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Morbidity profile and prevalence of postoperative complications among patients after a short-term surgical mission in a district hospital in Ghana

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Ethics Committee Approval
The study complied with the Declaration of Helsinki (1964) and its later amendments. The standardized written informed consent procedure for surgery, as outlined by the Ghana Health Service, was used during the STSM. Ethical approval for the study protocol was obtained from the Ghana Health Service Ethics Review Committee (GHS-ERC:018/05/25).

Conflict of Interest
No conflict of interest was declared by the authors.

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Abstract

Background/Aim: In most of Africa, including Ghana, access to surgical care is limited by socioeconomic factors, infrastructural constraints, and shortages in human resources. Short-term surgical missions (STSMs) have been used to bridge this gap by providing free surgical services, especially in rural areas. This study aimed to determine the morbidity profile and prevalence of postoperative complications among patients who underwent surgery during an STSM at a municipal hospital in the Volta Region of Ghana.

Methods: This cross-sectional descriptive study involved a secondary analysis of data from 180 patients who underwent surgical procedures during an STSM at Ketu North Municipal Hospital, Volta Region, Ghana, from October 27 to November 2, 2024. The mission was conducted by a local team of 38 health professionals, including surgeons, nurses, and anesthetists. Patients' selection was based on predetermined criteria.

Results: The mean age of the patients was 45.7 (18.7) years, with a range of 2 to 82 years. Most patients were male (54.4%). Surgical care was provided for general surgical and gynecologic conditions. Inguinal hernia was the most common diagnosis (35.0%), with right-sided hernia being the predominant type, followed by lipoma (24.4%) and goiter (15.6%). Spinal anesthesia was the most frequently used anesthetic technique (47.8%). A low complication rate of 1.0% was observed, consisting mainly of urinary retention and pruritus.

Conclusion: Short-term surgical missions can effectively address surgical needs in low-resource settings such as rural Ghana by providing safe surgical care with minimal complications. These findings underscore the importance of a well-organized mission and sustainable local partnerships to improve access to surgical care and patient outcomes.

Keywords: short-term, surgical mission, morbidity, diagnosis, case type, prevalence, complication

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Introduction

According to the World Health Organization (WHO), safe and affordable surgical care must be made available to achieve universal health coverage (UHC) and the health-related Sustainable Development Goals (SDGs) [1, 2]. However, the cost of surgical operations is a significant barrier to accessing healthcare in Africa [3]. Access to surgical care is severely limited, with an estimated 5 billion people worldwide lacking access to such services [4]. Barriers to surgical access include socioeconomic factors, lack of infrastructure, and insufficient human resources [5].

Ghana faces significant challenges in providing accessible surgical care, particularly in rural areas. These challenges include the limited availability of health facilities capable of performing essential surgical procedures, as well as a lack of trained surgical personnel and resources [6]. Over 77% of surgical procedures are essential operations performed at district-level hospitals, which often lack adequate infrastructure and supplies [7]. Financial barriers also exist, with patients covering up to 91% of surgical costs out of pocket [7].

Short-term surgical missions (STSMs) or medical outreach have traditionally been an approach to address the lack of access to surgical care in low- and middle-income countries, but their long-term impact is questioned [8, 9]. Although communities value these missions, which offer free services, they are often confronted with obstacles such as language barriers and a lack of oversight [10]. To improve sustainability, there is a shift toward local missions and partnerships with host countries [8, 11]. Training activities during missions are considered the most impactful, with emphasis on collaboration with local actors and long-term follow-up [8]. There is a growing emphasis on transitioning from traditional STSMs to sustainable partnerships with local healthcare systems [8]. As the focus shifts from international to local missions, particularly in middle-income countries, there is potential for sustainable improvement in surgical care access across Africa [11].

In Ghana, STSMs aim to address healthcare gaps, particularly in rural areas [10]. STSMs can effectively address surgical needs in low-resource settings, but they also present challenges regarding long-term patient outcomes and complications. Long-term follow-up studies have reported high patient satisfaction and symptom improvement, with complications within an acceptable range [12]. Studies have reported complication rates ranging from 16% to 30%, emphasizing the need for careful patient selection and follow-up protocols [12, 13].

Despite complications, patient satisfaction and symptom improvement are generally high. Essential surgical care can be provided during STSMs without incident if high-risk situations are avoided, patient safety procedures are followed, and patients are carefully chosen [14]. Thus, this study sought to determine the morbidity profile and prevalence of postoperative complications among patients after undertaking STSMs at the Ketu North municipal hospital in the Volta Region, Ghana.

Materials and methods

Study design

This was a cross-sectional descriptive study using secondary data analysis of all patients who underwent surgical procedures during the STSM organized from October 27 to November 2, 2024, at the Ketu North municipal hospital located in Weta in the Volta Region, Ghana.

Mission description

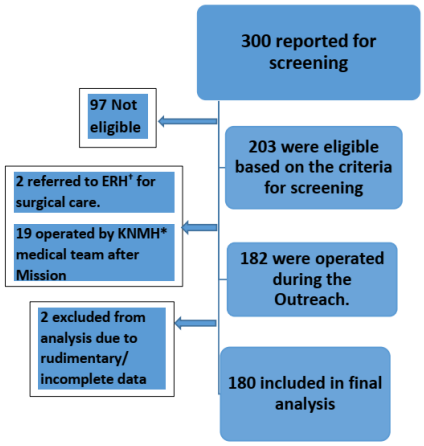
The STSM was undertaken by a local (Ghana) mission team of 38 health professionals, comprising nurses, nurse anesthetists, medical officers, and specialists in the fields of family medicine, public health, general surgery, and gynecology. The inclusion of consultants, often not available at peripheral health facilities like Ketu North municipal hospital and highly skilled in their areas of specialty, underscored the level of preparedness and commitment not only to provide service but to train and pass on competencies. The addition of surgical residents to the team reinforced the training component. The professional characteristics of the mission team are presented in Table 1.

Table 1. Professional characteristics of the mission team

Profession (N = 38)	Professional Characteristics	Frequency
Doctors (N = 11)	**Specialty**	
	Obstetrics and Gynaecology	3
	General Surgery	2
	Family Medicine	1
	Public Health	1
	Surgery Resident	1
	Anaesthesiologist	1
	Medical Officer	2
	Years of Practice	
	1 to 5 years	2
	6 to 15 years	5
	16 to 25 years	2
	26 years or more	2
	Country of Medical School	
	Belarus	1
	Cuba	1
	Russia	1
	Ukraine	1
	Ghana	7
	Country of Postgraduate/Specialist Training	
	Cuba	1
	Ghana	8
	Non-specialist	2
	Present Duty Station	
	Pretoria	1
	Eastern Regional Hospital, Koforidua	7
	Koforidua Technical University, University Health Directorate	1
	University of Cape Coast, School of Medical Sciences	1
	Korle-Bu Teaching Hospital	1
Nurse Anesthetist (N = 6)	**Number of years practising as an Anaesthetist**	
	10 years and below	2
	Above 10 years	4
	Present Duty Station	
	Eastern Regional Hospital, Koforidua	2
	Adidome Govt Hospital	1
	Keta Municipal Hospital	1
	Ketu North Municipal Hospital, Weta	2
Nurses (N = 21)	**Nursing Duty**	
	Scrub Nurses	9
	Recovery Ward Nurses	12
	Qualification	
	Bsc. Nursing	6
	Diploma	13
	Certificate	2
	Number of years practising in current Nursing duty	
	10 years and below	19
	Above 10 years	2
	Present Duty Station	
	Eastern Regional Hospital, Koforidua	15
	Ketu North Municipal Hospital, Weta	6

The mission started with the triage of patients and pre-screening by the local/facility healthcare teams. Triage was performed by medical officers based on pre-determined criteria. The pre-screened and selected patients were cleared for surgery after anesthetic assessment and review. The procedures were then performed for all selected patients over a period of seven days. Figure 1 shows the trajectory of case selection for the STSM.

Figure 1. Flowchart of the trajectory of case selection for surgeries. ERH: Eastern Regional Hospital; KNMH: Ketu North Municipal Hospital.



Out of a total of 203 eligible patients after screening, 182 were operated on during the surgical mission, 2 were referred to the Eastern Regional Hospital for surgical care, and 19 had less serious conditions and were operated on by the hospital's local healthcare providers after the STSM ended. Data from 180 patients were used in the final analysis because 2 patients were excluded due to rudimentary/incomplete data. The latter was facilitated by competencies transferred during the short-term mission by developing confidence in the local hospital team to perform mop-up surgeries after the visiting team had left. Follow-up of patients continued after discharge, one week after the mission, through phone calls.

Study setting

The Ketu North Municipality shares boundaries with the Republic of Togo on the East, Akatsi North District on the North, Akatsi South on the West, Keta Municipality on the Southwest, and Ketu South Municipality on the South. The Municipality consists of 332 communities and six sub-municipalities. It has a population of 119,720. The main religions of the inhabitants are Christianity and Traditional worship. Major economic activities include fishing, salt mining, and general farming.

Ketu North municipal hospital (KNMH) officially opened on March 9, 2022, as a 60-bed capacity primary health facility. Ghana operates the 3-tier system of primary health care comprising Maternal and Child Health (MCH)/Community-based Health Planning and Services (CHPS) at the community level (Level A), Health Centre (Level B), and the District/municipal hospital (Level C) [15]; KNMH belongs to the apex of this system at Level C.

Operating with a rudimentary staff of less than 20 per cent established posts, the hospital runs nearly all the departments, except for child health, which is integrated into the maternal care unit. The hospital offers a comprehensive range of services, including General Outpatient and Inpatient care, special clinics for Tuberculosis (TB) and antiretroviral therapy (ART), Mental Health, Eye Care, Dental care, Pharmaceutical Services, Accident and Emergency, Laboratory Services, Reproductive, Maternal, and Child Health Services, as well as Mortuary Services.

In 2023, Malaria, Urinary Tract Infection, and Typhoid fever were the leading causes of morbidity and admissions. In the same year, the hospital recorded 53 minor and 66 major surgeries. The minor cases comprised lipoma excision, circumcisions, and suturing of lacerations, and the major cases included Caesarean sections, Myomectomy, Hysterectomy, and Hernia Repairs. This feat was achieved by 3 doctors, 1 Family Physician who doubles as the Medical Superintendent, and 2 Medical Officers.

Sample size and sampling procedure

Given the retrospective nature of the study, a census approach was used to select medical records of all patients who participated in the STSM. There was no predetermined sample size, mainly because the STSM was conducted as part of service provision and not initially in the context of research. The sample size was based on all data available from the monitoring database of the Surgical Outreach.

Study participants

The study participants (N = 180) were all patients who underwent surgical procedures during the STSM in the facility. The inclusion criteria were patients with inguinal swellings, other hernias, scrotal swellings, bumps and lumps, thyroid tumors, fibroids, breast tumors, general surgical conditions, and general gynecologic conditions. Exclusion criteria included patients with co-morbidities, malignancies, unresectable tumors, major orthopedic or urological conditions, situations requiring intensive care or long follow-ups, and those who needed vascular surgeries or major plastic repair.

Data extraction and variables

Data was extracted from the patients' monitoring database of the surgical outreach and included demographic information (age and sex), pre-operative diagnosis, type of anesthesia, main postoperative findings, and postoperative complications identified and recorded from the end of surgery until patient discharge. Post-operative complications were identified using a combination of reported patient complaints, review of Nurses' notes, and follow-up notes of Doctors assigned to review each patient after the surgery.

Data was entered into an Excel spreadsheet and manually cross-checked for errors. A standardized data extraction form was developed and designed into a monitoring chart to ensure consistency of data across all records. To address potential sources of bias, the study employed a standardized data extraction form and manual cross-checking procedures to ensure consistency and accuracy across all patient records.

Study size

The study used a census approach to extract data on all 180 patients with complete data treated during the STSM. The flowchart in Figure 1 explains how the study size was arrived at.

Statistical analysis

Descriptive statistics were used to summarize the demographic characteristics. Means (SD) were used to summarize continuous data, whereas frequencies and percentages were used to summarize categorical variables. Morbidity of patients was expressed in frequencies, and percentage/proportion was used to determine the prevalence of postoperative complications. Statistical analyses were conducted using SPSS version 25.

Ethical considerations

The study complied with the Declaration of Helsinki. Written informed consent for the surgical procedure was obtained from all patients. Patients' confidentiality and data security were maintained throughout the study. To ensure participant confidentiality and data security, all information was anonymized and stored on a password-protected computer.

The standardized written informed consent procedure for surgery by the Ghana Health Service was used during the STSM. Administrative approval to use data from the STSM in a letter with reference: GHS/KNMH/S/09 was obtained from the Ketu North municipal hospital management team, which permitted the publication of the study findings retrospectively. Ethical approval of the Study protocol was also obtained from the Ghana Health Service – Ethics Review Committee (GHS-ERC:018/05/25).

Results

The surgical procedures under this STSM were undertaken for a period of 7 days. A total of 180 patients, with a mean age of 45.7 (18.7) years, ranging from 2 to 82 years, were operated upon. The age distribution showed that the majority of the patients were in the 35–44 years and 45–54 years age groups. The sex distribution of the patients was 54.4% male and 45.6% female. The age and sex distribution of patients are presented in Table 2.

Table 2. Age and sex distribution of patients

Variable	Frequency (N=180)	Percentage (%)
Age (years), Mean(SD), (range)	45.7 (18.7), (2, 82)	
Age group (years)		
0 – 14	15	8.3
15 – 24	9	5.0
25 – 34	18	10.0
35 – 44	41	22.8
45 – 54	39	21.7
55 – 64	29	16.1
65 – 74	18	10.0
75 – 84	11	6.1
Sex		
Male	98	54.4
Female	82	45.6

The morbidity profile was dominated by general surgical conditions, with inguinal hernias (35%) and lipomas (24.4%) being the two most common diagnoses, together accounting for nearly 60% of all cases (Table 3). For the other surgical conditions, one case of each of the following was diagnosed: abdominal diatheses, bilateral varicocele with hydrocele, congenital right inguinal hernia, ganglion, granuloma, incisional hernia, keloid, left parotid mass, left undescended testis, left accessory breast, and syndactyly.

In terms of the type of anesthesia, the majority of patients (47.8%) received subarachnoid spinal block, and the duration of hospital admission varied, with one night stay being the predominant duration of stay (48.3%).

The majority of patients (99%) experienced no postoperative complications. Post-operative complications were reported in 1% of the patients after their surgeries. The complications observed were urine retention and pruritus following opioid administration.

Table 3. Morbidity profile, type of anesthesia, and duration of hospital admission

Variable	Frequency (N=180)	Percentage (%)
Diagnosis		
Inguinal Hernias (Overall)	63	35.0
Right Inguinal Hernia	40	22.2
Left Inguinal Hernia	13	7.2
Bilateral Inguinal Hernia	10	5.6
Lipoma	44	24.4
Goitre	28	15.6
AUB-L and Uterine Fibroid	19	10.6
Hydrocele	9	5.0
Hemorrhoid	2	1.1
Phimosis	2	1.1
Umbilical/Para-umbilical Hernia	2	1.1
Other Surgical Conditions†	11	6.1
Type of Anesthesia		
Sub-Arachnoid Spinal Block	86	47.8
General Anesthesia	46	25.6
Local Anesthesia	45	25.0
Sub-arachnoid block with General Anaesthesia	3	1.7
Duration of Hospital Admission		
Day Surgery	41	22.8
1 Night	87	48.3
2 Nights	42	23.3
3 Nights	8	4.4
4 Nights	1	0.6
6 Nights	1	0.6

† Other surgical conditions included abdominal diatheses, bilateral varicocele with hydrocele, congenital right inguinal hernia, ganglion, granuloma, incisional hernia, keloid, left parotid mass, left undescended testis, left accessory breast, and syndactyly.

Discussion

Overall, this Short-Term Surgical Mission (STSM) was successful regarding the availability of a local (Ghana) mission team with diverse expertise and the reach and scope of surgical conditions managed. The most common surgical conditions encountered were inguinal hernia (35%), lipoma (24.4%), and goitre (15.6%). The mission team, comprising 38 health professionals, performed different surgical procedures for over 180 patients within one week, operating with limited funding in a low-resource setting. Compared to other STSMs in Sub-Saharan Africa, this study reports data on a relatively high volume of surgeries completed within a shorter duration. For instance, Djedjo et al. reported consulting 97 female patients during three different missions over one year in Guinea-Bissau, whereas Honeyman et al. reported 70 patients undergoing surgery between 2008 and 2016 during STSMs [13, 16].

The STSM provided care for patients across different age categories, spanning from pediatric patients (2 years) up to older adults (82 years). The dominant age groups also suggest that middle-aged adults are more likely to undergo surgical procedures, possibly due to the onset of age-related conditions. The sex distribution shows a slight male predominance, with 54.4% of the patients being male and 45.6% being female. This aligns with previous studies that have reported higher surgical intervention rates among males, potentially due to differences in health-seeking behavior and the prevalence of certain conditions [17].

The STSM undertaken was multi-specialty, providing surgical care for patients with disease conditions in general surgery, plastic surgery, and gynecology. The patient population also consisted of both sexes, adult and pediatric patients. This contrasts with other STSMs where the focus was a single specialty or disease condition, such as head and neck reconstruction or only breast disease [13, 16, 18, 19]. In deciding the type of surgical specialty to include in an STSM, one could consider the unmet surgical needs of the patients or the community [20, 21].

The morbidity profile highlights that inguinal hernia was the most common diagnosis, representing 35% of the cases. This was followed by lipomas (24.4%), which have been identified in the literature as common benign tumors that often require surgical removal [22]. The high prevalence of hernias may be attributed to factors such as heavy lifting, obesity, and genetic predisposition [17]. Similar to this current study, multiple studies have consistently found a higher incidence of right-sided inguinal hernias compared to left-sided ones [23-29]. Similarly, studies among pediatric patients have shown that inguinal hernias can occur on either side of the groin, but they are more frequent on the right side [26, 30-33]. In Turkey, Erdoğan et al. [31] reported 61.1% right-sided versus 29.4% left-sided hernias in a large study involving 3776 pediatric patients. Ademuyiwa et al. [30] in Nigeria reported 55.8% right inguinal hernias versus 35.8% left inguinal hernias among a small sample of pediatric patients. The preponderance of right inguinal hernias is thought to be caused by the right side's patent processus vaginalis closing more slowly than the left and the persistence of the diameter of the processus vaginalis on the right relative to the left in children [25, 34].

The postoperative complication rate was remarkably low, with only 1% of patients experiencing complications (urine retention and pruritus). This suggests that the surgical procedures and perioperative care provided were effective in minimising adverse outcomes. The low complication rate is a positive indicator of the quality of care and the proficiency of the surgical team [22]. STSMs in resource-limited settings can provide safe, essential general surgery with low complication rates, given careful patient selection and adherence to safety protocols [14].

Many district hospitals in Ghana lack physicians with formal surgical training beyond medical school and internship, leading to concerns about the quality of surgical care [35]. Training activities during STSMs can be considered in resource-limited settings where a large number of patients undergo surgical procedures within a relatively shorter time. Other proposed solutions to the lack of physicians with formal surgical training include compulsory short-term surgical training for medical officers, continuing education opportunities, incentives for surgically trained physicians, and training non-physician clinicians to perform common emergency procedures [35].

Limitations

This study has limitations inherent in retrospective data analyses, such as potential biases in record keeping and missing data. To mitigate some of the limitations, rigorous data-cleaning procedures were employed. The study could not curate data on other sociodemographic characteristics. Also, due to the nature of the STSMs, long-term follow-up of patients for complications beyond 30 days was a challenge. Furthermore, the findings are limited in terms of generalisability.

Conclusion and recommendations

The findings highlight the prevalence of certain conditions, such as lipomas and inguinal hernias, during the STSM. There were low complication rates, which may stem from rigorous patient selection and synergy of team effort. Generally, the output of providing surgical care to over 180 patients within one week in this STSM in a low-resource setting suggests that with enough funding and adequate health professionals, more patients can receive surgical care during such STSMs.

STSMs may help alleviate the gap of low surgical rates in peripheral hospitals in Ghana, which may be the result of inadequately equipped infrastructure, rudimentary and demotivated human resources, and low surgical competence. It may also serve as an opportunity for surgical training for residents in training facilities with little exposure to practice their surgical skills due to congestion and competition for patients. This study observed pruritus with opioid administration, and a detailed study into this complication is worthy of pursuit. The cost-effectiveness of STSMs in Ghana is also worth evaluating, as well as the long-term complications of such missions.

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References

1. World Health Organization. Action Framework for Safe and Affordable Surgery in the Western Pacific Region (2021-2030). World Health Organization. 2021.
2. World Health Organization. Ensuring safe and affordable surgery. 2024 [cited 2024 Dec 12]. Available from: https://www.who.int/westernpacific/activities/ensuring-safe-and-affordable-surgery.
3. Aderinto N, Olatunji G, Kokori E, Abdulrahmon MA, Akinmeji A, Fatoye JO. Expanding surgical access in Africa through improved health insurance schemes: A review. Medicine (Baltimore). 2024;103:e37488. doi: 10.1097/MD.0000000000037488.
4. Mehta A, Awuah WA, Aborode AT, Ng JC, Candelario K, Vieira IMP, et al. Telesurgery's potential role in improving surgical access in Africa. Ann Med Surg. 2022;82:104511. doi: 10.1016/j.amsu.2022.104511.
5. Aderinto N, Opanike J, Oladipo E, Olakanmi D, Adepoju O. Accessing neurosurgical services in Africa: efforts, challenges, and recommendation. IJS Glob Health. 2022;5:1-3. doi: 10.1097/GH9.0000000000000090.
6. Ministry of Health, Ghana. National Surgical, Obstetric and Anesthesia Plan (NSOAP) 2025-2029. 2024.
7. Jumbam DT, Amoako E, Blankson P-K, Xepoleas M, Said S, Nyavor E, et al. The state of surgery, obstetrics, trauma, and anesthesia care in Ghana: a narrative review. Glob Health Action. 2022;15:2104301. doi: 10.1080/16549716.2022.2104301.
8. Botman M, Hendriks TCC, Keetelaar AJ, Smit FTC, Terwee CB, Hamer M, et al. From short-term surgical missions towards sustainable partnerships. A survey among members of foreign teams. Int J Surg Open. 2021;28:63-9. doi: 10.1016/j.ijso.2020.12.006.
9. Ibrahim GM, Cadotte DW, Bernstein M. A Framework for the Monitoring and Evaluation of International Surgical Initiatives in Low- and Middle-Income Countries. PLOS ONE. 2015;10:1-14. doi: 10.1371/journal.pone.0120368.
10. Mantey EE, Doh D, Lasker JN, Alang S, Donkor P, Aldrink M. Ghanaian views of short-term medical missions: The pros, the cons, and the possibilities for improvement. Glob Health. 2021;17:115. doi: 10.1186/s12992-021-00741-0.
11. Nagengast ES, Munabi NCO, Xepoleas M, Auslander A, Magee WP, Chong D. The Local Mission: Improving Access to Surgical Care in Middle-Income Countries. World J Surg. 2021;45:962-9. doi: 10.1007/s00268-020-05882-8.
12. Padmanaban V, Johnston PF, Gyakobo M, Benneh A, Esinam A, Sifri ZC. Long-Term Follow-Up of Humanitarian Surgeries: Outcomes and Patient Satisfaction in Rural Ghana. J Surg Res. 2020;246:106-12. doi: 10.1016/j.jss.2019.08.017.
13. Honeyman C, Patel V, Yonis E, Fell M, Demissie Y, Eshete M, et al. Long-term outcomes associated with short-term surgical missions treating complex head and neck disfigurement in Ethiopia: A retrospective cohort study. J Plast Reconstr Aesthet Surg. 2020;73:951-8. doi: 10.1016/j.bjps.2019.12.009.
14. Johnston PF, Kunac A, Gyakobo M, Jalloh S, Livingston DH, Sifri ZC. Short-term surgical missions in resource-limited environments: Five years of early surgical outcomes. Am J Surg. 2019;217:7-11. doi: 10.1016/j.amjsurg.2018.05.014.
15. Armah P, Kicha D. Primary health care in Ghana: the structure and functions in relation to preventing neglected tropical diseases. Arch Euromedica. 2020;10:12-7. doi: 10.35630/2199-885x/2020/10/3.2.
16. Djedjo L, Martins M do CO, Bicho L, Andrade D, Sidiropoulou Z. Short-Term Surgical Mission in Sub-Saharan Country, Experience of a Breast-Dedicated Team: Reviewing the Past and Stepping Toward the Last Mission. JCO Glob Oncol. 2023. doi: 10.1200/go.22.00317.
17. Yadeta DA, Manyazewal T, Demessie DB, Kleive D. Incidence and predictors of postoperative complications in Sub-Saharan Africa: a systematic review and meta-analysis. Front Health Serv. 2024;4. doi: 10.3389/frhs.2024.1353788.
18. Crockett CJ, Zeigler LN, Kynes JM, Lawson KC, Figueroa LI, Hayes CB, et al. A prospective observational study of postoperative follow-ups and outcomes at a nonprofit, internationally supported pediatric surgery center in Guatemala. Pediatr Anesth. 2020;30:469-79. doi: 10.1111/pan.13830.

19. Corno AF. Pediatric and congenital cardiac surgery in emerging economies: surgical "safari" versus educational programs . Interact Cardiovasc Thorac Surg. 2016;23:163-70. doi: 10.1093/icvts/ivw069.
20. Bitter CC, Dornbush C, Khoyilar C, Hull C, Elsner-Boldt H, Mainali S, et al. A Short-Term Medical Mission in Rural Nepal: Chief Complaints, Medications Dispensed, and Unmet Health Needs. Cureus. 2021;13. doi: 10.7759/CUREUS.15427.
21. Coughran AJ, Merrell SB, Pineda C, Sceats LA, Yang GP, Morris AM. Local and Visiting Physician Perspectives on Short Term Surgical Missions in Guatemala: A Qualitative Study. Ann Surg. 2021;273:606-12. doi: 10.1097/SLA.0000000000003292.
22. Peiffer S, Ssentongo AE, Keeney L, Amponsah-Manu F, Yeboako R, Ofosu-Akromah R, et al. Predictors of Poor Postoperative Outcomes in Pediatric Surgery Patients in Rural Ghana. BMC Surg. 2020;20:211. doi: 10.1186/s12893-020-00867-9.
23. Agarwal PK. Study of Demographics, Clinical Profile and Risk Factors of Inguinal Hernia: A Public Health Problem in Elderly Males. Cureus. 2023;15:e38053. doi: 10.7759/cureus.38053.
24. Rahul BG, Ravindranath GG. Incidence of inguinal hernia and its type in a study in a semiurban area in Andhra Pradesh, India. Int Surg J. 2016;3:1946-9. doi: 10.18203/2349-2902.isj20163184.
25. Ho IG, Ihn K, Koo E-J, Oh J-T. A study of contralateral persistent processus vaginalis in laparoscopic hernia repair in children. Hernia. 2019;23:783-7. doi: 10.1007/s10029-019-01895-y.
26. Koo E, Jung E. Laparoscopic totally extraperitoneal ligation for pediatric inguinal hernia: a novel surgical treatment. Surg Endosc. 2022;36:1320-5. doi: 10.1007/s00464-021-08408-y.
27. Nethaji K, Kumari R, Jaiswal P, Jha PK, Ranjan R, Akela A. Comparison of Extended Total Extraperitoneal (E-TEP) Repair and Trans-Abdominal Pre-Peritoneal (TAPP) Mesh Repair in Inguinal Hernia Repair. Cureus. 2023;15:e39420. doi: 10.7759/cureus.39420.
28. Pilkington JJ, Obeidallah MR, Zahid MS, Stathakis P, Siriwardena AK, Jamdar S, et al. Outcome of the "Manchester Groin Repair" (Laparoscopic Totally Extraperitoneal Approach With Fibrin Sealant Mesh Fixation) in 434 Consecutive Inguinal Hernia Repairs. Front Surg. 2018;5. doi: 10.3389/fsurg.2018.00053.
29. Jarrard JA, Arroyo MR, Moore BT. Occult contralateral inguinal hernias: what is their true incidence and should they be repaired? Surg Endosc. 2019;33:2456-8. doi: 10.1007/s00464-018-6528-y.
30. Ademuyiwa AO, Bode CO, Desalu I, Elebute OA, Olatosi JO, Temiye E. Routine haemoglobin electrophoresis screening in day case herniotomy in Nigerian children: Is it evidence-based? Niger Med J. 2013;54:408-10. doi: 10.4103/0300-1652.126297.
31. Erdoğan D, Karaman İ, Aslan MK, Karaman A, Çavuşoğlu YH. Analysis of 3776 pediatric inguinal hernia and hydrocele cases in a tertiary center. J Pediatr Surg. 2013;48:1767-72. doi: 10.1016/j.jpedsurg.2012.09.048.
32. Chu CB, Chen J, Shen YM, Liu SJ, Sun L, Nie YS, et al. Individualized treatment of pediatric inguinal hernia reduces adolescent recurrence rate: an analysis of 3006 cases. Surg Today. 2020;50(5):499-508. doi: 10.1007/s00595-019-01940-4.
33. Aneiros Castro B, Cano Novillo I, García Vázquez A, De Miguel Moya M. Is the Laparoscopic Approach Safe for Inguinal Hernia Repair in Preterms? J Laparoendosc Adv Surg Tech A. 2019;29(10):1302-5. doi: 10.1089/lap.2019.0116.
34. Hammoud M, Gerken J. Inguinal Hernia. StatPearls. Treasure Island (FL): StatPearls Publishing; 2025.
35. Abantanga F, Hesse A, Sory E, Osen H, Choo S, Abdullah F, et al. Policies for Improving Access to and Quality of Basic and Essential Surgical Care at District Hospitals in Ghana. Postgrad Med J Ghana. 2022;1(1):3-8. doi: 10.60014/pmjg.v1i1.12.