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Variation of elective healthcare in West Africa: secondary analysis of an inguinal hernia international cohort study

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Abstract

Background: Access and quality of elective healthcare varies globally as shown in a previous study where inguinal hernia was used as a tracer condition. Incidence of inguinal hernia increased from 1990 to 2019 in West Africa but access to its repair is not fully characterised. The aim of this study was to evaluate access and quality of elective healthcare in West Africa comparing it with the other regions.

Methods: We conducted a secondary analysis of a prospective, cohort, international study which included any hospital providing hernia surgery. Data was collected from all consecutive patients undergoing primary inguinal hernia repair between 30 January and 21 May 2023. Inguinal hernia was chosen as the tracer condition to evaluate access and quality of elective healthcare. In this analysis, we characterised the group of patients undergoing inguinal hernia repair in West Africa, comparing adults and children. We compared the access and quality metrics in West Africa with those measured and reported globally.

Results: We included 18,058 patients undergoing inguinal hernia repair globally, from which 1,079 patients were from West Africa. Most included patients were adults (76.7%, 828/1,079), with ASA I-II grades (97.7%, 1,054/1,079), and without comorbidities. Regarding access, emergency surgery and bowel resection adjusted rates were higher in West Africa than globally (18,0% and 4.0% vs 7.9% and 1.5%, respectively). Waiting time for elective surgery was longer than the waiting time globally (median 10.3 vs 8.0 months), especially justified by the longer waiting time before having a diagnosis (median 7.3 vs 4.0 months). Out-of-pocket payment was the most common financing method in West Africa patients (54.5%, 588/1079). Regarding quality, for patients where a mesh would be indicated, its adoption was less than half compared to the other regions globally (44.9% vs 94.8%). Day-case surgery had a low adoption (adjusted rate 38.5%, 325/649) and postoperative complications were lower than other regions (adjusted rate 10.8% vs 13.3%).

Discussion: This study identified that access to elective healthcare in West Africa still needs to be improved despite previous actions to tackle this. Adult, inguinal hernia patients would benefit if mesh was used to avoid recurrence in future. Reducing out-of-pocket payments might be essential to address both problems.

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A full list of collaborating authors is shown in Appendix 1

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Introduction

The COVID pandemic shutdowns in elective care and the subsequent slow recovery from the COVID crises led to an international crisis in healthcare with emergency care becoming the norm. This seemed to affect all regions in the world and West Africa was not left out of the problem[1,2]. A previous international cohort study used inguinal hernia as a tracer condition to assess elective care and found access restrictions in low- and lower-middle-income countries. This was translated by high emergency and bowel resection rates and long waiting times to elective surgery before a diagnosis was made[3].

Inguinal hernia burden in West Africa increased from 1990 to 2019, with an age-standardised rate of 189.38 per 100,000 people in 2019, which supports its use as a tracer condition for this region too[4]. Considering the similarities of health systems across West Africa, a focused analysis and assessment would be relevant to all countries from this region. Furthermore, the fact that inguinal hernia repair was included by the World Bank in the Essential Surgery package reinforces the relevance of its provision across all income settings[5].

Considering the unique health seeking behaviour from patients in West Africa[6,7], the evaluation of inguinal hernias pathways would provide a fair assessment of the variation of elective care in the region. It is performed across all hospitals and clinics in West Africa from the tertiary teaching hospitals to the regional, district and private health facilities and clinics. The doctors who perform inguinal surgery across West Africa also vary, ranging from junior doctors to the senior consultants[8–10]. The aim of this study was to evaluate access and quality of elective healthcare in West Africa comparing it with the global data, by characterising its variation in this region.

Methods

Study design and participants

We conducted an international, multicentre, prospective cohort study of patients undergoing inguinal hernia surgery with the full methods reported elsewhere. In brief, any hospital operating inguinal hernia patients was eligible to take part. Consecutive patients with primary inguinal hernias undergoing surgery were included in 4-week inclusion blocks between 30 January and 21 May 2023, regardless of age or urgency of surgery. Patients with an open approach via midline incision were excluded due to the higher complexity associated with these procedures.

Study setting

Any country could participate in the study. We used the UN definition of West Africa, which included Benin, Burkina Faso, Cape Verde, The Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo. Patients operated in any of these countries were analysed and included as a separate group from the whole dataset. We defined adults if patients were aged 16 years and above and children if younger than 16 years.

Measurement set

We evaluated the attributes of the World Health Organisation's Health System Building Blocks with a measurement set. This included key performance measures and additional descriptive data, as shown in supplementary table 1. Each metric was applied to the relevant set of patients to ensure it was relevant. Therefore, waiting times were measured in patients undergoing elective surgery, mesh use was evaluated in adults undergoing elective repair, day-case surgery adoption was evaluated in eligible patients, who were adults younger than 90 years old, with ASA I or II undergoing elective repair (as defined the international guidelines). The additional descriptive measures were evaluated in the whole dataset. The measurement set was compared between patients undergoing hernia repair in West Africa and the rest of the world. The measurement set was also compared between adults and children undergoing hernia repair in West Africa, excluding mesh and day-case adoption as these two measures would only be applicable to adults.

Statistical analysis

Continuous variables with a normal distribution were presented as means and standard deviation, and if not normally distributed, were presented as median and interquartile range (IQR). Categorical variables were reported with frequencies and percentages. The rates of key performance measures were presented as adjusted rates, with a 95% confidence interval and were compared between West Africa and globally. The rates of additional descriptive measures were presented as unadjusted rates. All statistical analyses were performed using R (version 4.0.2, R Foundation for Statistical Computing, Vienna, Austria). A p-value of <0.05 was considered statistically significant.

Table 1: Pre-operative and intra-operative characteristics comparing West Africa included patients and global included patients.

	West Africa	Total
	(n=1,079)	(n=16,979)
Age, years		
Median	40	58.0
IQR	17.5 to 57.5	41.0 to 70.0
Age groups		
Infants (<1 year)	66 (6.1%)	768 (4.5%)
Children (1-16 years)	185 (17.1%)	1153 (6.8%)
Adults (≧16 years)	828 (76.7%)	15043 (88.7%)
(Missing)	0	15
Sex		
Female	90 (8.3%)	1749 (10.3%)
Male	989 (91.7%)	15216 (89.7%)
(Missing)	0	14
ASA grade		
ASA I-II	1054 (97.7%)	14569 (85.9%)
ASA III-V	23 (2.1%)	2308 (13.6%)
Not recorded	2 (0.2%)	88 (0.5%)
(Missing)	0	14
Co-morbidities		
None	1010 (93.6%)	13146 (77.4%)
One	65 (6.0%)	2865 (16.9%)
Two	3 (0.3%)	727 (4.3%)
Three or more	0 (0.0%)	215 (1.3%)
(Missing)	1	23
Symptoms		
Asymptomatic	191 (17.7%)	2732 (16.1%)
Symptomatic	888 (82.3%)	14231 (83.9%)
(Missing)	0	16
Hernia size		
Limited to inguinal region	510 (47.3%)	13184 (77.7%)
Limited to scrotum	548 (50.8%)	3586 (21.1%)
Extend to mid-thigh or beyond	21 (1.9%)	196 (1.2%)
(Missing)	0	13
Contamination		
Clean	974 (90.3%)	16376 (96.5%)
Clean-Contaminated	81 (7.5%)	543 (3.2%)
Contaminated	19 (1.8%)	31 (0.2%)
Dirty	5 (0.5%)	12 (0.1%)
Missing	0	17

Table 2: Pre-operative and intra-operative characteristics stratified by age group

	Adults	Children
	(n=828)	(n=251)
Age, years		
Median	49.0	2.0
IQR	33.0 to 62.0	0.0 to 6.0
Sex		
Female	60 (7.2%)	30 (12.0%)
Male	768 (92.8%)	221 (88.0%)
(Missing)	0	0
ASA grade		
ASA I-II	805 (97.2%)	249 (99.2%)
ASA III-V	21 (2.5%)	2 (0.8%)
Not recorded	2 (0.2%)	0 (0.0%)
(Missing)	0	0
Co-morbidities		
None	761 (91.9%)	249 (99.2%)
One	63 (7.6%)	2 (0.8%)
Two	3 (0.4%)	0 (0.0%)
Three or more	0 (0.0%)	0 (0.0%)
(Missing)	1	0
Symptoms		
Asymptomatic	102 (12.3%)	89 (35.5%)
Symptomatic	726 (87.7%)	162 (64.5%)
(Missing)	0	0
Hernia size		
Limited to inguinal region	388 (46.9%)	122 (48.6%)
Limited to scrotum	419 (50.6%)	129 (51.4%)
Extend to mid-thigh or beyond	21 (2.5%)	0 (0.0%)
(Missing)	0	0
Contamination		
Clean	738 (89.1%)	236 (94.0%)
Clean-Contaminated	68 (8.2%)	13 (5.2%)
Contaminated	18 (2.2%)	1 (0.4%)
Dirty	4 (0.5%)	1 (0.4%)
Missing	0	0

Table 3: Measurement set stratified by age group

	Adults	Children
ACCESS AND COVERAGE		
Total	(n=828)	(n=251)
Emergency surgery		
Yes	169 (20.4%)	19 (7.6%)
No	659 (79.6%)	232 (92.4%)
(Missing)	0	0
Bowel resection		
Yes	35 (4.2%)	3 (1.2%)
No	793 (95.8%)	248 (98.8%)
(Missing)	0	0
Total	n=659	n=232
Waiting time to elective surgery		
Median	11.0	8.0
(IQR)	(4.0 to 36.0)	(3.0 to 18.2)
(Missing)	0	0
Waiting time before diagnosis		
Median	9.6	4.0
(IQR)	(3.7 to 33.5)	(1.0 to 10.4)
(Missing)	0	0
Waiting time after diagnosis		
Median	1.0	5.0
(IQR)	(0.3 to 3.3)	(1.3 to 12.2)
(Missing)	0	0
Waiting time after decision for surgery		
Median	0.4	0.7
(IQR)	(0.1 to 1.2)	(0.2 to 1.8)
(Missing)	0	0
QUALITY AND SAFETY		
Postoperative complications		
Yes	116 (14.0%)	13 (5.2%)
No	712 (86.0%)	238 (94.8%)
(Missing)	0	0
Anaesthesia variation		
General	93 (11.2%)	217 (86.5%)
Spinal	403 (48.7%)	16 (6.4%)
Loco-regional	29 (3.5%)	2 (0.8%)
Local	303 (36.6%)	16 (6.4%)
(Missing)	0	0
Primary operator		
Senior surgeon	404 (48.8%)	173 (68.9%)
Trainee surgeon	386 (46.6%)	78 (31.1%)
Non surgeon, medical practitioners	38 (4.6%)	0 (0.0%)
(Missing)	0	0

Mesh and day-case excluded from this table considering they were only measured in eligible adults and these data were already presented in the previous table.

Role of the funder

The funders of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

Results

Overall, 18,058 patients from 640 hospitals in 83 countries were included and analysed. From these, 1,079 patients were from 51 hospitals located in West Africa, distributed across Benin, Burkina Faso, Ghana, Mali, Nigeria and Togo, as shown in supplementary figure 1. Most included hospitals were tertiary-level hospitals (64.7%, 33 out of 51) and had public funding (88.2%, 45 out of 51), similar to all other included hospitals. All of them had emergency surgery available 24 hours, as shown in supplementary table 2.

Most patients from West Africa were adults (76.7%, 828/1079) and male (91.7%, 989/1079) but children and infants had a higher representativeness compared to the global setting (23.3% vs 11.3%, respectively) as described in table 1. Patients from West Africa had less comorbidities and lower ASA grades compared to the wider sample. Regarding presentation, 17.7% were asymptomatic (191/1079), but this proportion reduced to 12.3% when evaluating only adults undergoing repair (102/828, table 2). Overall, in West Africa there were more patients with inguinal hernia extending to scrotum (50.8%, 548/1079), which was not the most common globally, and was also verified when evaluating only adults (50.6%, 419/828).

Emergency rates (18.0%) and bowel resection rates (4.0%) were higher in West Africa, as shown in figure 1 and supplementary table 3. The median of waiting times to elective surgery were longer in West Africa compared to global setting (10.3 vs 8.0 months), but the distribution across the pathway was different in all areas (figure 2). Patients experienced longer waiting times before having a diagnosis (median waiting time 7.3 months in West Africa and 4.0 months globally), but after having a diagnosis, they experienced a shorter waiting time (median waiting time of 1.7 months in West Africa and 3.2 months globally).

Regarding quality and safety of surgery, for adults undergoing elective surgery, the mesh use rate in West Africa was less than half of the global mesh use rate (adjusted rate 81.9%, 13699/14109).

However, of the eligible patients to undergo day-case surgery, half of them were discharged the same day in West Africa (adjusted rate 38.5%, 324/649), which was similar to what was shown globally (adjusted rate 43.1%, 6415/12009). Regarding postoperative complications at 30-days, the rates were lower in patients undergoing repair in West Africa compared to what was observed in other regions.

Standardised patient pathways, waiting list management, and availability of day-case surgical units were all higher in West Africa compared to globally, as shown in supplementary table 4. However, there were differences in the financing methods with out-of-pocket expenditure being the most used form of payment in West Africa (54.5%, 588/1079) opposed to insurance by the government, which was the most common method globally (82.2%, 13816/16979).

Looking at the intraoperative variation, senior surgeons were the most common operator in West Africa and globally, but surgeries led by trainees and non-

Figure 1: Access and quality panel

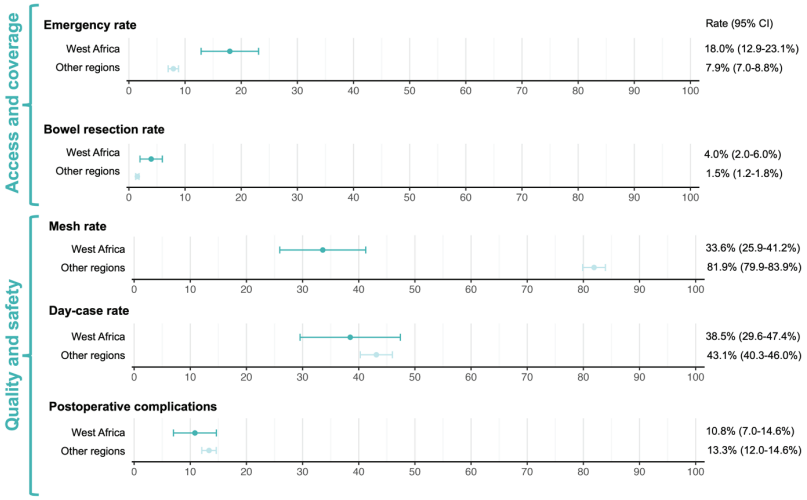
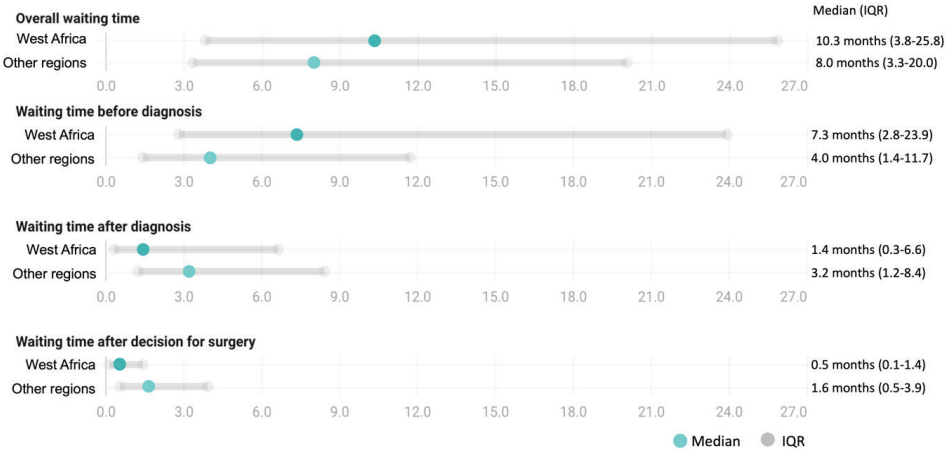
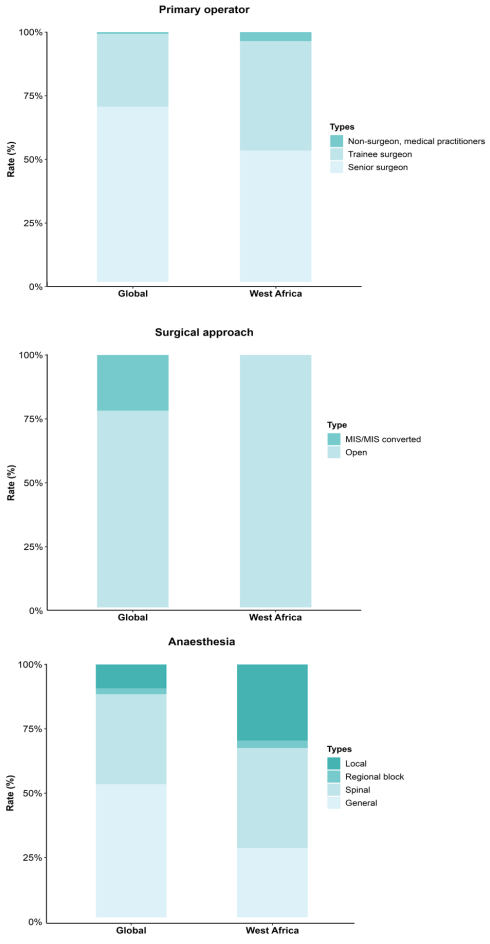


Figure 2: Waiting times to elective surgery



surgeons medical practitioners occurred more often in West Africa, as represented in figure 3. The variation in anaesthesia was wider in West Africa, with higher adoption of non-general anaesthetics, including spinal and local anaesthesia (38.8% and 29.6%, respectively), as opposed to the global setting, where general anaesthesia was most commonly adopted (55.1%, 9348/16979).

Figure 3: Intra-operative variation



The included children and adults from West Africa showed differences when evaluating the measurement set. There were less children undergoing emergency surgery compared to adults (7.6% vs 20.4%) and children also had a shorter median waiting time to elective surgery (8.0 vs 11.0 months). The distribution of waiting times along patients pathway in children was opposite to adults, showing longer waiting times after diagnosis than before diagnosis, as shown in table 3.

General anaesthesia was the preferred method in children (86.5%, 217/251) whereas spinal was the most used method in adults (48.7%, 403/828). The primary operator also showed differences between these two groups. Included children were more commonly operated by a senior surgeon (68.9%, 173/251) whereas included adults were operated by a broader range of professionals, which included non-surgeons medical practitioners (4.6%, 38/828). Postoperative complications occurred less frequently in children than adults (5.2% vs 14.0%, respectively).

Discussion

This analysis showed that there is limited access to elective care in West Africa. This was supported by the high emergency and bowel resection rates and by the long waiting times to elective surgery. The limited access was more significant in adults, where all measures of access were higher when compared to children. The diagnosis timing seemed to be the most important marker along the elective pathway, as waiting time before diagnosis was longer in West Africa, but after a diagnosis was made, it was shorter, which was also observed in adults. However, in children from West Africa it showed a different trend where the waiting time after diagnosis was longer when compared to before diagnosis.

A mesh was used in less than half of the adults undergoing elective hernia repair in West Africa. This is significant to patients considering the increased risk of recurrence when a mesh is not used, increasing the chances of requiring further surgery. It also represents a limitation of access to simple devices, which can limit development and investment in more advanced technologies.

Anaesthetic practices showed higher variation in West Africa, with higher use of local and spinal anaesthesia in adults. This highlights the feasibility of this type of procedure without general anaesthetic, which was the main method globally. Day-case adoption and postoperative complications were similar in the two groups. This suggests that there is the capacity to provide standard care for inguinal hernia treatment and potentially scale up services to meet the large unmet need for surgical care for inguinal hernias.

The limited access to elective care seen in West Africa supports the findings from previous single country studies[11–17]. This limited access might also justify the younger age observed, who might have had the hernia for years before seeking care and delaying this until it became bothersome[18], with an impact in both social and professional life. Seeking care behaviour variation might also be the reason for shorter waiting times in children, where parents would be more willing to seek care for their children than for themselves. Additionally, operations in children usually are only conducted in tertiary-level hospitals, where the expertise is available, which might be the reason for longer waiting times after diagnosis[19,20].

The limitation in access to new technologies, even at the simple device level, such as mesh, can be used as a surrogate while evaluating the whole system. The barriers to access this simple device will likely be the same as the barriers while trying to implement more advanced technologies and devices. Considering the high investment in this progression in low-income settings, finding a way to support wider access to less expensive devices should be prioritised. Payment out-of-pocket may be something to tackle when addressing this[13,21].

There are limitations associated with this analysis. First, not all countries from West Africa participated in this study and within the ones that participated, the number of enrolled patients were different. Second, there was a higher representation from tertiary-level hospitals, which has been previously associated with more resources available, and very limited representation of primary-level hospitals, where inguinal hernia repairs usually are also performed. Therefore, generalisations of our findings should be made carefully to other countries and to rural and district hospitals. Thirdly, we did not conduct statistical comparisons between the rates from West Africa and the rest of the world to avoid false significance. However, we did present adjusted rates for hospital and country.

The findings shown by this study shine a light for future research in West Africa. Reasons for limited access to elective care should be further explored, as there might be some that were dependent specific from the health system in place and that could be targeted in quality improvement projects. Better understanding of out-of-pocket expenditure in this context and strategies to avoid it while making surgical care more affordable could be a turning point for this group of patients.

This study validated the relevance of the targets identified in the main study to West Africa but also identified context specific actionable points. Investment in expansion of mesh is particularly needed in West Africa. However, funding, training and supply chains to provide it need improvement. Additionally, a revision of the healthcare payment system could be a turning point to reduce out-of-pocket expenditure. The benefit of this would have wider benefits to the whole system, with more patients being able to seek care at the right time, instead of waiting for a condition to become unbearable and life-threatening.

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