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Assessment of Capacity to Meet Lancet Commission on Global Surgery Indicators in the Federal Capital Territory, Abuja, Nigeria

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Abstract

Background This is a baseline assessment of surgical capacity in the Federal Capital Territory (FCT), in preparation for the creation of a National Surgical, Obstetric, Anesthesia, and Nursing Plan.

Methods In October 2017, all 10 of the 11 secondary hospitals in FCT that provide surgical and/or obstetric care were surveyed using a modified World Health Organization Hospital Assessment Tool and a qualitative semi-structured hospital interview tool of the medical Director (MdD). This project received approval from the Nigeria Federal Ministry of Health and the FCT Department of Health and Human Services.

Results The number of inpatient beds ranged from 35 to 140, and the number of admissions ranged from 1200 to 6400 patients per year. The mean number of surgeries performed in 2016 by these hospitals was 783 (range 235–1601). Cesarean section was the most common surgical procedure at each hospital. Only five hospitals regularly performed laparotomies. Only three hospitals regularly performed fixation of open fractures. Of 152 surgical, obstetric, and anesthesia providers, all hospitals had at least one consultant obstetrician, but only four hospitals had a general surgeon and three hospitals had a consultant anesthesiologist. Deficient physical space for inpatient admissions was the most common concern of MdDs.

Conclusions The FCT reaches the target for 2-h access, with 80% of patients (on average) reaching the hospital within 2 h. However, SAO provider density, surgical volume, and tracking of the perioperative mortality rate were low. Data were lacking to comment on protection against impoverishing and catastrophic expenditures.

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Background

Despite gains in global health, access to safe, affordable, quality surgical care remains inaccessible for most people [1]. To strengthen surgical systems, particularly in low- and middle-income countries (LMICs), *The Lancet* Commission on Global Surgery developed six surgical indicators to be tracked by all countries (Table 1) and recommended the creation of national surgical plans to reach these targets by 2030.

Nigeria has embarked on its effort to create a National Surgical, Obstetric, Anesthesia, and Nursing Plan (NSOANP). First, the country must have a thorough and accurate assessment of the strengths and weaknesses of its surgical system. This report is the first of several planned studies to perform a baseline assessment of surgical care throughout Nigeria, starting with the Federal Capital Territory (FCT).

Materials and methods

Nigeria, the most populous African country at 186 million people, is divided into 6 geopolitical zones (36 total states) and the FCT, Abuja (Fig. 1). FCT has an estimated population of 2.4 million people (42.7%< age 15) and is divided into 6 councils: (1) Abaji; (2) Abuja Municipal; (3) Bwari; (4) Gwagwalada; (5) Kwali; and (6) Kuje (Fig. 2). Of the 11 secondary hospitals in FCT, 10 provide surgical and/or obstetric care (Table 2).

In October 2017, the Medical Director (MdD) or highest-ranking hospital administrator (a physician or chief nursing officer) of these 10 hospitals was surveyed via two methods: quantitative data using a modified World Health Organization Hospital Assessment Tool that captured data on Bellwether procedures [1, 2] (HAT; Online Appendix 1) and qualitative data using the semi-structured hospital interview tool (Online Appendix 2).

This project was approved by the Nigeria Federal Ministry of Health and the FCT Department of Health and Human Services.

Results

Physical resources

The number of inpatient beds ranged from 35 to 140 (mean 89) (Table 3). Total admissions ranged from 1200 to 6400 patients per year (mean 3598), with an average patient-to-bed ratio of 32–50 (overall average 40 patient-to-bed ratio). Three facilities had intensive care units (ICUs) (2–5 beds each; mean 1.25 beds); only two had dedicated ventilators for these patients (2 ventilators each). Two hospitals had neonatal ICUs (12–13 beds each). The number of operating rooms ranged from 2 to 4 (mean 2.9, median 3).

Lack of physical space was the most common concern of MdDs and was the most common reason patients were transferred to other hospitals (Table 4). Most had already expanded over the past few years, with several doubling bed numbers. All hospitals reported inadequate electricity. Each had at least one power generator. One hospital's primary generator was currently inoperable, and they transferred critical patients to other hospitals. Most hospitals reported adequate access to clean water (public water supply or private burr holes).

Essential surgical medications, including antibiotics, intravenous fluids, paralytics, and sedatives, and vasopressors (epinephrine), were typically always available at each hospital (Table 5). The only narcotic available was pentazocine due to national laws controlling narcotics.

Ultrasound was available in all hospitals, but x-ray machines were not available in three hospitals, and only one hospital had a CT scanner, which was inoperable and being fixed (Table 5). Access to blood within 2 h was typically available. All hospitals could regularly perform most basic laboratory tests.

All hospitals reported access to maintenance staff to fix broken equipment. Pulse oximetry was sometimes/rarely available in only two hospitals (Table 5).

Surgical cases

The average number of surgeries performed in 2016 was 783 (range 235–1601; missing data for 5 hospitals; Table 6). Cesarean section was the most common procedure (Table 6). Annual total births in 2016 ranged from 739 to 2532 (mean 1376). The Cesarean section rate was 48.3% (range 36.9–58.2%). Rates were higher than average because patients were often transferred/referred to these hospitals for this purpose. Only five hospitals regularly performed laparotomies for acute abdomen or trauma (average monthly operations: 17; range 1–50). Only three hospitals regularly performed fixation of open fractures (range monthly operations: 1–17).

Four hospitals operate on pediatric patients (<age 15; mean number of operations in 2016: 137; range 4–446). A 24-h surgical care was always available in six hospitals and almost always available in two hospitals (Table 5). The mean percentage of cases that were emergent was 40% (range 25–90%).

Table 1 *The Lancet* Commission on Global Surgery indicators

Indicator	Definition	Target by 2030	Average FCT assessment
2-h access to essential surgical care	Percent of population that can access a surgical facility capable of performing Bellwether procedures (laparotomy, Cesarean section, open fixation of fracture) in 2 h	Min. 80% coverage	Average 80% (3 with 100% coverage)
Surgical, anesthetic, and obstetric (SAO) provider density	Number of licensed SAO providers per 100,000 population	20 per 100,000 population	6.3 per 100,000 population
Surgical volume	Number of procedures in an operating theater per 100,000 population	5000 per 100,000	161 per 100,000 population
Perioperative mortality rate (POMR)	Rate of death prior to discharge after undergoing surgical care	100% tracking POMR	30% of hospitals tracked POMR
Protection against impoverishing expenditure	Percent of population protected from impoverishing expenditure from surgery	100% protection from out-of-pocket payments	Unknown
Protection against catastrophic expenditure	Percent of population protected from catastrophic expenditure from surgery	100% protection from out-of-pocket payments	Unknown

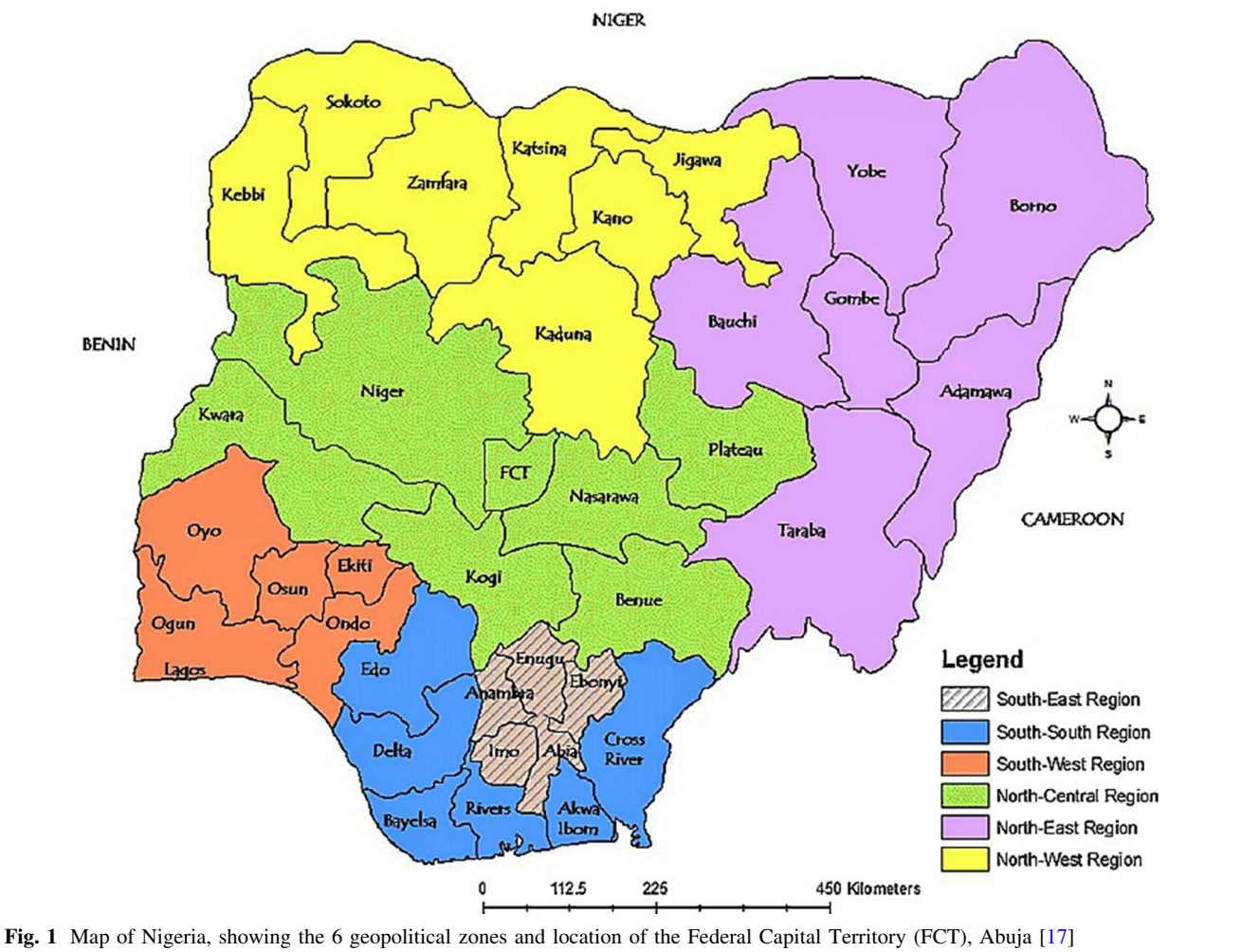

Fig. 1 Map of Nigeria, showing the 6 geopolitical zones and location of the Federal Capital Territory (FCT), Abuja [17]

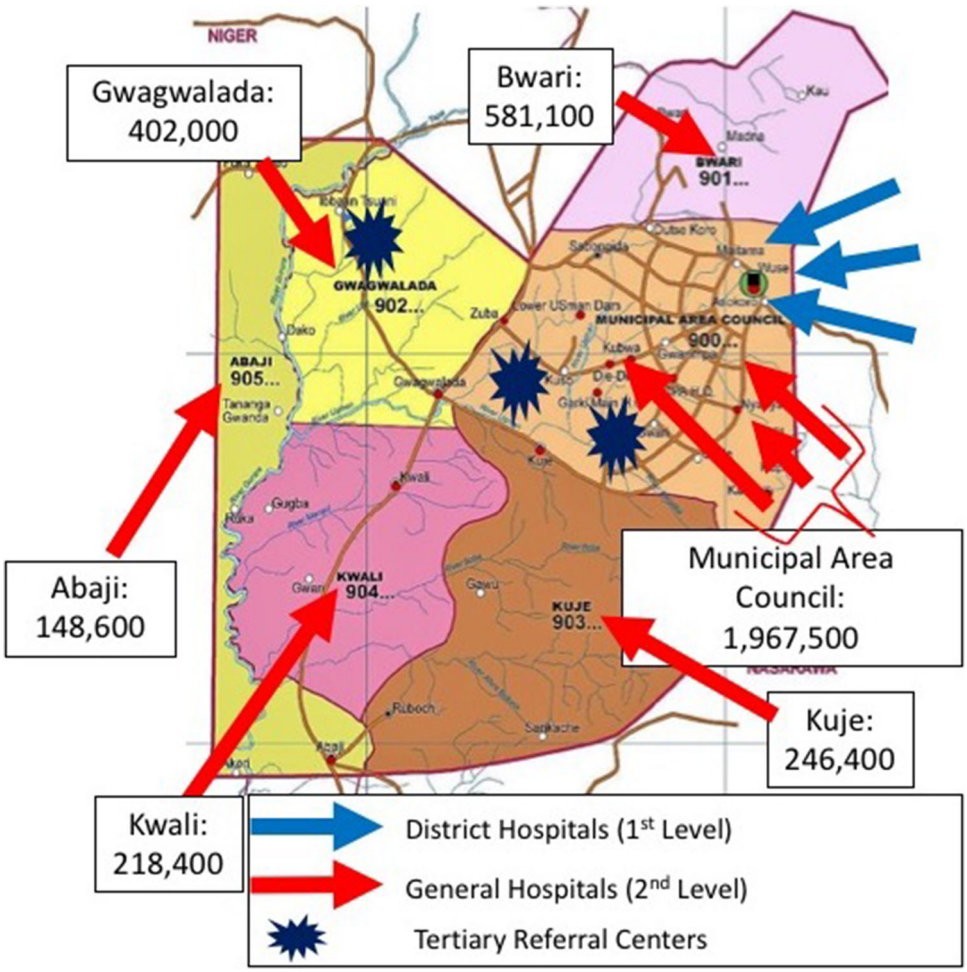

Fig. 2 Map of the Federal Capital Territory, Abuja, showing the 6 Area Councils, their populations, and the locations of the district and general hospitals (included in the study), and tertiary referral centers [18]

Access to care within 2 h

At least half of the patients could reach these hospitals within 2 h. For those who required longer than 2 h, these patients were typically transferred or referred to the hospital or chose to travel to this hospital (instead of going to their nearest hospital).

Workforce

A total of 152 surgical, obstetric, and anesthesia (SOA) providers were identified. All hospitals had at least one consultant obstetrician/gynecologist (mean 1.9, range 1–3; Table 7). Only four hospitals had a surgeon (general or specialist). Three hospitals had consultant anesthesiologists (1–2 each). Seven hospitals employed physicians who were not trained surgeons to provide surgical care; these ranged in number from 3 to 15. Two hospitals employed medical officers (MOs, physicians who hold MD or MBBS degrees without specialist training) to perform surgery, while four hospitals employed MOs to perform anesthesia. Four hospitals employed nurse anesthetists. Four hospitals had consultant radiologists. None had a pathologist.

All hospitals but one hospital desired more SOA consultants (Table 4). As this hospital was transitioning to a tertiary hospital, they had an influx of consultants, but were lacking ancillary and support staff, including nurses. At most hospitals, the limited number of SOA providers results in inadequate surgical care when they are away at trainings or conferences. All hospitals desired more nursing staff.

Finance

All hospital budgets were centrally managed by the FCT, except for a small discretionary monthly fund for each hospital. None of the MdDs knew their hospital's monthly budget, and there was no specific budget line for surgery.

Staffing was done at the FCT administration level; MdDs were not able to provide incentives to recruit or retain staff. Most staff had little personal connection to the

Table 2 Hospitals surveyed in FCT with correlation to DCP 3 and World Health Organization (WHO) hospital levels

FCT		WHO [19]		Disease control priorities 3 [20]	
Hospital level	Hospital name	Hospital level	Description	Hospital level	Description
		Level 1 (small hospital/ health center)	Rural hospital, small number of beds, sparse OR for minor procedures	Level 1	Few specialties, often only one general practice physician, 50–250 beds
District Hospital	Maitama	Level 2 (district/ provincial hospital)	100–300 beds, adequately equipped major and minor operating theater. Can perform Cesarean section laparotomy, amputation, hernia repair, closed fracture treatment, etc.	Level 2	More differentiated by function with as many as 5–10 clinical specialties, from 200 to 800 beds
	Wuse				
	Asokoro				
General Hospital	Kubwa				
	Nyanya				
	Bwari				
	Kuje				
	Abaji				
	Kwali				
	Gwarimpa				
		Level 3 (Referral Hospital)	300–1000 beds with basic ICU and specialty care	Level 3	Highly specialized staff and technical equipment, for example, cardiology, ICU, specialized imaging units; clinical services high differentiated by function, from 300 to 1500 beds

Table 3 Number of beds and hospital volume, operations, and surgical providers at each hospital (hospitals have been deidentified)

Hospital	Hospital beds	Inpatient admissions 2016	Outpatient visits 2016	ICU beds	Operating theaters
A	115				
B	60	2971	70,530	0	2
C	140	6429	84,161	5	4
D	35	1197	27,044	0	2
E	105	3398	150,296	2	4
F					2
G	127			3	3
H				0	2
I	85	5400	7000	0	4
J	52	2195	19,710	0	3

hospital's surrounding community, which some MdDs saw as a barrier to quality care.

MdDs reported most patients had inadequate resources to pay for their surgery and medications, but hospitals offered emergency surgery and medications up to 24–48 h regardless of the patient's ability to pay. Hospitals sometimes pay for patient food/board/transport.

Quality assurance

All had weekly or bi-weekly morbidity and mortality (M&M) conferences and continuing medical education (CME) conferences. Most had other quality assurance committees, typically related to infection control. Only three hospitals could easily ascertain their perioperative inpatient mortality; they each reported one surgical death in 2016. None of the hospitals use the WHO Surgical Safety Checklist.

Six hospitals had transitioned to electronic medical records (EMR), and the others were in process. Online connectivity and staff training were ongoing issues. Patient records could be accessed across multiple encounters for continuity.

Table 4 Key themes from the qualitative interview

Category	Responses
Infrastructure	*Bed space*
	Since I started, we have [doubled the number of hospital beds], but we still don't have enough beds for all the need. People come from other areas because we offer so many services and are one of the best hospitals around
	One of our main challenges is that we lack bed space. This hospital was supposed to be a perinatal/obstetric hospital. We are always full and we have to refer patients to other hospitals. We need to expand but there is no land available. Maybe we can do an upward expansion
	We have shortages for bed space. If we are full, we stabilize patients and transfer them
	We are transitioning to a tertiary hospital and a training facility. There are many [infrastructure] requirements for training programs, including analog and digital x-ray machines. We have expanded our infrastructure quite a bit due to these requirements
	The major problem is space constraint. We don't have enough buildings or bed space. We have to refer many patients, even for emergencies. It is not good for patients because they wait too long and they go to [unfamiliar] places where they don't have family resources
	We need space. We have been innovative, but we have no more space. We would have to expand upward
	There is inadequate space for expansion. Existing structures are overcrowded
	Power
	In reality, we are on a generator and backed up by national power. We only have a power failure every 2–3 months
	We experience electricity failure often. We have two generators. Currently the power is off. We are not accepting any new patients and sending them to other hospitals. Our [smaller generator] is working a little and this is dedicated to the [operating] theatre. Our [larger] generator has been leaking oil and smoking today and we are working to fix it
	We have power outages but we have a policy that generators must come back on within 5 min. We have 2 generators. We spend a lot of money on diesel
	Other
	We only have an ultrasound machine. The lack of diagnostic equipment, such as an x-ray machine, is a problem. We do our best and refer patients to other hospitals if we cannot manage
	The infrastructure is inadequate. Theatres are not ergonomically designed. Resuscitative tools are not readily available or accessible
	We do not have an ICU due to lack of staffing. There is no post-operative recovery room and surgical wards are too small
	There is only a narrow spectrum of antibiotics available
Workforce	Even though we have lots of staff, we are still short staffed because the population is huge. Each person is overworked. Sometimes procedures have to be pushed back because we don't have enough hands
	We have 'old hands.' Our nursing staff is getting older, but we still work the same hours as a young nurse. We are short staffed and need younger nurses
	We also need more specialized manpower. We only have one consultant obstetrician/gynaecologist, so he can't leave. When there are some complications, such as a ureteral injury, we don't have the expertise to fix it.
	We don't employ staff; they are employed by the FCT. Because we don't have a permanent staff, they can be transferred elsewhere and it takes a while to get new staff. There are also no strategies to retain staff
	There are shortages of doctors and nurses but we try to balance things. We try to bridge the gap using local people
	We have lopsided manpower. This year we have many new doctors. We have 22 consultants in various faculties. We have a need for nurses, pharmacy staff, and laboratory staff
	The number of surgeons and nurses is inadequate. We need more specialists. Lack of specialized care (including an orthopedic surgeon) is the most common reason for referral
	Our key challenge is lack of manpower
	We have a workforce shortage. There is a complete dearth of certain cadres, such as anesthesiologists. There is also inadequate on-the-job training and we do not have refresher courses at adequate intervals
	Available human resources are inadequate to provide the necessary surgical care. Specialists, like urology and neurosurgery, are also unavailable
Working environment	It is a pleasant and lively working environment. We have cordial relationships with the patients
	The patient-staff relationship is still very poor. The staff should be more observant to help patients in need
	We have team spirit in our hospital

Table 4 continued

Category	Responses
Finance	Because decisions cannot be made at the hospital, it can take time to get approval from above. Even purchasing drugs and reagents takes a while. The bureaucracy delays our services, although it is good for checks and balances
	There is no budget line for surgery. Each month, every department comes [to the MdD] with budget requests. The theatre usually gets everything it needs at the beginning of the month. Obstetrics is usually the most expensive, and they don't generate a lot of revenue. Many times we also have to feed patients and even sometimes provide transport money to get them home
	Most patients are poor, ignorant and uneducated. They therefore don't present early and may not be able to afford the appropriate treatment, leading to cutting corners and poor treatment outcomes
	Many patients accessing this facility are poor and cannot afford the cost of surgical care. In fact, many have to be assisted by well-meaning Nigerians, and some are discharged without fully settling their surgical bills
	The hospital operates a Drug and Services Revolving Fund (DSRF) to ensure drugs and consumables are available in the hospital
	Occasionally we carry out surgical care in partnership with non-governmental organizations and humanitarian organizations like St. Vincent de Paul for indigent patients
Service delivery	Our maternal mortality for inpatients is very good. Most maternity patients who die are those who were referred here [and have delays to treatment]
	We have regular mortality and morbidity reviews. Each department has their own meeting each week. Each department also holds their own CME each week. We have a 'no blame, no shame' platform. This is an initiative from the FMOH
	Most patients live within 30 min. If we have to refer patients to other facilities, it is typically due to lack of specialists
	There is still room for improvement [in the information management system]. Apart from occasional network issues, the system is functional, readily accessible, and available
	The facility operates an e-health system. The challenges we currently face is that of inadequate computers and occasional failure of the network. There is also the apathy of staff in terms of changing from the previous method (paper) to the e-health system
	Key challenges to carrying out research include poor data storage, lack of cooperation from other staff and patients, and funding

Discussion

We provide a quantitative and qualitative assessment of surgical services at 10 public hospitals in Federal Capital Territory, Nigeria, during October 2017. Based on these data, the FCT reaches the target for 2-h access to essential surgical care, with 80% of patients (on average) living within 2 h from the hospital. However, SAO provider density, surgical volume, and tracking of the perioperative mortality rate were low and below *The Lancet* Commission targets (Table 1). Data regarding surgical volume and tracking of the perioperative mortality rate were missing in some hospitals. There were also not enough data to comment on protection against impoverishing and catastrophic expenditures.

Strengths of surgical capacity in FCT

Importantly, 10 of the 11 hospitals in FCT offered regular access to emergency obstetric surgery. Despite the lack of reliable access to electricity, all hospitals had at least one backup generator that was generally reliable. On average, hospitals reported that at least 80% of their patients live within 2 h of the hospital.

Almost all hospitals could also perform most laboratory tests and blood transfusions within 2 h. If patients required a higher level of care, there was a functioning referral system. All hospitals reported regular M&M conferences; all deaths were reviewed. All hospitals have also transitioned to or are in the process of transitioning to EMR.

Barriers to adequate surgical care in FCT

Consistent availability of emergency laparotomies was variable, and availability of fixation of open fractures was rare. Few hospitals were able to regularly provide pediatric surgery, even basic operations or lifesaving temporizing operations.

The most commonly cited barriers to essential surgical care were lack of trained surgical staff (particularly in subspecialties, including orthopedic surgery) and nurses, adequate bed space, and access to diagnostic capability beyond ultrasound. Delayed patient presentation and patient affordability of care were key concerns. The centralized nature of the financial structure was a challenge reported by

Table 5 Availability of resources, equipment, medications (n = number of hospitals)

	Always (100%)	Almost always or often (51–99%)	Sometimes or rarely (1–50%)	Never (0%)
Infrastructure				
Electricity/generator	3	4	2	0
Running water	5	3	1	0
Oxygen	5	3	0	0
Internet	2	2	1	2
Pulse oximetry	4	3	1	0
Medications				
Inhalational anesthetic	4	1	3	0
IV sedation	4	3	1	0
Spinal anesthetic	6	1	1	0
Regional anesthetic	5	0	2	1
Narcotics	5	1	1	1
Antibiotics	7	1	0	0
IV fluids	7	1	0	0
Paralytics	5	2	0	0
Sedatives	8	0	0	0
Epinephrine	7	0	1	0
Radiology				
24-h access to imaging services	4	1	0	2
X-ray machine	3	1	0	3
Ultrasound machine	4	2	1	0
CT machine	0	0	0	7
MRI machine	0	0	0	7
Laboratory				
Availability of blood within 2 h	4	4	0	0
CBC	8	0	0	0
BMP	7	1	0	0
Coagulation studies	4	1	2	1
Urinalysis	8	0	0	0
Infectious disease screening (HIV, hepatitis)	8	0	0	0
24 h emergency surgical care	6	2	0	0

many MdDs, and the lack of information on the monthly hospital budget and lack of a specific budget line for surgical care were also concerning. Without adequate financial resources and with limited control over available funds, MdDs have limited capacity to improve surgical care in their hospitals.

While most hospitals had access to pulse oximetry, it was not used or not adequately available in all hospitals. None of the hospitals use the WHO Surgical Safety Checklist.

Key recommendations

To improve surgical services in FCT, we believe the following policies should be a priority:

1. Workforce scale-up (including SAOs, consultants and MOs, and nurses): Increase the number of training positions and develop retention strategies at district hospitals.
2. Infrastructure renovation and development: Focus on water and adequate electricity, and a comprehensive plan for bed expansion.
3. National health insurance coverage expansion: Publically available data are lacking; need a better understanding of the current percent of the population who are covered, and the ability of this coverage to protect against impoverishing or catastrophic expenditures.
4. Data management and coordination: Scale-up of electronic resources is underway. Creating a centralized electronic database of all operations performed and surgical deaths would further inform regional quality improvement efforts.

At the hospital level, implementation of the WHO Safe Surgical Checklist and scaling use of pulse oximetry are two tangible programs that could improve surgical outcomes [3, 4].

Literature review

Although this is the first baseline assessment of surgical care in a state in Nigeria, other studies have examined surgical capacity in the country. In 2011, 41 hospitals in southern Nigeria reported running water was almost always available (82%), access to a blood bank and a reliable x-ray machine were less common (38% and 44%, respectively) [5]. Most hospitals could perform Cesarean Section (95%), but only 41% could perform open fracture fixation and 12% could perform a cholecystectomy.

A study in pediatric surgery found that Nigerian hospitals did not have significantly better resources compared to 17 other sub-Saharan African countries, despite economic advantages [6]. While a majority of hospitals reported x-ray machines, blood banks, and ultrasound machines (75%), fewer than half of hospitals reported a neonatal ICU (46%) or running water (42%).

Other studies estimate significant SAO workforce shortages in Nigeria. Estimates in 2010 and 2016 suggest Nigeria needs 300–700 pediatric surgeons to meet the burden of surgical disease in the pediatric population [7, 8].

Table 6 Number of operations and average number of Bellwether procedures per month at each hospital

	Total number of operations	Percent of operations that were emergent (%)	Cesarean section rate (%)	Avg. C-sections per month	Avg. laparotomies per month	Avg. fixation open fracture per month
A						
B	1334	32	52.8	51	1	1
C	1601	45	36.1	76	10	12
D	492	47	58.1	36	0	0
E			57.5	55		
F						
G						
H	257	25		10	2	0
I		75	36.9	18	50	17
J	235	90		4	22	0
Average	784	52.3	48.3	36	14	5
Total	3919					

Table 7 Number of surgical providers at each hospital

	Consultant physicians (specialized training)				Medical officers (MD or MBBS without specialist training)		Medical officers providing surgery		Nurse
	General surgery	Orthopedic surgery	OB/GYN	Anesthesia	Surgery and OB/GYN	Anesthesia	Surgery and OB/GYN	Anesthesia	Nurse anesthetists
A									
B	0	0	2	0	10	0	0	4	4
C	1	1	2	1	15	0	4	0	5
D	0	0	1	0	10	0	0	4	
E	1	1	3	1	0	0	0	0	7
F	0	0	3	0	10	0	0	0	6
G									
H	0	0	1	2	3	0	0	0	
I	3	0	2	0	6	0	0	7	
J	2	0	1	0	3	1	4	2	
Total	7	2	15	4	57	1	8	17	22

Surgical mortality has been reported at several institutions throughout Nigeria; these range from 5 to 10% in adults [9–12] and 2–62% in children [13–16]. Mortality of women undergoing Cesarean section at one hospital in Nigeria was reported at 2% [16].

There are still major gaps in the literature to accurately assess *The Lancet* Commission indicators in Nigeria, particularly in rural areas. Number and geographic distribution of SAO workforce, ability of patients to access Bellwether procedures within 2 h, and financial burden of surgical care for patients are all areas requiring more study.

Limitations

This survey was performed in October 2017; results are limited to information available and the situation of each hospital at that time. Hospital capacity to provide data for the survey was limited, given limited information management and research capacity, and often short staffing. Furthermore, staff have little or no time to commit to data and information activities. Performing this survey itself was somewhat burdensome on most hospitals, as it took time away from the daily functions of the hospital administrators, who were often primary clinical providers, as well as administrative staff, of which there were few. The burden of data collection and even participating in outside quality improvement efforts is quite large when staff are severely limited.

Results of the qualitative interview are also specific to individuals who participated. There may be variability based on the study team surveyor in recording these answers.

Tertiary hospitals (of which there are 3 in FCT), private, and faith-based hospitals were also not included. The three tertiary centers were not included as the focus was on first and second level hospitals (district hospitals) to estimate the surgical capacity of the region to provide basic general, orthopedic, and obstetric surgical care to the population, consistent with the goals of the NSOANP.

These findings are also specific to the FCT. The Nigerian states vary widely in terms of socioeconomic status; there is wide diversity within each state, as well. The Federal Capital Territory is significantly better resourced than most other regions of Nigeria and has higher socioeconomic parameters. A majority of the population are civil servants and staff of government and non-governmental organizations, as well as high-level political class. Although the outskirts of the FCT are populated by a lower socioeconomic class, overall, the socioeconomic outlook in the FCT is better than most regions. We expect to see weaker surgical systems and poorer surgical capacity in most of the other regions in Nigeria—except Lagos state, which is arguably the best-resourced region in Nigeria with the highest socioeconomic status [21]. Thus, similar studies should be undertaken in each state in Nigeria.

Conclusion

This is the first of a planned series of studies to survey surgical capacity throughout Nigeria, which is necessary to inform the creation of a Nigerian NSOANP. Although the fundamental components for providing emergency and essential surgical care are available in the FCT, all aspects of the health system need to be strengthened to meet the recommended targets.

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Compliance with ethical standards

Conflicts of interest All authors declare that they have no conflict of interest.

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