparoscopic training in gynecology across different centers in Southwest Nigeria.

Methodology: This study was carried out among 75 resident doctors in gynecology across four centers in Southwest Nigeria. Data was collected using a modified pretested semi-structured questionnaire. Continuous and categorical variables were summarized, and the Chi-square test was used to test for statistical associations at $p<0.05$.

Results: The study found that two-thirds of the respondents had attended a local training program in laparoscopy, and 81.3% of the residents had an above-average level of knowledge. The level of knowledge of laparoscopy was significantly associated with the cadre of the residents, center, and the level of exposure of the residents to laparoscopy ($\chi2 = 7.040$, $p= 0.008$; $\chi2 = 19.233$, $p= 0.001$; $\chi2 = 28.440$, $p= 0.001$). While laparoscopy facilities were available in almost all centers, the average monthly laparoscopy procedure was 2.40±1.25. Only about half of the doctors have assisted in laparoscopic procedures, and just 4.0% have performed a laparoscopic procedure under supervision. Exposure to laparoscopy was associated with the cadre, center, the average number of laparoscopies performed per month in the center, availability of training programs for laparoscopy and the availability of skills lab ($\chi2 = 10.215$, $p= 0.001$; $\chi2 = 25.182$, $p= 0.001$; $\chi2 = 15.444$, $p= 0.001$; $\chi2 = 35.810$, $p= 0.001$; $\chi2 = 8.214$, $p= 0.004$). Factors limiting exposure and expertise included lack of funds, low surgeon motivation, lack of trained personnel, and institutional support.

Conclusion: The study indicates high knowledge and exposure to laparoscopy among Southwest Nigerian doctors, but low competence, emphasizing the need for further inclusion in Nigeria's postgraduate training programs.

Keywords: Exposure; Gynecology; Knowledge; Laparoscopy; Residency.

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Quick Response Code:

Introduction

Minimally invasive surgical procedures have revolutionized surgery for various conditions. Laparoscopy is the use of minimally invasive procedures for diagnosis and treatment and is now more widely recognized as an invaluable tool in modern medicine.[1, 2] Since its introduction in the late 20th century, it has become a crucial tool in modern medicine, particularly in gynecology and surgery.[3] Laparoscopic procedures offer higher surgical proficiency, cosmetic advantages, and better patient outcomes, with lower rates of blood loss, postoperative pain, infection, and hospital stay.[4, 5]

Laparoscopy is increasingly used in gynecological care for diagnostic and therapeutic purposes, replacing open surgical approaches.[2] Laparoscopy and hysteroscopy are particularly beneficial for managing infertility, a prevalent condition in this region.[6] The growing demand for laparoscopy has led to the need for comprehensive laparoscopy training for doctors.

Gaining gynecological surgical skills in laparoscopy is challenging due to its steep learning curve, extensive training period, and the narrow margin of safety in untrained hands.[7, 8] Efficiency is crucial for building competence through structured training, which includes didactic lectures, video recordings, computer-generated programs, and practical exercises.[9, 10] Structured training programs are necessary to support training, and they should be strengthened by the availability of specialized gynecological laparoscopy surgeons, facilities, and skills laboratories.

The residency training allows for attaining proficiency in laparoscopic procedures. In developed nations, structured programs facilitate training on the use of laparoscopy for gynecology residents.[11, 12] Research in the UK, Germany, the Netherlands, and Canada shows that resident doctors are better exposed to minimally invasive surgical techniques.[11, 12] However, laparoscopy training has not been fully incorporated into most African countries' postgraduate surgical curricula due to inadequate formal program guidelines. A Nigerian survey conducted among postgraduate surgical trainees discovered that while 80% expressed a desire to practice laparoscopy in the future, up to 90.7% had never had formal laparoscopic training.[13]

Gynecology resident doctors' satisfaction with laparoscopy training varies. In Germany, only 23% of trainees expressed dissatisfaction, while 69% in the UK and 84.2% in Nigeria expressed dissatisfaction with their knowledge and exposure to laparoscopy.[11, 14, 15] In Nigeria, poor exposure to laparoscopy practice was linked to this level of dissatisfaction.[15]

Training barriers in laparoscopy include inadequate facilities, lack of specialized surgeons, dedicated units, and theater time.[16, 17, 18] The lack of objective assessment is a significant obstacle to improving competence, even in cases where training is available.[19] Nigeria's limited availability of simulators and lack of access to laparoscopic skills labs further contribute to the poor exposure of resident doctors. While some training centers offer short courses, most require voluntary enrollment. This low level of engagement can also be attributed to cost, difficulty obtaining time off work, and the lack of facilities for continued practice.[6, 16] These barriers have hindered Nigeria's progress in laparoscopy, highlighting the need for improved facilities and resources.

The implementation of gynecological laparoscopy training has proven difficult in sub-Saharan Africa.[6, 18] As there are only a few published studies on the exposure and training of gynecology residents in Nigeria, this study appraises residents' exposure and education on laparoscopic training in gynecology across different centers in Southwest Nigeria. As the rate of laparoscopic surgery in low and middle-income countries (LMICs) is gradually increasing, it is important to know the current state and level of preparedness of the Nigerian residency program to match up to globally acceptable standards. The findings, therefore, will form the basis for providing evidence-based recommendations to policymakers on the future of gynecological laparoscopy training during the residency program.

Materials and methods

Study Area

The study was conducted across four tertiary hospitals with residency training programs in Southwest Nigeria. The South-West is one of the geopolitical zones of Nigeria and makes up most of the Yorubaland in Nigeria. It spans along the Atlantic seaboard from the international border with the Benin Republic in the west to the South-South region in the east, and the North-Central region to the north. The South-West region of Nigeria has several tertiary hospitals, including both private and government-owned institutions. The four tertiary hospitals included in this study were Lagos State University Teaching Hospital (LASUTH), Olabisi Onabanjo University Teaching Hospital (OOUTH), University College Hospital (UCH), and Obafemi Awolowo University Teaching Hospital Complex (OAUTHC).

Lagos State University Teaching Hospital (LASUTH) is a state-owned tertiary hospital affiliated with the Lagos State University. Amongst its many services, it boasts a comprehensive obstetrics and gynecology care for women. It began with laparoscopic surgery in March 2011 after three missions (in March, May, and July 2011) with foreign facilitators from the United States and the United Kingdom. Since its inception, laparoscopic surgery has grown to be a popular choice for numerous treatments. The hospital is currently among Nigeria's top public facilities for laparoscopic procedures.

Olabisi Onabanjo University Teaching Hospital (OOUTH) was established with the goal of offering Ogun and Nigeria as a whole top-notch medical services, including obstetrics and gynecological care. Although the laparoscopy services of OOUTH are still in their early years, the hospital offers the option of laparoscopic surgery in pediatrics, urology, and, to some extent, gynecology.

University College Hospital (UCH), the premier teaching hospital in Nigeria, was founded to train medical personnel and other healthcare professionals for Nigeria and the West African subregion. One of the foundational departments was obstetrics and gynecology, which comprises five units. Within its department of obstetrics and gynecology, it provides gynecological laparoscopic services. It also includes training on minimally invasive surgeries in its residency programs.

Obafemi Awolowo University Teaching Hospital Complex (OAUTHC) is a tertiary healthcare facility in Southwest Nigeria affiliated with Obafemi Awolowo University. A crucial component of the center is the Department of Obstetrics, Gynecology & Perinatology, which focuses on advanced maternal care, women's reproductive health, education, and research. It has experts and offers training in specialties like urogynecology and laparoscopy, and strives to offer the community integrated primary to tertiary healthcare.

Study design

This was a cross-sectional study carried out among resident doctors in the Department of Obstetrics and Gynecology of four tertiary health facilities in Southwest Nigeria.

Study population

The study population comprises doctors undergoing residency programs in Obstetrics and Gynecology in four tertiary health facilities in Southwest Nigeria. The number of resident doctors in the department in each of the facilities was obtained from the respective offices of the Director of Clinical Services.

Inclusion criteria: Registrars and senior registrars in the Department of Obstetrics and Gynecology of the selected tertiary health facilities.

Exclusion criteria

1. Resident doctors with less than one year of training.
2. Doctors who have passed the fellowship examinations of either the National Postgraduate Medical College of Nigeria or the West African College of Surgeons, but are still employed as resident doctors by the hospitals.

Sample size determination

The minimum sample size was determined using Slovin's Formula.[20]

$n=N/1+Ne^2$

where n is the minimum sample size,

N is the total population size = 83 (calculated from the number of resident doctors supplied by the Chief Resident in the Obstetrics and Gynecology departments of the tertiary health facilities; LASUTH (22), OOUTH (17), UCH (28), and OAUTHC (16).

e is the level of significance, i.e., 5% at 95% Confidence Interval (CI)

$n=N/1+Ne^2$

$$n = \frac{83}{1 + 83(0.05)^2}$$

$n = 68.73$

Accepting 10% non-response rate, the sample size =

$68+6.8 = 74.8 \approx 75$

Thus, a minimum sample of 75 was used in this study.

Sampling technique

Respondents were selected via a multi-staged sampling technique.

Stage 1:

A simple random technique was used to select four tertiary health facilities in Southwest Nigeria.

Stage 2:

Stratified random sampling was used to allot the sample size to the four health facilities

Number of O&G residents to be selected from each facility

$$= \frac{\text{Number of residents in O \& G department in that facility}}{\text{Total population size}} \times \text{Sample size}$$

LASUTH = 20
OOUTH = 15
UCH = 25
OAUTHC = 15

Stage 3:

Stratified random sampling was also used to select the number of registrars and senior registers to be sampled in each facility, using the formula

Number of registrars to be included in each facility =

$$\frac{\text{Number of registrars in the department}}{\text{Total number of resident doctors in the department}} \times \text{Allotted sample size to the facility}$$

Number of senior registrars to be included in each facility =

$$\frac{\text{Number of senior registrars in the department}}{\text{Total number of resident doctors in the department}} \times \text{Allotted sample size to the facility}$$

LASUTH:	Registrars = 9	Senior Registrars = 11
OOUTH:	Registrars = 8	Senior Registrars = 7
UCH:	Registrars = 11	Senior Registrars = 14
OAUTHC:	Registrars = 7	Senior Registrars = 8

Stage 4:

Simple random sampling was used to select participants from each sub-cadre.

Study instrument and Data collection

A semi-structured, self-administered validated questionnaire was used for this study. The questionnaire was adapted from previous studies.[13, 15] It has four (4) sections:

Section 1: Demographic and professional characteristics of the resident doctors. This included the age, gender, cadre, number of years of residency training completed, etc.

Section 2: Knowledge of basic laparoscopy. This included questions on awareness and attendance of formal laparoscopy training, knowledge of laparoscopic training models, and self-appraisal of the level of knowledge on gynecological laparoscopy, etc.

Section 3: Exposure and experiences in laparoscopy. This included questions on the availability of laparoscopic facilities in the training center, availability of facilities for training residents in laparoscopy, level of participation of residents in laparoscopy procedures, etc.

Section 4: Factors limiting functional adoption of laparoscopy and expectations. This included questions on factors limiting residents' exposure and experiences of laparoscopy and their expectations for laparoscopy training.

A pilot survey was done to ensure accuracy and efficiency of the research instrument, with a population of 9 resident doctors, recruited from the Department of Obstetrics and Gynecology of Babcock University Teaching Hospital, before the onset of the study. Modifications were made to the questionnaire following the outcome of the pilot survey. A non-affiliated researcher reviewed the questionnaire for content validation. The final questionnaire was tested for reliability and consistency using internal consistency (Cronbach's alpha = 0.82).

Permission to conduct the study was sought from the heads of departments in each of the selected facilities. The chief residents of the Department of Obstetrics and Gynecology in each of the facilities were contacted, and the purpose and details of the study were explained to them.

The questionnaires were delivered by the investigators to the facilities selected for this study. Four research assistants were recruited from the registrars of each of the 4 selected facilities. The research objectives were explained to the research assistants, and they distributed and retrieved the questionnaires from the participants.

Data analysis

Data was analyzed using Statistical Packages for Social Sciences (SPSS) version 25. Continuous variables were summarized using means and standard deviation (SD), while categorical variables were summarized as frequencies and percentages. Chi-square test was used to test for statistical associations. Differences were considered statistically significant if *p* was less than 0.05.

Ethical consideration

Ethical clearance was obtained from the Health Research Ethics Committee of Olabisi Onabanjo University Teaching Hospital (Approval date: 30th August, 2024; Reference number: OOUTH/HREC/102/2024). Furthermore, written informed consent was obtained from the participants. Participants were assured that all information provided in the questionnaire would be treated confidentially and anonymously. Above all, participation in the study was voluntary, and participants were assured that there would be no victimization of anyone who refused to participate or who withdrew from the study after providing consent. Data obtained in the course of this study were strictly for this study.

Results

During the research period, 75 resident doctors met the inclusion criteria and were recruited for this study.

Table 1 shows the demographic and professional characteristics of the resident doctors. The mean age was 36.85 (± 4.61) years. The majority of the doctors were males, 55(73.3%), and more than half of them were senior registrars, 40(53.3%). The overall mean number of years of residency training completed was 4.39 (± 2.25) years. Most of the gynecology residents 60(80.0%) desired to practice/specialize in laparoscopy in the future.

Table 1: Demographic and professional characteristics of the respondents

Variables	Frequency (n=75)	Percentage (%)
Age (years)		
- 29 – 34	27	36.0
- 35 – 44	46	61.3
- ≥45	2	2.7
Mean ± SD = 36.85 ± 4.61		
Gender		
- Male	55	73.3
- Female	20	26.7
Cadre		
- Registrar	35	46.7
- Senior registrar	40	53.3

Mean number of years completed in residency training - OOUTH - LASUTH - UCH - OAUTHC - Overall	 3.20 ±2.78 4.80 ± 2.19 4.33 ± 1.88 4.00 ± 2.07 4.39 ± 2.25	
Desirability of future practice/specialization in laparoscopy - OOUTH - LASUTH - UCH - OAUTHC - Overall	 11 14 23 12 60	 73.3 70.0 92.0 80.0 80.0

The knowledge of basic laparoscopy among the resident doctors is shown in Table 2. The majority, 50(66.7%), have local training programs in laparoscopy. Most of the residents 71(94.7%) agreed that laparoscopy was relevant to gynecology practice. The two most identified training models for laparoscopy by the residents were trainer boxes 57(76.0%) and virtual simulators 54(72.0%).

Table 2: Knowledge of basic laparoscopy among the respondents

Variables	**Frequency (n=75)**	**Percentage (%)**
Aware of local training programs in laparoscopy	67	89.3
Attended a training program in laparoscopy	50	66.7
Perception of the relevance of laparoscopy skills to gynecology practice - Relevant - Undecided - Not relevant	 71 4 0	 94.7 5.3 0.0
Training models in laparoscopy aware of - Trainer boxes - Virtual simulators - Wet labs/live animal models - Cadaveric models	 57 54 15 18	 76.0 72.0 20.0 24.0

Table 3 shows the residents' self-appraisal of their level of knowledge of laparoscopy. Overall, most of the respondents, 61(81.3%), agreed to having at least an average level of knowledge on laparoscopy. This level of knowledge was also obtained in each of the centers.

Table 3: Self-appraisal of the level of knowledge of laparoscopy

	Overall	**OOUTH**	**LASUTH**	**UCH**	**OAUTHC**
Good	19 (25.3%)	1 (6.7%)	6 (30.0%)	12 (48.0%)	0 (0.0%)
Average	42 (56.0%)	6 (40.0%)	12 (60.0%)	13 (52.0%)	11 (73.3%)
Poor	14 (18.7%)	8 (53.3%)	2 (10.0%)	0 (0.0%)	4 (26.7%)

Table 4 shows the level of exposure and experiences in laparoscopy among the resident doctors. Most of the doctors agreed that laparoscopy procedures were performed at their center, 71(94.7%), with all the resident doctors in LASUTH and UCH agreeing. The average number of gynecological laparoscopy procedures per month was 2.40 (±1.25). The majority of the residents, 52(69.3%), reported that their centers had programs designed for laparoscopy training of resident doctors, with OOUTH having the least number of residents aware of such training, 1(6.7%). Generally, less than half of the gynecology residents, 33(44.0%), affirmed receiving lectures or seminars organized by their departments for training residents in laparoscopy. No resident in two of the tertiary health facilities reported having received such training. A skills lab for laparoscopy was reported to be available by most of the respondents, 45(63.4%), and most of the doctors had received practical training using trainer boxes, 51(68.0%). The majority of the residents had observed a gynecological laparoscopy procedure 70(93.3%), about half had assisted such a procedure 37(49.3%), a few had performed one of such procedures under supervision 3(4.0%), and none had performed a laparoscopy procedure without supervision. Overall, more residents 29(38.7%) judged their level of exposure to laparoscopy as being good.

Table 4: Level of exposure and experiences in laparoscopy

Variables	**Overall**	**OOUTH**	**LASUTH**	**UCH**	**OAUTHC**
Laparoscopic equipment/facilities are present at our center	71 (94.7%)	12 (80.0%)	20 (100.0%)	25 (100.0%)	14 (93.3%)
Laparoscopic procedures are performed in our center	71 (94.7%)	12 (80.0%)	20 (100.0%)	25 (100.0%)	4 (93.3%)
Average number of laparoscopy procedures per month	2.40±1.25	1.13±0.83	3.2 ±0.77	3.28±0.74	1.28 ±0.58
The hospital has programs designed for laparoscopy training of resident doctors	52 (69.3%)	1 (6.7%)	19 (95.0%)	24 (96.0%)	8 (53.3%)
Training lectures and seminars in laparoscopy are	33	0	13 (65.0%)	20	0

organized by the department in our center for residents	(44.0%)	(0.0%)		(80.0%)	(0.0%)
Laparoscopy skills lab/suite is available in our center	45 (63.3%)	10 (66.7%)	19 (95.0%)	16 (76.2%)	0 (0.0%)
Observed a laparoscopy procedure	70 (93.3%)	12 (80.0%)	19 (95.0%)	25 (100.0%)	14 (93.3%)
Assisted a laparoscopy procedure	37 (49.3%)	5 (33.3%)	12 (60.0%)	16 (64.0%)	4 (26.7%)
Performed a laparoscopy procedure under supervision	3 (4.0%)	0 (0.0%)	1 (5.0%)	2 (8.0%)	0 (0.0%)
Performed a laparoscopy procedure without supervision	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Average number of laparoscopy procedures observed/participated in	6.49±4.33	1.73±1.58	8.70±3.54	9.44±3.16	3.40±2.29
Type of laparoscopy procedures observed/participated in (n=70) -Diagnostic & Operative -Operative	 34(48.6%) 36(51.9%)	 9(75.0%) 3(25.0%)	 12(63.2%) 7(36.8%)	 9(36.0%) 16(64.0%)	 4(28.6%) 10(71.4%)
Self-appraisal on the level of exposure to laparoscopy by the residents -Good -Average -Poor	 29(38.7%) 25(33.3%) 21(28.0%)	 0(0.0%) 4(26.7%) 11(73.3%)	 14(70.0%) 3(15.0%) 3(15.0%)	 15(60.0%) 9(36.0%) 1(4.0%)	 0(0.0%) 0(0.0%) 0(0.0%)

The comparison of key variables with the level of knowledge on laparoscopy of the residents is shown in Table 5. There was a significant association between the level of knowledge and the cadre of the residents, center, and the level of exposure of the resident doctors to laparoscopy ($\chi^2 = 7.040$, p= 0.008; $\chi^2 = 19.233$, p= 0.001; $\chi^2 = 28.440$, p= 0.001). Other variables like the desirability of future practice in laparoscopy and the relevance of laparoscopy in gynecology did not show significant differences among the women (p>0.05).

Table 5: Comparison of key variables with the level of knowledge on laparoscopy

Variables	At least average knowledge (n=61)	Poor knowledge (n=14)	χ^2 value	p-value
Cadre			7.040	.008*
Registrar	24(39.3)	11(78.6)		
Senior registrar	37(60.7)	3(21.4)		
Center			19.233	.001*
OOUTH	7(11.5)	8(57.1)		
LASUTH	18(29.5)	2(14.3)		
UCH	25(41.0)	0(0.0)		
OAUTHC	11(18.0)	4(28.6)		
Desirability of future practice in laparoscopy			0.022	.882
Yes	49(80.3)	11(78.6)		
No	12(19.7)	3(21.4)		
Relevance of laparoscopy in gynecology practice			0.970	.325
Relevant	57(93.4)	14(100.0)		
Undecided	4(6.6)	0(0.0)		
Level of exposure to laparoscopy			28.440	.001*
At least average exposure	52(85.2)	2(14.3)		
Poor exposure	9(14.8)	12(85.7)		

*Statistically significant, $p<0.05$

The comparison of key variables with the level of exposure to laparoscopy is shown in Table 6. There was a significant association between the level of exposure and the cadre of the residents, center, the average number of laparoscopy performed per month in the center, availability of programs designated for laparoscopy training and the availability of skills lab ($\chi^2 = 10.215$, p= 0.001; $\chi^2 = 25.182$, p= 0.001; $\chi^2 = 15.444$, p= 0.001; $\chi^2 = 35.810$, p= 0.001; $\chi^2 = 8.214$, p= 0.004).

Table 6: Comparison of key variables with the level of exposure to laparoscopy

Variables	At least average exposure (n=54)	Poor exposure (n=21)	χ^2 value	p-value
Cadre			10.215	.001*
Registrar	19(35.2)	16(76.2)		
Senior registrar	35(64.8)	5(23.8)		
Center			25.182	.001*
OOUTH	4(7.4)	11(52.4)		
LASUTH	17(31.5)	3(14.3)		
UCH	24(44.4)	1(4.8)		
OAUTHC	9(16.7)	6(28.6)		
Average number of laparoscopy done in the center per month			15.444	.001*
≤2	19(35.2)	18(85.7)		
>2	35(64.8)	3(14.3)		
Availability of laparoscopy training programs for residents			35.810	.001*
Yes	48(88.9)	4(19.0)		
No/Don't know	6(11.2)	17(80.9)		
Availability of laparoscopy skills lab			8.214	.004*
Yes	37(74.0)	8(38.1)		
No	13(26.0)	13(61.9)		

*Statistically significant, p<0.05

The factors limiting the functional adoption of laparoscopy and the expectations of resident doctors in gynecology on laparoscopy training are shown in Table 7. The major factors identified as limiting residents' exposure and experience of laparoscopy were the low motivation of surgeons, 68(90.7%), lack of funds or leave to attend laparoscopy training, 68(90.7%), and lack of trained personnel, 58(77.3%). The expectations of the residents for laparoscopy training and practice include funding and leave to attend training programs 74(98.7%), presence of a laparoscopy unit/specialist surgeon 73(97.3%), a fully equipped laparoscopy suite, 67(89.3%), etc.

Table 7: Factors limiting functional adoption of laparoscopy and expectations

Variables	Frequency (n=75)	Percentage (%)
Factors limiting exposure and experiences of laparoscopy		
- Lack of trained personnel	58	77.3
- Faulty/lack of sufficient equipment	40	53.3
- Lack of laparoscopy skills lab or training facility	19	25.3
- Low motivation of surgeons	68	90.7
- Lack of institutional support	56	74.7
- Lack of funds/leave to attend laparoscopy training	68	90.7
Expectations for laparoscopy training/practice		
- Incorporation into the residency training curriculum	57	76.0
- Fully equipped laparoscopy suite	67	89.3
- Presence of laparoscopy skills lab	60	80.0
- Funding and leave to attend laparoscopy training	74	98.7
- Presence of laparoscopy unit/specialist surgeon	73	97.3
Expectations from a training program		
- Didactic lectures	45	60.0
- Use of simulators	75	100.0
- Use of animal models	65	86.7
- Hands-on (live surgeries)	75	100.0
- Objective assessment at the end of the training	75	100.0

Discussion

This research examined the surgical exposure and training of resident doctors on laparoscopy. In all four centers, there were more men than women in the gynecology residency training programs, which is consistent with other studies that found a similar pattern.[15] This might be explained by the fact that, in contrast to what happens in Europe and America, surgical specializations are typically seen as less desirable by women in this region of the world. In contrast, an European study reported more females being in gynecology residency programs.[19] The respondents' average age is comparable to that of participants in a similar survey carried out in Abuja.[15] However, it was more than what participants in a comparable research from Belgium reported.[19] This disparity may be because of the difficulty in securing residency positions in the past and the higher age at entry into residency programs in Nigeria. In this study, the respondents' average completed years of residency were 4.00±2.25 years, which is comparable to the results of Ezeike et al (2023).[15] Comparatively, it was more than the findings of Majmudar et al. and Gabriel et al. from the UK and Germany, where the majority of the residents had completed only three years of residency training, respectively.[11, 14]

Future specialization or laparoscopic practice was desired by the majority of participants in this study. This study's findings are consistent with previous ones in that the residents wanted post-fellowship training and specialization in minimally invasive surgery.[13, 15] Despite the current difficulties, this desire to pursue more laparoscopic training demonstrates a high degree of enthusiasm, and it follows global trends in surgical specialization in minimally invasive procedures.[11, 14]

Training has been shown to result in improved skills. Most of the doctors were aware of local training programs in laparoscopy, while two-thirds reported that they had attended a laparoscopic training program. In contrast, fewer residents have reportedly participated in minimally invasive surgical training programs, according to other research. In a study conducted in Abuja, only 10.5% of the resident doctors claimed to have had this kind of formal training.[15] In a similar vein, Balogun et al. reported that only 11.2% of the residents were aware of a local training program, and 90.7% of the respondents had not yet received endoscopic training.[13] Structured courses on minimally invasive surgery continue to have relatively low attendance rates, even in developed nations. For example, only 26% of gynecology residents in Belgium got additional laparoscopy training that was not coordinated by their training program.[19]

In this study, most of the respondents were aware of trainer boxes and virtual stimulators as training models used in laparoscopy, while only about a fifth were aware of wet labs and cadaveric models. This is not surprising as the few available training facilities for laparoscopy in the country use trainer boxes because they are cheap and easily accessible, as compared to the cost of procurement and maintenance of wet labs. Furthermore, in Nigeria, qualifying for the postgraduate surgical exam does not currently require previous expertise with basic laparoscopy. Therefore, having to seek training experience that includes exposure to other trainer models like virtual simulators, wet labs, and cadaveric models may not have attracted enough attention from the residents. Comparatively, in a similar study, the majority of respondents were unaware of training models used in laparoscopy, including wet laboratory/live animal models (7.4%), virtual simulators (14.8%), laparoscopic trainer boxes (20.4%), and cadaveric training models (0.0%).[15]

According to the majority of the residents in this study, laparoscopy is relevant to gynecological practice. This finding is comparable to that of another study conducted in Abuja, where all participants deemed endoscopy to be significant. It also bears comparison with findings by Gabriel et al. (2016), where 90% of German gynecology residents deemed laparoscopy training to be important, while 80% thought hysteroscopy training to be useful.[11] As regards self-appraisal of the level of knowledge of laparoscopy, most of the respondents reported having more than an average level of knowledge. This is not surprising as laparoscopy training is becoming more available and the enthusiasm for laparoscopy is increasing among resident doctors.

The statistically significant knowledge difference between the junior and senior residents in this study further supports the claim that improved laparoscopic service delivery requires both training and sufficient knowledge. This is similar to the reports from similar studies.[9, 19] The level of knowledge of laparoscopy was also significantly associated with the extent of exposure to laparoscopy. This is not unexpected, as knowledge is often facilitated and improved by seeing and practicing.

Residents are exposed to laparoscopy to a larger extent at centers where laparoscopic surgeries are more frequent. Most of the respondents in this study agreed that their centers had facilities for laparoscopy and that the laparoscopic procedures were carried out at their centers. This is similar to the findings of a study conducted in Lagos State, Nigeria.[13] Remarkably, there was no discernible relationship between the presence of laparoscopy facilities and the monthly number of cases that the respondents reported, as the reported average number of laparoscopic procedures conducted per month was about 2.5. This is lower than the reported monthly average in a study among gynecology residents in Abuja.[15]

To gain proficiency in laparoscopy, there is a need for residents to practice. For this, there is a need for laparoscopic facilities to be available, training sessions to be organized, and laparoscopic labs to be available for residents to hone their skills. While about two-thirds of respondents in this study reported having a laparoscopic skills lab at their center, residents in one of the centers reported having none at all. This is similar to the report from a study in Belgium, where a significant number of residents claimed to have access to a skills lab for laparoscopic procedures.[19] That, however, contrasts with another research, where every responder mentioned that their center lacked a skills lab.[15]

The majority of study participants stated that they had practiced laparoscopy on trainer boxes. Comparatively, other similar Nigerian studies reported very few residents having limited access to such.[13, 15] A study conducted in the UK found that 34% of trainees said they had used a simulator during their training.[14] This environment's restricted simulator availability could help to further explain why there is still limited exposure to and use of laparoscopy in this area.

The level of competence in laparoscopy by the gynecology residents in this study is low. Although most of the respondents had observed one of such procedures, only about half had assisted in at least one. Very few of the resident doctors had performed a laparoscopic procedure with permission, and none had done so without permission. These findings accord with those of a similar study carried out in Abuja, where a significant proportion of the participants had not yet attained proficiency in surgical endoscopy.[15] Additionally, it agrees with the results of a related study conducted among postgraduate trainees in Nigeria.[13] This highlights some issues regarding the residents' level of exposure to laparoscopy in our residency centers and highlights the necessity of increasing case volumes to overcome the steep learning curve associated with minimally invasive surgeries. On the other hand, although experience with advanced operations was still limited, results from a study in the UK indicated that nearly all the postgraduate trainees had attained proficiency in level 1 laparoscopic procedures.[14] Similarly, all fifth- and sixth-year trainees have performed more than 25 laparoscopic appendectomies and more than 25 laparoscopic cholecystectomies without supervision, according to a study conducted in Belgium among residents in another surgical specialty (general surgery).[19]

The average number of laparoscopic procedures observed/participated in was 6.5, with residents in one of the centers having observed/participated in as many as 9 laparoscopic procedures, while residents in another center participated/observed about 2 procedures, in the course of their residency training. This is higher when compared to surveys involving residents in other surgical specialties. For example, Balogun et al. reported that general surgery trainees witnessed about one to four laparoscopic procedures throughout their entire rotations in general surgery.[13]

The majority of resident doctors self-assessed as having at least average exposure to laparoscopies. Similar to this, Gabriel et al. found that just 23% of trainees in gynecology in Germany were unsatisfied.[11] In contrast, the majority of participants in a study in Northern Nigeria stated that they were dissatisfied with the level of exposure to endoscopic procedures at their various centers.[15] In another study in the UK, trainee gynecologists expressed dissatisfaction with the degree of exposure, with 69% of them expressing this sentiment.[14] The higher level of exposure to laparoscopy reported in this study could be linked to the increasing interest in minimally invasive surgeries in Southwest Nigeria, and more centers now have the facilities to conduct laparoscopic surgeries.

There was a significant association between the level of exposure and the cadre of the residents. This is not surprising, as residents who have spent more time in the residency training program are more likely to have assisted or have more hands-on experience in laparoscopy. Similarly, the average number of laparoscopies performed per month in the center, the availability of programs designated for laparoscopy training, and the availability of skills lab were all found to be associated with the level of exposure to laparoscopy. Centers where laparoscopy is more routine are likely to offer more exposure to their residents. Such centers are also more likely to offer training modules to their residents and adhere to them.

The study revealed that the primary factors restricting exposure and proficiency in laparoscopy were financial constraints/leave to attend training programs, low motivation of surgeons, limited trained personnel, and inadequate institutional support. Similarly, the majority of residents (66.7%) in the study by Ezekiel et al. stated that the biggest barrier to training and practice at their center was a lack of funds.[15]

Other studies found that the use of laparoscopy by Nigerian surgeons may be limited by malfunctioning/nonfunctioning equipment, apathy towards the practice among Nigerian surgeons, and the limited application of laparoscopy to the common advanced intra-abdominal and intra-pelvic pathologies.[21, 22] However, according to 87% of participants in a UK research, not being able to serve as the principal surgeon was the biggest obstacle to training.[14] This demonstrates the stark differences in the level of progress attained in laparoscopic training between poor and industrialized nations, as well as what is needed for laparoscopy training to improve in both climes.

Cost, availability of a laparoscopic specialist, presence of a laparoscopy unit and skills lab, and integration into the residency curriculum were the most often expressed expectations among the residents about laparoscopy training and practice. These results are consistent with those of Ezeike et al (2023). [15] Similarly, the majority of residents in a Dutch survey agreed that a surgeon with expertise in laparoscopic surgery had to be present in every surgical hospital department.[23] Furthermore, compared to traditional residency training, a thorough simulation-based training curriculum improves knowledge and operating room technical performance.[24]

Conclusion

The level of knowledge on laparoscopy of the gynecology residents who participated in this study is high, while the level of exposure is low. Although the availability of training facilities and programs was above average, the level of competence by the respondents still leaves a lot to be desired. Nonetheless, the trainees have a strong desire to advance their laparoscopic knowledge and experience. The use of other training models for laparoscopy, other than trainer boxes, is also yet to be embraced.

It is recommended that residency training centers fund the education of residents in laparoscopy and offer a suitable setting and equipment to support the practice at the end of such training. Resources for the best adaptable training methodologies, staff, and pertinent curriculum content are necessary for an efficient training program that will maintain residents' motivation. To further enhance residents' exposure to the fundamentals of laparoscopy, it is also advised that residents undergo regular, focused, short-term hands-on training in basic laparoscopy skills. This should be included in the National Workshops on laparoscopy.

It is likely that many other Nigerian postgraduate training institutes still face the same obstacles that have been highlighted as limiting residents' exposure to laparoscopy (such as funding, low motivation of surgeons, lack of trained personnel, low institutional support, etc.). This study showed a high degree of desirability for future laparoscopic practice among the respondents, despite our local difficulties. It is imperative that laparoscopy be further included in Nigeria's postgraduate training program going forward. Maintaining and supporting the current laparoscopic training institutions requires the collaboration of postgraduate colleges, residency training centers, and other relevant authorities.

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