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Original Article

The Rating of Nigerian Neurosurgical Facilities Based on the Availability of Sub-Specialty Services in 2024

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Abstract

Background: Nigerian neurosurgery is striving to catch up with emerging sub-specialties, in accordance with international best practices. The study aims to profile the available sub-specialty services in Nigerian neurosurgery and rate the facilities based on their capacities.

Methodology: A cross-sectional study involving all centres with full-time neurosurgical services in Nigeria. Data collection was done electronically with questionnaires, WhatsApp, and short message services (SMS), from practising and resident neurosurgeons per centre. Clarifications on equivocal responses were sought by direct phone interviews. The rating of facilities was based on the availability of 7 major sub-specialty services – Spine instrumentation / C-Arm, operative microscopy, trans-sphenoidal/-nasal cranial procedures, neuroendoscopy, aneurysmal clipping, neuronavigation and aneurysmal coiling. Scores and ratings were done based on the number of available services.

Results: A total of 44 neurosurgery facilities were profiled, 38 (86.4%) being government-owned, and 6 (23.6%), privately-owned. Of the 38 government facilities, 30 are federal. The modal available service is spine instrumentation/C-Arm fluoroscopy (78%), then operative microscopy (58.5%) and trans-sphenoidal/-nasal cranial procedures (51.2%). The mean subspecialty services are as follows: spine instrumentation/C-arm 0.8, operative microscopy 0.6, transsphenoidal/nasal procedure 0.5, neuroendoscopy 0.4, aneurysm clipping 0.4, neuronavigation 0.1, aneurysm coiling 0.04. Amongst the top-10 facilities, 7 are government and 3 privately-owned, but amongst the top-3 facilities, 2 are privately-owned. All 10 lowest-ranked facilities are government-owned.

Conclusions: Spine surgery and operative microscopy are more readily available in Nigeria, while aneurysmal clipping and coiling and neuroendoscopy services are poor in Nigeria. Despite the government-owned institutions being in the lead, the privately-owned institutions have massive future prospects.

Keywords: Aneurysm, C-arm, Clipping, Coiling, Neuroendoscopy, Neuronavigation, Operative microscopy, spine instrumentation

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Quick Response Code:

Introduction

Neurosurgery services in Nigeria have been the subject of a few studies by Nigerian neurosurgeons practising within the country and in diaspora, over the past 4 decades. Unlike the recent past, when such studies were few and far between, it appears that Nigerian specialists are beginning to take increasing interest in this rare medical field.

Some 40 years ago, the Late Prof Adelola Adeloye, who had been Nigeria's 2nd neurosurgeon [qualified in 1967], had written extensively on African Neurosurgery, which included the history of Nigerian Neurosurgery since its inception in 1962 at the University College Hospital, UCH Ibadan, by the Late Prof E Latunde Odeku.[1] The next attempt to evaluate the practice in Nigeria came some 30years after the efforts of Adeloye in 2008 by Emejulu. [2]

Different accounts have indeed been given on the journey of Neurosurgery in Nigeria,[3] and, in 2024, Ukachukwu *et al* published a flurry of papers assessing the distribution of neurosurgical personnel, trainers and trainees in Nigeria.[4] Most of these publications appear to convey that Nigeria's population of 235million people is grossly underserved by neurosurgery, at various times of their study.

The World Health Organisation (WHO) recommends that there should be 1 neurosurgeon to 200,000 population, for all nations (ratio of 1:200,000), in order to meet their neurosurgical health needs.[5,6] This translates to a need for at least 1,175 neurosurgeons to serve the Nigerian population of 235million.[7] As of December 2024, the total number of Nigerian neurosurgeons in the Register is 166.[8] Unfortunately, barely 60% of those neurosurgeons are still available in the country.

With the harsh economic depression of the past decade, 2015–2024, more than 40% of Nigerian neurosurgeons have emigrated abroad in search of better remuneration, safety of life and property, good working conditions and world-class surgical facilities and equipment, most of which are not readily realisable within Nigeria.

It has been noted by the Nigerian Minister of Health that between 15,000 and 16,000 doctors have departed Nigeria in the past five years, leaving the country with just 55,000 doctors on the ground for its 235million citizens.[9] Statistics from Medical & Dental Council of Nigeria (MDCN) show that the migrants are mostly in the UK 68%, Canada 10%, USA 7%, UAE 5%, Australia 3%, KSA 1%, etc.[10] Remuneration, unsafe working environment and lack working tool have neen adduced as part of the reason for the brain drain in the health sector in Nigeria and Africa. [11,12,13]

In 2023, the World Bank estimated that 38.9% of Nigerians lived below the poverty line, which is the 2nd largest poor population in the world, after India.[14] With the unavailability of capital, neurosurgery services took a hit that stunted their growth. Routine services and facilities like high-end radiodiagnostics, endoscopic procedures, operative navigational instruments, operative fluoroscopy and microscopy became too expensive for healthcare facilities to procure. Medical tourism and capital flight, which was estimated between USD5B–10B annually, took a further toll on the economy, reducing the capacity of neurosurgery facilities to compete favourably with their counterparts even within the West African sub-region. The 2001 Abuja Accord between the WHO and African Heads of Government had set the minimum allocation of annual budgets to health at 15%; Nigeria's health budgets never exceed 6%. [15,16]

This study was, therefore, conceptualized and designed to evaluate the available sub-specialty services in Nigerian neurosurgery and to use them as the instruments for the stratification and rating of the capacity of these facilities to deliver high-end services, which should be comparable to what is obtained worldwide. The Nigerian upper class flock to seek healthcare on a routine basis outside the country because they probably do not have confidence in the services within the country.[17] If these services become available, capital flight will be ameliorated. Specifically, the increasing burden of spine surgeries has made the

subspecialty very important in neurosurgical practice in Nigeria.[18] The operating microscope, endoscopy and neuronavigation are now basic tools that have made brain and spine surgeries safer,[19,20,21] while the increasing need for aneurysmal surgeries (coiling and clipping) has made their availability important.[22,23,24] Transphenoidal access is now the preferred route for pituitary surgeries and other skull base lesions.[25,26]

Aims / Objectives

To assess and rank Nigerian neurosurgical facilities based on the availability and scope of the mentioned sub-specialty neurosurgical services.

Setting/scope/type of study: This is a multicentre cross-sectional study involving full-time Neurosurgery units across Nigeria. (The Nigerian Academy of Neurological Sciences register of neurosurgery units in Nigeria was consulted)

Materials and Methods

Direct interviews – physical, virtual and telephone – with neurosurgeons in most of the institutions where neurosurgery services are available in Nigeria. Questionnaire-based data collection (see table 1) from neurosurgeons practising and resident in Nigeria who could not be reached physically or by mobile phone for a direct interview. WhatsApp and short message services (SMS) to seek clarifications and confirmation on equivocal responses received by direct or telephone interviews.

Inclusion criteria: Neurosurgical centres with at least one full-time neurosurgeon

Exclusion criteria: Centres whose neurosurgeon could not be reached via direct call, WhatsApp or short message services

Data were collected on the availability of spine instrumentation / C-Arm fluoroscopy, operative microscopy, trans-sphenoidal/-nasal cranial procedures, neuroendoscopy, clipping of aneurysms, neuronavigation and coiling of aneurysms in every facility. Almost all the facilities had access to ultrasonography, x-rays, computed tomography scan and relatively fewer, to magnetic resonance imaging, whether on an institutional basis, public-private partnership, or under private ownership. And, so, their availability was no longer considered discriminative enough for the disaggregation and stratification of the various neurosurgery facilities.

The facilities and manpower for intra-operative neuromonitoring and/or invasive intracranial pressure monitoring were rarely available, and so, these services were not considered representative enough as part of the assessment.

For the rating of the facilities (see Appendix 1), each subspecialty or service was scored one (1). The more the number of specified equipment and services available, the higher the score and subsequent rating of the facility. Where two or more institutions have an equal number of equipment and services, the following criteria were deployed to further discriminate between them appropriately:

1. Number of full-time and part-time neurosurgeons running the facility. (Each full-time neurosurgeon was scored 1, while a part-time neurosurgeon was scored 0.5)
2. Age of the facility – Each year of service is rated 1

In the case of institutions having the same number of equipment/subspecialty services, the aggregation of the above score was used to further rate the centres. Centres with higher scores were rated higher than those with less score.

The results were analysed with descriptive statistics, while the data were presented as a table and a pie chart. Inferential statistics were also used. The ethical clearance was obtained from Nnamdi Azikiwe University Teaching Hospital with reference number NAUTH/CMAC/01/VOL.2/239

Results

Data were collected from 44 neurosurgery facilities – 38 (86.4%) government-owned (Federal and State), and 6 (13.6%) privately-owned (see Figure 1), distributed around Nigeria's 6 geopolitical zones – North-Central, North-East, North-West, South-East, South-South and South-West. (see Figure 2)

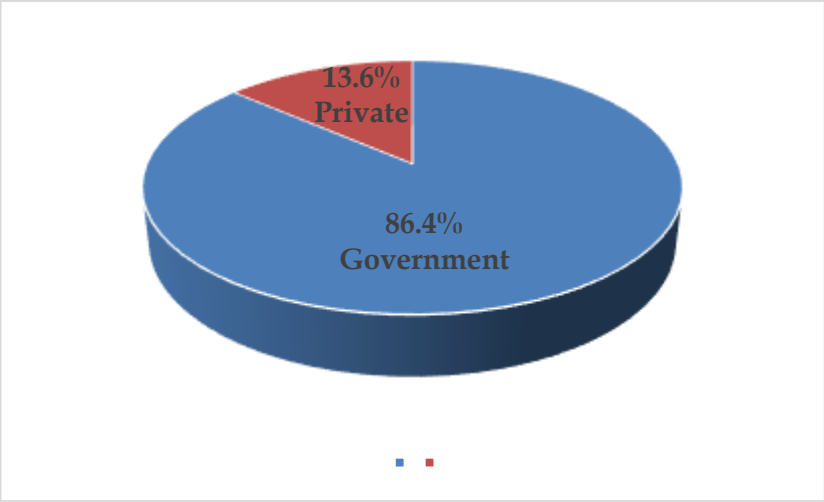

Figure 1. Pie Chart of the ownership of neurosurgery facilities in Nigeria

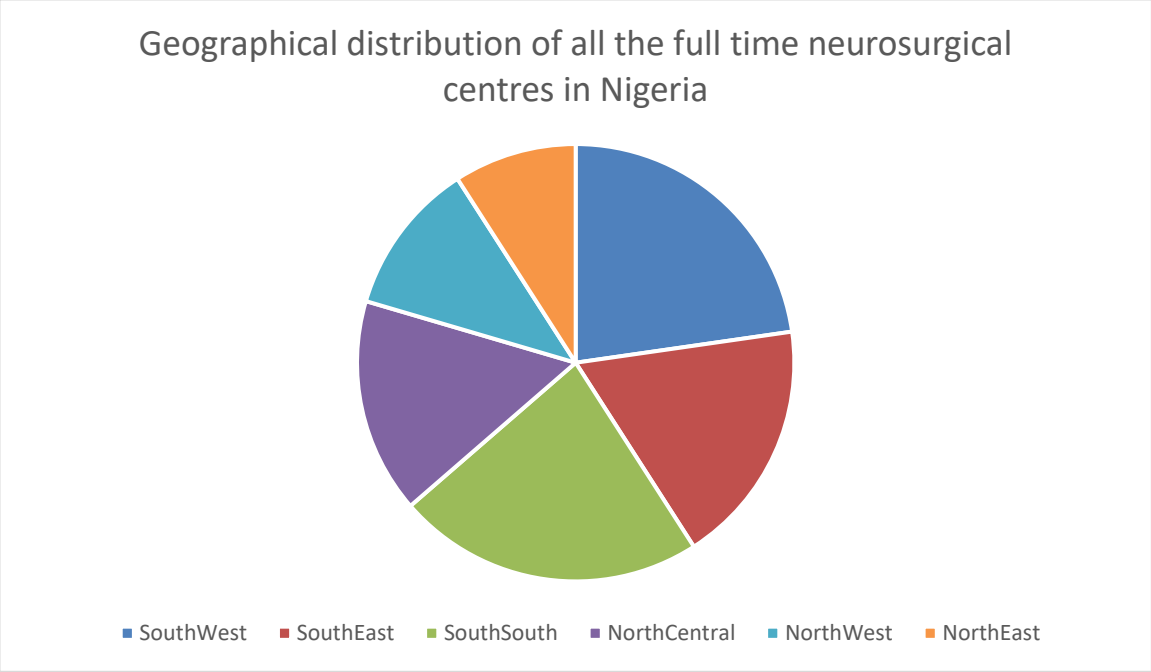

Figure 2. Pie Chart of the geographical distribution of all the full-time neurosurgery facilities in Nigeria. The least number of units is in the North-East.

We found spinal instrumentation with C-Arm in 35 (79.5%) facilities, operative microscopy in 26 (59.1%), trans-sphenoidal /-nasal cranial procedures 22 (50%), neuroendoscopy 18 (40.9%) and others, as shown in Table 1.

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Table 1: Availability of sub-specialty services in 44 neurosurgical facilities

Services	**Frequency**	**%**
Spinal Instrumentation and C-Arm	35	79.5
Operative Microscopy	26	59.1
Trans-Sphenoidal / -Nasal Cranial Procedures	22	50
Neuroendoscopic Procedures / ETV	18	40.9
Aneurysmal Clipping	16	36.4
Neuronavigation	5	11.4
Aneurysmal Coiling	2	4.6

The most common sub-specialty service was spine instrumentation, while the least was aneurysm coiling.

The mean subspecialty services are as follows: spine instrumentation/C-arm 0.8, operative microscopy 0.6, transsphenoidal/nasal procedure 0.5, neuroendoscopy 0.4, aneurysm clipping 0.4, neuronavigation 0.1, aneurysm coiling 0.04. Private ownership recorded a higher mean rank compared to government-owned facilities. (see table 2)

Table 2: Comparison of the distribution of scores between government-owned and privately owned facilities.

Ownership	**Mean Rank**	**Sum of Ranks**	**U-value**	**p-value**
Government	38.00	228	21	0.001
Private	20.05	762		

The result showed a statistically significant difference in scores between the two ownership groups.

Table 3: Comparison of subspecialty/services among neurosurgery units in different zones of Nigeria.

Region	Mean Rank	K-value	p-value
SouthWest	31.13	12.167	0.033
NorthWest	28.25		
NorthCentral	24.71		

SouthEast	23.11		
SouthSouth	13.80		
NorthEast	13.13		
Scores varied significantly across regions.			

A Kruskal–Wallis test was conducted to examine differences in scores across the six regions. The result showed a statistically significant difference among regions ($\chi^2 = 12.167$, df = 5, p = 0.033). Scores varied significantly across regions, with the Southwest demonstrating better performance compared to other regions.

The University College Hospital (UCH) Ibadan was rated as the best facility in terms of the provision of sub-specialty services, being able to provide spinal instrumentation / C-Arm, operative microscopy, trans-sphenoidal/-nasal cranial procedures, neuroendoscopy, aneurysmal clipping and neuronavigation. Ibadan fell short due to a lack of aneurysmal coiling services, giving it a score of 6 out of 7 sub-specialty services. Closely following Ibadan is Memfys Hospital Enugu (2nd position) and Wellington Hospital Abuja (3rd). One of these top-3 facilities is government-owned, whereas the other two are private facilities.

The rest of the top-20 rated facilities (4th – 20th, respectively) are RNZ Lagos, Lagos University Teaching Hospital (LUTH) Idi-Araba, Jos University Teaching Hospital (JUTH) Jos, Ahmadu Bello University Teaching Hospital (ABUTH) Zaria, Usmanu Dan Fodiyo University Teaching Hospital (UDUTH) Sokoto, National Hospital Abuja (NHA), Aminu Kano Teaching Hospital (AKTH) Kano, University of Nigeria Teaching Hospital (UNTH) Enugu, Lagoon Hospital Lagos, Duke's Hospital Lagos, Obafemi Awolowo Teaching Hospital (OAUTH) Ile-Ife, Nnamdi Azikiwe University Teaching Hospital (NAUTH) Nnewi, University of Benin Teaching Hospital (UBTH) Benin City, Brain and Spine Surgery (BASS) Abuja, Lagos State University Teaching Hospital (LASUTH) Ikeja, University of Maiduguri Teaching Hospital (UMTH) Maiduguri and Federal Medical Centre (FMC) Asaba. The remaining last-24 rated facilities are also shown in Appendix 2.

Discussion

The World Federation of Neurosurgical Societies (WFNS) Guidelines on Minimum Facilities for neurosurgical services are outlined as follows:[27]

1. Radiology – Angiography, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Myelography.
2. Access to a Critical Care Unit - Intensive Care Unit (ICU)
3. Operating Room – Operating Table, Diathermy, Basic Instruments, Microscope, Microsurgery Instruments, Head Holder
4. Support Staff – Nurses, Anaesthetists, Rehabilitation Therapists
5. Library – Standard and E-Library
6. Neurophysiologic Diagnostic Equipment – Diagnostic, Therapeutic and Neuromonitoring

The 44 neurosurgery facilities that were profiled in this study, for the most part, have access to these WFNS requirements, and so, our focus was not on those. The basic neurosurgery procedures, like the repair of congenital central nervous system anomalies and cranial and spinal surgeries for trauma, infections, neoplasms, dysmorphisms and degenerative lesions, were noted to be satisfactorily undertaken by all neurosurgery facilities in Nigeria. And so, in this study, we aimed at assessing only the scantily available high-end services.

It has been widely recognized that access to neurosurgical care is limited worldwide, especially in low-and-medium income countries (LMICs).[28,29] Neurosurgery is an essential component of global health systems, and similar to all surgical conditions, access to neurosurgical care remains a challenge in many regions.[30] On account of these challenges, the WHO and Lancet Commission on Global Surgery have advocated for improvements in surgical care delivery worldwide by collaborations between HIC and LMICs.[31,32]

We considered the availability of 7 neurosurgery services as essential for sub-specialty procedures, and as rating tools for the facilities. The first amongst them was operative microscopy, which should be the basic requirement for cutting-edge services. The other higher essential services that we considered were: Spine instrumentation with C-Arm fluoroscopy, trans-sphenoidal/-nasal minimal access procedures, neuroendoscopy including endoscopic third ventriculostomy (ETV), clipping and coiling of aneurysms, and neuronavigation.

It is evident that cutting-edge and sub-specialty practices are currently available in Nigeria, though at sub-optimal levels. The most popular and widely available sub-specialty service in Nigeria is spine instrumentation with C-Arm fluoroscopy (78%). It is followed by operative microscopy (58.5%) and trans-sphenoidal/-nasal cranial procedures (51.2%). The least available service is aneurysmal coiling, which is available in just 4.9% of the facilities. Kanmounye et al found spine surgery and skull base surgery to be among the most common subspecialty in Africa.[33] The rate of availability of vascular surgeries, however, contrasts with the general African picture.[33]

This study showed that most private neurosurgery facilities are much better equipped than their government-owned contemporaries in Nigeria, but the private facilities are much fewer in number (see Table 2). It appears that the private neurosurgical facilities hold a relative, comparative advantage, going by their age and smaller numbers. For instance, all 6 of the private facilities made it to the top-20, whereas the least-20 were all government-owned. The unnecessarily rigid bureaucratic structure, as seen in most public institutions, may make innovation difficult in government-owned institutions.[34] The main challenge at the moment is the fact that private ownership of neurosurgery facilities is still in its infantile stage in Nigeria, due to the enormous capital demand.

Ordinarily, it would be expected that in the Nigerian neurosurgery space, the private facilities should excel in sub-specialty services, but this study found that government facilities, especially the first- and second-generation tertiary facilities, actually dominated. But, this trend could just be temporary, for obvious historical reasons, since most of the facilities that were evaluated are government-owned, at a ratio of 6.3:1.

The highest-ranked facility in Nigeria is the University College Hospital (UCH) Ibadan, where neurosurgery services were established in 1962 by the Late Prof E Latunde Odeku. Ibadan provides 6 out of the 7 sub-specialty services that were profiled.[1] The highest ranked private facility is Memfys Hospital Enugu, which was established in 2002, by Prof Samuel C Ohaegbulam, some 40years after UCH Ibadan. Memfys provides just as many services as Ibadan does.[35]

Another demonstration of the rising potentials of private facilities is the fact that for aneurysmal clipping, all the 6 (100%) private facilities offer the services, whereas only 10 (26.3%) out of the 38 government facilities offer it.

Again, for neuroendoscopy, even in its basic forms, 5 (83.3%) of the 6 private facilities, compared to 11 (28.9%) of 38 in the government sector, offer this. Interestingly, the only two facilities that offer the rare procedure of aneurysmal coiling in Nigeria are both private, not government-owned.

Aside from the availability of the skills, or otherwise, the clientele is always tilted in favour of the older and bigger government facilities on account of their cheaper charges and wider patronage, compared to private facilities. This is understandable, health insurance coverage is still poor despite recent attempts by the relevant authorities to enhance it, and most people still depend on out-of-pocket spending. [36,37]

Noteworthy still is the fact that all the lowest-ranked 20 facilities are government facilities reflecting the annual budgetary allocation to health in Nigeria, which has never exceeded 6% in the past 5years - 5.03% (2024), 4.70% (2023), 4.56% (2022), 4.77% (2021), and 5.43% (2020).[16,29,30] This may indeed account for the poor performance of most of the government-owned institutions.

The recommendation is 15% for every African country, as enacted at the AU Heads of Government Abuja Declaration of April 2001.[15]

The inherent limitation of this study includes the following: This is self-reported data and may not be easily verified independently by the researcher, thus there is a potential risk of bias from the respondent.

However, the authors strongly recommend the following: Firstly, Funds should be made available, if necessary, in phases, to systematically equip Nigeria's neurosurgery facilities. A medical or health bank should be established in Nigeria to support the funding of neurosurgery services. Secondly, Public-Private Partnerships should be encouraged to facilitate the procurement and maintenance of the capital-intensive equipment required for sub-specialty services. Furthermore, Nigeria's annual healthcare budget should be up-scaled to a minimum of 15%, stipulation of the annual budget by the 2001 African Union Abuja Declaration. Inter-regional and intra-regional collaborations among neurosurgery centres across Nigeria will also ensure equitable distribution of these high-end services, as well as enhance capacity building.

Conclusion

Sub-specialty neurosurgery services are becoming increasingly available in Nigeria, though they are still grossly inadequate. While the government-owned facilities are in the lead, the privately-owned institutions are showing good promise for the future and should be targeted for financial and logistical support. For the future, the current reality calls for a deliberate strategy to systematically equip Nigeria's neurosurgery facilities to meet international best practices in sub-specialty services.

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Appendix 1: Questionaire form

Title: The Rating of Nigerian Neurosurgical Facilities Based on the Availability of Sub-Specialty Services in 2024

Name of centre: …….

a. Ownership of hospital

Private ☐ Federal ☐ State ☐

b. Number of full-time neurosurgeon ☐

c. Number of part-time neurosurgeon ☐

d. Geopolitical zone

North-Central ☐ North-East ☐ North-West ☐

South-East ☐ South-West ☐ South-South ☐

e. Tick which subspecialty(ies) is (are) available in your centre

Items	remark
Spine instrumentation /Carm	
Operative microscope	
Trans-sphenoidal /-nasal procedure	
Neuroendoscopy/ETV	
Aneurysmal clipping	
Neuronavigation	
Aneurysmal coiling	

Appendix 2. Rating of neurosurgery facilities by the availability of sub-specialty services

Rating / Position	Facility
1st	University College Hospital (UCH) Ibadan *(6 of 7 Sub-specialty Services)*
2nd	Memfys Hospital Enugu *(6 of 7)* x
3rd	Wellington Hospital Abuja *(6 of 7)* x
4th	RNZ Hospital Lagos *(6 of 7)* x
5th	Lagos University Teaching Hospital (LUTH) Idi-Araba *(5 of 7)*
6th	Jos University Teaching Hospital (JUTH) Jos *(5 of 7)*
7th	Ahmadu Bello University Teaching Hospital (ABUTH) Zaria *(5 of 7)*
8th	Usmanu Dan Fodiyo University Teaching Hospital (UDUTH) Sokoto *(5 of 7)*
9th	National Hospital Abuja (NHA) *(5 of 7)*
10th	Aminu Kano Teaching Hospital (AKTH) Kano *(5 of 7)*
11th	University of Nigeria Teaching Hospital (UNTH) Enugu *(5 of 7)*
12th	Lagoon Hospital Lagos *(5 of 7)* x
Teaching 13th 13th	Duke's Hospital Lagos *(5 of 7)* x
14th	Obafemi Awolowo Teaching Hospital (OAUTH) Ile-Ife *(4 of 7)*
15th	Nnamdi Azikiwe University Teaching Hospital (NAUTH) Nnewi *(4 of 7)*
16th	University of Benin Teaching Hospital (UBTH) Benin City *(4 of 7)*
17th	Brain and Spine Surgery (BASS) Abuja *(4 of 7)* x
18th	Lagos State University Teaching Hospital (LASUTH) Ikeja *(4 of 7)*
19th	University of Maiduguri Teaching Hospital (UMTH) Maiduguri *(4 of 7)*
20th	Federal Medical Centre (FMC) Asaba *(3 of 7)*
21st	University of Abuja Teaching Hospital (UATH) Abuja *(3 of 7)*
22nd	Imo State Specialist Hospital Owerri *(3 of 7)*
23rd	University of Ilorin Teaching Hospital (UITH) *(3 of 7)*
24th	Ibom Hospital Uyo *(3 of 7)*
25th	University of Port Harcourt Teaching Hospital *(2 of 7)*
26th	University of Osun Teaching Hospital Oshogbo *(2 of 7)*
27th	Delta State University (DELSUTH) Oghara *(2 of 7)*
28th	Federal Medical Centre (FMC) Umuahia (2 of 7)
29th	Federal Teaching Hospital (FTH) Ido Ekiti *(2 of 7)*
30th	Federal Medical Centre (FMC) Abuja *(2 of 7)*
31st	BDTH Kasu Kaduna State *(2 of 7)*
32nd	Alex Ekwueme Federal Univ Teaching Hospital (AEFUTH) Abakaliki *(1 of 7)*
33rd	University of Calabar Teaching Hospital (UCTH) Calabar *(1 of 7)*
34th	Rivers State University Teaching Hospital (RSUTH) Port Harcourt *(1 of 7)*
35th	Enugu State University Hospital Enugu *(1 of 7)*
36th	Federal Teaching Hospital (FTH) Gombe *(1 of 7)*
37th	Abubakar Tafawa Balewa Teaching Hospital (ATBTH) Bauchi *(1 of 7)*
38th	Federal Teaching Hospital (FTH) Owerri *(1 of 7)*
39th	Irrua Specialist Hospital (ISH) Irrua *(1 of 7)*
40th	Federal Teaching Hospital (FTH) Katsina *(1 of 7)*
41st	Moddibo Adama Univ Teaching Hospital (MAUTH) Yola *(1 of 7)*
42nd	Federal Medical Centre (FMC) Yenagoa *(1 of 7)*
43rd	Federal Teaching Hospital (FTH) Lokoja *(No Sub-specialty Services)*
44th	University of Uyo Teaching Hospital UUTH *(No Sub-specialty Services)*

***x*: privately owned facilities**